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RAPID RESPONSE ABSTRACTS
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**POD15-1**

**THE IMPACT OF RACIAL DISPARITIES AND E-CIGARETTE USE ON PROSPECTIVE ASSOCIATIONS BETWEEN MENTHOL CIGARETTE FLAVORING AND SMOKING CESSATION**

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**SIGNIFICANCE:** There is conflicting evidence regarding the extent to which the association between menthol cigarette use and smoking cessation differs between key groups. In this study, we examined whether the association between menthol cigarette use and smoking cessation differed by race/ethnicity using a longitudinal sample of US adults. In addition, we tested whether current e-cigarette use had a differential impact on smoking cessation for menthol and non-menthol smokers.

**METHODS:** Data were derived from W1-W4 of the Population Assessment of Tobacco and Health, a nationally representative longitudinal cohort study. The analytic sample was restricted to adult respondents (ages 25+) who were current established cigarette smokers at baseline and responded at follow-up waves. Multivariable discrete-time survival models were fit to an unbalanced person-period data set (person n=7423, risk period n=18,897). Effect modification by race/ethnicity and by time-varying e-cigarette use was assessed.

**RESULTS:** Menthol cigarette smokers had lower odds of smoking cessation relative to non-menthol smokers, but the association was modified by race/ethnicity and current e-cigarette use. NH Black and NH Other menthol smokers were less likely to quit smoking than NH White or Hispanic menthol smokers. E-cigarette use was also associated with greater smoking cessation, and the association was stronger for menthol smokers than for non-menthol smokers. **CONCLUSIONS:** Our results provide evidence from a nationally representative longitudinal dataset that there are racial disparities in smoking cessation. This suggests that a menthol smoking ban may have a favorable impact on smoking cessation for NH Black and NH Other racial/ethnic groups. The analysis demonstrates, for the first time, that menthol smokers who use e-cigarettes were more likely to quit smoking than non-menthol smokers. This finding suggests that a menthol smoking ban may be more effective if menthol smokers have access to e-cigarettes as a way to quit cigarette use. Lack of consistent data across waves precluded assessment of the impact of menthol flavor availability in e-cigarettes on smoking cessation.

**FUNDING:** Federal

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**POD15-2**

**LOCAL-LEVEL MENTHOL POLICIES -- IMPACT ON CIGARETTE SALES IN MINNEAPOLIS AND ST. PAUL**

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**BACKGROUND:** In 2016, Minneapolis (Mpls) and St. Paul (StP) implemented sales restrictions on flavored tobacco products which excluded mint- and menthol-flavored products. In 2019, both localities expanded their flavored tobacco product sales restrictions to include menth- and menthol-flavored tobacco products, thus including cigarettes. In this analysis, we assessed associations between cigarette sales and implementation of the respective local policies. **METHODS:** Weekly retail tobacco product sales at convenience stores and other outlets were obtained from The Nielsen Company’s scanner data for January 2015–December 2019. We used Nielsen-provided flavor descriptors to categorize items as flavored, menthol or non-menthol. Sales data from Mpls, StP, and Indiana, a comparison area with no policy, were analyzed separately using single-group interrupted time series models. **RESULTS:** Cigarettes account for most tobacco product sales; in Mpls and StP, cigarette sales made up 80-96% of total tobacco sales prior to the policies. Total weekly cigarette pack sales decreased by 6% in Mpls and increased by 2% in StP from the week before to the week of flavor policy implementation, while cigarette sales decreased by 29% and 26%, respectively, following menthol policy implementation. Total cigarette sales in Indiana decreased by no more than 6% after policy implementation dates. The market share of menthol cigarettes of total cigarette pack sales decreased by 15 percentage points in Mpls and by 12 percentage points in StP after menthol policy implementation. Significant pre-post decreases were also observed in sales of flavored cigars in Mpls and menthol/mint smokeless tobacco in both cities following the policies. **CONCLUSION:** Unlike flavored tobacco sales restrictions that exclude mint and menthol products, flavored tobacco sales restrictions that include mint and menthol products restrict cigarette sales; as a result, the more inclusive policy may have a greater impact on decreasing total tobacco product sales. Consideration of policy effects on total tobacco product sales can inform regulatory actions that optimize population health impact.

**FUNDING:** Federal, Other

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**POD15-3**

**THE DIFFERENTIAL IMPACT OF THE POS BAN ON QUIT ATTEMPTS AND SMOKING CESATION BY SEX, INCOME, AND EDUCATION**

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**Significance:** Point-of-sale display bans reduce exposure to tobacco advertising, which may facilitate smoking cessation by reducing cues to smoke. Little is known about the POS ban effects across population sub-groups, including lower socioeconomic individuals who experience lower quit rates. This study examines the differential effects of Canadian POS display bans across provinces on quit attempts and smoking cessation, by sex, education, and income. **Methods** We analyzed survey data; four waves (2006-2011) of the International Tobacco Control (ITC) Canada Survey, a population-based, longitudinal survey of adult smokers, focusing on smokers in provinces that implemented display bans between 2004 and 2010. Primary outcomes were: quit attempt - at the follow-up survey (time t+1), reporting at least one quit attempt since the prior survey; and sustained cessation - at follow-up (time t+1), had been quit for at least one month. We used generalized estimating equation (GEE) logistic regression models to estimate associations within and across provinces and living in a province: 1. without a ban; 2. with a POS ban in place for 0 to 24 months before the survey data; 3. with a POS ban for more than 24 months. We tested modification of these associations by sex, education, and income on the multiplicative scale by including interaction terms in separate models, correcting for multiple testing. **Results:** Across survey waves, the percentage of smokers living in provinces with POS bans in place for more than 24 months increased from 7.6% to 95.8%. Those living in a province with a POS ban for at least 24 months had a higher odds of sustained cessation (OR: 1.73, 95% CI: 1.11-2.69) compared to those in a province without a ban. Compared to those in a province with no ban, females living in a province with a POS ban been in place for 0-24 months had higher odds of attempting to quit than men. No other interactions were statistically significant. **Conclusion:** Study results suggest that POS bans improve smoking cessation overall and promote quit attempts among women. Further studies should assess the reasons why POS bans may be more likely to motivate women to try to quit compared to men.

**FUNDING:** Federal

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**POD15-4**

**“IT IS THE ONE THING THAT HAS WORKED”: QUALITATIVE ANALYSIS OF SUBJECTIVE EXPERIENCE WITH NICOTINE SALT POD SYSTEM E-CIGARETTES AMONG AFRICAN AMERICAN AND LATINX SMOKERS IN A RANDOMIZED CLINICAL TRIAL**

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**Significance:** Little is known about perceived benefits and challenges of switching to electronic cigarettes (ECs) among African American (AA) and Latinx (Lx) smokers. We investigate the subjective experience of using nicotine salt pod system (NPS) ECs in a randomized clinical trial. **Method:** The 114 adult smokers (M age=44.6, 59.6% male, 52.6% AA, 47.4% Lx) who received JUUL ECs for 6 weeks answered interview questions at the end of the study. We inquired what they liked and disliked about using ECs, what helped with switching and made switching difficult, future intentions for continued use of ECs, and how ECs compared to past smoking reduction methods. Responses were coded into emergent themes by independent raters. Theme frequencies were analyzed separately by race/ethnicity and EC use trajectory (exclusive EC, dual EC-cigarette, exclusive cigarette). **Results:** Clean/smell was the aspect of using ECs most commonly liked (23%), followed by convenience (19%). Coughing/harshness was a more common barrier to switching for AA (44%) than Lx (9%), and for continuing smokers (96%) than...
exclusive switchers (15%) or dual users (21%). Most (78% AA; 90% Lx) reported that the benefits of using ECs outweighed barriers, and this varied by ECs use trajectory: 94% exclusive switchers, 86% dual users, and 42% continued cigarette smokers. The majority said they would continue ECs to replace cigarettes (83% AA; 94% Lx) and that ECs worked better than other methods to quit cigarettes (72%). Conclusion: AA and Lx smokers' experience using NSPS ECs was generally positive. Understanding facilitators and impediments to switching to ECs among racial/ethnic minority smokers can inform harm reduction interventions.

FUNDING: Federal

POD15-5

GLOBAL REGIONAL ECONOMIC AND TOBACCO REGULATORY FACTORS INFLUENCE SMOKING CESSATION OUTCOMES IN THE MULTINATIONAL EAGLES TRIAL

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Significance: Prior work from our group and others found global regional differences in smoking cessation outcomes with smokers of U.S. origin having lower quit rates than smokers from other countries. The aim of this post-hoc secondary analysis was to examine regional differences in individual-level demographic, smoking, and psychiatric characteristics, as well as country-level epidemiologic, economic, and tobacco regulatory factors that may affect such outcomes. Methods: The EAGLES trial evaluated the safety and efficacy of varenicline and bupropion in relation to placebo and the nicotine patch in 8144 smokers with and without psychiatric diagnoses enrolled from 16 countries across six regions. Generalized linear models and stepwise logistic regression models that considered pharmacotherapy treatment, psychiatric diagnoses, and both traditional individual-level predictors (e.g., demographic and smoking characteristics) and country-specific smoking prevalence rates, Gross Domestic Product (GDP) per capita, cigarette affordability, and W.H.O. derived MPOWER scores were used to predict 7-day point prevalence abstinence at end-of-treatment. Results: Quit rates varied across regions (22.0% in Australasia to 55.9% in Mexico). With North America (U.S. & Canada) as the referent, odds of achieving short term abstinence were significantly higher in Western Europe (odds ratio=1.4; 95% confidence interval (CI)=1.14, 1.81), but significantly lower in the Eastern European (0.39; 95% CI=0.22, 0.69) and South American (0.17; 95% CI=0.08, 0.35) regions. In addition to the traditional predictors (e.g., severity of nicotine dependence) in our model, three of four country level variables predicted short term abstinence: GDP (0.54; 95% CI=0.47, 0.63), cigarette affordability (0.62; 95% CI=0.53, 0.72), and MPOWER score (1.03; 95% CI=1.01, 1.06), but not smoking prevalence. Conclusions: To the extent EAGLES data mirror heterogeneity among smokers across parts of the globe, increased tobacco regulation, less affordable cigarette pricing, and treatment with approved medications and counseling appear to boost short-term quit rates in smokers with and without psychiatric disorders.

FUNDING: Pharmaceutical Industry

POD15-6

CHANGES IN INCOME PREDICT SUBSEQUENT INITIATION AND CESSATION OF CIGARETTE USE BUT NOT E-CIGARETTE USE IN THE UNITED STATES

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INTRODUCTION: Cigarette smoking is closely linked to income in the US. The purpose of this study is to examine the relationship in the US between income and cigarette/e-cigarette transitions. METHODS: With data from Waves 1-3 (W1-W3) of the US Population Assessment of Tobacco and Health Study, we fit modified Poisson models to assess the longitudinal relationship between income and cigarette/e-cigarette initiation and cessation. Primary predictors were income (W2; categorical) and change in income (unchanged, increased 1+ income strata, decreased 1+ strata) between W1 and W2. Our four outcomes were initiation of 1) cigarette and 2) e-cigarette use at W3 among those reporting never using each respective product and cessation of 3) cigarette and 4) e-cigarette use at W3 among those reporting current use of each at W2. All models controlled for age, gender, and use of the other cigarette product (W2). RESULTS: Those making lower incomes at W2 had an increased likelihood of initiating smoking at W3, compared to those making $100k+/year: <$10k (Relative Risk [RR]:15.4, 95% Confidence Interval [CI]:6.4–36.9), $10-25k (RR:7.3, 95% CI: 3.0–17.7), $25-50k (RR: 4.3, 95% CI:1.7–10.7), and $50-100k (RR:3.2, 95% CI:1.3–7.7). Similarly, people reporting smoking at W2 making lower incomes were less likely to report cessation at W3 compared to those making $100k+/year: <$10k (RR:0.4 95% CI:0.3–0.5), $10-25k (RR:0.5, 95% CI:0.4–0.6), and $25-50k (RR:0.7, 95% CI:0.5–0.9). Those whose income increased from W1 to W2 had an increased likelihood of both initiating smoking at (RR:1.7, 95% CI:1.1–2.6) and a decreased likelihood of cessation (RR:0.8 95% CI:0.7–0.9) at W3 compared to those with no income change. We did not observe any significant associations for the e-cigarette outcomes. DISCUSSION: We found a dose-response relationship between lower income level and higher likelihood of initiating cigarette use and lower likelihood of cessation. Further, that the protective associations of higher income are attenuated for individuals whose income level has recently increased. Finally, we were unable to identify significant associations between income level and e-cigarette transitions. Funding Statement DW is supported by a Canadian Institutes of Health Research New Investigator Award, an Early Researcher Award from the Ontario Ministry of Research, Innovation and Science, and the St. Michael's Hospital Foundation.
POD16-1
URGE TO SMOKE MEDIATES THE EFFECTS OF MINDFULNESS-BASED SMOKING CESSATION INTERVENTION ON DAILY SMOKING RISK FOR SOCI ECONOMICALLY DISADVANTAGED SMOKERS WITH MOOD DISORDERS

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Mindfulness-based smoking cessation interventions have been hypothesized to facilitate smoking cessation by reducing the urge to smoke. Yet there is a lack of real-time assessment of mechanisms underlying effects of mindfulness-based interventions for high-risk populations. Using ecological momentary assessment (EMA), this study investigated whether the urge to smoke is one of the pathways linking a mindfulness-based intervention to daily smoking risk in the context of quitting. Methods: Socioeconomically disadvantaged smokers with mood disorders were randomized to a smartphone-assisted mindfulness-based smoking cessation intervention with contingency management (SMI-CM, n = 25) or enhanced standard treatment (EST, n = 24). Participants were prompted via smartphone to complete 5 EMA reports per day, indicating levels of their momentary urge to smoke and smoking behaviors since the last report for 28 days (end of intervention) after target quit date (TQD). A total of 3069 post-TQD EMA reports completed by 46 participants were used. We examined whether momentary smoking urge mediated the effects of intervention on smoking in the next 6 hours (reported at the subsequent report), controlling for smoking status since the last report and number of days since TQD. Results: Multilevel models showed that those in SMI-CM were less likely to report smoking since the last report compared to those in EST over 28 days post-TQD (AOR = 0.13, 95% CI = 0.02 – 0.68, p = 0.12). Those in SMI-CM (vs. EST) reported significantly lower urge to smoke overall (b = -0.82, 95% CI = -1.37 – -0.26, p = 0.01), and greater smoking urge predicted smoking risk within the next 6 hours, controlling for intervention (AOR = 1.58, 95% CI = 1.15 – 2.17, p = 0.004). The impact of intervention on smoking risk was reduced and no longer significant when smoking urge was entered into the model (AOR = 0.50, 95% CI = 0.11 – 2.32, p = 0.38), indicating that greater odds of smoking among SMI-CM (vs. EST) can be explained by reduced smoking urge observed in SMI-CM. Conclusions: For smokers with mood disorders trying to quit, SMI-CM may seem to reduce acute smoking risk through its impact on smoking urge.

FUNDING: Federal; Academic Institution

POD16-2
PREDICTORS OF NON-COMPLIANCE WITH VERY LOW NICOTINE CONTENT CIGARETTES IN SMOKERS WITH SERIOUS MENTAL ILLNESS

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Significance: Cigarette dependence contributes to health disparities among individuals with serious mental illness (SMI), and it is crucial to evaluate potential nicotine and tobacco regulatory policies in this population. Reducing the nicotine content of cigarettes is a promising intervention to address cigarette addiction, but study participants' non-compliance with very low nicotine content (VLNC) cigarettes may limit intervention efficacy. Prior research has focused on behavioral predictors of non-compliance in the general population. Extending this research, we examined behavioral and psychiatric predictors of non-compliance among individuals with SMI who smoke. Methods: Smokers with SMI (N=58) were randomized to receive VLNC or normal nicotine content (NNC) cigarettes over six weeks. We investigated predictors of both biologically-confirmed and self-reported non-compliance in participants (n=30) assigned to the VLNC condition. Baseline (BL) and week 1 predictors included: Cigarette Evaluation Scale, Questionnaire for Smoking Urges, Minnesota Nicotine Withdrawal Scale, Fagerström Test for Cigarette Dependence, Brief Wisconsin Inventory of Smoking Dependence Motives, Calgary Depression Scale for Schizophrenia, Positive and Negative Syndrome Scale, and Brief Psychiatric Rating Scale. We fit a series of linear and generalized linear models regressing non-compliance metrics (biologically confirmed = ratio of week 6 to BL TNE/CPD ratios; self-reported = number of non-study cigarettes at week 6) onto covariates (gender; menthol) and focal predictors. Results: Lower sensory enjoyment of VLNC cigarettes predicted greater biologically-confirmed non-compliance (p < .05). More severe psychiatric symptoms and general psychopathology predicted greater self-reported lower non-compliance (ps < .05). Participants with greater dependence motives (affective enhancement, cognitive enhancement, and social/environmental goads) self-reported lower non-compliance (ps < .05). Conclusions: Our results offer preliminary insight into potential barriers to compliance that should be prioritized to increase the acceptability of VLNC cigarettes in SMI populations. Future studies should replicate these analyses with a larger sample of individuals with SMI who smoke.

FUNDING: Nonprofit grant funding entity

POD16-3
SMOKING, DISTRESS AND COVID-19 IN ENGLAND CROSS-SECTIONAL POPULATION SURVEYS FROM 2016 TO 2020

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Background: Changes in the prevalence of mental health problems among smokers due to the COVID-19 pandemic in England have important implications for existing health inequalities. This study examined the prevalence of psychological distress among smokers following the onset of the pandemic compared with previous years. Methods: Cross-sectional data were used from a representative survey of smokers (18+) in England (n = 2,927) during four months (April to July) in 2016, 2017 and 2020. Adjusted logistic regressions estimated the associations between past-month psychological distress across two time periods (2016/17 and 2020), and age. Weighted proportions, chi-squared statistics and stratified logistic regression models were used to compare the distributions of minimal, moderate and severe distress, respectively, within socio-demographic and smoking characteristic categories in 2016/17 and 2020. Results: The prevalence of moderate and severe distress among past-year smokers was higher in 2020 (moderate: 28.79%, 95% CI 26.11-31.80; OR=2.08, 95% CI 1.34-3.25; severe: 11.04%, 9.30-13.12; OR=2.16, 1.13-4.07) than in 2016/17 (moderate: 20.66%, 19.02-22.43; severe: 8.23%, 7.16-9.47). While there was no overall evidence of an interaction between time period and age, young (16-24 years) and middle-age groups (45-54 years) may have experienced greater increases in moderate and older age groups (65+ years) in severe distress from 2016/17 to 2020. There were also increases in 2020 of moderate distress among those from more disadvantaged social grades and of both moderate and severe distress among women and those with low cigarette addiction. Conclusions: Between April-July 2016/17 and April-July 2020 in England there were increases in both moderate and severe distress among smokers. The distribution of distress differed between 2016/17 and 2020 and represents a widening of established inequalities, with increases in distress among socio-economically disadvantaged groups, women and diverging age groups.

POD16-4
EFFECTIVENESS OF MENTAL HEALTH WARNINGS ON TOBACCO PACKAGING IN PEOPLE WITH AND WITHOUT COMMON MENTAL HEALTH CONDITIONS AN ONLINE RANDOMISED EXPERIMENT

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Background: Smoking is the leading cause of preventable death and illness in the UK. Health warning labels on tobacco packaging are a cost-effective means of health risk communication. However, while an extensive range of physical health risks are well-portrayed via current tobacco health warnings in the UK, there are none that currently portray the negative impact of smoking on mental health. Smoking tobacco increases the risk of developing mental health conditions, such as depression, schizophrenia and bipolar disorder. Mental health warnings on tobacco packaging could be a means of mental health risk communication and education, however this is yet to be tested in a UK population. Aims: i) develop novel mental health warning labels for tobacco packaging and ii) test perceived effectiveness of these warnings to encourage smokers to quit in smokers and non-smokers, with and without mental health problems. Methods: Six mental health warning labels were developed with a consultancy focus group. These warning labels were tested in an online randomised experiment, where respondents (N = 532) rated six mental health warning labels and six physical health warning labels on.
measures of perceived effectiveness to encourage smokers to quit, and, in smokers, potential effectiveness to reduce immediate desire to smoke. Results: A 2 (mental health) x 2 (warning label type) x 2 (smoking status) ANOVA was run for perceived effectiveness. Across the groups, mental health warnings labels were perceived as effective (M = 3.97, SD = 2.40), but less effective than physical health warnings (M = 5.66, SD = 2.59, p < .001, ηp2 = .43). A 2 (mental health) x 2 (warning label type) ANOVA was run for potential effectiveness. Mental health warning labels were effective at reducing immediate desire to smoke (M = 1.71, SD = 1.11), but less effective than physical health warning labels (M = 2.25, SD = 1.47, p < .001, ηp2 = .18). Conclusions: Mental health warnings had similar effects in people with and without mental health disorders. Mental health warning labels could potentially be an effective means to influence desire to smoke and communicate the effects of smoking on mental health.

FUNDING: Nonprofit grant funding entity

POD16-5

TOBACCO USE AND TREATMENT PREFERENCES AMONG ADULTS ACCESSING SERVICES AT A DAY SHELTER

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Significance: Although smoking rates have declined to 14% among adults in the U.S., 70-80% adults experiencing homelessness continue to smoke. Approaches are needed to address persisting tobacco-related health disparities. The current study characterized tobacco use and treatment preferences among adults accessing day shelter services. Methods: Adults completed a survey at the Homeless Alliance Day Shelter in Oklahoma City to assess sociodemographic characteristics, tobacco history, tobacco treatment preferences, and substance use. Results: Of participants, 75.2% (n=406) reported current smoking, and most wanted to quit (57.2%). Current smokers reported smoking 13.9 (SD=10.0) cigarettes per day (CPD); 57.1% smoked <10 CPD and had been smoking for 23.3 (SD=12.7) years on average. Smokers were primarily male (74.9%), 45.7 (SD=11.2) years of age on average, and largely of White (41.1%, n=167), Black (25.9%, n=105), or American Indian (12.8%, n=52) race. A total of 7.2% (n=29) were veterans. Most had not previously tried any cessation aids (51.7%). Smokers most commonly endorsed cold turkey (25.1%) for best chance of quitting. A total of 55.4% of all smokers reported interest in using ECs for smoking cessation and 14.5% had used ECs in the past 30 days. Smokers who reported past 30-day EC use more often used fruit/candy/other flavored (50.9%) or menthol/mint (22.0%) ECs. Past 30-day cannabis use (51.5%), heavy drinking (58.8%), and injection drug use (12.5%) were prevalent, as were mental illnesses including Generalized Anxiety Disorder (28.1%), Posttraumatic Stress Disorder (26.9%), and Major Depressive Disorder (22.5%). Conclusion: Findings suggest that homeless shelter guests were interested in smoking cessation, though evidence-based treatments were underutilized. Smokers may benefit from education about cessation approaches along with increased access. A focus on non-traditional smoking cessation approaches including EC switching and financial incentives for quitting may be warranted, and non-tobacco substance use and mental health problems may need to be considered and potentially addressed as part of a broader treatment approach.

FUNDING: Federal

POD16-6

ADHD AND CIGARETTE SMOKING: EARLY ADULT FACTORS THAT INCREASE RISK OF DAILY SMOKING BY AGE 29 FOR CHILDREN WITH ADHD

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Significance: Children with, versus without, ADHD are more likely to become regular cigarette smokers. Little research exists on unique and aggregated smoking-specific risk factors that longitudinally explain this vulnerability. The present study hypothesized that childhood ADHD would predict 1) daily smoking in adulthood (age 29), 2) more severe smoking risk profiles in earlier adulthood (18-25), and 3) the risk profile would mediate prediction from childhood ADHD to age 29 daily smoking. Methods: Data were from the Pittsburgh ADHD Longitudinal Study. Participants with data in early and later adulthood included n=237 with childhood ADHD (88% male, 84% White) and n=164 without (87% male, 87% White). A smoking risk profile score was calculated based on smoking-specific factors measured between ages 18-25 (e.g. dependence, quantity) and tested as mediator of the association between childhood ADHD and daily smoking at age 29. Results: Childhood ADHD significantly predicted adult daily smoking (β=.15, p=.019) and the smoking risk profile score (β=.07, p=.004); the risk profile score partially mediated the relation between ADHD history and adult daily smoking (β=.03, p=.007). When the risk factors were examined individually, smoking quantity (β=.03, p=.017), difficulty concentrating (β=.02, p=.036), and dependence (β=.03, p=.005) each partially mediated the association between childhood ADHD and adult daily smoking. Conclusions: These findings are the first to demonstrate that several empirically-supported risk factors during young adulthood, individually and in aggregate, mediated the relationship between childhood ADHD and adult daily smoking above and beyond ADHD symptom severity. A better understanding of contributors to cigarette smoking among individuals with ADHD can help explain this population’s elevated smoking risk and inform prevention and intervention efforts.

FUNDING: Federal; State
POD17-1

CAN PATH SURVEY SUSCEPTIBILITY MEASURES PREDICT E-CIGARETTE AND CIGARETTE USE AMONG YOUTH ONE YEAR LATER?

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Significance: In 2020, 19.6% of US high school students reported current e-cigarette use while 5.8% reported cigarette smoking in 2019. It is important to identify adolescents susceptible to vaping and smoking, and to prevent them from initiating product use. Susceptibility – the absence of a firm decision not to use the product – can predict future use and identify youth at high risk of initiating tobacco products. Methods: We analyzed the two most recent waves of the Population Assessment of Tobacco and Health (PATH) survey (wave 4, 2017-2018; and wave 4.5, 2018-2019). Our sample included youth who had never used any tobacco product at wave 4 (N = 8,841), observing their vaping and smoking behaviors in wave 4.5. We conducted multivariable logistic regressions to calculate the association between susceptibility and product use the following year, controlling for nicotine use, e-cigarette use, and smoking behaviors in wave 4.5. Results: In wave 4.5, youth susceptible just to e-cigarettes in wave 4 had increased odds of using e-cigarettes in the past 12 months (aOR = 2.89 [2.35-3.66]), in the past 30 days (aOR = 2.79 [2.00-3.88]), and in the past 12 months but with no past 30-day use (aOR = 2.63 [1.93-3.50]), along with increased odds of smoking in the past 12 months (aOR = 1.86 [1.08-3.20]) but with no past 30-day use. They did not have increased odds of past 12 months smoking or past 30-day smoking. Youth susceptible to both e-cigarettes and cigarettes reported substantially elevated risk in all measures of e-cigarette and cigarette use, compared with youth susceptible to either e-cigarettes or cigarettes. Conclusion: PATH survey e-cigarette susceptibility measures are associated with higher odds of vaping and trying cigarettes a year later. We identified youth susceptible to both e-cigarettes and cigarettes as the highest-risk group for vaping and smoking. Future prevention policies should target this group to prevent initiation and reduce youth vaping/smoking prevalence.

POD17-2

HOW THE NATURAL AMERICAN SPIRIT CIGARETTE ADVERTISING CHANGED AFTER THE FDA ORDER, A CONTENT ANALYSIS OF MAGAZINE ADS FROM 2000-2020

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Background: In August 2015, FDA ordered Natural American Spirit (NAS) to discontinue use of marketing claims that imply reduced risk. A January 2017 agreement between NAS and FDA banned use of “additive-free” and “natural,” which had become standard on NAS packaging and ads. In Fall 2017, new NAS ads emerged with new claims and advertising strategies in addition to previously used potentially misleading claims, such as “organic” and “Tobacco Ingredients: Tobacco and Water,” which the agreement did not ban. Limited research has documented the use of these and other claims and images in these ads. This longitudinal content analysis aimed to document and compare potentially misleading claims and images in NAS magazine advertising pre- and post-agreement. Methods: NAS magazine ads from 2000-2020 were identified using Trinkets and Trash, an online surveillance system of tobacco ads. A coding guide was developed to identify literal terms, implied risk statements and NAS themes (e.g., the environment). Ads were double coded and discrepancies were settled by a third coder. Data were analyzed from cross-sectional surveys of South Carolina, USA, specifically NAS magazine advertising pre- and post-agreement. Results: 173 ads were identified (n=151 pre-agreement; n=22 post-agreement). Analysis showed a decrease over time in claims such as “natural” and “additive free,” words used in over 80% of pre-agreement ads and no post-agreement ones. But it also showed use of language implying banned terms. Post-agreement ads headlined a new phrase “Real Simple Different” (50%) and an increase in use of the phrase “tobacco and water” (16% to 91%) and references to the brand’s heritage (13% to 36%). Environmental imagery (54% vs.100%) and eco-friendly language (19% to 45%) were more prevalent post-agreement, but the presence of “organic” decreased from pre- (39%) to post-agreement (23%). Conclusions: Findings from initial post-agreement ads show that while NAS is compliant with the terms of the agreement, it substitutes language and imagery implying “natural” and “additive free.” Continued analysis of NAS magazine advertising is critical in order to identify and limit misleading messages in NAS advertising.

FUNDING: Federal

POD17-3

TIME VARYING EFFECTS OF DIFFERENT CIGARETTE PACKAGE EXPOSURES ON SMOKING CESSION OUTCOMES PRELIMINARY EVIDENCE FROM A LONGITUDINAL RANDOMIZED CONTROLLED TRIAL

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Background: Preliminary evidence suggested that smokers exposed to different cigarette packages (i.e., health warning labels [HWLs], self-efficacy text inserts, or combined) may link to different effects on quitting smoking. It is unclear whether the effect of specific cigarette package exposure on smoking cessation outcomes changes over time. Methods: Adult smokers (n=230, Mage=42.4, SD=12.2) were randomly assigned to one of the four (2x2) cigarette package exposure conditions, including 1) text HWLs, 2) text HWLs + self-efficacy text inserts, 3) fear-arousing pictorial HWLs, and 4) pictorial HWLs + self-efficacy text inserts. Participants were provided with a 14-day supply of their preferred brand of cigarettes with packs modified to reflect their condition. At the end of each of 14 days, participant used a smartphone to answer a survey on psychosocial (i.e., response efficacy, perceived susceptibility) and behavioral (i.e., stubbing out cigarettes, forgoing cigarettes in the prior 24 hours) predictors of smoking cessation. Separate generalized linear models were estimated, regressing each outcome on treatment conditions while controlling for demographics and cessation-related variables (i.e., smoking frequency, intention to quit, recent quit attempts). Results: Compared to the standard text-only HWLs condition (reference group), the odds of forgoing any daily cigarettes increased as a function of time (day in the study) among participants in all three conditions (OR range=1.09-1.16); response efficacy increased over time only for participants in the text HWLs + self-efficacy text inserts condition (b=0.04, p<.05); and perceived susceptibility tended to increase over time only for participants in the pictorial HWLs condition (b=0.03, p=.05). The odds of stubbing out daily cigarettes did not change over time in all conditions. Data analysis showed that the effects of different cigarette package exposures on smoking cessation outcomes are dynamic and likely to change over time. More longitudinal studies are needed to investigate if these time-varying effects are measure-specific and if they are amplified over a longer intervention period.

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POD17-4

CHANGES IN EXPOSURE TO AND PERCEPTIONS OF E-CIGARETTE MARKETING: FINDINGS FROM THE 2017-2019 ITC YOUTH AND VAPING SURVEY

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Significance E-cigarette (EC) marketing may explain changes in EC use among youth. We examined changes in reported exposure to and perceptions of EC marketing among youth between 2017 and 2019 across countries with varying EC marketing policies and by smoking or vaping status. Methods Data were analyzed from cross-sectional surveys in the ITC Youth Tobacco and Vaping Survey conducted in 2017, 2018, and 2019. A non-probability sample of youth aged 16 to 19 from England (n=11,362), Canada (n=12,018), and the United States (US n=12,110) was recruited through commercial panels and surveyed online. For each country and smoking or vaping status (i.e., current dual use of both products, current exclusive smoking, current exclusive vaping, former use of either product, never use of either product), weighted logistic regression was used to estimate each year’s prevalence of reporting: (1) noticing EC marketing often or very often, (2) noticing EC marketing through each of 15 different channels, and (3) perceived appeal of EC ads. Results In each country, the prevalence of reporting frequent exposure to
EC marketing increased between 2017 and 2019, with a smaller increase observed in England (21.6% to 25.2%) than in Canada (12.7% to 24.2%; p<.05) or the US (17.2% to 31.7%; p<.05). EC marketing exposure through traditional media and online channels increased among youth in Canada and the US during this period, but not among youth in England, which had banned EC marketing through these channels. The prevalence of youth reporting that ads made vaping seem appealing significantly increased from 2017 to 2019 in Canada and the US, but not in England. In 2019, when compared to never users, current dual users and exclusive vapers reported higher prevalence of frequent exposure to EC marketing (24.3% vs 38.2% & 32.9%, p<.05) and perceived appeal of EC marketing (36.4% vs. 58.3% & 47.6%, p<.05).

**Conclusions**

Self-reported exposure to EC marketing increased between 2017 and 2019 among youth in all countries, but less so in England, where marketing is more restricted. The pattern of results, including the perceived appeal of EC marketing, parallels recent increases in EC use over the same period.

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**POD17-5**

**PROJECTED IMPACT OF APPLYING PLAIN PACKAGING TO TOBACCO PRODUCTS IN ARGENTINA. A MODELING STUDY**

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Significance: Tobacco packaging colors, shape and overall design is conceived to be attractive. Plain packaging of tobacco products reduces this attractiveness by standardizing their shape, size, font and colors, with inclusion from the manufacturer of no other information than the brand, the quantity and the contact information. Methods: To evaluate the effect of applying plain packaging to tobacco products on cardiovascular events and mortality in Argentina, we used the Cardiovascular Disease Policy Model - Argentina, a local adaptation of a well-established computer simulation model that projects cardiovascular and mortality events for the population 35-94 years-old using local demographic and consumption data, during the period 2015-2024. After a literature review, we estimated that the implementation of plain packaging of tobacco products would result in a decrease of tobacco prevalence of 0.55% in the first year after its application (base case scenario); and performed a sensitivity analysis assuming a higher and lower effect of 1.01% and 0.095%, respectively. Results: Over the 2015-2024 period, the decrease in smoking prevalence associated with plain packaging (0.55%) is projected to avert 570 myocardial infarctions (MI), 320 strokes, and 1270 total deaths in Argentina. Likewise, the higher estimate of smoking prevalence reduction (1.01%) would translate into 1040 fewer MIs, 590 fewer strokes, and 2330 fewer deaths; while the lower estimate of smoking prevalence reduction (0.095%) would result in 100 fewer MIs, 60 fewer strokes, and 220 fewer deaths in the same period. Conclusions: The implementation of plain packaging of tobacco products could reduce cardiovascular events in Argentina, even in the absence of other tobacco control measures. Since there is still limited empirical data on the effects on smoking prevalence of plain packaging of tobacco product policies, actual reductions could be higher since most of the impact of these policies are expected to result from preventing young people from initiating smoking, an effect that would only be visible after several years.

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POD18-1

TOBACCO SMOKE EXPOSURE INCREASES ACE2 ACTIVITY

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Significance: Tobacco smoking has been suggested to influence the clinical outcomes of patients with coronavirus disease 2019 (COVID-19). Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) uses its spike (S) protein to bind to angiotensin-converting enzyme 2 (ACE2) receptors on human cell plasma membranes and subsequent cleavage by transmembrane serine protease 2 (TMPRRSS2) facilitates the entry of the virus within cells. The objective of the study was to determine the effect of tobacco smoke exposure on ACE2 activity and on subsequent SARS-CoV-2 infection.

Methods: ACE2 activity was determined by fluorescence-quenching substrate (Abz-Ser-Pro-Tyr-(NO2)-OH). Bronchoalveolar lavage (BAL) fluids obtained from healthy non-smokers and smokers were evaluated for soluble ACE-2 and tissue-like serine protease activity. Human airway epithelial cells (HBEC) grown at the air-liquid interface were acutely exposed to smoke from Kentucky research cigarettes. Binding of fluorescent S1 spike protein to cell membranes and cellular entry of pseudotyped virus expressing SARS-CoV-2 spike protein was evaluated following acute smoke exposure. ACE2-expressing HEK293T cells also used to investigate the mechanistic aspects of ACE2 activity. One-way ANOVA was used for statistical analysis.

Results: ACE2 activity was significantly increased in concentrated BAL fluid from smokers compared to non-smokers, while TMPRSS2 protease activity was unchanged. Acute smoke exposure increased apical ACE2 expression in HBECs. Significantly increased binding of fluorescent spike S1 protein and spike protein pseudotyped-virus supported elevated ACE2 activity in smoke exposed HBECs. Pre-treatment of ACE2 expressing HEK293T cells with forskolin (cyclical AMP modulator), thapsigargin (intracellular calcium modulator) and nicotine enhanced ACE2 activity and pseudotyped-virus binding. Conclusions: Smoking-mediated increases in ACE2 activity, may facilitate SARS-CoV-2 binding and entry into airway cells, and may result in increased susceptibility to COVID-19 disease symptoms. Avoidance of smoking may help in reducing viral infection and severity of COVID-19 disease.

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POD18-2

E-CIG AEROSOL REDUCES THE EXPRESSION OF KEY ANTIOXIDANT REGULATORS AND INCREASES INFLAMMATORY MARKERS

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Background: In recent years, the use of electronic cigarette (e-cig) has risen rapidly among the youths, in part because e-cigs are promoted as a safe alternate for tobacco cigarettes. The long-term health effects of e-cig use remain unknown. E-cig aerosols contain harmful and potentially harmful substances, e.g., nicotine, ultrafine particles, flavoring agents, carbonyl compounds, heavy metals, and carcinogens. In addition to containing reactive oxygen species (ROS), recently, our laboratory demonstrates that e-cig aerosols can also increase the generation of cellular ROS and diminish the cellular antioxidant and inflammatory responses worsening the oral health of e-cig users.

Methods: Human oral epithelial cancer (UM-SCC-1) cells were exposed for every other day for 2 weeks, to e-cig aerosol extracts. E-cig aerosol extracts (18 mg/ml of nicotine; tobacco flavor) were prepared from two distinct e-cig brands. Standard tobacco extracts were used as positive control. Whole-cell RNA was isolated and processed for RNA-sequencing. The expression of altered genes was further validated by RT-PCR, western blotting and ELISA. Data were analyzed by Student’s t-test.

Results: RNA-sequencing data showed that exposure of oral epithelial cells to e-cig aerosol extracts for 2 weeks led to alterations in several major cellular pathways, including inflammatory and immune response, cell death and survival, cell migration and proliferation, and anti-hydrogen receptor signaling. Within the oxidative stress pathway, we observed decreased levels of master regulator NRF2 and its downstream targets, e.g. glutathione peroxidases (GPX2 and GPX7) and glutathione-S-transferases (GSTA4 and GSTK1), glutaredoxin 3 (Gsrx), as well as an increased expression of nuclear factor-κB (NFκB) and IL-1R1. At the protein level, oral epithelial cells exposed to e-cig aerosol for 2 weeks, showed a decrease in NRF2 and SOD2 and an increase in CD54, IL-1Rα, IL-1α, and IL-10. Conclusions: E-cig aerosol exposure alters the expression of several components of the antioxidant and inflammasome pathways. The unbalance in antioxidants and inflammasome pathways can lead to several diseases, including cancer. These alterations might put the cells under additional oxidative stress, which can have significant biological implications. Overall, our study suggests that e-cig aerosol not only carries high levels of ROS, but also alters the cellular antioxidant and inflammatory responses worsening the oral health of e-cig users.

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POD18-3

CANNABIDIOL REDUCES WITHDRAWAL SYMPTOMS IN NICOTINE DEPENDENT RATS

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Rationale: Cannabidiol (CBD) reduces craving in animal models of alcohol and cocaine self-administration and is known to modulate nicotinic receptor function, suggesting that it may alleviate symptoms of nicotine withdrawal; however, preclinical evaluation of its efficacy is still lacking. Objectives: The goal of this study was to test the preclinical efficacy of a chronic CBD treatment in reducing nicotine dependence using measures of withdrawal symptoms including somatic signs, hyperalgesia, and weight gain during acute and protracted abstinence. Methods: Male and female Wistar rats were made dependent on nicotine using osmotic minipumps (3.15 mg/kg/day) for two weeks, after which minipumps were removed to induce spontaneous withdrawal. Three groups received CBD injections at doses of 7.5, 15, and 30 mg/kg/day for two weeks, starting one week into chronic nicotine infusion. The control group received vehicle injections of sesame oil instead of CBD. Finally, another control group received a saline minipump and sesame oil injections (double vehicle). Throughout the experiment, serum was collected for determination of CBD and nicotine concentrations, mechanical sensitivity threshold and withdrawal scores were measured, and body weight was recorded. Results: CBD prevented rats from exhibiting somatic signs of withdrawal and hyperalgesia during acute and protracted abstinence. There was no dose-response observed for CBD, suggesting a ceiling effect at the doses used and the potential for lower effective doses of CBD. Conclusions: This preclinical study suggests that using CBD as a strategy to alleviate the withdrawal symptoms upon nicotine-cessation may be beneficial.

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POD18-4

EXAMINATION OF SEX DIFFERENCES AND IMPACT OF DRUG EXPOSURE ORDER ON THE REWARD-ENHANCING EFFECTS OF NICOTINE AND D-AMPHETAMINE

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Significance. Nicotine enhances the value of environmental stimuli and rewards, and this reward-enhancement can maintain nicotine consumption. Stimulants, including d-amphetamine, are misused more by women and are highly comorbid with nicotine use. Nicotine often precedes use of other psychostimulants in humans. In mice, nicotine pre-exposure can potentiate the effects of later psychostimulant administration, leading to the notion of nicotine as a “molecular gateway” to psychostimulant use. To date, there are no published studies examining the effect of previous nicotine exposure on the reward-enhancing effects of d-amphetamine, or vice versa. Accordingly, we sought to examine the effects of sex and previous drug exposure on reward-enhancement by nicotine and d-amphetamine. Methods: Using 20 male and 20 female Sprague-Dawley rats, we assessed enhancement within-subjects by examining active lever pressing for a visual stimulus reinforcer on a Variable Ratio 3 schedule of reinforcement. Before one-hour sessions, rats received either nicotine (0.03, 0.06, 0.1, 0.3 mg/kg) or d-amphetamine (0.1, 0.3, 0.6, 1.0 mg/kg). We assigned 20 rats (10 M, 10 F) to complete enhancement testing with nicotine before d-amphetamine. The remaining 20 rats (10 M, 10 F) completed testing with d-amphetamine before nicotine. Results: Males'
and females’ responding relative to saline was increased by 0.3, 0.6, and 1.0 mg/kg amphetamine. This enhancement was greater in females than males with 0.3 and 0.6 mg/kg. In both sexes, responding was increased by 0.06, 0.1, and 0.3 mg/kg nicotine; no sex differences were seen. Testing with nicotine before d-amphetamine did not change responding in d-amphetamine conditions. In contrast, completing d-amphetamine testing before nicotine potentiated responding in 0.06, 0.1, and 0.3 mg/kg nicotine conditions. Conclusion. In summary, we observed sex differences in reward-enhancement by d-amphetamine, but not nicotine. Further, prior d-amphetamine exposure potentiated the reward-enhancing effects of nicotine. Given the role of reward-enhancement in nicotine consumption, we suggest careful consideration of prior amphetamine use in treatment of nicotine dependency.

FUNDING: Federal

POD18-5

CARBONYL PROFILES OF ELECTRONIC NICOTINE DELIVERY SYSTEM (ENDS) AEROSOLS ARE FLAVOR-SENSITIVE; STRAWBERRY FLAVOR AFFECTS BRONCHIAL EPITHELIAL CELL REDOX SIGNALING

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Propylene glycol (PG) and vegetable glycerin (VG) are the most widely used humectants in electronic nicotine delivery system (ENDS) devices. Carbonyls are present in aerosols produced when ENDS devices heat PG and VG. Whether aerosolized PG and VG are innocuous to the lungs has not been established. Here, we determined the chemical profiles of ENDS aerosols containing three humectant ratios (30/70, 50/50 and 70/30, PG/VG), for 3 flavors (strawberry, vanilla and Catalan cream) containing either 12 or 18 mg/mL of nicotine. We examined the in vitro toxicity of the strawberry-flavored ENDS aerosol in human lung epithelial cells (BEAS-2B) exposed at the air-liquid interface for 1 hour. For strawberry- and vanilla-flavored aerosols produced by a 3rd-generation ENDS device with the same PG/VG ratio, the e-liquid nicotine content of 12 and 18 mg/mL did not transfer to the aerosol with substantial differences in concentrations, while a more notable difference in aerosol nicotine content was observed for the Catalan cream-flavored aerosols. In addition, for a given flavor, there was no direct relationship between changes in the e-liquid PG/VG ratios (30/70, 50/50, 70/30) and either the glycerin levels, or the PG concentrations in the aerosols. This may be due to PG being more susceptible to thermal decomposition than VG. The 3 flavors, however, produced distinct carbonyl profiles: vanilla-flavored aerosols had high levels of butyraldehyde (>1 µg/puff), Catalan cream aerosols had elevated levels of acetaldehyde (>1.9 µg/puff), and strawberry-flavored aerosols had high levels of acetone (> 1 µg/puff). Moreover, under non-cytotoxic conditions, BEAS-2B cells exposed to strawberry-flavored aerosols exhibited significantly increased reactive oxygen and nitric oxide species (ROS/NOS) levels in cell media compared to air controls. Our data suggest a) that ENDS aerosol chemical composition will vary based upon the presence and concentration of the initial e-liquid ingredients, with a pronounced impact of the flavoring components; and b) short-term exposures to flavored ENDS aerosols may impair lung cells' redox signaling.

FUNDING: Federal

POD18-6

HUMAN 3’UTR POLYMORPHISM (RS2304297) IN THE ALPHA(Ɑ)6 NICOTINIC ACETYLCHOLINE RECEPTOR SUBUNIT ENHANCES NICOTINE PLUS CUE-INDUCED REINSTATEMENT IN ADOLESCENT SPRAGUE-DAWLEY RATS

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35 million adults in the United States are current smokers, a majority began smoking during adolescence. 90% of smokers who try cessation treatments will relapse within the first year. Large-scale human candidate gene studies have indicated a genetic variant in the alpha(Ɑ)6 nicotinic acetylcholine receptor subunit (nAChR), encoded by Chrna6C123G, may play a key role in adolescent smoking. We hypothesize the Chrna6C123G polymorphism, rs2304297, selectively enhances nicotine + cue-induced reinstatement, but not nicotine- or cue-only reinstatement in GG (risk) versus CC (non-risk) allele carriers. Methods: Genetically modified adolescent rats were food trained under a fixed-ratio one (FR1) schedule of reinforcement and progressively increased to FRST020. Animals were implanted with catheters and began nicotine self-administration (SA) (15 µg/kg infusion) at FR5. Upon reaching stable responding reinforced behavior was extinguished by removal of drug and associated cues for 5 days minimum. Reinstatement testing began for cue only, nicotine only, and nicotine + cue in a randomized order. Animals were returned to extinction conditions 2 days minimum between testing. Results: No genotype effects are observed for food reinforcement during acquisition at FR5 or progressive ratio schedule of reinforcement. All animals show a preference for reinforced versus non-reinforced nicotine. CC and GG-allele carriers have exhibited equivalent nicotine reinforcement and extinction. GG versus CC exhibit potentiated nicotine + cue induced reinstatement. Conclusions: Our findings indicate the GG risk allele carriers exhibit enhanced nicotine + cue reinstatement at a low nicotine dose without altering natural food reward, nicotine reinforcement, cue-or nicotine-only reinstatement. Understanding the role of functional human genetic variants in nicotine use among adolescents is key for development of future prevention and intervention strategies.

FUNDING: Federal
POD39-1
WHAT INFLUENCES DEMAND FOR CIGARS AMONG AFRICAN AMERICAN ADOLESCENT CIGAR SMOKERS? RESULTS FROM A HYPOTHETICAL PURCHASE TASK

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SIGNIFICANCE: African Americans (AA) have the highest rates of current cigarette use compared to other racial/ethnic groups in the United States. Yet, there is limited evidence on the factors associated with this demand. The objective of this study was to examine correlates of cigar demand among a sample of AA current cigar smokers. Method: Data were from a community sample of 70 AA past 30-day cigar users in Richmond, Virginia. Study outcomes included four demand indices from a validated behavioral economic purchase task: intensity, a measure of cigar demand when free; breakpoint, a measure of the highest price participants are willing to pay; Omax, a measure for the maximum daily expenditure; and Pmax, a measure for the price after which demand changes from inelastic to elastic. Linear regression models examined the association of socioeconomic, health, and other factors on the log-transformed outcomes. Significance was set at p-value less than 0.05. Results: The sample was primarily little cigar/cigarillo smokers (96%) and smoked cigars on average 6 days (standard deviation [SD]: 6.34) in the past month. Mean intensity was 8.89 cigars (SD: 8.53) and breakpoint was $4.68 (SD: 3.89). Average Omax was $15.75 (SD: 26.81), while Pmax was $5.29 (SD: 3.92). Participants aged 21 to 30 years had a significantly higher intensity than those aged 18 to 20 years. Participants that had cannabis use above the sample median in the last 30 days (4+ days) also had a significantly higher intensity than those below the median. Participants with a high school education or more had a significantly lower intensity, breakpoint and Omax than those with less than a high school education. Individuals with income below the federal poverty line also had a significantly lower breakpoint and Omax than those above. Finally, participants' belief that tobacco products are harmful was significantly associated with lower Pmax. Conclusion: Age, education, income, cannabis use and the belief that tobacco products are harmful were associated with cigar abuse liability indices among AA. Stronger price policies on cigar products, such as higher taxes and product-specific harm messaging, may have an immediate and sustained impact on health disparities related to cigar use.

FUNDING: Academic Institution

POD39-2
CONCERN REGARDING POLICE BRUTALITY AND UNFAIR TREATMENT BY LAW ENFORCEMENT AND SUBSEQUENT TOBACCO AND MARIJUANA USE AMONG HISPANIC YOUTH

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SIGNIFICANCE: Tobacco and marijuana products may be used as a coping strategy for minorities to combat the social injustice and racial discrimination. This study explores how concern over negative encounters with law enforcement affects subsequent tobacco and marijuana use in Hispanic youth. METHODS: The data are from a prospective cohort study of Hispanic 11th-12th grade students (N=1344) originally recruited in Southern California. Participants reported concern, worry, and stress levels regarding police brutality or the unfair treatment of members in their community by law enforcement" in waves 6 (2016) and 8 (2017). Four groups were created to show changes in overall concern about police brutality between two waves (consistently low, decreased, increased, and consistently high). Past-30-day marijuana smoking, blunt smoking, THC-oil vaping, and cigarette smoking in wave 9 (2019) were assessed. Multivariable logistic regressions were used to assess associations between concern over police brutality and subsequent marijuana and cigarette use, controlling for covariates. RESULTS: About 39%, 15%, 16%, and 30% of Hispanic youth showed consistently low, decreased, increased, and consistently high concern over police brutality. The prevalence of using marijuana, blunts, THC-oil vapes, and cigarettes was about 29%, 23%, 24%, and 6%. Changes in concerns over police brutality were associated with subsequent marijuana but not cigarette use. Specifically, compared to the group with low concern, those with high concern were more likely to smoke marijuana (aOR=1.66, 95% CI=1.12-2.44) and smoke blunts (aOR=1.61, 95% CI=1.06-2.48). Additionally, compared to the group with low concern, those with increased (aOR=1.64, 95% CI=1.14-2.36) and high concern (aOR=1.69%, 95% CI=1.08-2.51) were more likely to vape THC oil. DISCUSSION: Hispanic youth may be using various forms of marijuana products to cope with stress associated with concerns over police brutality. Police reforms to promote racial equity may therefore reduce Hispanic marijuana use. School and community resources are needed to help minority youth cope with stress and reduce stress-induced marijuana use.

FUNDING: Federal

POD39-3
DISCRIMINATION, PSYCHOLOGICAL FUNCTIONING, AND TOBACCO USE AMONG U.S. YOUNG ADULTS AGED 18-28, 2017

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SIGNIFICANCE: Among youth, Blacks (v. Whites) have lower tobacco use rates, but rates are similar starting in emerging adulthood. Blacks experience disproportionate tobacco-related mortality and morbidity and a deeper understanding of contributors to tobacco use is needed to eliminate disparities. Discrimination and poor mental health have emerged as salient substance use risk factors and given the current socio-political climate, more recent examinations of these relationships are needed, particularly among young adults. This study aimed to test whether 1) discrimination is directly associated with cigarette and e-cigarette use among Black and White U.S. adults aged 18-28, 2) psychological distress (PD) and positive wellbeing (PW) are mediators of the discrimination-tobacco use relationships?, and 3) the associations are moderated by race and sex? Methods: A multiple-group moderated mediation analysis was conducting using the 2017 wave of the recently re-launched, nationally representative Transition into Adulthood Study. Participants were 2,192 young adults aged 18-28 (508 Black males, 594 Black females, 533 White males, 557 White females). Binary outcomes were current cigarette smoking and past 30-day e-cigarette use. Descriptive and bivariate analyses were conducted in SAS 9.4 and CFA, mediation, moderation, and multiple-group moderated mediation analyses in Mplus 8.1. Path analyses adjusted for age, were conducted using a WLSMV estimator, and structural equation models (SEM) were used to conduct mediation analyses. RESULTS: On average, Black males had higher discrimination, Whites had higher PD, and females had higher PD scores. Black males had higher rates of cigarette smoking (11.6% v. 3.2% - 6.2%) and White males had higher rates of e-cigarette use (13.4% v. 3.8% - 6.8%). Cigarette smokers and e-cigarette users were more likely to have higher discrimination and PD scores and lower PW scores. Discrimination was positively associated with PD and negatively associated with PW. Among Black males only, there was a positive, indirect effect of discrimination on cigarette smoking through PD and a negative, indirect effect of discrimination on cigarette smoking through PW. However, among Black males, Black females, and White females (but not White males), there were positive, indirect effects of discrimination on e-cigarette use through PD. Conclusions: The relationship between discrimination, current cigarette smoking, and past-30 day e-cigarette use may be mediated by past 30-day psychological distress and positive wellbeing, especially among Black male young adults. Future tobacco studies and interventions, especially those targeted to Blacks, may benefit from considering discrimination and non-specific mental health conditions.

FUNDING: Unfunded

POD39-4
ASSOCIATIONS BETWEEN LIFETIME EXPERIENCES OF SEXUAL ORIENTATION DISCRIMINATION AND PAST-YEAR PATTERNS OF TOBACCO USE AMONG A SAMPLE OF SEXUAL MINORITY ADULTS IN THE UNITED STATES

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Significance: Sexual orientation-based experiences of discrimination (EOD) have been linked to increased individual tobacco product use, but the association with dual/poly tobacco use is unclear. Dual/poly tobacco use may come with health consequences in excess of exclusive product use, and determining at-risk groups is needed to better inform tobacco prevention and cessation efforts. Methods: A subset of sexual minority
POD39-5

PERSPECTIVES OF HIV CARE PROVIDERS ON SMOKING BEHAVIOR AMONG PLHIV SMOKING CESSATION SERVICES PROVIDED AND CESSATION INTEGRATION SUPPORT REQUIRED IN UGANDA

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Significance: Integration of smoking cessation interventions into HIV care can play a crucial role in reducing the growing burden of smoking among people living with HIV. However, there is a dearth of information on HIV care providers' perspectives towards integration of smoking into HIV care programs. Methods: This was a qualitative study conducted among 12 HIV care providers, one (1) district health officer and one (1) tobacco control program manager between October and November 2019. Data were collected on healthcare providers' awareness about the smoking behaviour of HIV-positive patients enrolled in HIV care; support provided to smoking patients to help them quit smoking, and healthcare providers' perceptions about integrating smoking cessation services into HIV care programs. Data were analysed deductively following a thematic framework approach. Results: Most of the HIV care providers (86%) were in charge of the HIV clinics in the health facilities surveyed. Findings show that: a) healthcare providers were not aware of the full extent of smoking among their HIV-positive patients since screening for smoking behaviour is not routinely done; b) in the few patients that smoked, healthcare providers did not offer them a full package of smoking cessation services given that there are no tobacco cessation integration guidelines in place; and c) healthcare providers had a positive attitude towards integration of tobacco smoking cessation services into HIV care provided that they are trained on how to manage the integration process. Conclusion: Our study shows that healthcare providers did not have full awareness of HIV-positive patients’ smoking behaviour since screening for smoking is not routinely done; smoking patients receive suboptimal cessation support given that there are no smoking cessation guidelines, but healthcare providers have a positive attitude towards the integration of tobacco smoking into HIV care programs. These findings suggest a need for developing tobacco smoking cessation integration guidelines to support the integration of smoking cessation interventions into HIV care programs.

FUNDING: Unfunded
DIFFERENCES IN ADULT CURRENT SMOKING PREVALENCE ESTIMATES IN U.S. NATIONAL SURVEYS: 2014-2018 FINDINGS FROM THE NHIS, BRFSS, PATH, AND NSDUH

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Introduction: Estimating national cigarette smoking prevalence is key to understanding smoking trends in the United States. This study updates the existing literature, comparing, for the years 2014-18, National Health Interview Survey (NHIS), Behavioral Risk Factor Surveillance System (BRFSS), Population Assessment of Tobacco and Health (PATH), and National Drug Use Survey on Survey and Health (NSDUH) data, survey methodology, and national smoking estimates using a standardized definition of current smoking. Methods: We used data on adults, age ≥18 years, from the 2014-2018 NHIS, BRFSS, and NSDUH public data files and published numbers on official websites for prevalence comparisons across surveys. Adult data were used from Waves 1-4 of the public use files of PATH for 2014-2017. We used cross-sectional weights for each year of survey data. Current smoking rates and, among current smokers, daily smoking rates were compared for each survey. A standardized definition of current smoking was constructed for all four surveys. Participants who had smoked ≥100 lifetime cigarettes and currently smoked every day or some days were included in the current smoker group. 2017 demographic data (age, race, and gender) were used across all four surveys to evaluate differences across the surveys. Additionally, we compared the surveys’ designs and methodology characteristics. Results: NHIS, BRFSS, and NSDUH are all cross-sectional surveys whereas PATH is a longitudinal cohort survey. NHIS consistently yielded lower current cigarette smoking prevalence estimates (14.00% in 2017) compared to BRFSS (16.33%), PATH (17.71%), and NSDUH (17.62%). Demographic data were comparable across all four surveys for age and gender. Conclusion: Carefully defining who constitutes a current smoker in nationally representative surveys is essential to interpreting prevalence estimates derived from these surveys. Differences in survey methodology, design, sampling, question wording, and weighting characteristics produce significant differences in estimates of smoking prevalence and limit inter-survey comparisons. The NHIS is widely cited as the measure of U.S. smoking prevalence rates. This analysis raises the question as to whether NHIS is being disproportionately cited as an authoritative measure of U.S. smoking prevalence while other nationally representative studies provide varying and higher estimates of smoking prevalence.

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Among these youth, the prevalence of current marijuana use was 50.7%. Compared to non-current marijuana users, current marijuana users were more likely to be a current smoker (AOR=3.52, p=0.03). Current smokers who concurrently use marijuana smoked more cigarettes per day than those who did not concurrently use marijuana (AOR=3.63, p<.001). The impact of cigarette price on smoking prevalence among youth did not differ by their marijuana use status, but current smokers who concurrently used marijuana were more responsive to cigarette price than those who did not use marijuana (AOR=-1.59, p<.001). The price elasticity was statistically significant at -1.2 for smoking participation, -2.4 for smoking intensity, and -3.6 for total price elasticity. **Conclusions:** Our results suggest that raising cigarette prices, such as via tobacco tax increases, would result in reduced smoking prevalence, cigarette consumption, and total cigarette demand for youth. Dual users of cigarettes and marijuana were more sensitive to cigarette prices in reducing cigarette consumption than current smokers only.

**FUNDING:** State; Academic Institution; Nonprofit grant funding entity
CESSION LIKELIHOOD INCREASES WITH HIGHER EXPIRED-AIR CARBON MONOXIDE CUTOFFS: A META-ANALYSIS

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Background: Expired-air carbon monoxide (CO) is commonly used to biochemically verify abstinence. The CO cutoff and brand of CO monitor may affect the probability of classifying smokers as quit, thus influencing conclusions about the efficacy of cessation trials, though no systematic investigation has confirmed support for this hypothesis. We performed a meta-analysis examining whether likelihood of cessation classification in randomized trials varied due to CO cutoff and monitor brand. Methods: We searched Pubmed for articles published between January 2000 and April 2020. Eligible studies recruited ≥50 participants and longitudinally assessed CO-verified cessation in adult smokers randomized to an intervention. Effect sizes (logit β) were averaged across interventions and follow up periods; study was the level of analysis. Meta-regressions separately assessed differences in quit classification likelihood due to continuous and categorical CO cutoffs (Low 3-4 ppm, k=13; [SRNT] Recommended 5-6 ppm, k=16; Moderate 7-8 ppm, k=29; and High ≥9 ppm, k=64); secondary analyses compared likelihood outcomes between monitor brands: Bedfont (k=73) and Vitalograph (k=19).

Results: We identified 122 studies. Likelihood of quit classification rose 18% with likelihood outcomes between monitor brands: Bedfont (k=73) and Vitalograph (k=19). Meta-regressions revealed a 17% higher quit probability at higher CO cutoffs (Low 3-4 ppm, k=13; [SRNT] Recommended 5-6 ppm, k=16; Moderate 7-8 ppm, k=29; and High ≥9 ppm, k=64); secondary analyses compared likelihood outcomes between monitor brands: Bedfont (k=73) and Vitalograph (k=19). CONCLUSIONS: As expected, higher CO cutoffs were associated with greater likelihood of cessation classification. Within brand model-level variance may have confounded comparisons between monitor brands. Researchers are advised to report outcomes using a range of cutoffs, including lower cutoffs at the recommended range—5-6 ppm—and the CO monitor brand/model used. Use of higher CO cutoffs in cessation trials has a large impact on cessation classification and may artifically elevate treatment strategies.

FUNDING: Federal

EVALUATION OF AN “OPT OUT” MECHANISM TO REFER CANCER PATIENTS TO TOBACCO TREATMENT

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Although continued tobacco use worsens cancer outcomes, the reach of tobacco treatment interventions is low in current oncology practice. As part of the NCI Cancer Moonshot™ program, the Mayo Clinic Cancer Center implemented an “opt-out” system that refers cancer patients who use tobacco to the Mayo Clinic Nicotine Dependence Center(NDC). This system utilizes an informatics tool we developed and implemented in Epic electronic health record, a Best Practice Advisory (BPA). Roaming staff use the BPA to query tobacco use status during the rooming process, and place a referral that does not require a provider co-sign for those who are current users. This referral approach was successfully adopted in oncology practices. Between July 8, 2019 and September 18, 2020, the BPA screened 13,889 unique patients for current tobacco use. Of these, 2093 (16%) indicated current tobacco use, with the balance indicating former or never tobacco use. Of the 2093 patients that admitted to current tobacco use, the roaming staff provided referral to the NDC to 1334 (64%). Of these patients, 1133 (85%) booked an appointment with the NDC. At the time of analysis in October 2020, 299 (22%) unique patients completed at least one appointment. Despite the disruption of clinical services due to COVID-19 pandemic, the NDC was able to maintain the tobacco treatment service lines open to patients, including providing telemedicine appointments. However, changes in the practice workflow as the patient rooming processes adapted to the pandemic conditions required modifications of the BPA logic. Future work will need to focus on enhancing treatment options for patients and formulating strategies to increase appointment completion rates. We conclude that an “opt out” referral mechanism based on the electronic medical record that does not require provider involvement is feasible in oncology practices.

FUNDING: Nonprofit grant funding entity

MODERATELY MENTHOLATED CIGARETTES ARE NOT SMOKED MORE INTENSELY THAN NON-MENTHOLATED CIGARETTES: A RANDOMIZED CROSSOVER TRIAL

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Background: One-third of all U.S. smokers use menthol cigarettes, including 77% of African American/Black and 54% of youth smokers. Menthol smokers are more likely to progress to regular smoking and are less likely to quit. Menthol may reduce the aversiveness of cigarette smoke, leading to more smoke inhalation. Methods: Current menthol smokers were recruited from the Baltimore, MD area and smoked SPECTRUM NRC 600 cigarettes modified to contain approximately 0, 3, 6, or 12mg of menthol in a crossover design. Participants smoked one cigarette using a prescribed smoking regimen and reported subjective effects on the modified cigarette evaluation questionnaire (mCEQ). After 2.5 hours of washout, participants were permitted to smoke ad libitum for one hour. Puff topography (CReSS) and exhaled carbon monoxide (eCO) data were collected. Data were analyzed using mixed effects ANOVA models with pairwise comparisons. Results: Participants (N=48) were 69% African American/ Black-only, 56% male, and 98% exclusive menthol smokers. Participants smoked 17 cigarettes/day and had smoked regularly for 18 years, on average. Participants rated

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moderately mentholated cigarettes higher on the mCEQ (3mg: 4.24, 6mg: 4.11) than the non-mentholated (0mg: 3.27) and highly mentholated (12mg: 3.67) cigarettes (all p<0.05). Participants chose to smoke during 96% of ad libitum sessions. Excluding the non-smoking visits, the ad libitum total puff volume varied significantly by menthol content, with the 12mg having the lowest volume: 852mL vs. 1051mL, 1074mL, and 1089mL for 0, 3, 6mg menthol, respectively (all p<0.05). The boost in eCO did not differ significantly between any menthol levels (all p>0.05). Conclusions The 0mg, 3mg, & 6mg menthol cigarettes did not differ in puff volume or eCO boost during ad libitum smoking, though participants rated the 3mg & 6mg menthol cigarettes more positively than the 0mg cigarette. Participants smoked 12mg menthol cigarettes less intensively than 0, 3, and 6mg cigarettes and rated them less positively than 3mg & 6mg cigarettes. The hypothesis that menthol increases smoke inhalation was not supported.

FUNDING: Federal

POD41-5

TRIAL-LEVEL BIAS SCORE VERSUS MEAN BIAS SCORE: COMPARISON OF THE INTERNAL AND TEST-RETEST RELIABILITY USING DOT PROBE TASK AMONG DAILY SMOKERS

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Attentional bias (AB), biased allocation of attention to cigarette cues over neutral cues, is observed among current and former smokers. One of the most widely used indices of AB is the mean bias score (MBS), a mean difference of reaction time between congruent (i.e., target probe replaces cigarette cues) and incongruent conditions (i.e., target probe replaces neutral cues). Recently, a novel AB index, trial-level bias score (TLBS) has been introduced as an alternative and more psychometrically sound index of AB given the evidence of poor reliability of the MBS. To calculate the TLBS, every reaction time difference between two different consecutive conditions is obtained at the trial level, and then averaged. Several studies have compared the reliability between the MBS and the TLBS but such an examination is limited in daily smokers. We hypothesized that the TLBS, as compared to the MBS, would demonstrate superior internal and test-retest reliability, and validity. Daily smokers (n=48, Mean age = 34.0, 31.3% female, FTND = 6.0, Mean cigarette per day [CPD] = 14.6) completed a dot-probe task three times, which comprised of 36 pairs of pictorial stimuli of cigarette and neutral objects, yielding 144 trials in total. Each AB task was separated by affect manipulation conditions. As expected, the MBS demonstrated low internal reliability (range intra class correlation ICC = .09 - .19, all p's < ns) and low test-retest reliability (range Pearson's r = .07 -.17, all p's < .01). The TLBS yielded higher internal reliability (range ICC = .63 -.91, all p's < .001) and test-retest reliability (range r = .66 -.91, all p's < .001). Surprisingly, both indices did not demonstrate any significant association with either nicotine dependence or CPD. These results indicate that the reliability of the TLBS is superior to the MBS. Contrary to our hypothesis, none of the AB indices was associated with cigarette variables, indicating limited evidence of their validity. Together, our findings suggest that the TLBS might be a more reliable measure of AB while its validity is to be further examined among daily smokers.

FUNDING: State

POD41-6

DEVELOPMENT AND VALIDATION OF NATURAL LANGUAGE PROCESSING MODELS FOR TECHNOLOGY-ASSISTED MOTIVATIONAL INTERVIEWING

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Significance Motivational interviewing (MI) has been found to promote readiness for smoking cessation, but it requires substantial time and skill. While technology-assisted MI may provide an efficient and equitable means to deliver MI, previous attempts have been disappointing. This study evaluates a novel technology-assisted MI system that deploys recent advances in artificial intelligence and natural language processing (NLP) to classify Change or Sustain Talk (CT/ST), and 81 smoking-related topics in order to later support fully automated MI-consistent conversations. Methods Expert-scored MI session transcripts were first used to train the CT/ST classification model. 20,890 unique utterances labeled for CT and ST codes were tokenized, a process by which utterances are broken down into words and subwords for NLP training. 14,106 utterances were extracted from 81 subreddits to create a topic classification model with 81 classes. Pretrained models for XLNet, RoBERTa, and BERT were fine-tuned using an open source package, Transformers. Stratified and class balanced 5-fold cross validation with holdout test sets (i.e. a subset of data from the MI-coded transcripts and topic-based subreddits not used to train the model) were scored by the trained model to assess performance. Mean accuracy and F1-score (the harmonic mean of precision and recall) were assessed for each model, using python packages. Results Following assessment of the CT/ST classifier, F1-score was found to be 0.79 and the accuracy was 84.0% - i.e. the NLP model agreed with expert CT/ST coders 84% of the time. Evaluation of the topic classifier via holdout set testing demonstrated an F1-score of 0.61 and an accuracy of 68.5% - i.e. the NLP model correctly identified the topic-based subreddit 68.5% of the time. Conclusion The F1-score and accuracy achieved by the CT/ST classifier is comparable to that of a human coder. Poor performance by the topic classification model suggests that more training data is required and that fewer topics should be included. These findings show preliminary support for two NLP models that are required for successful development and implementation of an automated MI system.

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PAD6-1

INTENTIONS AND FUTURE PLANS TO STOP VAPING AMONG E-CIGARETTE USERS IN THE US AND THE UK

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Background and Aims: The United States (US) and the United Kingdom (UK) have different policy approaches to e-cigarettes; the US treats them as suspect and poor alternatives to smoking cessation and the UK consider them first-line cessation aids. This study describes e-cigarette users’ characteristics and compares intentions to quit and attributes associated with intentions to quit among both countries. Design: We used the online crowdsourcing platform Prolific Academic to survey current e-cigarette users in both countries. Participants: 1044 participants (524 UK; 520 US) with a mean age of 34.18 years. Most were male (50.57%), white (84.57%), had bachelor’s degree or above (55.45%), and were employed (75.95%). Measurements: Measures were drawn from existing international surveys and included intentions to quit, sociodemographics, and attitudes toward e-cigarettes. Tests included Wilcoxon Signed-rank test, Fisher’s Exact test, logistic regression and ordinal regression. Findings: UK respondents were more likely than US respondents to be ever cigarette smokers (89.3% vs 71.3%, p < 0.001); daily vapers (88.9% vs 53.3%, p < 0.0001) and have used e-cigarettes to quit smoking cigarettes (74.8% vs 65.2%, p = 0.007). Most UK (61.6%) and US (61.3%) respondents intended at some point in time to stop using e-cigarettes for good (p=0.9493); this difference remained non-significant after controlling for social and demographic factors. Adjusted analyses found that future plans to quit were significantly different between countries (OR 0.47, p<0.001) with US respondents planning to quit in general sooner. UK respondents perceived attitudes to be more favorable toward e-cigarettes, with compared to 29% of US respondents (p =.0004). This requirement stands in sharp contrast with the history of $0.41 increase in tax on cigarettes (74.8% vs 65.2%, p =.007). Most UK (61.6%) and US (61.3%) respondents intended at some point in time to stop using e-cigarettes for good (p=0.9493); this difference remained non-significant after controlling for social and demographic factors. Adjusted analyses found that future plans to quit were significantly different between countries (OR 0.47, p<0.001) with US respondents planning to quit in general sooner. UK respondents perceived attitudes to be more favorable toward e-cigarettes, with compared to 29% of US respondents (p =.0004). Conclusions: Most vapers intend to quit, but US respondents plan to quit sooner than UK respondents. This may be due to UK policies recommending the use of e-cigarettes as a cessation aid, US policies related to e-cigarette regulation and marketing, and the epidemic of e-cigarette-related lung disease in the US.

FUNDING: Federal; Academic Institution

PAD6-2

INDIVIDUAL- AND STATE-LEVEL TOBACCO REGULATORY FACTORS INFLUENCE U.S. REGIONAL DIFFERENCES IN SMOKING CESSATION IN THE EAGLES TRIAL

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Significance: Quit ratios (number of former smokers divided by the number of ever smokers) and smoking prevalence vary by state. The aim of this post-hoc secondary analysis was to examine regional differences in demographic, smoking, and psychiatric characteristics, as well as state-level epidemiologic, economic, and tobacco regulatory factors that may affect short-term quit rates among individuals motivated to stop smoking.

Methods: We evaluated the subset of 4260 smokers enrolled from 29 states across 6 regions in the U.S. who participated in the EAGLES trial that evaluated the safety and efficacy of varenicline and bupropion versus placebo and the nicotine patch in smokers with and without psychiatric disorders. A stepwise logistic regression model that considered pharmacotherapy treatment, psychiatric diagnoses, and individual-level characteristics (e.g. race, heaviness of smoking) was embellished to include state-level median household income per capita, smoking prevalence, cigarette affordability, and American Lung Association (ALA) scores (that gauge a state’s tobacco control policies) to predict 7-day point prevalence abstinence at end-of-treatment. Results: Quit rates varied across regions (17.9% in the Great Plains to 31.6% in the Four Corners region). Using the Northeast (7-day PPA=23.7%) as the referent, odds of successful quitting were positively associated with being enrolled from the Four Corners [odds ratio (OR)=1.69; 95% confidence interval (CI)=1.08, 2.64], Midwestern (1.45; 95% CI = 1.04, 2.01), and Southern (1.47; 95% CI = 1.05, 2.06) regions. The ALA score was also positively associated with short-term abstinence (1.064 95% CI = 1.02, 1.11). State income levels were negatively correlated with smoking prevalence [-0.0001 and cigarette affordability [-0.47; p=0.0099]; however, these three variables did not significantly affect the stepwise model. Conclusions: Alongside traditional predictors (e.g. pharmacotherapy, race), increased tobacco regulation and policy were associated with increased quit rates among U.S. smokers in the EAGLES trial. Our results may help explain regional differences in cessation outcomes across the U.S.

FUNDING: Pharmaceutical Industry

PAD6-3

HEALTHY PEOPLE 2030 COUNTDOWN: HOW TO ACHIEVE THE 5% SMOKING PREVALENCE TARGET AMONG THE US POPULATION THROUGH STATE CIGARETTE TAX INCREASES

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Smoking causes illnesses among more than 16 million adults and half a million deaths annually in the US. Current national cigarette smoking prevalence is 12.6% with state-level variation from 8.3% in Utah to 23.3% in West Virginia. The pre-existing annual trend in cigarette smoking prevalence isolated from the effect of price changes is -2.7% varying from -14% in Utah to 2.8% in West Virginia. It will take 34 years to reach the Healthy People 2030 target of 5% smoking prevalence at this pace. On average, cigarette smoking prevalence is required to fall -8.8% annually. There is, however, no state-level quantification on policy measures necessary to achieve the target rate of decline. In this paper, a US cigarette tax model is constructed to project how much cigarette tax increase would be required at the state level over 2021-2030 to reduce smoking prevalence to 5% by 2030. The baseline scenario includes state-wise cigarette smoking prevalence in 2020 and price and tax per pack of cigarettes. The state-wise trends in smoking prevalence are determined based on data from the Behavioral Risk Factor Surveillance System over 2011-2018. State level cigarette tax and price data are drawn from the Tax Burden on Tobacco database. The price increases necessary to attain the desired reduction in smoking prevalence to 5% following a linear path over 2021-2030 after adjustment for the pre-existing trend (isolated from the effect of price changes) are determined using the price elasticity of smoking prevalence. The state cigarette excise tax increases required to attain the necessary price increases are determined based on a pooled time-series regression linking cigarette excise tax rates to average cigarette price by state controlling for year fixed-effects. The price elasticity of smoking prevalence is estimated at -0.32. The tax coefficient in the price regression is 1.26 indicating that a $1 tax increase per pack of cigarettes is expected to lead to $1.26 increase in cigarette price per pack. Based on these two parameters, the national average retail price of cigarettes is required to increase more than 5-fold by 2030 from the current level of $6.21 per pack, with the variation of 1.5-fold increase in Idaho to 18-fold increase in West Virginia. The national average tax rate is required to increase 7-fold from the current level of $1.33 per pack to induce this level of price increase, varying from 2-fold in Connecticut from $4.35 to 43-fold in Missouri from $0.17. This requirement stands in sharp contrast with the history of $0.41 increase in tax on average in only 36 occurrences of state cigarettes taxes increases in 50 states and the DC over 2011-2018 (out of 357 year-on-year observations). Cigarette tax policy has fallen behind in mitigating the disease burden of smoking. Tax increases combined with comprehensive tobacco control policy measures can help achieve the 5% smoking prevalence target by 2030.

FUNDING: Unfunded

PAD6-4

OFFERING SMOKING REDUCTION TREATMENT IN VA PRIMARY CARE: A CLINICAL DEMONSTRATION PROJECT

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Introduction: All tobacco users should be offered treatment at every primary care encounter, regardless of whether they are ready to quit. Tobacco treatment targeting smoking reduction (rather than cessation) can increase the reach of tobacco treatment for this population. However, there is a concern that offering smoking reduction as a
treatment option could reduce the number of patients who engage in smoking cessation treatment. The current clinical demonstration project evaluated whether offering smoking reduction treatment in addition to cessation treatment in a primary care setting would increase tobacco treatment reach (i.e., result in a greater number of referrals for smoking treatment relative to offering cessation treatment only). Methods: Clinical pharmacists in U.S. Veteran Health Administration primary care clinics were trained to offer smoking reduction treatment alongside cessation treatment to Veterans who reported smoking during clinical encounters. Those interested in either reduction or cessation treatment were referred to the VA Tobacco Treatment Clinic. We conducted a chart review of 563 Veterans who attended visits for 2 months pre-implementation and 2 months post-implementation of the reduction treatment offer. Results: Approximately 21% of patients attending primary care appointments were current tobacco users. There was not a significant difference in the percent of current tobacco users who were interested in cessation treatment pretreatment (11.6%) and posttreatment (12.9%). However, 5.8% of patients selected smoking reduction treatment during post-implementation phase. As a result, there was a significant increase in overall tobacco treatment engagement from pre- (11.6%) to post-implementation (18.7%). Conclusions: This pilot clinical demonstration project suggests that offering both smoking reduction and smoking cessation treatment in primary care settings is feasible and may increase total tobacco treatment reach without decreasing smoking cessation treatment use. Future studies with comparison control groups are needed to draw stronger conclusions regarding the effect of offering smoking reduction on treatment reach and engagement. Key words: smoking, harm reduction, treatment and intervention. Funding: This research was supported by the U.S. Department of Veterans Affairs (VA), Veterans Health Administration, Office of Research and Development, Clinical Science Research and Development (Merit Review Award I01CX000560-01A1 to J.W.C) and the VA Office of Academic Affiliations (Advanced Fellowship to J.T.K.).

FUNDING: Unfunded; Federal

ASSOCIATIONS OF TOBACCO CIGARETTE USE AND DEPENDENCE WITH SUBSTANCE USE DISORDER TREATMENT OUTCOMES BY SEX/GENDER AND RACE/ETHNICITY

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Significance: People with Substance Use Disorders (SUD) have increased mortality due to more to tobacco than drug-related causes, and have higher rates of tobacco cigarette use than the general population. Yet, there is inconsistent treatment of nicotine dependence across SUD treatment programs when it could improve long-term SUD outcomes. It is unknown how tobacco cigarette use and nicotine dependence may be related to SUD treatment completion within a treatment stay, especially among women and racial/ethnic minorities. The purpose of this study is to examine tobacco cigarette use and nicotine dependence in relation to SUD treatment completion in adult residential and outpatient programs by sex/gender and race/ethnicity. Methods: Participants were clients at Samaritan Daytop Village, a non-profit NYC-based SUD treatment agency. Data collected were from state admissions forms which included demographics, questions on tobacco use, and the Fagerström Test for Nicotine Dependence. Treatment completion status was recorded at end of treatment stay. Results: Clients (N=2855) were ~38 years old (SD=11.74), mostly male (71.9%), typically Black Non-Hispanic (38.8%) or White Non-Hispanic (28.06%) with a primary drug of alcohol (29.74%) or opiates (28.04%). More women (74.68%) than men (73.24%) smoked at admission (p<0.01). White Non-Hispanic adults (80,40%) smoked the most and Other Race Non-Hispanic adults (66.15%) smoked the least. There was no difference in rate of treatment completion by sex/gender or race/ethnicity. Lower rates of treatment completion were associated with cigarette use in men (p<0.01) and Other Race Hispanic adults (p<0.01); association with greater nicotine dependence was nearing significance. An exploratory logistic regression found that those who smoke 0.68 times as likely as those who do not smoke to complete treatment (p<0.01). Conclusion: This study was the first to examine tobacco cigarette use and nicotine dependence with SUD treatment outcomes by sex/gender and race/ethnicity. Findings highlight the prevalence of smoking during SUD treatment for all demographics and importance of concurrent treatment.

FUNDING: Academic Institution

TELEHEALTH OVERCOMES TREATMENT BARRIERS IN A TOBACCO TREATMENT PROGRAM

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Significance: Tobacco users face many barriers to in-person tobacco treatment including distance from a tobacco treatment provider, transportation, scheduling, mobility and illness. In response to COVID-19, health systems across the US began offering greater access to tobacco treatment through telehealth platforms. On March 20, 2020, the Duke Smoking Cessation Program transitioned from 100% in-person visits to 100% telemedicine visits. Methods: We conducted an observational study on patient outcomes from patients who received treatment at the Duke Smoking Cessation Program before and after the transition to telehealth-based treatment. The abrupt and complete transition offered a unique opportunity to compare in-person and telehealth outcomes. Data on patient outcomes were compared between two six-month periods - pre-telehealth implementation (April 1 - September 30, 2019) and post-telehealth implementation (April 1 - September 30, 2020). Results: Our sample showed no significant differences between groups on key baseline variables including age, gender, race, ethnicity, education, cigarettes per day, or nicotine dependence. Over the 6-month in-person period, there were 1,161 patient encounters; over the post-telehealth period there were 2,617 patient encounters, a 225% increase. In comparison to the same 6-month period 1 year prior, this increase was significant (p = 0.02). Conclusions: Observational data from the Duke Smoking Cessation Program shows that telehealth may increase access to clinical tobacco treatment services compared to in-person treatment. Data comparing smoking abstinence rates, cancellation and no show rates, follow up visit rates, treatment barriers and patient satisfaction are discussed.

FUNDING: Unfunded

CANNABIS AND TOBACCO USE AMONG PATIENTS IN PRIMARY CARE CLINICS IN A LARGE, URBAN HEALTHCARE SYSTEM IN CALIFORNIA

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Significance. To describe the prevalence and clinical correlates of tobacco, cannabis, and tobacco and cannabis co-use among patients attending primary care (PC) clinics in a large urban healthcare system in Los Angeles, CA, after legalization of recreational cannabis use. Methods. We used electronic health record (EHR) data from patients seen at one of over 60 PC clinics. Records were eligible for inclusion in this analysis if the patient was ≥ 18 years of age and had an annual physical examination between July 2019 and May 2020. Tobacco and cannabis use was assessed by clinical staff and patients were asked about their smoking status and cannabis use. We also used the EHR to collect information on sociodemographic and clinical characteristics including current diagnoses and comorbidities. Results. 98,752 patients were included in the analysis: median age 49 years (range: 18-104), 56% female; 60% identified as white/Caucasian, 12% Asian, 11% and Hispanic/Latinx. Current cannabis use was reported by 13% (n=10,540), 5% (n=4,735) were current smokers, and 21% (n=20,854) were former smokers. Cannabis and tobacco co-use was reported by 1.7% (n=1,440). Cannabis and tobacco co-users had a higher prevalence of mental health diagnoses including anxiety, depression, and sleep disorders compared to tobacco only users (39% vs. 33%; p value<0.01). However, tobacco only users were more likely to have a diagnosis of cardiovascular diseases including coronary artery disease, myocardial infarction, and hypertension compared to cannabis and tobacco co-users (47% vs. 27%; p value<0.01). After adjusting for age, sex, and former smoking status, cannabis and tobacco co-users had a reduced odds of cardiovascular diseases (AOR=0.7; 95% CI 0.6-0.9) compared to tobacco only users. Adjusting for the same factors, cannabis and tobacco co-users had an increased odds of mental health diagnoses (AOR=1.5; 95% CI 1.3-1.7) compared to tobacco only users. Conclusion. The prevalence of cannabis use in adults in PC is high and a non-trivial proportion report co-use with tobacco. Patients may benefit from routine PC screening and brief advice regarding cannabis use, in addition to tobacco use.

FUNDING: State
RR-1

POTENTIAL FACTORS AFFECTING FREE BASE NICOTINE IN e-CIGARETTE AEROSOL

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Significance: Nicotine delivery from e-cigarettes is partially affected by the source of nicotine (i.e., nicotine salts, flavors, PG:VG ratio, and battery power. Whether these factors also affect the protonation of nicotine in e-cigarette aerosol is yet to be determined. This study focuses on systematic manipulation of flavors, PG:VG ratios, battery power outputs, and nicotine compound types to determine free base nicotine yield in the aerosol. Methods: An aerosol generating model was developed using a syringe pump based vaping machine and validated using N81 CORESTA guidelines. Unflavored control e-liquids of five pHs (4-11) with nicotine concentration of about 50 mg/mL were used to determine the total nicotine entrapment efficiency on a Cambridge filter. Using \( n = 10 \) puffs and a 0.2 Ω coil, nicotine was collected on the filter. To quantify yield of pre and post vaporization free base nicotine, three flavors, two battery powers, and three nicotine compounds were tested using the Henderson Hasselbalch method of the dilution approach. Results: Filter entrapment efficiency of nicotine was 97.88 ± 1.55%. The model passed CORESTA criteria with a standard square puff profile, puff duration of 3.00 s, and puff volume of 55.16 ± 0.3 mL. Free base nicotine yield of the aerosol was dependent on flavor (ANOVA, \( p < 0.05 \)) and nicotine source. For pure nicotine with a PG:VG ratio 0:100 v/v, free base nicotine yield was significantly decreased from 92.73 to 79.88% at 120 W battery power (t-test, \( p < 0.05 \)). In the case of nicotine salicylate, degradation of salicylic acid was observed resulting in phenol generation with increased higher power settings. Nicotine benzoate did not show changes in free base nicotine yield at different powers, flavors or PG:VG ratios. Future studies will be carried out for quantitative analysis on nicotine salicylate degradation into phenol generation. Funding Statement: The study is supported by Virginia Youth Tobacco Projects Small Grants Program for research funding and the Central Virginia Center on Drug Abuse Research, NIDA, (2P30DA033934-06). The content is solely the responsibility of the authors and does not necessarily represent the views of the NIH or the FDA.

FUNDING: Federal; State; Nonprofit grant funding entity

RR-2

MICROSTRUCTURAL MEAL PATTERN ANALYSIS REVEALS A PARADOXICAL ANORECTIC EFFECT OF ACUTE NICOTINE DESPITE ITS LONG TERM ANOREXIGENIC EFFECTS

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Significance: Chronic exposure to nicotine in humans and nonhuman animals reduces body weight and food intake in hours and days after initiation of exposure. The current dogma is that activation of nicotinic receptors produces nicotine’s anorectic properties, and with nicotine’s rapid pharmacokinetic profile, it should produce a robust decrease in hunger or caloric intake in seconds to minutes. However, studies to date have not evaluated the effects of nicotine on feeding in the seconds to minutes after nicotine exposure. We used two different rat models of nicotine intake to test the hypothesis that nicotine will produce an acute decrease in feeding behavior, similar to its long-term effects. Methods: Self-administration: Wistar rats were trained to self-administer nicotine or saline through intravenous jugular catheters. Microstructural (seconds-minutes) changes in feeding and drinking behavior were analyzed following self-administration and passive administration. Macrostructural (hours-days) analyses measured long-term changes in feeding, drinking, and weight gain. Osmostic minipump: Wistar rats were implanted with osmostic minipumps containing 1 mg/kg/day nicotine. Before and after implantation, rats were subcutaneously injected with nicotine or saline. Microstructural and macrostructural changes in feeding and drinking behavior were analyzed. Results: Contrary to our hypothesis, we found that nicotine self-administration increased feeding and drinking behaviors within 10 min of intake. This effect was seen following passive administration of nicotine, but not active or passive administration of saline. Minipump model analysis revealed that this nicotine-specific effect was seen in dependent, but not non-dependent, animals. Conclusions: Our findings show that although nicotine decreases food intake and body weight gain over chronic use, acute nicotine intake produces a short-term increase in food and water intake. These behaviors are specific to nicotine-dependent animals, thus suggesting nicotine may alter both physiology and neurocircuitry to evoke the behavior. Future studies will aim to identify the mechanisms driving this phenomenon.

FUNDING: Federal; State

RR-3

MINDFULNESS FOR COPING WITH SMOKING URGES MOTIVATED BY NEGATIVE AFFECT

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Significance: Difficulties regulating negative affect (NA) are significantly associated with increased urge to smoke cigarettes and smoking relapse. Mindfulness meditation is a practice shown to help individuals effectively manage NA. The present study utilized a brief mindfulness intervention in a sample of college smokers and predicted that those in the mindfulness group would better manage NA and report lower urge to smoke after undergoing the mindfulness group intervention, as compared to those participants in the control intervention. Methods: Participants (N = 52) were college smokers who reported high negative affect reduction smoking expectancies. They completed the Mindful Attention and Negative Affect Scale (MANAS), Toronto Multidimensional Scale, and urine to smoke. They were randomly assigned to a mindfulness intervention (n = 24) or a control intervention (n = 28). Participants in the mindfulness condition listened to a 10-minute guided meditation. Control participants completed a word search puzzle for 10 minutes. All participants then completed the PANAS, TMS, and smoking urge question. Next, participants underwent a NA mood induction. Participants were then administered the PANAS, and smoking urge question. Results: Participants were 46% male, 85.5% Caucasian and 3.8% African American, with an average age of 19.3 (SD = 1.5). Forty-six percent were daily smokers, with a mean daily smoking rate of 6.0 (SD = 3.4) cigarettes per day, and FTND of 1.9 (SD = 1.9). The other 54% of participants were nondaily smokers, and mean breath carbon monoxide (CO) level was 2.7 (SD = 3.2) ppm. Urge to smoke was lower post-intervention among the mindfulness group as compared to the control group, \( p = .017 \). Mindfulness participants showed lower increase in NA following the NA mood induction. Post-NA induction smoking urge did not differ significantly between groups. Conclusions: Brief mindfulness interventions may assist smokers in dealing with smoking urges and NA. Future studies should determine what facets of mindfulness predict smoking urge and NA reduction, as well as better define the association between these variables among smokers.

FUNDING: Unfunded; State; Academic Institution

RR-4

DYNAMIC METHYLOME MODIFICATION ASSOCIATED WITH MUTATIONAL SIGNATURES IN AGEING AND NICOTINE USE IN ETIOLOGY OF DISEASE

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Significance: Epigenetic markers and reversible change in the loci of genes that regulate critical cell processes, has recently emerged as important biomarker in the study disease pathologies. The hierarchy of epigenetic changes that accompany environmental exposure like smoking in population datasets in the context of population health risk is not clearly elucidated. We used the data from the unique endogamous Zoroastrian Parsi community of India, who display comparably decreased incidence of lung cancer compared to the rest of the Indian population and practice a faith, Zoroastrianism that proscribes smoking, making the population data unique in the context of investigating aging and smoking induced epigenetic transformation. Methods: We have completed the whole genome methylation analysis in current and retrospective Parsi non-smoking subject collected between an interval of 12 years (ZPMetG-HV2a-1A, ZPMetG-HV2a-1B) using Grid-iron Nanopore sequencer to get 15X genome coverage overall. Methylation analysis of the whole genome was performed with Hg19 reference and we are presently comparing the key variations in known CpG islands, mutational signatures, and its interplay in the etiology of ageing and associated disorders. Results: Our analysis showed total of 23022542 methylation sites (CpGos) in ZPMetG-HV2a-1A and ZPMetG-HV2a-1B respectively. Comparative Methylation Analysis between ZPMetG-HV2a-1A, ZPMetG-HV2a-1B indicated 103 genes that consist of significant Variable Methylated Regions

FUNDING: Federal; State
ash is formed. The yields of CO, NO, and NOx as the tobacco was cooled by the air drawn through it, indicating that no combustion was occurring. The maximum temperature of 327°C, which is well below the temperature necessary for combustion, demonstrated that oxygen does not play an important role in the HTP. Chemical analysis of a selection of compounds was also performed for the new tobacco products that are grandfathered or currently have FDA market authorization. In conclusion, levels of HPHCs in LUCY suggests negligible toxicological concern for consumers when compared to other oral tobacco products, including an oral nicotine replacement therapy (NRT) product. Additionally, a toxicological risk assessment was conducted for all quantifiable nicotine-related HPHCs, with an estimated daily exposure assumption of 100% bioavailability from a maximum use of 24 pieces/day. Results show that LUCY contains nicotine levels similar to nicotine polacrilex (NRT) gum (4 mg) and similar HPHC levels. Measured HPHCs were either absent or significantly reduced when compared to other oral tobacco products. When compared to established regulatory values, estimated daily exposure to each of the quantifiable HPHCs was below the established lifetime regulatory limit for each analyte. In conclusion, levels of HPHC in LUCY suggests negligible toxicological concern for lifetime exposure and are similar to, or lower than, HPHC levels of smokeless tobacco products that are grandfathered or currently have FDA market authorization.

FUNDING: Tobacco Industry

RR-6

NICOTINE, RISK AND SAFETY FACTORS, ASYSTEMATIC REVIEW OF PRECLINICAL STUDIES OF ITS TOXICOLOGY


Nicotine is an organic compound, mainly found in the tobacco plant (Nicotiana tabacum) although it is also found in other plants of the solanaceae family. More than 20 metabolites of nicotine have been identified, they are less active. Free and combined nicotine have been considered toxic. There are conflicting clinical reports on the safety and risks of nicotine, however, most cases refer to the delivery of nicotine through the smoke produced by burning cigarettes. We conducted a systematic review (1990 to 2019) that focused on searching, collecting, and analyzing published data, using the Preferred Reporting Items for Systematic Review and Meta-Analysis Protocols (PRISMA-P) questionnaires and methods, in toxicological studies in animals, in vitro, in culture, cellular arrays, and computer models, with the aim of analyzing and organizing the scientific basis of knowledge on toxicity, evaluating the consistency of the designs used, strength of each methodology, model applied for data collection and treatment, as well as reproducibility of results. From the general review process of the different databases, we obtained 706 articles. After reviewing the titles with the defined inclusion and exclusion criteria, 264 articles were left and 61 of them after the critical reading of the abstract. A first general reading of the selected articles included 25 articles, which were analyzed according to the defined criteria so that in the end 14 articles were included. In this review, we found consistency in the results, especially in the theoretical framework from which derives its analysis and discussion. The response in different arrangements seems contradictory because while in some cases there is evidence of proliferative effects for certain types of cells, in other (under similar conditions, in different organisms or markers), the effect is totally opposite or even, inhibition is reported. We also found reports related to drug interactions with products of cytotoxic action or cellular protection actions of antineoplastic cytotoxicity. On the other hand, the toxicopharmacological effects and their molecular behavior are clear and are reinforced by the studies that have been carried out and mentioned, linked to doses, time of exposure, and combinations. Finally, we highlight that there is not an adequate characterization on the safety levels about nicotine properties since most studies are related to the side effects of smoking and the exposition to tobacco smoke, which has obstructed a scientific analysis focused on the molecule.

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RR-7

CHARACTERIZATION OF CHEW AND PARK ORAL TOBACCO-DERIVED NICOTINE PRODUCTS

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LUCY is a noncombustible oral gum-like product that contains tobacco-derived nicotine and is intended for, and marketed to, adult tobacco consumers for non-therapeutic use. LUCY therefore meets the definition of a tobacco product as set forth in the FD&C Act and is regulated by the FDA Center for Tobacco Products. In preparation for a premarket tobacco application, we measured the FDA-established HPHCs for smokeless tobacco in LUCY and compared the results to other commercially available oral tobacco products, including an oral nicotine replacement therapy (NRT) product. Additionally, a toxicological risk assessment was conducted for all quantifiable nicotine-related HPHCs, with an estimated daily exposure assumption of 100% bioavailability from a maximum use of 24 pieces/day. Results show that LUCY contains nicotine levels similar to nicotine polacrilex (NRT) gum (4 mg) and similar HPHC levels. Measured HPHCs were either absent or significantly reduced when compared to other oral tobacco products. When compared to established regulatory values, estimated daily exposure to each of the quantifiable HPHCs was below the established lifetime regulatory limit for each analyte. In conclusion, levels of HPHC in LUCY suggests negligible toxicological concern for lifetime exposure and are similar to, or lower than, HPHC levels of smokeless tobacco products that are grandfathered or currently have FDA market authorization.

FUNDING: Other

RR-8

E-CIGARETTE AEROSOL INCREASES MITOCHONDRIAL BIOGENESIS IN ORAL EPITHELIAL CELLS

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Significance: Mitochondrial dysfunction and altered cellular oxidative stress are associated with a wide range of disorders. Mitochondrial DNA (mtDNA) copy number is considered a biomarker of mitochondrial dysfunction. Recently, we reported that e-cigarette aerosols increase reactive oxygen species and oxidative DNA damage and reduces total antioxidant capacity and DNA repair in the oral epithelial cells. E-cigarettes use skyrocked among US teens and adults, yet its health consequences are unclear. Herein, we assessed the effects of e-cigarette use on mitochondrial mass and DNA damage. Aims: (1) To measure mtDNA damage in e-cigarette users’ oral epithelial cells. (2) To determine the effect of e-cigarette aerosol exposure on mtDNA damage and copy number in cultured oral mucosal cells. Methods: Upon ethical committee approval, we collected oral epithelial cells for e-cigarette users before and after a 2 h ad libitum vaping session. Cultured oral epithelial cells (POE9n) were exposed for 2 h to e-cigarette aerosol extracts (~30 ng/ml nicotine), to mimic the clinical setting; samples were collected before, after 2 h exposure, and 30 minutes post-exposure. Genomic DNA was extracted, mtDNA damage and relative mitochondrial copy number were quantified as previously described. Data were analyzed by student t-test. Results: 10 out of 12 e-cig users showed a decrease in mtDNA damage in oral epithelial cells after 2 h of vaping compared with respective participants before vaping (p<0.001). In vitro,
e-cigarette aerosol exposed POE9n cells also exhibit a decrease in mtDNA damage after 2h treatment and at 30 minutes (p<0.05) post-exposure. There was a significant increase (p<0.01) in mitochondrial copy number after 2 h of exposure and at 30 min post-exposure. **Conclusion:** Our data reveal for the first time that e-cigarette aerosol exposure decreases overall mtDNA damage levels. In-vitro data suggest that an increase in mitochondrial biogenesis accounts for the observed decrease in mtDNA damage. Further studies are warranted to fully understand the impact of e-cigarette use in mitochondrial biogenesis and the health implications of these findings.

**FUNDING:** Federal; Academic Institution

**RR-10**

**CHANGES IN BIOMARKERS OF CIGARETTE-SMOKE-RELATED TOXICANTS AFTER 6 DAYS OF SWITCHING EXCLUSIVELY OR PARTIALLY TO THE JUUL SYSTEM IN TWO NICOTINE CONCENTRATIONS AMONG ADULT SMOKERS**

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**OBJECTIVE:** Evidence suggests that cigarette smokers who switch to electronic nicotine delivery systems (ENDS) reduce their exposure to harmful toxicants and carcinogens. It is unclear if concurrent use of ENDS and cigarettes (dual use) is associated with decreases in exposure to toxicants. **METHODS:** This parallel-group confinement study assessed changes in biomarkers of exposure (BOEs) over six days among 279 healthy adult smokers who were randomized into 1 of 11 study groups: eight JUUL-brand ENDS ("JUUL") groups (4 flavors [Virginia Tobacco, Menthol, Mint, Mango] × 2 nicotine concentrations [5.0% or 3.0% by weight]); one Dual Use group used JUUL (5.0% nicotine; preferred flavor) and smoked ≤50% usual brand (UB) cigarettes/day; one UB Cigarette group; and one group abstained from all tobacco/nicotine product use (Abstinence group). Urine and blood analysis assessed changes in primary BOE endpoints (NNAL, PA, CEM, 1-OHP, Otoluidine, 2-NA, 4-ABP) and urine nicotine equivalents. **RESULTS:** Median percent reductions in primary BOEs (Day 6-Baseline) ranged from 62% to 96% (p<0.001); all reductions were significantly greater than those in the UB Cigarette group (p<0.05), and there were no significant differences between JUUL groups and Abstinence group. When all eight JUUL groups were aggregated, reductions in all five primary BOEs ranged from 65% to 94% of baseline values. Median reductions (Day 6-Baseline) in the Dual Use group were intermediate between the Abstinence and UB Cigarette groups, ranging from 31% to 47%. Similar results were observed for secondary BOEs. Changes in urine nicotine equivalents did not significantly differ between the JUUL 5.0% (aggregated across flavors) and UB Cigarette groups; nicotine equivalents were significantly reduced in the JUUL 3.0% group (across flavors). **CONCLUSIONS:** This study suggests that use of JUUL as a complete or partial substitute for combustible cigarettes substantially reduces exposure to multiple toxicants associated with cigarette smoking. Additionally, the data suggest that dual use of cigarettes and JUUL with a ≥50% decrease in cigarette consumption can substantially reduce toxicant exposure.

**FUNDING:** Nonprofit grant funding entity

**RR-11**

**VIEWS ABOUT INTEGRATING SMOKELESSSMOKING CESSATION TREATMENT WITHIN PSYCHOLOGICAL SERVICES FOR PATIENTS WITH COMMON MENTAL ILLNESS A MULTI-PERSPECTIVE QUALITATIVE STUDY**

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Background: Smoking rates are significantly higher in people with mental illness compared to those without. Negative attitudes towards smoking cessation are widespread in inpatient settings towards patients with severe mental illness. It is not clear if the same attitudes operate in outpatient psychological services towards people with common mental illness. Objective: To understand stakeholders’ views about integrating smoking cessation treatment into outpatient psychological services for common mental illness. Design: Qualitative in-depth interviews, with thematic analysis. Participants: 11 psychological wellbeing practitioners (PWPAs), six Improving Access to Psychological Therapies (IAPT) patients, and six stop smoking advisors were recruited from IAPT and smoking cessation services in England. Results: Patients reported psychological benefits from smoking, but also described smoking as a form of therapeutic self-harm. Stop smoking advisors displayed therapeutic pessimism and stigmatising attitudes towards helping people with mental illness to quit. PWPs have positive attitudes towards smoking cessation treatment for people with common mental illness. PWPs and patients accept evidence that smoking tobacco may harm mental health, and quitting might benefit mental health. PWPs report expertise in helping people with common mental illness to make behavioural changes in the face of mood disturbances and poor motivation. **Conclusion:** PWPs felt confident to offer smoking cessation treatments to patients but suggested a caseload reduction may be required to deliver smoking cessation support. Conclusions: IAPT appears to be a natural environment for smoking cessation intervention; however, there may be service-level barriers. Integration of smoking cessation into IAPT services should be tested in a pilot and feasibility study. Patient or public contribution: Service users and members of the public were involved in study design and interpretation of data.

**FUNDING:** Nonprofit grant funding entity; Other

**RR-12**

**THE IMPACT OF SMOKING CESSATION INTERVENTIONS AS PART OF STROKE SECONDARY PREVENTION ON SMOKING CESSATION OUTCOMES: A SYSTEMATIC REVIEW**

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**Introduction** Smoking is a major risk factor for a multitude of acute and chronic conditions. The links between smoking and the incidence of stroke are well established. This review aims to assess the effectiveness of smoking cessation interventions as part of stroke secondary prevention on individuals who have suffered a stroke, and thus the impact on smoking cessation outcomes. **Methodology** The protocol for this review was registered on the PROSPERO database (CRD42020173578) and followed the ‘Preferred reporting system for Systematic Reviews and Meta-Analyses’ (PRISMA), (Moher et al. 2009). Four databases, (CINAHL 1981 - 23rd April 2020; Embase 1974 - 23rd April 2020; Medline 1946 - 23rd April 2020 and psycINFO 1866 - 23rd April 2020), were searched using the ‘PICO’ facet analysis. The terms used by the Cochrane Tobacco Addiction Group and within the Cochrane Tobacco Addiction Group Specialised Register formed the structural basis of the search. Analysis of the data was completed by means of a narrative synthesis and meta-analysis using the RevMan software. A ‘random effects’ model was chosen due to the high level of heterogeneity between the studies. Three individual meta-analyses were performed, grouping studies together according to follow-up interval. Sub-group analysis was performed to contrast the effectiveness of multi-modal interventions versus those which exclusively targeted smoking cessation. **Results** A total of 767 records were identified through the database and hand search. After screening, six studies met the inclusion criteria. A meta-analysis was performed on the smoking-cessation outcomes at 12 months, 24 months, and at the longest common follow-up; the results of which displayed a high level of heterogeneity between the studies, and no overall statistical significance. However, a subgroup analysis comparing smoking-cessation outcomes from ‘multi-modal’ interventions, versus those which focussed exclusively on smoking-cessation, suggested that the latter was more effective. The pooled risk ratio (RR) for abstinence was 1.17 (95% confidence interval, CI, 0.81 to 1.7); four studies, 1032 participants) for multi-modal interventions, and 1.91 (95% CI, 0.9 to 1.84; two studies, 141 participants), for interventions that focussed exclusively on smoking cessation. **Discussion** Whilst the results in their entirety were not of statistical significance, interventions which only addressed smoking cessation, were found to be more clinically effective than those which considered other stroke risk factors simultaneously. As per previous study findings, educative approaches to smoking-cessation were found to be largely ineffective, as well as interventions conducted by non-specialist healthcare professionals. This review therefore recommends further research to include large scale smoking-cessation-only interventions, with biochemical validation of results.

**FUNDING:** Nonprofit grant funding entity; Other

**RR-13**

**INFLUENCE OF CRAVING AND MOOD ON E-CIGARETTE, COMBUSTIBLE TOBACCO PRODUCT, AND DUAL USE AMONG YOUNG ADULTS: RESULTS FROM A PILOT STUDY**

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**Significance:** Cigarette smoking has been shown to be correlated with subjective factors such as craving and negative affect (NA). It is largely unknown if these same factors
trigger e-cigarette or dual use episodes among young adults who use both e-cigarettes and combustible tobacco products. This pilot ecological momentary assessment (EMA) study explored whether young adults’ ratings of subjective factors differed between discrete episodes of using e-cigarettes only (EC) or combustible tobacco products only (CT; cigs, cigars, cigarillos, hookah), as compared to using both e-cigarette and combustible tobacco products (DU; dual use). Methods: Young adults ages 18-30 years (n=29, 15 men/14 women, mean age 22.9, SD=3.4) who used e-cigs and 1+ combustible tobacco product at least once weekly completed a 1-week smartphone-based EMA study. Participants completed random prompts twice/day assessing past-15-minute use of specific tobacco products, ratings of craving and NA (via the International Positive and Negative Affect Schedule Short Form). Mixed modeling was used to identify whether unique factors characterize single use episodes (i.e., EC and CT) relative to DU episodes. Predictors independently associated with episode type were included in a full model. All models were adjusted for timing of the assessment (i.e., weekend, time of day, day of week), sex, age, baseline Fagerstrom Test for Nicotine Dependence scores and education level. Results: Higher craving was associated with lower odds of CT vs. DU (between-subject aOR 0.07; 95% CI (0.01-0.50); within subject aOR 0.41; 95% CI (0.18-0.92)). There was a significant between-subject effect of NA such that individuals with higher NA had greater odds of EC vs. DU episodes (aOR 1.27 95% CI (1.02-1.56)) and CT vs. DU episodes (aOR 1.24; 95% CI (1.06-1.47)). Conclusions: This pilot data suggests that unique subjective factors characterize single product vs. dual use episodes among young adults. NA is higher among those using EC and CT only relative to DU. Further research is needed to replicate and further characterize these effects to inform tobacco cessation intervention efforts.

FUNDING: Federal

RR-15

HEALTH RISK SMOKING EXPECTANCIES PREDICT READINESS TO QUIT SMOKING AMONG ADULT MALE SUBSTANCE USERS CURRENTLY IN SUBSTANCE USE TREATMENT

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Significance: Over the past several decades smoking rates have significantly decreased in the general population. However, subgroups of smokers, such as those actively using other substances and those in substance use treatment have been identified as smoking at disproportionately high rates. Identifying predictors of readiness to quit smoking in smokers engaged in substance use treatment is essential in order to determine relevant factors to address in cessation interventions tailored for this population. Health risk smoking expectancies, the anticipated health consequences of smoking, have been found to be associated with motivation to quit smoking and may serve as a predictor for readiness to quit smoking in this treatment population. Methods: The current study examined the relationship between health risk smoking expectancies and readiness to quit smoking among adult male smokers entering substance use treatment. Upon entry to substance use treatment participants completed self-report measures of health risk smoking expectancies and readiness to quit smoking as well as a biochemical assessment to confirm smoking status. Results: Participants (N=51) were predominantly Caucasian (n = 96.1%) adult, male smokers recently admitted to substance use treatment. A majority of participants reported daily smoking (n = 90.2%) and overall, participants reported smoking on average 15.8 (SD = 8.1) cigarettes per day. Five participants were excluded from outcome analyses due to missing data. Health risk smoking expectancies explained a significant amount of variance in readiness to quit smoking, F(1, 44) = 8.61, p = .005, R² = 16.4%. A linear regression revealed health risk smoking expectancies significantly predicted readiness to quit smoking (β = 0.465, p = 0.005). Conclusions: Results provide important information in the development of cessation interventions for smokers in substance use treatment. Cessation intervention targeting smokers entering substance use treatment should include a component to augment health risk smoking expectancies to increase readiness to quit smoking.

FUNDING: Academic Institution

RR-16

THETA OSCILLATORY FEEDBACK DYNAMICS - LINKS TO BODY MASS INDEX AND WEIGHT LOSS SMOKING MOTIVES IN ADOLESCENT DAILY CIGARETTE SMOKERS

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Objectives: Cigarette smoking and body weight are related, and the neurobehavioral basis for this relationship is poorly understood. Smoking and overeating may activate common reward pathways, driving co-occurrence. Alternately, some smokers use tobacco to lose weight. To explore these possibilities, we examined relationships between body mass index (BMI), taste and weight loss smoking motives, and mediofrontal event-related oscillations (EROs) in the 4-8 Hz theta frequency band elicited during feedback processing in adolescent (age 13-21 years) smokers. Methods: Using high-density EEG (128 electrode system, 1000 Hz sampling) and a non-learning 4-choice guessing task, ERO data including event related spectral perturbations (ERSPs [power]) and intertrial phase coherence (ITC) were collected during the 200-350 millisecond post-feedback time window following receipt of monetary reward, neutral, and loss feedback. The sample included N=65 adolescents (mean age = 17.7±1.3, 35% female, mean BMI = 24.4±5.2) with 36 daily cigarette smokers and 29 matched healthy controls (HCs). Repeated measures ANOVAs with Greenhouse-Geisser corrections were used to examine relationships between BMI z-scores (age/sex referenced to U.S. population data), taste and weight loss cigarette smoking motives (assessed using the Wisconsin Inventory of Smoking Dependence Motives [WISDM]) and theta ITC across feedback conditions (n’s = 28 to -33, all p’s < 0.05). Among smokers, an interaction effect for weight loss motives x condition on theta ITC (F = 5.1, p = 0.01) was observed. Conclusions: Together these findings provide preliminary evidence for relationships between feedback-related
RR-17
IMPLEMENTATION OF ELECTRONIC QUITLINE REFERRALS IN AN ADULT URGENT CARE
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Significance: Electronic health record (EHR) tools to promote electronic referrals to the state tobacco quitline were not available for an adult urgent care setting. The purpose of this quality improvement project is to implement electronic referrals via a clinical decision support (CDS) tool and a best practice advisory (BPA) for currently smoking urgent care patients. Methods: A CDS tool to order electronic referrals was implemented in the EHR with a BPA triggered by documented current tobacco use. Medical assistants received training to encourage compliance with tobacco use screening. Providers received training and resources on the use of the CDS tool and BPA to order electronic referrals. Screening and referral rates were tracked via EHR data. Quitline patient contact and enrollment data were collected via EHR results reported by state tobacco quitline. Results: The median tobacco use screening rate was 67% of patients prior to the medical assistant training. For the two months following the training, the median screening rate was 70%. Before the implementation of the CDS tool and BPA, no patients received electronic quitline referrals. For the month following implementation, 6% of screened current smokers received electronic referrals. Conclusions: The availability of a CDS tool and BPA made ordering electronic referrals fast and simple for clinicians. Electronic referrals can provide a quick tool for assisting urgent care patients with smoking cessation. However, electronic quitline referrals for urgent care patients may be limited by tobacco use screening, competing provider demands, and patient interest.

FUNDING: Federal; Nonprofit grant funding entity

RR-18
ACCEPTABILITY AND PUFF TOPOGRAPHY OF E-CIGARETTES AND HEAT-NOT-BURN PRODUCTS RELATIVE TO CIGARETTES AMONG AFRICAN AMERICAN SMOKERS
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Background: Electronic cigarette (ECs) and heat-not-burn (HNB) products are likely less harmful than combustible cigarettes. While use of these products proliferates, little is known about the acceptability of EC and HNB products among African American (AA) smokers who bear a disproportionate burden of smoking-related morbidity and mortality. Methods: Nine adult AA cigarette smokers completed three in-laboratory smoking/vaping sessions in a randomized crossover design. Participants completed three 60-minute ad libitum sessions (usual brand cigarette [UBC], JUUL EC, IQOS HNB device. Results: A CDS tool to order electronic referrals was implemented in the EHR with a BPA triggered by documented current tobacco use. Medical assistants received training to encourage compliance with tobacco use screening. Providers received training and resources on the use of the CDS tool and BPA to order electronic referrals. Screening and referral rates were tracked via EHR data. Quitline patient contact and enrollment data were collected via EHR results reported by state tobacco quitline. Results: The median tobacco use screening rate was 67% of patients prior to the medical assistant training. For the two months following the training, the median screening rate was 70%. Before the implementation of the CDS tool and BPA, no patients received electronic quitline referrals. For the month following implementation, 6% of screened current smokers received electronic referrals. Conclusions: The availability of a CDS tool and BPA made ordering electronic referrals fast and simple for clinicians. Electronic referrals can provide a quick tool for assisting urgent care patients with smoking cessation. However, electronic quitline referrals for urgent care patients may be limited by tobacco use screening, competing provider demands, and patient interest.

FUNDING: Federal

RR-19
TOBACCO USE IN ALCOHOL DEPENDENT PATIENTS
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Significance: A significant association exists between alcohol and tobacco misuse. People who drink and smoke are at higher risk for certain types of cancer, particularly those of the mouth and throat and both are major risk factors for various forms of cardiovascular disease. Hence, the present study aimed to examine the pattern of tobacco use (smoking/smokeless/dual tobacco use) in alcohol dependent users and to study the dose response relationship between tobacco and alcohol dependence with a view to plan treatment intervention. Methods: This was a cross-sectional observational study conducted in a tertiary care drug dependence treatment center. Alcohol dependent males (n=150) in the range of 18-65 years were enrolled in the study. History of alcohol, nicotine use and any other psychoactive substances was collected in a semi-structured format, alcohol dependence was assessed by Severity of alcohol dependence questionnaire (SADQ), nicotine dependence on smoking and smokeless tobacco was measured using FTDN & FTND-ST respectively. Results: The mean age of 150 participants was 39.2 (SD 8.1) years. Most participants were married(n=113, 75.3%), educated (n=140, 93.3%) and employed(n=135,90%) Most were using nicotine through smoking (n=58, 38.7%) or were dual users ( were using smoking and smokeless tobacco together (n=54, 36%)}. 38 participants (25.3%) were smokeless tobacco users only. The mean number of bids/cigarettes and smokeless tobacco packets taken per day was 12.7 (SD 10) and 6.0 (SD 4.0) respectively. The mean and median value of FTND and FTND-ST scores were 5 (IQR 3.5) and 6.6 (SD 2.1) respectively. A significant positive correlation was observed between severity of alcohol use and both, severity of smokeless tobacco use (r = .31, p value=.003) and quantity of bids smoked. Conclusion: Tobacco use was associated in varied patterns with alcohol use, most commonly by smoking and there were significant associations between severity of alcohol dependence with smokeless tobacco dependence severity and quantity of smoking. It is important to address the use of both to offset the serious health consequences.

FUNDING: Federal

RR-20
EXPLORING BARRIERS AND FACILITATORS OF TOBACCO TREATMENT APPOINTMENTS AMONG CANCER PATIENTS
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As part of the National Cancer Institute Moonshot™ program, we implemented an “opt-out” referral system that automatically refers cancer patients who use tobacco to the Mayo Clinic Nicotine Dependence Center (NDC). For those patients who were scheduled via this process for a NDC appointment but did not complete their appointment, our objective was to determine why they did not. A brief survey was mailed to patients with scheduled TTS appointments who did not attend their appointments. A total of 254 surveys were mailed; 40 (16%) were completed. Of the 40, 14 (37%) agreed that visiting NDC would be useful even if they were not ready to quit using tobacco and 10 (28%) agreed they would be more likely to keep appointment if their cancer doctor told them it was important. 18 (47%) agreed they would be more likely to talk with a specialist if they could do it by phone rather than in-person. 23 (64%) disagreed that the cost of the appointment played a significant role in their decision not to attend the NDC appointment, and 13 (36%) patients admitted not keep the appointment because they were overwhelmed with everything else that is going on with cancer treatment. 27 (68%) wanted staff to verify availability prior to scheduling NDC appointments. Although interpretation of these findings is limited by the low response rate, factors identified in this survey that are amenable to change include increasing the ability to schedule appointments at convenient times, ensuring that patients know about their scheduled appointments, and promoting phone consultations as an option. Many cancer patients are open to considering tobacco treatment appointments, but further work is needed to increase the rate at which cancer patients scheduled for NDC appointments attend these appointments.

FUNDING: Nonprofit grant funding entity
E-CIGARETTE USE DOCUMENTATION OPTIMIZATION IN AN ELECTRONIC HEALTH RECORD

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Electronic cigarette (e-cigarette) use in the US has increased substantially; the long term health effects of regular use remain unknown. Information collected from electronic health records (EHRs) could help establish pathways to conduct robust research investigations and generate evidence-based information to advance our understanding about the use of these devices as well as facilitate better care for patients that vape. However, current EHRs have very limited capabilities to collect structured data regarding e-cigarette use. The purpose of this work was to optimize the social history section of an EHR (Epic) to capture structure data regarding e-cigarette use by patients. Design considerations included 1) providing a location for e-cigarette and vaping information that is distinct from other types of tobacco use information, and 2) appropriately classifying the different e-cigarette and vaping devices. After the new section was implemented in the Mayo Clinic EHR, a large health system that serves >1.5 million patients annually, all responses from Sep 29, 2019 to October 25, 2020 for ambulatory visits were analyzed. Minimal clinician education accompanied implementation. During this period, information was entered into the new section for 72,635 unique patients (62% female). However, as 879,597 unique patients had at least one ambulatory visit over this period, this represented only 8.25% of all patients who could have had this information recorded in EHR. Of patients who did have the section completed, 1279 (1.76%) used every day, 623 (0.85 %) used some days and 1747 (2.4%) formerly used. Among the 1902 current e-cigarette users, who did have the section completed, 1279 (1.76%) used every day, 623 (0.85 %) used some days and 1747 (2.4%) formerly used. Among the 1902 current e-cigarette users, 1307 (69%) were female and 640 (34%) of all current users reported being counseled by a clinician. These results indicate that it is feasible to collect structured data in the EHR regarding e-cigarette use, but that focused educational efforts will be necessary to increase the rate of completion in clinical practice.

FUNDING: Academic Institution

REFERENCE:

RR-25

SPATIAL SPILLOVER EFFECTS OF STATE-LEVEL POLICIES BANNING ENDS PRODUCTS

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OBJECTIVES: After an outbreak of illness linked to Tetrahydrocannabinol (THC)-containing vaping products in 2019, several states passed short-term bans on the sale of Electronic Nicotine Delivery Systems (ENDS) products. Previous studies suggest that banning ENDS may have unintended consequences, such as increasing cigarette sales. We explore a related but different angle, namely the spatial spillover effects of state-level ENDS bans. METHODS: We utilize a fixed-effect panel regression model with an embedded difference-in-differences design to evaluate the impact of state-level ENDS bans in Massachusetts, Rhode Island, Washington and Montana. We use indicator variables to capture the direct impact and corresponding spillover effect of a full ENDS ban, or a ban on flavored ENDS products (including mint and menthol flavors), on counties or stores that are directly affected, as well as neighboring counties or stores. Primary outcomes are monthly sales of total and flavored ENDS refill kits per store. Control variables include temperature, population size, unemployment, tobacco product taxes, and time and location fixed effects. RESULTS: A full ban on ENDS products increased monthly total ENDS sales by $5,563 (p<0.05) per store in the neighboring counties, or by 53% of the pre-ban regional average, and monthly per-store sales of menthol- and mint-flavored ENDS by $5,462 (p<0.01). We find similar but weaker spatial spillover impacts of bans on flavored ENDS products only - monthly total ENDS sales in the neighboring counties increased by $1,548 (or 15%; p<0.05) per store. Moreover, as flavored product bans did not restrict tobacco-flavored ENDS sales, we observe a $2,154 (or 118%; p<0.10) monthly increase in tobacco-flavored ENDS products per store in the counties subject to the flavor ban. Analyses using balanced store-level data show consistent results. Findings are robust to numerous robustness checks and matched sample specifications. CONCLUSIONS: This study improves our understanding of the unintended consequences of bans on the sale of ENDS products, as we demonstrate significant spillover effects in neighboring areas after states implement such bans.

FUNDING: Federal

REFERENCE:

RR-22

YOUNG ADULTS’ PERCEPTIONS ABOUT QUITTING TOBACCO PRODUCTS AND INTERVENTIONS

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Significance: Smoking and vaping for young adults is a serious public health concern in part due to the fact that this population is less receptive toward interventions designed to stop the use of tobacco products. Little attention has been given to developing evidence-based implementation strategies for quitting tobacco-products among young adults. This study focuses on young adults’ perceived barriers and facilitators to quitting cigarettes and e-cigarettes, in addition to young adults’ perceptions of intervention strategies to stop the use of tobacco products. METHODS: One-on-one semi-structured interviews were conducted via in-person, phone, and virtual meetings. Thirty young adults (18 to 26 years old) who used combustible cigarettes and e-cigarettes participated. Thematic analysis was used to identify themes related to implementation strategies. Results: Overall, a majority of participants were women (53%) or White (60%), 43.4% were high school graduates, and 33.4% were currently employed. Additionally, 50% were cigarette smokers, 20% were e-cigarette-only users, and 30% were dual users. The majority were daily tobacco product users (86.7%), were interested in quitting, and had tried quitting before (83.3%). Only 46.7% were interested in pharmacological treatment, and 53.3% were interested in receiving counseling to help them quit the tobacco products they were using. Major barriers to quitting included peer pressure and smoking for stress relief, and facilitators for quitting included self-motivation and limited social interactions. A majority expressed that they would prefer text messaging or emails over in-person or telephone counseling, and liked the idea of receiving interventions from healthcare professionals. The most preferred method for interventions included a focus on tobacco products’ risks and strategies to deal with social aspects. There was no difference between dual users, e-cigarette only users, and cigarette smokers in perceived barriers and facilitators, or preferences on intervention format and content. Conclusions: Although there is limited generalizability, understanding the perceived barriers and facilitators can help inform interventions that young adults will be more receptive and adherent toward. In addition, their perspectives on interventions to quitting tobacco products can help guide the further development of implementation strategies.

FUNDING: Federal

REFERENCE:

Funding: Academic Institution
POLYTABOCANO USE AMONG CURRENT SMOKERS IN RESIDENTIAL SUBSTANCE USE DISORDER TREATMENT


Introduction: Tobacco use remains high among people in substance use disorder (SUD) treatment. However, little is known about polytobacco use (use of 2 or more products) and its associated factors among this population. Purpose: We examined patterns and associated factors of polytobacco use among 340 current smokers in residential SUD treatment. Methods: A cross-sectional survey was conducted in 2019 among 340 current smokers (Mage =38, 74% male, 37% non-Hispanic White) in 20 residential SUD treatment programs in California, USA. The binary outcome was polytobacco use (vs. exclusive cigarette smokers), defined as current use of cigarettes and alternative tobacco products (i.e., e-cigarette, cigar/cigarillo, and smokeless tobacco). Independent variables were nicotine dependence, quitting-related factors, use of blunt/spiff, and number of unhealthy days in the past 30 days. A generalized estimating equation examined associations between the independent variables and the outcome, controlling for demographics and time in treatment. Results: Over half of current cigarette smokers (51.47%) were polytobacco users. The most common polytobacco use patterns were dual use of cigarettes with e-cigarettes and dual use of cigarettes and cigars/cigarillos. Factors associated with polytobacco use included greater nicotine dependence (AOR=1.29; 95%CI=1.04, 1.59), ever using e-cigarettes for quitting (AOR=3.61; 95%CI=2.09, 6.24), past 30-day use of blunt/spiff (AOR=2.52; 95%CI=1.02, 6.20), and reporting more mentally unhealthy days (AOR=1.04; 95%CI=1.00, 1.08). Conclusions: Tobacco control policy in SUD treatment programs should address polytobacco use rather than cigarette use only. Tailored interventions targeting polytobacco users in SUD treatment should consider e-cigarette use, co-use of tobacco and cannabis, and mental health problems.

FUNDING: Federal; State; Academic Institution

EVALUATION OF FLavored CIGAR PRODUCTS AS THEY RELate TO QUESTIONS OF PUBLIC HEALTH

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Significance: Flavors in tobacco products is a subject of public health debate and increasing regulatory attention. There is interest in gaining an in-depth understanding of flavored cigar smoking prevalence and behaviors to address the use of flavors in cigars and questions of public health. Methods: Seven publicly available data resources that assess flavored cigar use were analyzed. Two focus on youth tobacco use (NYTS, MTF), four focus on adult tobacco use (HINTS-FDA, NATS, TPRPS, TUS-CPS), and one on both groups (PATH). Available data (2011-2019) were analyzed to assess usage trends over time. In addition, longitudinal analysis of PATH adult data examined whether flavored cigar use was associated with future use of cigarettes or increased use of cigars. Results: Youth past 30 day estimates of cigar use ranged from 2%-10% for both flavored and non-flavored cigars, slightly higher in high school vs. middle school age subpopulations. These estimates have been stable or declined across all survey years within the respective surveys. Consistent trends were observed regarding frequency of use; most youth using cigars do so 1-2 days per month. Similar findings were observed for adult cigar users, with five surveys indicating less than 10% currently use cigars. Flavored cigar use is at least 5% across all data sources. These overarching use estimates were essentially flat over time. Frequency of youth cigar use remained consistent over time, with most youth reporting cigar use on 1-2 days per month. In addition, multivariable modeling of PATH adult data did not identify an association between flavored cigar use and future use of cigarettes or increased use of cigars. Conclusion: No evidence was found of increased use or different usage patterns, among either youth or adults, of flavored cigars vs. non-flavored cigars. While these trends should continue to be monitored, there is no indication of existing or emerging public health concern related to flavored cigars within the seven large, nationally representative epidemiologic databases examined. Active116510203.v11-11/21/20

FUNDING: Tobacco Industry

BEHAVIOR AND HEALTH RISKS OF SMOKERS LIVING WITH OTHER SMOKERS

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Significance: Compared with smokers who live alone or with non-smokers, smokers living with other smokers (SLS) may have more social reinforcement for smoking behaviors, greater nicotine dependence, and worse health outcomes. Although a few studies have shown that smokers exposed to secondhand smoke at home had higher serum cotinine levels, no study has compared other tobacco-related behaviors, biomarkers, and health outcomes between SLS and those who live alone or with non-smokers. This study aims to address this gap. Methods: We analyzed cross-sectional, nationally representative data from 8 US National Health and Nutrition Examination Survey cohorts (2003-2018), which comprises ~42,000 Americans who have biomarker data. SLS are identified through a question regarding the number of people smoked in a household and participants’ smoking status. We used weighted multivariable linear and logistic regression models to compare the outcomes of interest. Results: Of current cigarette smokers, 27.8% (95% confidence interval [CI]: 25.8%-29.9%) were SLS (men, 25.5%; women, 31.1%; P<0.001). Compared with smokers living with nonsmokers, SLS smoked more cigarettes per day (mean ratio, 4.82 [95% CI: 4.00-6.63]), were more likely to use another tobacco product in the past 5 days (odds ratio [OR], 2.67 [95% CI: 1.81-3.94]), had higher serum cotinine levels (geometric mean ratio, 1.56 [95% CI: 1.44-1.69]), had higher levels total urinary 4-(methylthio) (i.e., e-cigarette, cigar/cigarillo, and smokeless tobacco). Independent variables were nicotine dependence, quitting-related factors, use of blunt/spliff, and number of unhealthy (i.e., e-cigarette, cigar/cigarillo, and smokeless tobacco). Factors associated with polytobacco use included greater nicotine dependence (AOR=1.29; 95%CI=1.02, 6.20), and reporting more mentally unhealthy days (AOR=1.04; 95%CI=1.00, 1.08). Conclusions: Tobacco control policy in SUD treatment programs should address polytobacco use rather than cigarette use only. Tailored interventions targeting polytobacco users in SUD treatment should consider e-cigarette use, co-use of tobacco and cannabis, and mental health problems.

FUNDING: Federal; State; Academic Institution

EFFECTS OF CHANTIX MEDICATION BENEFIT ON QUITLINE PARTICIPATION

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BACKGROUND: Tobacco quitlines are a cost-effective, population-based strategy to support tobacco cessation, offering cessation counseling and, in some states, nicotine replacement therapy (NRT). Few quitlines in North America provide free or reduced-cost prescription medications, such as varenicline (Chantix®), and few studies have examined the impact of offering these medications as part of their cessation protocols. From November 2016 to March 2018, the Colorado QuitLine (CoQL) expanded its treatment protocols to include varenicline in order to explore the feasibility and cost of providing this enhanced benefit. Evaluators were asked to investigate whether adding varenicline to the CoQL cessation protocol had an effect on program reach, participation, coaching, or medication utilization. METHODS: We conducted an ARTIMA time-series analysis to examine long-term trends in CoQL intake calls, quit-medication requests, and coaching sessions. Multivariable regression models were used to compare CoQL participants before vs. during varenicline availability, and to examine differences among enrollees who selected varenicline vs. NRT vs. counseling alone. Cessation outcome data were not available. RESULTS: CoQL enrollees who requested Varenicline (12.4% during availability period) were more likely to complete the five-session CoQL coaching protocol compared to NRT patch or gum/lozenge requesters (Odds Ratio (OR) 1.54, 95% confidence interval (CI) 1.35-1.77), or coaching-only enrollees (OR 3.55, CI 2.71-4.64). Statistically significant but small differences were found between enrollees who selected varenicline and other enrollees on gender and age, tobacco dependence, and at least one quit attempt during enrollment. Varenicline availability was not associated with increased CoQL intake volume. CONCLUSIONS: Increased coaching completion among varenicline choosers may indicate that the medication confers an advantage over NRT in a quitline context. Self-selection bias cannot be ruled out as an explanation, however, since (unmeasured) cessation motivation may have been higher among varenicline choosers, although this study shows no clinically negligible differences from others on available characteristics and tobacco use measures. An absence of...
increased quitline enrollment with varenicline may have reflected inadequate public awareness of the new quitline benefit.

**FUNDING:** State

**RR-31**

**CHANGE IN E-CIGARETTE HARM PERCEPTIONS AND TOBACCO PRODUCT USE: FINDINGS FROM WAVES 1-4 OF THE POPULATION ASSESSMENT OF TOBACCO AND HEALTH (PATH) STUDY**

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**Significance:** Earlier in the decade, US adults on average perceived that e-cigarettes (EC) were less harmful than cigarettes (CC). However, recent research suggests that adults increasingly perceive EC to be just as or more harmful than CC. The purpose of this study is to examine whether similar changes have occurred in the absolute perceived harm of EC use, as well as associations between EC absolute and relative harm perceptions, product use, and EC quit intentions.

**Methods:** Adults with data in at least two waves of the Population Assessment of Tobacco and Health (PATH) Study Waves 1-4 (W1-W4) were analyzed. We used generalized estimating equations to describe change in absolute perceived harm of EC to one’s health (W3 & W4) and relative to CC (W1-W4, “relative harm” perceptions), examining differences in change by tobacco use (all adults), EC quit intentions, and attempts (EC users only). Models were adjusted for gender, age, and race/ethnicity. **Results:** The proportion of adults who perceived EC to be as or more harmful than CC increased over time, from 56% (W1) to 80% (W4) (p<0.001), as did those perceiving EC to be “at least somewhat harmful” (90% at W3 to 91% at W4, p<0.001). Those who had ever used one or both products consistently were more likely to have lower relative harm perceptions compared to never users across corresponding waves. Over time, the odds of having a lower relative harm perception decreased compared to never users at W1. Similar results were seen for absolute harm, except those who ever used CC did not differ from non-users at corresponding waves. EC users with low absolute perceived harm were less likely to intend or attempt to quit, and those with lower relative harm perceptions were generally less likely to quit at corresponding waves, compared to those with a high relative harm perception. **Conclusions:** Consistent with other research, we found that EC relative harm perceptions increased from 2013-2017, and found that absolute harm perceptions also increased. However, these perceptions were more likely to be observed among those who never used EC or CC. Harm perceptions appear to affect EC users’ intention and attempts to quit. EC harm perceptions may continue to change over time given increased regulatory and educational efforts, and publicized health risks, including the EVALI outbreak.

**FUNDING:** Federal

**RR-32**

**A MIXED METHODS STUDY OF PERCEIVED EFFECTIVENESS OF CIGARETTE PACK INSERTS AMONG U.S. ADULT SMOKERS**

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**Significance:** Canada is the only country that mandates cessation messages for cigarette pack inserts. This study evaluated smokers’ reactions to inserts after participation in a randomized experiment. **Methods:** Participants (n=199) received a two-week supply of their preferred brand of cigarettes either without (n=97) or with (n=102) 4 different inserts inside: two response efficacy messages (i.e., health benefits; quitting saves money) and two self-efficacy messages (i.e., strategies to address cravings; practice delaying smoking). After two weeks, participants (n=186) were interviewed, where recall of inserts was assessed among those in the insert condition (n=96). All participants were shown each insert and rated their perceived effectiveness (PE) (i.e., believability; helpfulness; feeling of being better off without smoking; feeling motivated to quit smoking), using a 5-point Likert response options (1, “not at all” – 5, “extremely”); alpha=0.88). PE items were averaged for each message range. Mixed-effects linear regression models regressed PE on whether participants had received packs with inserts, sociodemographic characteristics, and smoking behaviors. Responses to each PE question were probed for open-ended responses that were analyzed using thematic coding. **Results:** All 4 inserts were rated as effective (3.12-3.72). Compared to the lowest-rated insert (practice delaying smoking), PE ratings were higher for both response efficacy inserts (health benefits: b=0.50, p<0.05; saving money: b=0.77, p<0.05). Participants who intended to quit had higher PE scores than those who did not (b=-0.35, p<0.05). PE ratings of the inserts by participants in the insert condition were marginally higher than for those who were not (b=0.19, p=0.08). Among those exposed to the inserts, 31-48% recalled the inserts and many reported keeping the inserts, reading them, and finding them to be helpful. **Conclusion:** Our results suggest that cigarette pack inserts may be an effective way to communicate with smokers. Response efficacy messages were rated as more effective than self-efficacy messages, and overall ratings were higher for smokers who intended to quit.

**FUNDING:** Unfunded

**RR-33**

**CHARACTERISTICS OF FLAVORED AND NONFLAVORED WATERPIPE TOBACCO USERS**

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**Introduction:** Tobacco waterpipe smoking continues to be a major global public health challenge. Waterpipe (WP) tobacco smoking is an increasingly popular and harmful form of tobacco use, especially in the Middle East. Data on factors associated with flavored WP tobacco (FWT) and non-flavored WP tobacco (non-FWT) smoking in a real-world setting (e.g., cafe environment) is lacking. In this study, we aimed to compare sociodemographic characteristics, smoking patterns, beliefs and perceptions, nicotine dependence, and psychological indicators between FWT-only and non-FWT-only smokers in Iran. **Method:** A cross-sectional study was conducted in 94 WP-serving venues surrounding Tehran and Ardebil metropolitans in Iran. Convenience sampling was applied to select 900 current WP smokers (508 (56%) FWT-only and 392 (44%) non-FWT-only smokers) aged 18 years and older. Multivariable logistic regression was used to examine the independent characteristics of FWT and non-FWT smokers. **Results:** Compared to non-FWT smokers, FWT smokers were younger (Adjusted Odds Ratio [AOR]=0.88, 95% Confidence Interval [CI]:0.87-0.90), and more likely to have ≥ 1 sibling who smoked WP (AOR=1.54, 95% CI:1.06-2.24), share WP with others (AOR=2.52, 95% CI:1.68-3.77), current report cigarette smoking (AOR=2.05, 95% CI:1.23-3.42), and report confidence in quitting at any time (AOR=3.64, 95% CI:2.45-5.39). FWT smokers were less likely to have seen (AOR=0.40, 95% CI:0.27-0.60) or read (AOR=0.44, 95% CI:0.24-0.80) warning messages on WP tobacco packages relative to non-FWT smokers. The most common self-reported reason for smoking WP was entertainment for both groups, followed by stress relief for non-FWT smokers and the availability of flavors for FWT smokers. **Conclusions:** FWT-only smokers differ from non-FWT-only smokers in several aspects including being younger, having more positive beliefs and perceptions regarding WP use, and higher cigarette smoking prevalence. These findings will help in developing more effective and targeted policies and cessation interventions for WP smokers according to flavor type they use, especially in the Middle East.

**FUNDING:** Unfunded

**RR-34**

**COMMON ADVERSE EFFECTS OF ELECTRONIC CIGARETTES (EC) COMPARED WITH TRADITIONAL NICOTINE REPLACEMENT THERAPIES (NRT): A SYSTEMATIC REVIEW META-ANALYSIS**

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**Significance:** Tobacco is a leading cause of preventable death in Australia, with high relapse for established nicotine replacement therapies (NRTs). Adverse effects (AEs) associated with cessation therapies are commonly cited for discontinuation. This systematic review compares the side effect profiles of traditional NRTs (i.e., patches, gums, lozenges, sprays) with electronic cigarette (EC) nicotine delivery. It was hypothesised due to the relative similarity of nicotine delivery between ECs and combustible tobacco, EC adverse effects would be more tolerated and thus less reported.

**Methods:** A database search of PubMed, WebOfScience and PsyCINFO yielded a total of 2850 unique entries; 39 papers on EC with a total of 28,424 participants were
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EMBEDDING SMOKING CESSATION SUPPORT IN COMMUNITY MENTAL HEALTH RESULTS OF A CLUSTER RANDOMISED CONTROLLED TRIAL

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Significance: There is an urgent need to reduce the prevalence of tobacco use among people experiencing severe mental illness. Community managed mental health organisations (CMOs) are well placed to offer smoking cessation support but require additional support to do so. This study examined the effectiveness of an organisational change intervention, Tackling Tobacco, to increase the provision of smoking cessation support by staff working in CMOs. METHODS: A cluster randomised controlled trial was implemented in 26 CMOs in NSW, Australia between 2018-2019.

Guidelines were developed to identify organisational changes required to address tobacco use. Intervention sites received a financial grant, face-to-face and online training, and proactive monthly support to support implementation of the guidelines. Active control sites received online training and generic, scheduled support via email. Outcome and process measures were assessed via online and hardcopy surveys at baseline, six- and nine-months follow-up. The primary outcome was the proportion of CMO staff offering nicotine replacement therapy (NRT) to consumers (measured by consumer self-report). Secondary outcomes at the consumer (smoking cognitions and behaviour), staff (practices and attitudes) and organisational level (policies, procedures, and systems) were also measured. RESULTS: There was a significant intervention effect on the primary outcome of offering NRT at both six- (OR 3.1, 95% CI 1.3-7.5) and nine-months (OR 6.9, 95% CI 2.2-21.7) follow-up. Consumers in the intervention group had significantly higher odds of using any NRT (OR 3.0, 95% CI 1.3-6.9), and lower levels of nicotine dependence (Heaviness of Smoking Index scores) than the control group (OR -0.56, 95% CI -1.1 - 0.0). There were no significant differences in seven-day point prevalence or continuous abstinence at six- or nine-month follow-up. Implications: The organisational change program, Tackling Tobacco, was effective at achieving staff practice change (offer of NRT) six and nine months after the program was initiated. While the program did not lead to significant differences in consumers quitting smoking, the reduction in nicotine dependence for consumers is promising.

FUNDING: State; Academic Institution; Nonprofit grant funding entity

RR-37

UNDERSTANDING WHAT PEOPLE WHO SMOKE NEED FROM SMOKING CESSATION APPS. A THEMATIC ANALYSIS OF CONSUMER REVIEWS

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SIGNIFICANCE: This study aims to provide insight into the important design and feature considerations for smoking cessation apps as identified from unsolicited consumer reviews. METHODS: A targeted web-crawler mined publicly available user reviews and ratings of smoking cessation apps from the Google Play and App Store via a two-stage search strategy. Eligibility: English language apps with a primary focus on smoking cessation and at least twenty consumer reviews between 2011 and 2020 were included for analysis. User reviews were thematically analysed using Braun & Clarke’s six-phase framework. RESULTS: 584 unique apps and 3,988 reviews were mined. Thirty-nine apps encompassing 1,281 reviews and nine apps including 133 reviews from Google Play and App Store, respectively, met eligibility criteria. Inductive coding of 1,414 reviews produced a total of 1,084 coding references (55% coverage), including reviews coded across multiple nodes. In descending order of total coverage, themes (and sub-themes) generated included: 1) support features (Goal setting, tracking progress and rewards, habit tracking, identifying and managing cravings, community and message boards, health information, personal accountability, relationality); 2) useability (user interface design, technical issues and support, affordability, simplicity, language, interactivity and sharing); 3) influence on smoking behaviour (increasing awareness of smoking behaviour, motivational, quitting smoking, reducing smoking); 4) benefits of quitting (health benefits, impact on family, money saved, personal achievement); 5) suggested improvements; and 6) role as a supplementary tool for quitting. CONCLUSIONS: An opportunity to extend the reach of tailored smoking cessation support exists within smartphone apps. The development of new and innovative technologies should employ a co-design approach by considering user preferences and experiences of existing smoking cessation apps. This review enhances the literature by highlighting specific qualities of smoking cessation apps important to people who smoke, and will inform the consumer-driven design of a novel smoking cessation chatbot. GRANT FUNDING: National Health Medical Research Council Investigator Grant (APP1178331)

FUNDING: Federal; Academic Institution
changes in self-reported wheezing symptoms and tobacco product use: findings from waves 2-4 of the population assessment of tobacco and health (path) study

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Significance: Use of cigarettes (CC), and more recently e-cigarettes (EC), have been shown to be associated with wheezing. However, the prevalence of CC and EC use has changed over time, and longitudinal analyses of the association with wheezing are lacking. Methods: Adults with data in at least two waves of the Population Assessment of Tobacco and Health (PATH) Study Waves 2-4 (W2-W4) were used to assess trends in self-reported wheezing symptoms in the past 12 months, how current use of CC and/or EC predicts self-reported wheezing symptoms, and examine the effect of former smoking on their relationships. Descriptive statistics and weighted generalized estimating equation models were used for the analysis with adjustment for gender, age, race/ethnicity, BMI, childhood and current exposure to secondhand smoke, asthma diagnosed by the age of 18, and self-perception of health. Results: The proportion of self-reported wheezing has decreased (6.4%-26.7% at W2 to 4.4%-19.1% at W4). Current EC use (aOR: 1.39; 95%CI: 1.28, 1.51) and addicted former CC users (aOR: 1.35; 95%CI: 1.16, 1.59) predict self-reported wheezing symptoms more strongly than current CC users (aOR: 1.29; 95%CI: 1.04, 1.60) or current users of combustible tobacco products (aOR: 1.11; 95%CI: 1.01, 1.23). Conclusions: Use of EC is associated with lower risk of wheezing symptoms than current CC users, whereas addicted former CC users have higher risk of self-reported wheezing than current CC users. Further, former smokers who were not currently vaping were more likely to report wheezing in the past 12 months (aOR: 1.55; 95%CI: 1.35, 1.78) when compared to never smokers, but did not differ when compared to current vapers who were former smokers. Current vaping without a history of smoking was not associated with self-reporting wheezing symptoms when compared to never smokers, but this could be a function of a younger population who has not been vaping long enough to exhibit wheezing symptoms. Conclusion: Use of EC, CC, or dual use could predict self-reported wheezing symptoms. Current vaping showed a lower risk of self-reporting wheezing symptoms than current CC users or dual users. Also, it appears that the risk of wheezing symptoms among current vapers who were former smokers is primarily a result of their smoking history. However, quitting tobacco completely is beneficial for respiratory health.

Funding: Federal

adolescents' substance use and physical activity before and after the covid-19 pandemic

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Significance: School closures and other gathering restrictions related to the COVID-19 pandemic could disrupt adolescents' behaviors. We aimed to compare adolescents' substance use and physical activity behaviors before and after COVID-19 restrictions. Methods: This ongoing prospective cohort study of tobacco use behaviors among high school students enrolled adolescents in grades 9 or 10 at baseline (March 2019 to February 2020) from 8 public high schools in Northern California, United States, and followed from September 2019 to September 2020. In California, a COVID-19 statewide stay-at-home order was imposed March 19, 2020 such that, in this cohort, some-month follow-up observations were completed before (n=521) and some 6-month and 12-month observations after (n=950) implementation of school closures and social distancing measures. We compared the prevalence of substance use (i.e., past 30-day use of e-cigarettes, other tobacco, cannabis, and alcohol) and physical activity (active ≥5 days/week) at baseline and in follow-up observations completed before and after the stay-at-home order. We also modeled behaviors as a function of follow-up timing relative to the stay-at-home order using generalized estimating equations for repeated measures and adjusted for baseline behaviors and characteristics. Results: Of 1423 adolescents enrolled in the cohort, 1084 completed ≥1 follow-up survey (61% female, 49% Non-Hispanic white). Prior to the stay-at-home order, e-cigarette use declined by about a third from baseline (17% to 11%), but no further decline was observed after the stay-at-home order. In contrast, being physically active dropped from 53% to 39% following the stay-at-home order. Reported use of cannabis (18% to 16%) and alcohol (20% to 19%) did not differ meaningfully before and after the order. Conclusions: In this cohort, observed reductions in e-cigarette use were unrelated to the COVID-19 pandemic, but persistent cannabis and alcohol use suggest continued need for youth substance use prevention and cessation support. Declining physical activity under limited access to recreational spaces and scholastic athletics is an adolescent health concern.

Funding: Federal

a survey assessment of dual nicotine and cannabis e-cigarette users

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Significance: Dual nicotine and cannabis e-cigarette (e-cig) use is a growing public health concern. We still have a limited understanding of use behaviors and dependence among dual users, hindering informed public health policy-making. Hence, our survey aims to assess and compare nicotine and cannabis e-cig use characteristics, motivations, and dependence among dual nicotine and cannabis e-cig users. Methods: We surveyed US residents over the age of 21 who endorsed use of a nicotine or cannabis e-cig in the past 30 days via Amazon Mechanical Turk. The survey ascertained use characteristics, such as age of initiation and prior use of combustible products, along with motivations of e-cig use. We measured dependence using the Penn State Electronic Cigarette Dependence Index (PSECDI), containing ten questions and scored for no (0-3), low (4-8), medium (9-12), or high (≥13) dependence. Participants were asked to respond to the same set of questions regarding their nicotine and cannabis use separately. Results: The sample included 137 dual users with a mean age of 34.4 years, 76% male, 83% Caucasian, and 98% had a high school degree or higher. Participants first tried nicotine and cannabis vaping in their mid-twenties (M=25.4 and M=25.7 years, respectively). Dual users were more likely to use nicotine to replace combustible tobacco products (59%) than cannabis (35%) (p<.001). They were also more likely to endorse “ease of use” and “quitting a combustible product” as reasons for using their nicotine vs. cannabis e-cig (p<.001 and p<.026, respectively). The mean PSECDI score for nicotine (M=8.2, SD=4.1) was higher than for cannabis (M=6.2, SD=4.4) (p<.001), of which 47% endorsed medium or high levels of dependence on their nicotine vape versus 29% on their cannabis vape. Conclusion: This sample of dual users reported different use characteristics, motivations, and dependence levels for nicotine versus cannabis e-cigs. The findings highlight the need for tailored prevention and treatment efforts that are specific to nicotine and cannabis e-cig use.

Funding: Federal

Increase in boys' smoking threatens Ireland's endgame projections - European trend analysis of smoking prevalence 1995-2019

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Significance: Adolescent smoking has decreased in Europe in recent decades, although not homogeneously. We compare trends in current (last 30-day use) smoking among adolescents in Ireland and Europe from 1995 to 2019. Methods: ESPAD (European Schools Project on Alcohol and Other Drugs) is a cross-sectional survey carried out every four years between 1995 and 2019, during which time more than 600,000 students have completed questionnaires on substance use, including cigarettes. Ireland has participated in each of the seven data collection waves. In 2019, some 100,000 students in 35 countries participated in ESPAD. In Ireland, 1,949 students, born in 2003, were surveyed from a stratified random sample of 50 Irish schools. We compare prevalence and gender differences in the Irish and European samples at different time points from 1995 to 2019. Results: In Ireland and across Europe, total prevalence of current smoking decreased significantly between 1995 and 2019, and now ranges from 5.1% (Iceland) to 32% (Italy). On average, prevalence of current use in 2019 is the same (20%) for girls and boys. This figure masks gender differences across individual countries, with prevalence ranges higher among girls (5.9% (Iceland) to 36% (Bulgaria)) than among boys (4.3% (Iceland) to 31% (Italy)). The ESPAD prevalence increased from 1995 to 1999, and decreased thereafter from 1999 to 2019, while prevalence in Ireland decreased consistently from 1995 to 2015. Over the 25-year period 1995-2019, Ireland’s 66% decrease (from 41% to 14%) was more dramatic than the 38% ESPAD decrease (32% to 20%). Adolescents in Ireland have lower prevalence (14%) than the ESPAD average (20%). There was a decline of 5% in the ESPAD average between
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QUERYING ABOUT ELECTRONIC VAPING PRODUCTS USING THE PHRASE “ELECTRONIC CIGARETTE” RESULTS IN SIGNIFICANT UNDERESTIMATE OF ACTUAL DEVICE EVER USE IN YOUNG ADULTS

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Background: Survey research on electronic vaping products (EVPs) has frequently queried about device use referring to vape products as “e-cigarettes.” However, recently published methodological studies examining the impact of such survey wording have found that using “e-cigarette” terminology appears to result in substantial underestimates in actual EVP use when compared to asking participants about specific EVP generations and specific device types. Objective: The aim of the current study was to compare self-reported rates of lifetime use of EVP products using “e-cigarette” terminology compared to asking about device use with more precise questions. Method: In mid-2020, the current study recruited a cross-sectional sample of 754 young adults residing in the United States between the ages of 18 to 25 using Amazon’s Mechanical Turk (Mean age 23.34; 57.37% female; 61.01% Non-Hispanic White). Participants were first surveyed about lifetime use of “e-cigarettes.” Throughout the online survey, participants were unable to move to the previously answered questions. They were then queried about lifetime use for individual electronic vaping device types including the following: Cigalikes, Vape Pens, E-hookah Pens, Mods/Tanks, JUUL, and non-JUUL pod devices. Descriptions and pictures of each device type were provided within the online survey.

Results: Of the current sample, 61.49% reported lifetime use of “e-cigarettes,” while 75.71% endorsed lifetime use of one or more specific EVP device types. The highest rate of ever use for an individual device type was for JUUL (52.82%). Around 38% of participants endorsed ever use of one or more EVP device type, but denied e-cigarette ever use resulting in an underestimate of actual EVP ever use. The highest percent underestimate was found for vape pens with 21.86% endorsing ever use but denying e-cigarette ever use. Conclusion: It appears that vape pens are the least likely to be viewed as “e-cigarettes.” The findings support previous research suggesting using the term “e-cigarette” when surveying EVP use may lead to an underestimate in actual EVP ever use.

FUNDING: Other

RR-44
MOBILE DENTAL CLINICS FOR TOBACCO CESSATION: A NEEDS ASSESSMENT STUDY

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Significance: Rural communities are disproportionally affected by tobacco use and related harm. Tobacco use screening with provision of cessation support is endorsed by the Healthy People 2020 initiative and the American Dental Association, but challenging to implement in rural communities. Mobile dental vehicles (MDVs) serve tobacco users in rural areas and may provide an ideal opportunity for delivering cessation support to these hard-to-reach communities. The aims of this needs assessment survey were twofold: (1) to assess the prevalence of tobacco use among MDV patients in rural East Texas relative to prevalence rates among non-rural populations from state and national survey data; and (2) to determine interest in quitting smoking among MDV patients in the rural East Texas. Methods: Seventy-three consecutive patients receiving dental treatment at the MDV operated in East Texas by the University of Texas School of Dentistry at Houston completed an anonymous survey assessing socio-demographic characteristics, tobacco use history, past quit attempts, and interest in quitting. The prevalence of tobacco use among the sample was compared to the reported county, state, and national estimates. Results: The majority (77%) of the respondents were White, and 86% had a yearly income under $20,000. Prevalence of any current tobacco use was 37%, with type of tobacco product reported as combustible cigarettes (81%), smokeless tobacco (15%), and e-cigarettes (4%). The prevalence of current cigarette smoking among this sample was substantially higher than the reported county (18%), state (14%), and national (14%) rates. Sixty-seven percent of current smokers in the MDV sample reported a previous quit attempt, and 63% expressed interest in quitting if cessation support was available. Conclusion: The prevalence of current smoking among the MDV patient population was more than twice as high than the reported county and national rates and substantially higher than the reported county rates. That the majority of smokers indicated interest in quitting suggests that MDVs may serve as a conduit for delivering tobacco cessation interventions integrated with dental treatment to rural communities.

FUNDING: Federal

RR-43
EXCLUSIVE AND DUAL COMBUSTIBLE AND E-CIGARETTE USE AMONG U.S. ADOLESCENTS

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Significance: Cigarettes, cigars, and e-cigarettes are the most frequently used tobacco products among adolescents. Using a nationally representative survey, this study assessed the sociodemographic predictors of patterns of exclusive e-cigarette use, exclusive combustible use (cigarette or cigar), and dual use of e-cigarettes with combustibles among adolescents. Methods: We used repeated cross-sectional data from the 2017-2018 Monitoring the Future Study, nationally representative of 8th, 10th & 12th-grade students. We coded past 30-day tobacco use into four mutually exclusive categories: 1) no use, 2) e-cigarette use, 3) combustible use (cigarette/cigar), and 4) dual use (combustible & e-cigarette). For prevalence estimates, we present 2017-2019 data from the 2015-2018 National Health Interview Surveys. PD was defined as past year major depressive episode, and substantially higher than the reported county rates. That the majority of smokers indicated interest in quitting suggests that MDVs may serve as a conduit for delivering tobacco cessation interventions integrated with dental treatment to rural communities.

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RR-45
THE ASSOCIATION OF E-CIGARETTE USE WITH PSYCHOLOGICAL DISTRESS

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Significance: While cigarette smoking has been shown to be associated with psychological distress (PD), little is known about the association between e-cigarette (e-cig) use and mental distress. This study examines if current sole e-cig use and dual use of e-cigs and cigarettes are more likely to be associated with PD compared to never tobacco use and current sole cigarette smoking. Methods We analyzed data on adults aged 18+ (N=118,859) from the 2015-2018 National Health Interview Surveys. PD was identified if Kessler K6 Scale ≥ 5. Based on the use status of five tobacco products (e-cigs, cigarettes, cigars, pipe, and smokeless tobacco), we classified tobacco use status as: current sole e-cig use, current e-cig and cigarette (i.e. dual) use, current sole cigarette smoking, other use, and never use. Use indicated respondents who currently used only one product and never used the others. Dual use indicated respondents who use only two products currently and never used other products. Using logistic regression, we estimated the probability of having PD as a function of tobacco use in 2017, but exclusive e-cigarette use became more common by 2018/19 (16.4%). Also, male 12th graders (AOR=2.17 CI:1.82-2.59) had over twice the odds than females to be dual users (vs. non-use). Across all grades, Non-Hispanic Blacks were less likely to use e-cigarettes exclusively or be dual users compared to Non-Hispanic Whites. Conclusion: Dual use is more prevalent than exclusive combustible use among adolescents but exclusive e-cigarette use continues to be the most prevalent. Adolescents from lower socioeconomic groups are more likely to use combustibles exclusively compared to no tobacco use. Policy interventions should consider the patterns of use for combustibles and e-cigarettes among adolescents to help address tobacco use within this population.
use status, cigarettes smoked per day, years since quitting, insurance coverage, BMI, binge drinking, sociodemographic characteristics, and survey year. Results In our study sample, 0.2% of adults were current sole e-cig users, 0.7% were dual users, 4.3% were current sole cigarette smokers and 48.4% were never tobacco users. PD was reported by 46.4% of current sole e-cig users, 60.0% of dual users, 49.5% of current sole cigarette smokers, and 33.6% of never tobacco users. After adjustment, current sole e-cig users, dual users and current sole cigarette smokers had 86.8%, 78.6%, and 21.6% higher odds of having PD than never tobacco users; dual users had 46.9% higher odds of having PD than current sole cigarette smokers. However, current sole e-cig users did not significantly differ from current sole cigarette smokers in the association with PD.

Conclusion E-cig use is associated with PD. Further studies are needed to establish the causality of this relationship. However, clinicians should be vigilant to detect and treat mental health problems in their patients who use e-cigs.

FUNDING: State

RR-46

MULTI-LEVEL DRIVERS OF TOBACCO USE AND PURCHASING BEHAVIORS DURING COVID-19 “LOCKDOWN”: A QUALITATIVE STUDY IN THE UNITED STATES

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Objectives: The COVID-19 pandemic and associated public health prevention measures (e.g., “stay at home” orders) conceivably impact tobacco supply and demand among consumers. This qualitative study identified multi-level drivers of shifts in inhaled tobacco product use and access patterns during the initial COVID-19 “lockdown” period in the United States. Methods: Between April-May 2020, we conducted semi-structured telephone interviews (n=44) with adults who use cigarettes and/or electronic nicotine delivery systems (ENDS). Transcripts were thematically analyzed using a sociocological framework. Results: Nearly all participants reported changes in their tobacco use during lockdown, though patterns varied. Increased product use was most common and was predominantly driven by individual-level factors: pandemic-related anxiety, boredom, and irregular routines. Decreased use was common among social tobacco users who cited fewer interpersonal interactions and fear of sharing products. At the community level, retail access differentially impacted cigarette and ENDS use. While cigarettes were universally accessible, ENDS access was more limited, driving some to purchase products online. Delayed deliveries led some ENDS users to compensate with readily-available cigarettes. Conclusions: To mitigate ways that the COVID-19 pandemic may exacerbate an existing public health crisis, the medical and public health workforce must prepare multi-level strategies to minimize harm, reduce relapse, and support cessation among those who use tobacco products during this time.

FUNDING: Federal

RR-47

SYSTEM-LEVEL INTERVENTIONS FOR TOBACCO USE IN A DIVERSE PRIMARY CARE HEALTH SYSTEM DURING THE COVID-19 PANDEMIC

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Significance: The shift from in-person care to telemedicine, while offering flexibility for patient care encounters, has made it difficult to offer guideline-recommended smoking cessation care during the COVID-19 pandemic. We describe health-system level interventions that relied on the electronic health record (EHR) and a team-based care model to increase the delivery of cessation services between March and October 2020. Methods: The San Francisco Health Network includes 13 primary care clinics in San Francisco, serving diverse and predominantly low-income populations. We developed a tobacco registry embedded within the EHR to generate lists of smokers with comorbid disease conditions that placed them at risk for COVID-19. We conducted telephone outreach to these patients beginning in March and October 2020. Between May and September 2020, we offered clinical staff training (i.e., medical assistants, behavioral assistants, and health care providers) on providing smoking cessation care during telephone encounters. We examined the proportion of clinics providing cessation services during primary care encounters between June and October 2020. Results: In February 2020, 99% of the primary care visits (N=17,322) within our health network were in person, and this declined to 87% (N=12,975) in March 2020. With this decrease in in-person visits, tobacco screening declined from 43% in February 2020 to 26% in March 2020. Of the 3,133 patients who were smokers at high risk for COVID-19 and targeted for outreach, we reached 19% (N=601) by telephone. We trained 238 clinical staff on providing smoking cessation care and assessed clinics based on their delivery of cessation care to at least 60% of smokers in the past week. Between June and October 2020, the proportion of clinics meeting this metric increased from 23% (N=3) to 54% (N=7), a 31% increase. Screening for tobacco use increased to 40% by October 2020. Conclusions: The combination of EHR quality improvement tools and team-based care facilitated an increase in the delivery of smoking cessation services during the COVID-19 pandemic.

FUNDING: Federal; Academic Institution; Nonprofit grant funding entity
for cigarettes, and whether the interaction terms of 100% smoke-free air (SFA) laws and home working affect demand for cigarettes among U.S. wage and salary workers. Methods: Tobacco Use Supplement of Current Population Surveys (TUS-CPS) data was linked with American Time Use Survey (ATUS) and its Leave and Job Flexibilities Module data for the 2018 wave, and state-level smoke-free air bans data from State Tobacco Activities Tracking and Evaluation (STATE) System and per pack cigarette price data from Orzechowski &Walker 2018 and media reports were matched Only wage and salary workers between age 16 and 65 were selected (N=1,281 and N=642 for a subgroup with workplace smoking restriction question information from survey respondents). We employed two-part models among male and female workers respectively to analyze the association between the number of days exclusively working from home per month and the average number of cigarettes consumed per day, as well as the association between interaction terms of home working and 100% smoke-free air law smoking bans in four different locations (private worksite, government worksite, bars, and restaurants), adjusting for covariates. Results: Results indicate that home working frequency is not associated with smoking participation, while among those who smoke each one more day spent working from home for male workers is associated with 1.469 fewer cigarettes consumed per day, and each one more day spent working from home for female workers is associated with 1.156 fewer cigarettes consumed per day. We also find that those female workers who are capable of home working and living in states with 100% smoke-free air law in private worksites are less likely to smoke compared to female workers who do not work from home nor living in a state with 100% smoke-free air law bans in private worksites. Conclusion: Current smokers who work from home more often are smoking less. Homeworkers did not light up more.

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RR-50

THE TRENDS OF CHANGES IN SMOKING BEHAVIOUR MOTIVATED BY THE HIGH COST OF SMOKING AMONG AUSTRALIAN ADULT SMOKERS BETWEEN 2007 AND 2016

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Significance: Over the last three decades, the prevalence of smoking in Australia has been declining due to several tobacco control policies and the anti-smoking mass media campaigns. This study investigates the trends in changes in smoking behaviours and motivations of Australians to change their smoking behaviour between 2007 and 2016. In particular, whether the increasing cost of cigarettes in Australia due to regular tobacco tax increases since 2010, has increased motivation to change their smoking behaviour.

Methods: We conducted a secondary analysis of repeated cross-sectional data from the National Drug Strategy Household Survey (NDHSHS) data from 2007, 2010, 2013, and 2016. The main outcome measures were self-reported changes in smoking behaviours in the last 12 months with multiple response options: “Successfully quit smoking/ tried to quit but unsuccessful/reduced the amount of smoking per day/ tried to reduce the amount of smoking per day but were unsuccessful”. Participants also reported their motivations to change their smoking behaviour including “It was costing too much”.

Results: In these national representative samples of adults in Australia, the proportions of those who smoked in the past-year (including current smoking and recent quitting), who changed any smoking behaviour due to the cost of smoking significantly increased from 39.4% in 2007 to 52% in 2016 and this was the most common reason given since 2013. Among those who changed their smoking behaviour, those who were motivated by the cost of smoking were more likely to be from a low socioeconomic background, Indigenous, or having higher psychological distress. Further, they were more likely to smoke more cigarettes per day, only use manufactured cigarettes (vs. only roll-your-own cigarettes), or drank alcohol at higher risk levels compared to those who were not motivated. Conclusion: Regular increases in tobacco tax since 2010 in Australia have contributed to high cost of smoking, and this encouraged quitting, but also cutting down, especially among those with the greatest financial burden.

Disclosure of Interest: A. Cho holds an UQ scholarship. We have no relevant conflicts of interest.

FUNDING: Academic Institution

RR-51

ASSOCIATION BETWEEN MARITAL STATUS AND LENGTH OF SMOKING ABSTINENCE

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Background: The presence of peer support has consistently been associated with abstinence in smokers who attempt to quit. Marital status as a measure of social support has been associated with lower prevalence of smoking behavior as well as increased probability of smoking cessation. However, it is unclear whether the length of time for which smokers remain abstinent is impacted by engaging in closer peer relationships (measured as marital status). Methods: Analyses were performed using Wave 4 data from the Population Assessment of Tobacco and Health, collected from December 2016-January 2018 from a subsample of participants who made a quit attempt in the previous 12 months (N = 3,607). Associations between length of smoking abstinence in days and marital status was tested using ANOVA and included adjustment for the influence of covariates including race, education, sex, age, and nicotine dependence. Length of abstinence, measured in days, was treated as a continuous measure and log transformed. A Wilcoxon Rank Sums test compared those who abstained from smoking for less than one day to those who remained abstinent for one or more days by marital status. Results: The average length of smoking abstinence in the sample was just over one month (41.32 days, SD = 1.48). There was a significant difference in the average length of abstinence by marital status (F(2,97) = 11.44, p = 0.001). Those who had never been married were abstinent for 1.2 days longer than those who were married (p = 0.035) and 1.4 days longer than those widowed, divorced, or separated (p <0.001). There was, however, no significant difference in marital status between those with no days of abstinence from smoking and those with at least one day of abstinence (W = 609216, p = 0.12). Discussion: These results indicate that marital status is associated with length of smoking abstinence, and encourages future research on the role of this factor in cessation.

FUNDING: Federal
MEASUREMENT INVARIENCE OF THE REVISED WISCONSIN SMOKING WITHDRAWAL SCALE (WSWS2)

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**Background:** Smith et al. (in press, Psychological Assessment) developed a revised version the Wisconsin Smoking Withdrawal Scale (WSWS2) with 19 items and 6 subscales (Craving, Negative Affect, Hunger, Sleep, Restlessness, and Concentration) that demonstrated good reliability and validity. The current study examined measurement invariance of the WSWS2 across gender and race using equivalence testing (ET; Yuan and Chan, 2016) that uses the RMSEA fit index to assess metric, scalar, and strict equivalence. **Methods:** WSWS2 data that were collected on the quit day for 892 participants (51% female; 27% Black) in a smoking cessation clinical trial (Baker et al., 2016) were analyzed using the R package “equateMI” (Jiang and Mai, 2020) that implements ET. RMSEA-based ET allows approximate categorization of excellent, close, fair, mediocre, and poor equivalence across groups. Gender groups were females and males; race groups were Whites and Blacks only. **Results:** Goodness of fit indices for the 6-factor model for females and males, respectively, were RMSEA=.061/.070, CFI=.967/.964, TLI=.958/.943, and SRMR=.038/.039. Across gender, ET showed support for fair to close configural, metric, scalar, and strict equivalence of the WSWS2 for females and males. The goodness of fit indices for the 6-factor model for Blacks and Whites, respectively, were RMSEA=.080/.059, CFI=.932/.970, TLI=.915/.962, and SRMR=.049/.037. Across race, equivalence was fair for configural equivalence only with mediocre to poor equivalence for metric, scalar, and strict equivalence. **Conclusions:** The current results showed good fit for the 6-factor structure of the WSWS2 for females, males, and Whites but fit indices for Blacks suggest inadequate fit. Across gender, ET results supported fair to close equivalence of the WSWS2 for females and males but equivalence across race was unsupported. Further research is needed to ensure the accurate assessment of withdrawal among Blacks, given racial health disparities in tobacco use and consequences. Overall, the current results provide evidence that the WSWS2 has good psychometric properties for some groups, but future research should aim to increase measurement invariance across race.

**FUNDING:** Federal; Academic Institution

RR-55

WHAT MIGHT THE POPULATION HEALTH IMPACT HAVE BEEN HAD CHEW AND PARK ORAL TOBACCO PRODUCTS BEEN INTRODUCED INTO THE U.S. MARKET IN 1990?


The FDA Center for Tobacco Products has encouraged the use of computational models to estimate potential changes (positive or negative) in public health following the introduction of a new tobacco product. LUCY CHEW AND PARK (LUCY) is a noncombustible oral gum-like product that contains 4 mg of tobacco-derived nicotine and is intended for, and marketed to, adult tobacco consumers for non-therapeutic use. LUCY therefore meets the definition of a tobacco product as set forth in the Federal Food, Drug, and Cosmetic Act. In preparation for a Premarket Tobacco Product Application, a Population Health Impact Model (Lee et al. 2017) was employed to examine what the impact on public health would have been over a 20 year period if LUCY had been introduced to the U.S. Market in 1990. With a conservative assumption that use of LUCY presents 5% of the risk of smoking cigarettes and under five different prevalence scenarios, the estimated reductions in death from four major smoking-related diseases combined (i.e. ischemic heart disease IHD, lung cancer, chronic obstructive pulmonary disease COPD, and stroke) ranged from 16.528 to 70.307 in males and 8.929 to 40.405 in females, with associated years of life saved ranging from 0.190 to 1.012 million in males and 0.098 to 0.462 in females. Modifying the risk for LUCY and sensitivity analyses did not markedly change the finding of a positive outcome on public health. These results suggest that the continued marketing of LUCY may contribute to a significant reduction in deaths from IHD, lung cancer COPD and stroke among cigarette smokers and lead to a saving of millions of life-years.

**FUNDING:** Other

RR-56

HEALTHCARE COSTS ATTRIBUTABLE TO CIGARETTE SMOKING AMONG ADULTS WITH CARDIOVASCULAR DISEASE

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**SIGNIFICANCE:** Cigarette smoking is a major risk factor for cardiovascular disease (CVD). Although health costs of smoking have been assessed for the general population, it has not been extended to people who already have CVD. This study estimated healthcare costs of smoking for adults with CVD in the U.S. **METHODS:** Using the 2015-2016 National Health Interview Survey data, we estimated econometric models of the impact of cigarette smoking on healthcare utilization for 16,811 adults aged ≥35 who have ever been diagnosed with CVD (coronary heart disease, angina, heart attack, stroke, and other heart disease). Four utilization measures were examined: hospital days, emergency room (ER) visits, doctor visits, and home health visits. Smoking status was categorized as current heavy (≥20 cigarettes per day (CPD)), current moderate (10-19 CPD), current light (<10 CPD), former, and never smokers. From the models, we derived the relative risks of utilization for smokers versus never smokers, and then applied them along with 2018 smoking rates using an epidemiological formula to derive smoking-attributable fractions (SAF)’s. We determined the attributable costs for each utilization measure by multiplying the SAF by the corresponding total expenditures obtained from the 2018 Medical Expenditure Panel Survey data. **RESULTS:** In 2018, 38.6 million (21.6%) of U.S. adults aged ≥35 lived with CVD. Among them, 5.3% were current heavy smokers, while 4.5%, 5.6%, and 37.7% were current moderate, current light, and former smokers. Cigarette smoking attributed to an excess of $17.8 billion in inpatient cost, $1.3 billion in ER cost, $8.4 billion in doctor visit cost, and $5.4 billion in home health cost, a total of $32.8 billion in 2018. The attributable health cost was greater due to current smoking ($19.4 billion) than due to former smoking ($13.4 billion) and averaged $3,269 per current smoker and $923 per former smoker. **CONCLUSIONS:** Cigarette smoking among adults with CVD is associated with substantial excess healthcare costs. The lower excess costs for former smokers than current smokers suggest that providing smoking cessation intervention to patients with CVD is likely cost-effective.

**FUNDING:** Federal
Institute, Buffalo, NY, USA, 3

Significance Despite high rates of tobacco product use, Arab Americans are not yet a priority population, and there are few cessation resources specific to them. In consultation with the project Community Advisory Board (CAB) we assessed community knowledge of and response to tobacco cessation best practices in focus groups. Methods We conducted focus groups with respondents recruited from our community survey of 101 adult Arab Americans screened for any past 6 months commercial tobacco product use (cigarettes, hookah, e-cigarettes). We stratified 30 respondents into four focus groups by age (younger and older adults) and gender (male and female identified). Participants were asked about a list of best practice cessation methods (e.g., NRT products; individual and group counseling; telephone quitlines; text messaging) and invited to provide other methods. We shared results of the focus group survey with members of the CAB. Due to COVID-19 pandemic conditions, the four focus groups and the CAB meeting were conducted virtually. We assessed potential strategies given pandemic social distance conditions. Results Focus group respondents reported little knowledge but openness to NRT products. Participants most highly endorsed quitting on one’s own; and suggested organized sports (young men) and studying Quran (older women) could be helpful. There was some support for text messages and quitlines (Arabic language preferred). Online focus groups were easier to conduct with younger respondents of both genders. Younger women were particularly responsive to online meetings and suggested this as a program element. The CAB supported online meetings for community engagement under COVID-19 conditions to develop women’s knowledge and leadership in tobacco-related health. Conclusion Low awareness of cessation best practices was balanced by openness to trying these methods. Virtual data collection and engagement with Arab Americans under pandemic conditions was most feasible for women and younger community members. We found high response to online meetings of women in support of tobacco awareness and education. Although Arabic language quitlines are not available or feasible for this pilot study, text messaging in Arabic may support cessation among Arab American tobacco product users.

FUNDING: State

MEDIATING EFFECT OF SMOKING TOPOGRAPHY ON THE RELATIONSHIP BETWEEN CIGARETTE FILTER VENTILATION AND SUBJECTIVE EFFECTS

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Significance: Smoking topography describes the differences in how cigarettes are smoked. Cigarette filter ventilation dilutes the mainstream smoke and lowers smoking machine tar yields, and was thought to make smoking a cigarette safer when first created. Research has shown that ventilation alters tobacco combustion which increases smoke toxicants, allows for smokers to inhale more smoke/maintain their nicotine intake, and can lead to a false perception of lower health risk. The compensation for ventilation with smoking behavior may lead to smokers having positive sensory experiences and thus may lead to increased use. The objective of this project was to determine the relationships between topography, ventilation, and feelings derived from smokers using these products. Methods: The data in this project came from participants in the CENIC trial of reduced nicotine content cigarettes and was analyzed in SPSS. Baseline data when participants were smoking their usual brand cigarettes was used. Ventilation was an indirect relationship between ventilation and CES. This effect may be mediated by topography measures, specifically puff count and volume. Funding information: P01CA17806

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TOBACCO USE & SUBSTANCE USE CO-USE AMONG AGING ADULTS IN THE UNITED STATES 2015-2019

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Background: This study aims to provide national prevalence, patterns, and correlates of tobacco use, alcohol, marijuana and opioid misuse and co-use of tobacco use and substance use among aging adults in the United States. Method: Data were drawn from 2015-2019 combined National Survey on Drug Use and Health (NSDUH) datasets. The weighted prevalence and descriptive characteristics of any tobacco product’s use, alcohol, marijuana use, opioid misuse and co-use in the past year across groups of a nationally representative sample of aged 50 years old and above were examined. Multivariate logistic regressions were employed to assess the association between demographic variables and tobacco use and substance use respectively. Results: The overall weighted prevalence rate of past-year tobacco use remained stable in 2015-2019 among 44, 007 aging adults, although rates in aging black, Asian and other racial/groups (e.g., Pacific islanders and Native Americans) have been increasing over time. The prevalence rates of past-year tobacco, alcohol, any illicit drug among aging adults were 21.2%, 62.5%, and 10.4% respectively. Specifically, the marijuana use and opioid misuse rates was 7.5% and 2.5%. The co-use rate tobacco and marijuana was 5.8% and has been stably rising over time in aging adults. Multivariate analyses results indicated that lower socioeconomic status, being male, Native Americans, no insurance, living in rural
area, and having any mental illness, and using other substances (e.g., alcohol, and illicit drugs) were significantly more likely to use tobacco products (all \(p<.001\)). Conclusion: Tobacco use continues for aging American populations. Particularly, the future cessation interventions should target aging adults, especially low income/education aging racial/ethnic adults living in rural areas. Additionally, the co-use of tobacco and substance use is specifically problematic among aging populations. Comprehensive screening, and treatment for use of multiple substances in primary care should be warranted.

FUNDING: Federal

**RR-61**

**DETERMINANTS OF HARDCORE SMOKING STATUS IN A MULTI-ETHNIC ASIAN POPULATION: FINDINGS FROM THE SINGAPORE SMOKERS’ SURVEY**


**Background:** As prevalence of smoking decreased over the years in many developed economies, the rate has decreased and in some cases plateaued. The solution may lay within the group of smokers who are particularly resistant to quitting – “hardcore” smokers. The primary aim of the study is to investigate determinants of hardcore smokers in Singapore – a multi-ethnic Asian population in an urban setting, by comparing hardcore daily smokers with non-hardcore daily smokers. **Methods:** Data was from the first Singapore Smokers’ Survey (\(n=2,279\), ages 19–69 inclusive). Hardcore smokers were characterised by high consumption levels, lack of quitting histories and lack of intentions to quit. Multivariable logistic regression was used to study the associations between hardcore smoking status and 5 different baskets of variables (sociodemographics, social environment, smoking habits, lifestyle and health status, perceptions of tobacco products) amongst adult daily smokers. **Results:** Twenty three percent of adult daily smokers were classified as hardcore smokers. Characteristics that were associated with being a hardcore smoker included being male, having lower education, more likely to smoke within 30 minutes of waking, weaker social pressure and lack of conversations about quitting. Although ethnicity was not a significant factor, it was an effect modifier with peers’ disapproval of smoking being a significant protective factor amongst Malay daily smokers (adjusted odds ratio, AOR=0.313; 95%CI: 0.157, 0.625), but not amongst Chinese (AOR=1.066; 95%CI: 0.570, 1.996) and Indian smokers (AOR=0.628; 95%CI: 0.202, 1.948). **Discussion:** On top of the commonly known determinants of general smoking status, this study considered the smokers’ social environment and their perception towards tobacco products as potential determinants of hardcore smoking status. In particular, we found the role of peer norms is different in different ethnic groups. The investigation of this subpopulation provides important implications for targeted cessation interventions and tobacco control policies. Future work should investigate the differential effects of social influence between ethnicity groups.

FUNDING: Academic Institution

**RR-63**

**EXCLUSIVE AND CONCURRENT E-CIGARETTE AND MARIJUANA USE AND RISKY SEXUAL BEHAVIORS AMONG U.S. ADOLESCENTS**

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**Background:** The use of electronic cigarettes (e-cigarettes) and marijuana remain prevalent problems among American youth. This study assessed the associations between exclusive and concurrent e-cigarette and marijuana use and risky sexual behaviors among U.S. adolescents. **Methods:** We analyzed 2017 Youth Risk Behavior Survey data including 14,765 high school students nationwide. We classified students into groups based on their past 30-day e-cigarette and marijuana use behaviors: 1) non-users, 2) exclusive e-cigarette users, 3) exclusive marijuana users, and 4) dual users of e-cigarettes and marijuana. Multivariable logistic regression models were built adjusting for adolescent sex, grade, and race/ethnicity. **Results:** Approximately 65% of students were non-users, 4.3% were exclusive e-cigarette users, 8.3% were exclusive marijuana users, and 6.5% were dual users of e-cigarettes and marijuana. Compared to non-users, exclusive e-cigarette users were 1.72 times more likely (95% confidence interval [CI]=1.19–2.82) to report having > 4 lifetime sexual partners. Exclusive marijuana users were 1.56 times more likely (95% CI=1.31–1.85) to report having unprotected sex during last sexual intercourse and 2.58 times more likely (95% CI=2.11–3.16) to report having >2 lifetime sexual partners than non-users. Dual users were at significantly increased odds of being currently sexually active (adjusted odds ratio [aOR]=4.49, 95%CI=1.18–16.80), having unprotected sex during last sexual intercourse (aOR=1.43, 95%CI=1.18–1.74), and having >4 lifetime sexual partners (aOR=4.42, 95%CI=3.59–5.45). **Conclusion:** The relationship between concurrent e-cigarette and marijuana use and risky sexual behaviors highlights the importance of comprehensive educational efforts during high school. Findings have implications to guide school-based prevention and cessation initiatives to engage at-risk students and mitigate negative health consequences.

FUNDING: Federal, Academic Institution

**RR-62**

**TOBACCO USE & SUBSTANCE USE CO-USE AMONG REPRODUCTIVE-AGED WOMEN IN THE UNITED STATES**

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**Background:** The objective of the study was to provide national prevalence, patterns, and correlates of tobacco use and co-use of tobacco, and alcohol and marijuana in the past month among U.S. women of reproductive age. **Method:** We used 2015-2019 data from the National Survey on Drug Use and Health (NSDUH) to estimate weighted prevalence and descriptive characteristics of any tobacco product’s use, alcohol and marijuana use and co-use in the past month across groups of a nationally representative sample of U.S. women from 15 to 44 years old. Multivariable logistic regressions were employed to assess the association between demographic variables and tobacco use and substance use correlates of co-use respectively. **Results:** Of 97,830 women aged 15-44, the weighted prevalence rate of tobacco use steadily decreased over the past 5 years from 23.1% to 19.6%. Specifically, the percentage of past-month tobacco use among women aged 15-17, 18-25, 26-34, 35-44 was 6.6%, 21.8%, 24.9%, 21.3% respectively. The co-use rate of tobacco and alcohol continuously decreased from 16.1% to 13.0% yet with the high co-use rate in women aged 26-34. The co-use rate of tobacco and marijuana has been stably around 7.0% with the highest co-use rate in women aged 26-34. The co-use rate of tobacco and alcohol significantly increased from 16.4% to 21.6%. **Conclusion:** Our study indicates that low socioeconomic status, being covered by public insurance only, being White or Multiracial, having major depressive episodes, and living in rural area were significantly more likely to use tobacco products (all \(p<.001\)). Conclusion: Despite a decreasing trend of tobacco use and co-use of other substance overall, tobacco use and substance co-use remain prevalent among U.S. women at age 16-34. Particularly, the future cessation interventions should target young and middle-age adults. Moreover, the rising trend of marijuana use among young adults is exclusively challenging. Comprehensive screening, consultation, and treatment for substance abuse for young adults are necessary.

FUNDING: Federal

**RR-64**

**EXPLORING THE SMOKING-RELATED PERCEPTIONS, ATTITUDE, AND BEHAVIOR AMONG SMOKERS OF SOUTH ASIAN ETHNIC MINORITY IMMIGRATION IN HONG KONG: A QUALITATIVE STUDY**

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**Objective:** South Asian ethnic minorities (SAEM) accounts for the largest non-Chinese population in Hong Kong and has a high prevalence of tobacco. A full understanding of their experience of smoking and cessation is essential to develop and evaluate effective interventions targeting to promote smoking cessation among the SAEM. The study aimed to explore the smoking-related perception, attitude, and behavior among SAEM smokers in Hong Kong. **Methods:** A descriptive qualitative study was employed. The inclusion criteria are SAEM adult smokers who are resident in Hong Kong. Colazii’s comprehensive phenomenological method was used to analyze qualitative data. **Results:** From Aug 2018 to April 2019, 30 SAMIE smokers participated and completed the interviews. Five themes were generated including 1) Reasons for smoking initiation; 2) Motivation to quit; 3) Barriers to quit 4) Barriers accessing smoking cessation support; and 5) Perceptions on women smoking. SAEM perceived higher pressure and relatively narrow social network, as well as the diluted religious environment in Hong Kong, trigger them to start smoking or keep the smoking habit. The increasing cigarette price and under health issues may be potential reasons for smokers who want to quit. The limited...
social support provided incomplete information or assistance to them which drove their unconscious or misconceptions to quit. Their unawareness, being anxious about the cost of treatment, and received unsatisfied therapy were the main barriers for them in seeking smoking cessation support. **Conclusions:** Findings in this study provided information for healthcare professionals to develop and evaluate smoking cessation support and strategies targeting on promoting smoking cessation in this population.

**FUNDING:** Unfunded

**RR-65**

**CHANGE IN THE SMOKELESS TOBACCO CONSUMPTION PRACTICES DURING COVID-19 PANDEMIC**

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**Background:** During COVID 19 pandemic stringent lockdown was imposed. Supply of tobacco was restricted and the existing stocks of tobacco were sold at higher price. The study was designed in order to assess the change in practices of SLT consumption due to COVID 19 pandemic among the SLT users. **Methodology:** After Institutional ethics permission study was conducted in the East district of Delhi. The quantitative study designed with simple random sampling was conducted on 209 subjects with the help of semi structured questionnaire. **Result:** 55.5% of participants decreased the consumption of SLT during COVID-19 pandemic whereas 27.8% respondents had increased the frequency of SLT consumption. There was significant increase in the number of SLT users irrespective of literacy level or socioeconomic class of SLT users as compared to normal population. Despite pandemic, few opted for quitting as SLT products were unavailable during the pandemic.COVID 19 pandemic was responsible for behavioural changes in practices like sharing and spitting of SLT. There is a need to sustain these changed habits through behaviour change communication to reduce the burden of SLT consumption globally.

**FUNDING:** Academic Institution

**RR-67**

**DEVELOPMENT OF CONSUMER-REPORTED OUTCOME MEASURE (CROM) STANDARDS FOR THE TOBACCO INDUSTRY WITH RESPECT TO PSYCHOMETRIC CROM USING A CONSORTIUM-BASED APPROACH**

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**Background:** In November 2018, CORESTA approved the formation of a new Task Force (TF) to establish best practices and guidelines for the integration of consumer-reported outcome measures (CROM) in tobacco regulatory research. The primary objective of the CROM TF is to provide guidance on how to identify, develop, and validate CROM, and to provide access to CROM for evaluating tobacco and nicotine-containing products for pre-market and post-market purposes. Here, we describe the research completed by one of the TF working groups, WG02, with the purpose of developing CROM standards for tobacco regulatory research with respect to psychometric CROM (i.e., CROM intended to measure underlying psychological attributes - e.g., reinforcing effects). **Methods:** WG02 comprises 11 researchers from the CROM TF, representing 7 different tobacco companies and with experience in psychometrics, patient-reported outcomes (PRO), survey methodology, and product use behavior. WG02 members collaboratively drafted an operational definition of psychometric CROM and devised an approach for developing the standards. **Results:** Consistent with approaches taken by other outcomes research organizations, WG02 adopted a consensus-based approach for drafting the standards, which includes (1) review of literature and (2) an iterative peer-review process leveraging various sources, such as conference presentation and review by subject matter experts from tobacco, PRO, and related fields. Through literature review and WG02 member input, the scope was defined and initial content for the 5 components of the standards was drafted. These components include: (1) appropriate content, (2) development process and validation, (3) adaptation/modification of existing CROM, (4) application/implementation and interpretation of CROM, and (5) linguistic/cultural translation. **Conclusions:** This research represents the development of draft standards for Psychometric CROM for tobacco regulatory research, with the intention to complement 2020 FDA draft guidance issued by the Food and Drug Administration.
Quantitative Analysis of NNN in Plasma by LC-MS/MS - A Suitable Alternative to Urinary Determination to Assess the Exposure to This Important Toxicant

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Significance: N-Nitrosornicotinic acid (NNN) is a tobacco specific nitrosamine (TSNA) and is classified as a group 1 carcinogen (carcinogenic to humans) by the International Agency for Research on Cancer (IARC). Urinary NNN has often been used as a biomarker of exposure. However, urinary NNN excretion is highly variable, possibly due to formation of NNN by nitrosation of nicotinic acid in urine samples in acidic conditions. This limits the utility of urinary NNN as a biomarker of exposure. Hence, we developed an LC-MS/MS method for NNN in human plasma samples as an alternative to urinary NNN determination. Method: 1 mL of plasma is purified by means of a two-step liquid-liquid extraction with methyl-tet-butylether followed by UHPLC-MS/MS analysis using an Acquity HSS T3 UPLC column (100x2.1 mm; 1.8 µm; Waters) and MRM detection in ESI positive mode (QTRAP 6500+; Sciex). The method was validated according to US FDA guidelines for bioanalytical method validation. Results: No considerable matrix effects were observed. Interday accuracy and precision, measured on three different days in four concentration levels, five replicates each (LLOQ, low, medium and high concentrations), averaged an accuracy of 98.7% and precision of 7.5% CV. The method proved to be selective and highly sensitive (LLOQ: 0.5 pg/mL) with a broad linear range of 0.5 to 1000 pg/mL. The assay was applied to plasma samples from 10 traditional US smokeless tobacco users after a single 2g product use for 40 minutes. Blood was sampled at 15 time points over a 6h time course. NNN was quantifiable in 97% of the study samples. The maximum NNN concentration ranged from 3.5 to 10 pg/mL (mean Cmax: 7.1 pg/mL) with the time to maximal concentration ranging from 25 to 45 minutes (mean tmax: 31.5 min). Conclusion: A strong correlation in the pharmacokinetics (PK) of NNN and nicotine was observed in this study suggesting that the obtained NNN concentrations reflect the product use specific exposure. Given the high sensitivity, specificity, and throughput, the analytical method is well suited both for PK and exposure assessment of NNN during use of existing and new tobacco products.

FUNDING: Tobacco Industry

Perception and Intention Studies - Making Sense of Behavior Research for New Tobacco Products


Perception, intention, and behavior studies are critical to help industry, regulators and the public understand how novel tobacco products may be used or misused, and their potential benefits or risks. Smaller companies or those new to regulatory requirements may struggle to understand what’s needed and why. On October 27, the FDA issued draft guidance for industry on designing and conducting tobacco perception and intention studies. To illustrate how this guidance may be used, our presentation will share results of perception, intention and actual use behavior studies prepared for a premarket tobacco application for LUCY, a noncombustible oral gum-like product that contains 4 mg of tobacco-derived nicotine which is intended for, and marketed to, adult tobacco consumers for non-therapeutic use. The factors which influenced the research approach are explained and the results and planning of those studies are used to illustrate the practical difficulties and utility of behavioral research on novel tobacco products.

FUNDING: Other

Exploring the Role of E-cigarettes across Cessation Behaviors among U.S. Adults

Trenece L. Wilson, BS, Courtney T. Blondino, MPH, Elizabeth E. Prom-Wormley, MPH, PhD. Virginia Commonwealth University, Richmond, VA, USA.

Background: More individuals are using e-cigarettes as a cessation tool to stop conventional cigarette use. However, the role of e-cigarettes on smoking cessation remains unclear. This study explores the use of e-cigarettes as a conventional cigarette cessation tool across two stages of the cessation process (planning to quit and abstinence) among current and former cigarette users in a US adult population.

Methods: Data from 13,118 current and former conventional cigarette smoking adults ages 18 and over who participated in Wave 3 of the Population Assessment of Tobacco Health (2015-2016) were analyzed. Logistic regression was used to test the association between self-reported use of e-cigarettes as a cessation tool and abstinence among former smokers as well as plans to quit among current conventional cigarette smokers. Models were adjusted using several covariates, including: other cessation methods (programs, NRT, medication, and family support), nicotine harm perception, nicotine dependence, and demographic variables (age, sex, race, income, and education).

Results: Current smokers that used e-cigarettes as a cessation tool had significantly higher odds of making plans to quit smoking when compared to those that did not use e-cigarettes (OR=2.81, 95% CI: 2.14-3.71). This remained significant after adjusting for the influence of covariates (AOR=3.21, 95% CI: 2.32-4.45). Among former smokers, there were no significant associations between abstinence and e-cigarette use (OR = 1.09; 95% CI: 0.47-2.32). Conclusions: Current smokers that have used e-cigarettes as a cessation tool may be more likely to make plans to quit smoking. However, among former smokers, the use of e-cigarettes as a cessation tool may not significantly impact their discontinuation of smoking cigarettes. Therefore, the influence of e-cigarette use on cessation may vary across behaviors.

FUNDING: Unfunded; Academic Institution

Center for Tobacco Products. The initial draft content is being disseminated for peer review to gather feedback.

These findings warrant further research using RWD to evaluate the impact of HTPs on the health of the population.

FUNDING: Tobacco Industry

Exploring the Role of E-cigarettes across Cessation Behaviors among U.S. Adults

Trenece L. Wilson, BS, Courtney T. Blondino, MPH, Elizabeth E. Prom-Wormley, MPH, PhD. Virginia Commonwealth University, Richmond, VA, USA.

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FUNDING: Tobacco Industry
RR-72 CONTEXTUAL AND FAMILY HISTORY INFLUENCES ON TOBACCO AND MARIJUANA CO-USE AMONG ADOLESCENTS

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Significance: The use of tobacco and marijuana (co-use) among adolescents is more prevalent than the use of either substance alone and is associated with the onset of use disorders and risky use of alcohol and other illicit drugs. The globalization of the tobacco and marijuana industries has led to a rapid increase of both marijuana and tobacco use in Latin America. This highlights the need to investigate the risk factors associated with co-use among youth. Whether risk arising from the social context (e.g., peers) or due to increased family history of substance on co-use remains to be studied. Methods: We analyzed data from the PACARDO research project of adolescent substance use in Latin America. Self-administered anonymous questionnaires were completed by over 12,000 school-aged youth in seven countries. The dependent variable was a 3-category variable indexing past 12-month co-use of tobacco and marijuana, exclusive tobacco or marijuana use, or no use. Contextual variables included peer use of tobacco, marijuana, and pasta base, peer deviant behaviors, and participation in school drug prevention programs. A summary score of family history of substance use assessed alcohol-related problems, and tobacco, alcohol, and cocaine use among family members. Associations were examined using multinomial logistic regression models adjusting for adolescents’ age, gender, and parental level of education. Results: Relative to not using tobacco or marijuana, the odds of co-use of tobacco and marijuana were higher among adolescents reporting higher levels of peer use of marijuana (RRR=6.5, SE=1.5, p<0.001) and pasta base (RRR=3.2, SE=0.6, p=0.001) and greater levels of family history of substance use (RRR=1.8, SE=0.1, p<0.001) than their counterparts. Participation in school drug prevention programs reduced the use of either tobacco or marijuana but had no effect on co-use. Conclusions: Co-use of tobacco and marijuana increases with greater risk stemming from social sources. The strongest associations observed between co-use and peer factors underscore the need of interventions that provide peer-pressure resistance stemming from social sources. The strongest associations observed between co-use and peer factors underscore the need of interventions that provide peer-pressure resistance skills in these growing and vulnerable markets.

FUNDING: Federal

RR-73 USE, APPEAL, AND RISK PERCEPTIONS OF MENTHOL VS. NON-MENTHOL CIGARETTES AMONG PREGNANT SMOKERS AND NON-SMOKERS

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Significance: Pregnant mothers have shown highly variable patterns in quality and frequency of cigarette use over pregnancy and may be more vulnerable to the appeal of flavors due to alterations in taste, cravings, and nausea during pregnancy. This study focused on characterizing preferences and perceptions of menthol (MC) vs. non-menthol (NMC) cigarettes among both smoking and non-smoking pregnant women. Methods: Participants were 124 pregnant women (50% smokers, 26-45 years old, 49% ethnic/racial minority) recruited for a prospective study of pregnant women investigating novel biobehavioral markers of risk in the fetus. During the third trimester of pregnancy, participants responded to questions using 1-7 Likert-scale ratings (1=lowest appeal/harm) about preferences (liking, attractiveness, interest), intentions to use, and perceptions of harshness and harm (general, pregnancy-specific, fetal) towards MC vs. NMC. Using separate Mann-Whitney U tests, we examined differences between MC and NMC across all participants, as well as potential group differences based on active cigarette use during pregnancy (smokers vs. non-smokers) and smoking history (ever vs. never smokers). Results: Across all 124 participants, 74% reported ever smoking cigarettes (91% of whom had ever tried MC). Among the 62 pregnant smokers, 90% were MC users. Overall, MC had greater appeal compared to NMC - participants rated MC higher for liking, attractiveness, interest in, and intention to use postpartum, and lower for harshness compared to NMC (p<0.001). Interestingly, never smokers also rated MC significantly more likeable and less harsh compared to NMC (p<0.05). All participants had high ratings of harm across general, pregnancy, and fetal health risks - however, pregnant smokers had significantly lower ratings regarding pregnancy-specific harm for MC only compared to non-smokers (p<0.05), with no differences between groups for NMC (p>0.20). Conclusion: In this highly vulnerable population, menthol cigarettes were more appealing to pregnant women compared to non-menthol cigarettes, even among those who have never smoked cigarettes, and were associated with lower risk perceptions. Regulating menthol flavoring in cigarettes may have a particular positive impact on maternal and fetal public health.

FUNDING: Federal

RR-74 DETECTION OF Viable BACTERIA IN MAINSTREAM CIGARETTE SMOKE

Leena Malayil1, Suhana Chattopadhyay1, Anthony Bui1, Mansi Panse1, Robin Cagle1, Emmanuel Mongodin2, Amy R. Sapkota3, 1University of Maryland, College Park, MD, USA, 2University of Miami, Baltimore, MD, USA.

SIGNIFICANCE: An increasing number of studies have demonstrated that cigarette products harbor extensive and diverse bacterial communities. Yet, there is a paucity of data regarding the ability of these microorganisms to survive the cigarette combustion process and be transmitted to cigarette users via mainstream smoke. To bridge this knowledge gap, we characterized the bacterial community from four commercially available cigarette brands (Camel Unfiltered, Camel Red (filtered), Pall Mall Unfiltered, and Pall Mall Red (filtered)), using both culture-dependent and -independent techniques. METHODS: Non-smoked tobacco leaf, enriched non-smoked tobacco leaf extract and enriched mainstream smoke extract samples (n=144 total samples) were incubated on Trypticase Soy Agar, followed by traditional Sanger sequencing to identify the viable colonies. Total DNA was also extracted from similarly treated samples (n=96), followed by PCR amplified of the 16S-RNA gene and sequencing on the Illumina HiSeq2500. Sequencing data were analyzed using UCHIME, QIME and R packages. RESULTS: The predominant viable bacterial genera cultured from the mainstream smoke extract of Camel cigarettes were Bacillus and Thermococcus, while Pall Mall cigarettes’ smoke extract harbored Bacillus, Paenibacillus and Desulfotomaculum. Culture-independent methods demonstrated significant differences (p<0.001) in bacterial community composition between the three sample types (non-smoked leaf, enriched non-smoked leaf extract and enriched mainstream smoke extract) irrespective of cigarette brand. Mainstream smoke extract samples also were characterized by lower alpha diversity (p<0.001) when compared to leaf extract samples. Additionally, culture-independent methods also revealed a higher relative abundance of Bacillus in smoked Camel cigarette tobacco, as well as a higher relative abundance of Pseudomonads, particularly P. veronii in smoked Pall Mall cigarette tobacco. Additionally, the presence of filters in cigarettes did not have any significant effect (p>0.05) on the bacterial communities that were present in the mainstream smoke extract, when compared to unfiltered counterparts. In summary, our study provides novel evidence that bacterial communities can survive the cigarette combustion process. CONCLUSION: Our results also emphasize that there is an important need to study whether bacteria present in mainstream smoke can ultimately be transferred to the smoker, potentially impacting both the oral microbiome and the respiratory tract.

FUNDING: Federal

RR-75 EFFECTIVENESS OF CLICK CITY TOBACCO, A SMOKING AND VAPING PREVENTION PROGRAM FOR 5TH GRADERS

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In recent years, the prevalence of vaping ENDS has exceeded that of smoking among adolescents. To address this problem, we modified our efficacious school-based smoking prevention program, Click City: Tobacco (Andrews, Gordon et al., 2014), a 5th grade program with a 6th grade booster, to target vaping as well as smoking. Our aim was to develop a program that not only changed risk factors associated with vaping, but also maintained the effectiveness of the program on smoking prevention. The development of the program was unique in that the process was iterative, consisting of focus groups and usability testing, and culminated in an experimental evaluation of each component to assure that it changed the risk factor it was designed to target. Following development, we began an effectiveness trial with elementary schools across Oregon and Arizona, with 22 schools randomized to implement Click City: Tobacco (CC) and 22 schools randomized to implement their usual curriculum (UC). Due to school closures as a result of the Covid-19 pandemic, we had to stop the effectiveness trial with only 26 participating schools. Data were analyzed using a mixed model analysis of variance with students nested within schools. We found that students in the CC schools, as compared to students in the UC schools significantly changed targeted risk factors in the expected direction. Effect sizes were medium (d = .50) or greater for social images of youth who...
RR-76
Folefac Atem, PhD,1 Arnold Kuk, MS,2 Baqiang Chen, PhD,3 Sarah Messiah, PhD,4 Melissa Harrell, PhD,2 Adriana Perez, PhD,2 UT Health, Dallas, TX, USA,1 UT Health, Austin, TX, USA.
Objectives: In this study, we combined retrospective and prospective samples for improved estimation of the age of initiation of hookah use outcomes. Statistical methods exist to estimate the hookah outcome of interest, incorporating users and non-users of hookah at their first wave of entry into the PATH study and follow them across time. Methods: Secondary analysis of the PATH youth (ages 12-17) dataset across waves 1 (2013-2014), 2 (2014-2015), 3 (2015-2016), and 4 (2016-2017) were conducted for both left truncated data and prospective follow-up for the age of initiation of hookah use. Weighted interval censoring survival analyses with 100 balanced replicate weights and Fay’s correction factor of 0.3 was applied to estimate the hazard function for hookah benefit. Interval censoring Cox-proportional hazard regression models were used to assess the differences in the age of initiation of ever use hookah by sex and race/ethnicity. This statistical method is possible because the PATH data measured the participants’ period and the recalled age of initiation of hookah use for all participants. Results: Overall, by age 16, the hazard rate was 8.5% for first-ever hookah use. There were no statistically significant differences in the age of initiation hookah use between boys and girls. Non-Hispanic Black youth aged 12-17 initiated hookah use at earlier periods than non-Hispanic white youth. Conclusion: This paper provides an estimation of the age of initiation of hookah use by including left-truncated data and non-users of hookah at their first wave of entry into the study. The increased sample size, by having potential left-censored participants, provides different results than when never analyzing hookah users and estimating their age of initiation of ever use hookah across time.
Funding: A grant supported the research reported in this publication to Dr. Pérez number R01CA234205 from the National Cancer Institute (NCI) and the FDA Center for Tobacco Products (CTP) and a diversity supplement to Dr. Atem by the National Cancer Institute of the National Institutes of Health under Award Number R01CA234205.
Funding: Federal

RR-77
THE FALLACY OF SCIENCE IS SCIENCE, THE IMPACT OF CONFLICT OF INTEREST IN ARTICLES ABOUT VAPING
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Introduction: It has been long publicized by the tobacco industry (TI) that as long as the scientific method is correctly used all results are equally valid. The funding source or relationships of the researchers with the industry does/should not matter. Contrary to this idea, this study aims to measure the impact of the conflict of interest in the results of articles about vaping in a sample from 2017 to 2019. Methods: We included a total of 631 articles regarding vaping. The articles were selected from a systematic search of recent evidence (2017 to 2019) done in Pubmed. We collected information of conflict of interest reported by the authors; type of conflict: no conflict, conflict with TI (including vaping companies), pharmaceutical industry (PI) or other (paid participation, founding from NIH or journals); and country of publication. From a total of 80 articles that reported conflict of interest, 24 reported with the TI, 36 reported with the PI and 20 reported other kind of conflict. We fitted a logistic regression to account for the impact of reporting a conflict of interest and having a favorable result for vaping adjusting by country of publication. Results: We found that compared to those articles with no conflict of interest, the ones that reported having a conflict of interest with the TI had a probability 21 times higher (OR 21.63 CI 95% [7.81, 59.99]) of having a favorable result for vaping; while having a conflict with the PI increased the probability of favoring vaping by 2.8 (OR 2.83 CI 95% [1.34, 5.93]). Other conflict of interest doubled the probability of favoring vaping (OR 2.37 CI 95% [0.97, 6.44]), however this result was not statistically significant. Conclusions: Conflict of interest with the TI and positive results for vaping are highly associated. When using data about vaping conflict of interest should be taken into consideration and proceed with caution, especially when used for policy making.
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Funding: Nonprofit grant funding entity

RR-78
DETERMINANTS OF SMOKING CESSATION AMONG SPANISH-SPEAKING MEXICAN AMERICAN SMOKERS
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Significance: Although numerous studies demonstrate that affective and interpersonal factors are critical determinants of smoking cessation, the extent research largely under-represents minority smokers, thus limiting generalizability. As such, the current study examined associations between affective and interpersonal factors and intermediary smoking cessation variables among 290 Spanish-speaking Mexican-American smokers.
Methods: We regressed the Contemplation Ladder (CL) and Smoking Abstinence Self-efficacy (SASE) onto each of the Center for Epidemiological Studies Depression (CESD) scale, Positive and Negative Affect Schedule (PANAS-NA and -PA), Interpersonal Support Evaluation List (ISEL), and Loneliness scale. Significant predictors of each of CL and SASE were simultaneously entered into final models to determine their unique predictors. Analyses controlled for gender, age, and physical dependence (Heaviness of Smoking Index). Results: PANAS-NA, CESD, Loneliness and ISEL were significantly associated with CL. PANAS-NA, PANAS-PA and ISEL were significantly associated with SASE. In the final models, no measure was significantly associated with CL. PANAS-PA (b=.05, SE b=.02, p=.01) and ISEL (b=.05, SE b=.01, p=.001) were significantly associated with SASE. Conclusion: Positive affect and social support had unique associations with smoking abstinence self-efficacy. Such resilience factors may be more important for smoking cessation among Mexican-American smokers than negative affect, which are typically a large focus of cessation interventions.
Funding: Federal

RR-79
EFFECTS OF ADVERTISING FEATURES ON SMOKER AND NON-SMOKER PERCEPTIONS OF A REDUCED NICOTINE CIGARETTE MODIFIED RISK TOBACCO PRODUCT
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Background: Research is needed to determine the impact of marketing on perceptions and use of reduced nicotine content (RNC) cigarettes, particularly as U.S. regulators have authorized the sale of a RNC cigarette modified risk tobacco product (MRTP) that seeks further approval to advertise using modified risk claims. This study examined the effects of two advertising elements (product name and disclaimer content) on perceptions of a RNC cigarette MRTP. Methods: Eight-hundred seven participants (28.7% smokers, 58.2% male, 74.2% Non-Latinx White) were randomized to view 1 of 6 RNC cigarette advertisements via online MTurk survey, using a 2 x 3 between-subject factorial design to manipulate the product name (Moonlight vs. Moonrise) and content of a disclaimer (industry-proposed ["Nicotine is addictive. Less nicotine does NOT mean a safer cigarette"] vs. focused ["Less nicotine does NOT mean a safer cigarette"] vs. no content). Afterward they completed recall and product perception (perceived health risks, false beliefs, attitudes, intentions) questionnaires. Results: Smokers (vs. non-smokers) had worse disclaimer content recall, had better product name recall, perceived lower risks of, held more false beliefs, and held more favorable attitudes/intentions toward using/
purchasing the advertised cigarettes (p’s < .05). All participants who viewed the industry-proposed disclaimer perceived greater risk of addiction from the advertised cigarettes (p’s < .05). Non-smokers who viewed the industry-proposed disclaimer also held fewer false beliefs and perceived greater health risks vs. those who saw no disclaimer (p’s < .05). Smokers who viewed the Moonlight (vs. Moonrise) ads perceived fewer health risks of using the advertised cigarettes (p < .05). Conclusions: The industry-proposed disclaimer may effectively inform consumers about addiction risk of a new RNC cigarette MRTP and, among non-smokers, improve risk perceptions and reduce false beliefs. This element, however, did not alter false beliefs or perceived health risks among smokers, among whom the Moonlight brand name was associated with fewer perceived health risks, similar to the banned “light” descriptor.

FUNDING: Federal

RR-80
POSITIVE TOBACCO USE MOTIVES PREDICT TRANSITIONS IN POLYTOBACCO USE: RESULTS FROM WAVES 3 AND 4 OF THE PATH STUDY

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Significance: Polytobacco use is common among youth. However, little work has examined whether this pattern of tobacco use is stable over time or has identified factors that predict changes in such patterns. Thus, latent transition analysis (LTA) was used to examine sensation seeking and motives as predictors of transitions into and out of classes of tobacco use. Methods: Data derive from youth aged 12-18 years of the Population Assessment of Tobacco and Health Study. LTA identified classes of tobacco users (past 30-day use of cigarettes, electronic cigarettes [ECIGs], traditional cigars, small cigars, cigarillos, smokeless tobacco [SLT], snus, hookah) and examined probabilities of transitioning between classes from Wave 3 (2015-16) to Wave 4 (2016-18). Predictors (i.e., sensation seeking, tobacco use motives) of transitions were examined while controlling for age. Results: Four tobacco use classes were identified: Low-level users (36.5%), Poly-users (30.1%), ECIG users (23.7%), and SLT users (9.7%). Poly-users (23.9%) and ECIG users (11.3%) were more likely to remain stable over time compared to the other classes (0.1-4.9% likelihood of stability). The greatest transitions were from Low-level to ECIG users (17.3%), Low-level to Poly-users (16.5%), ECIG to Low-level users (8.8%), and Poly- to Low-level users (5.0%). Participants with greater positive motives (e.g., use tobacco to reduce stress, control weight, calm down when angry) were more likely to transition toward classes of greater risk (e.g., Low-level users to Poly-users, SLT users, or ECIG users) than from the Low-level users class. Conclusions: Patterns of tobacco use were largely unstable over an approximate 2-year period for this youth sample. The greatest transitions were from using tobacco at low levels to using multiple tobacco products or ECIGs specifically, and these transitions were predicted by higher positive motives for tobacco use. Future prevention and cessation efforts might consider focusing on these particular patterns of tobacco use, which were more stable than others.

FUNDING: Federal

RR-81
E-CIGARETTE USE AND THE COLLEGE EXPERIENCE - ASSOCIATIONS BETWEEN MENTAL HEALTH AND POLY-SUBSTANCE USE

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Significance: College students have long been a priority population for substance use prevention, and e-cigarette use and mental distress in this population is increasing. Evidence suggests that substance use and mental health outcomes interact. Building upon a previous study of adolescents, this study describes the prevalence of e-cigarette use alone and in combination with other substances (i.e. poly-substance use) and assesses the contribution of mental health to e-cigarette single and poly use. Methods: We analyzed Fall 2018-Spring 2019 National College Health Assessment (NCHA) data from undergraduate students aged 18-24 (n=55,768). We characterized patterns of substance use (e-cigarettes, other tobacco, alcohol, cannabis; other drugs) and used multi-level multivariable regression to model odds of e-cigarette use (none [reference]; only e-cigarettes [single use]; or e-cigarettes plus other substances [poly use]) by mental health, sociodemographic, and college variables. Results: Alcohol was the most frequently used substance (57.7%), followed by cannabis (23.1%), and e-cigarettes (15.2%). Nearly all (94.7%) e-cigarette users reported using other substances. Students with a past 12-month mental health diagnosis/treatment had higher odds of single (OR=1.50) and poly (OR=1.34) use, and psychological distress was associated with higher odds of poly use (OR=1.09). Other correlates of poly use included self-rated health; gender identity; sexual orientation; year in school; race/ethnicity; academic performance; Greek affiliation; current residence; institution years (two vs. four-year); and study period. Conclusion: As most college students who reported using e-cigarettes also reported at least one other substance, efforts to reduce e-cigarette use should address other substances, especially alcohol. Additional research that clarifies the direction of the relationship between mental health and substance use will inform interventions to improve college student health.

FUNDING: Unfunded

RR-82
A CONTROLLED CLINICAL TRIAL FOR THE IDENTIFICATION OF BIOMARKERS SPECIFIC TO FIVE DIFFERENT NICOTINE PRODUCT USER GROUPS

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Introduction of strict tobacco control measures and constantly increasing awareness to the negative effects of conventional cigarette smoking causes users to turn to ever-evolving alternative nicotine-delivery products, which are often advertised as potentially reduced risk products. In order to discern the sole use of different products, identification of specific biomarker patterns in various body fluids is essential. The objective of this study is the assessment of biomarker profiles in urine, blood, saliva, exhaled breath and exhaled breath condensate. For this purpose, a controlled, single-center study was conducted with 60 healthy subjects, divided into 6 groups. Each group consisted of 10 experienced sole users of combustibles, heated tobacco products, electronic cigarettes, oral tobacco and oral/dermal nicotine products used for nicotine replacement therapy (NRT), with a control group of non-users/never smokers. Compliance within each of the groups, being of essence for clear discrimination between the specific biomarkers, was ensured through a strict separated confinement of the subjects. Several methods are being developed employing untargeted omics approaches, i.e. exposomics, breathomics and adductomics, for identification of product-specific biomarkers in the collected biospecimens by means of LC-Orbitrap and GC-MS systems. In parallel, fully validated biochemical methods are applied for the quantification of various biomarkers of exposure. Several statistical tools will be applied to specifically discriminate different product use categories. The aim of the study is to identify biomarkers, or more likely biomarker patterns, which are suitable for the unambiguous identification of single product use. This would improve general distinction between the tested nicotine user groups, with a special emphasis given to those use groups showing only little differences. The identified biomarker patterns should be useful to establish robust compliance markers for long-term studies, for instance in product switching studies, and provide scientific evidence for the risk assessment of those emerging product categories.

FUNDING: Nonprofit grant funding entity

RR-83
WHICH SOCIAL NETWORK CHARACTERISTICS ARE ASSOCIATED WITH SMOKERS’ CONVERSATIONS ABOUT SMOKING AND CESSATION?

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Significance: Smokers’ conversations about smoking harms and cessation are associated with quit attempts, yet little is known about the role of social network characteristics in these conversations. This study assessed associations between smokers’ social network characteristics and the frequency and topics of conversations
about smoking and cessation. Methods: At the start of a trial on pack labeling, 199 adult smokers named up to five people with whom they felt close and communicated frequently, providing information about each person (relationship, smoking status, approval of smoking). For two weeks, participants completed daily surveys on conversations about smoking and cessation over the prior 24 hours, identifying conversation partners (i.e., network members identified at baseline or others) and topics (e.g., dangers of smoking, benefits of quitting, usefulness of cessation messages). Linear and logistic generalized estimating equations accounting for within-subject correlation regressed conversation frequency and topics on network characteristics, each evaluated in a separate model. All models adjusted for participants’ sociodemographics and baseline smoking frequency, intention to quit, and recent quit attempts. Results: The number of smokers in the network (B=0.08, p<0.01) and proportion of network members who were friends (B=0.38, p<0.01) were positively associated with the frequency of conversations about smoking and cessation. Smokers with a higher proportion of friends in their network were more likely to discuss the benefits of quitting (OR=2.58, p<0.01) and usefulness of cessation messages (OR=3.40, p<0.01). Smokers who perceived higher approval of smoking across their network were less likely to talk about smoking dangers (OR=0.61, p<0.01) or cessation benefits (OR=0.70, p=0.04). Conclusion: Smoker’s social network attributes appear to influence both the frequency and topics of conversations about smoking and cessation. Future studies should assess potential network influences on the quitting behaviors that follow from these conversations.

FUNDING: Federal

RR-84

STATE-LEVEL AND NATIONAL CHANGES IN TOBACCO SALES BEFORE AND DURING COVID-19

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BACKGROUND: COVID-19 (COVID) was confirmed in the US on January 21, 2020 and in Florida (FL) on March 1st. By late March, all 50 states had confirmed cases. The COVID pandemic has implications for tobacco product availability and sales. Pandemic related shutdowns and stay-at-home orders may have influenced tobacco product availability. The pandemic has affected the financial, physical, and mental health of consumers which could affect tobacco sales and use. We assessed tobacco sales before and during COVID to assess the potential effects of the COVID pandemic on tobacco sales. METHODS: We analyzed Nielsen retail scanner sales data in 4-week aggregates for cigarettes, cigars, smokeless tobacco, ENDS, and other smoking tobacco from convenience and large food stores from October 2018 to September 2020 for the state of FL and the US. Standardized units were created to reflect the typical quantity purchased by product type and were summed to calculate total tobacco volume. Trends in year-over-year (YoY) changes (e.g., comparing current 4-week period to the previous year 4-week period) were used to assess relative changes and avoid seasonality bias. RESULTS: Between October 2019 and February 2020 (pre-COVID), YoY tobacco unit sales averaged -2.8% (US) and -2.9% (FL). Between March 2020 and September 2020 (during-COVID), YoY tobacco unit sales averaged +1.9% (US) and +2.6% (FL). Pre-COVID YoY sales for cigarettes averaged -4.7% (US) and -2.4% (FL) while during-COVID sales averaged -0.8% (US) and +2.8% (FL). Pre-COVID YoY sales for cigars averaged 0.2% (US) and -9.3% (FL) while during-COVID sales averaged +10.3% (US) and -1.0% (FL). CONCLUSION: Tobacco unit sales in the six months before the pandemic were lower compared to sales in the same period in the prior year in the US and in FL; however, during the first six months of the pandemic, tobacco sales were higher compared to sales in the same period in the prior year. Sales patterns between the US and Florida varied, suggesting the need for state-level analyses. Increased tobacco product sales may relate to stress felt by consumers related to the pandemic. The results suggest a need for increased efforts to help smokers quit. 

FUNDING: State

RR-85

COMPARING INTERCEPT AND ONLINE ADVERTISING RECRUITMENT METHODS TO RECRUIT SOCIOECONOMICALLY DISADVANTAGED SMOKERS FOR RANDOMIZED TRIALS

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Significance: Researchers often face challenges recruiting participants from lower socioeconomic status (SES) groups where smoking is most prevalent. We report on adherence to study protocols across two recruitment methods aimed at achieving a diverse sample of smokers within a randomized controlled trial using Ecological Momentary Assessment. Methods: Separate groups of researchers recruited adult smokers (n=188, M_age=42.0, SD=11.9) into a 14-day RCT on cigarette pack messaging by (a) intercept at smoke shops in 6 urban and rural areas (57%) or (b) Facebook ads with prescheduled orientation sessions requiring travel to a university (43%). Participants received an EMA device (smartphone) and a 14-day supply of their preferred cigarettes with packs modified according to labeling conditions. We instructed participants to log each cigarette (event-contingent assessment) and complete a daily evening report on the device. We developed two measures of compliance that were sensitive to reduced levels of smoking during the study due to pack labeling. Results: In 5 of 6 locations, intercept recruitment produced a higher proportion of participants with less than a high school diploma (9% to 21% higher) than in census estimates for these locations. In contrast, Facebook recruitment resulted in a lower proportion of this demographic group (6% lower) than census estimates. Intercept recruitment resulted in lower compliance (M=55.6%) than online recruitment (M=64.2%) for event-contingent assessments in a univariate analysis (β=0.06, SE=.02, p<.01). This pattern persisted after adjusting for sociodemographics (age, sex, race, education, income), health literacy, and smoking levels at baseline (β=.07, SE=.02, p<.01). Compliance with the evening report was greater overall with no significant difference between recruitment methods (Ms=80.4% & 85.7%, respectively, p=0.07). Conclusion: Intercept strategies can recruit lower SES study participants, yet also pose a challenge to some types of compliance in ways that cannot be fully explained by demographics or smoking behavior. Researchers should carefully consider recruitment methods in light of sampling needs, resources, and assessments.

FUNDING: Other
#VAPE: A CONTENT ANALYSIS OF E-CIGARETTE RELATED VIDEOS ON TIKTOK

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Significance: TikTok is a video sharing platform with an active audience of 1.5 billion users, most of which are aged between 16 to 24 years old. The rise of TikTok has offered adolescents another route of exposure to substance related content, such as tobacco use. We aimed to examine how the top viewed e-cigarette related videos are portrayed on TikTok.

Methods: Hashtag based keywords were used to collect the most viewed e-cigarette related videos from TikTok (n=1000) from inception to November 2020. Five researchers independently coded for number of views, likes, user category, contextual characteristics, and theme. Results: After removal of duplicates, we included a final sample 808 e-cigarette related videos. Collectively, videos were viewed over 1.5 billion times, with a median view count of 1,000,000 (range 112,900-78,600,000) and a median ‘likes’ count of 143,000 (range 10,000-1,000,000). The vast majority portrayed e-cigarette use positively (63%; collectively viewed over 1.1 billion times). Neutral depictions of e-cigarette use were viewed a total of 275 million times (24%) and negative portrayals of e-cigarettes were viewed a total of 194 million times (13.4%). Their themes included (themes are not mutually exclusive): comedy and joke (52%; total of 618 million views), lifestyle and acceptability (34.5%; 447 million), marketing (28.5%; 392 million), nicotine and addiction (20%; 195 million), vaping tricks (20%; 487 million), creativity (16%; 311 million) and warning (11%; 131 million). The models in the videos were 71% male, 68% white, and 26% were less than 18 years old. We found that 62% of users originated from the United States and nearly half of the posts were made exclusively by vaping specific channels. Conclusion: These findings illustrate the high degree of views for e-cigarette related postings on a social media platform prevalent among youth. Regulation is needed for TikTok and similar platforms (e.g. mandating an algorithm based age gating) to reduce adolescents’ exposure to videos that portray vaping positively.

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FUNDING: Academic Institution

SMOKERS’ PRECEPTIONS OF VERY LOW NICOTINE CONTENT CIGARETTE HEALTH RISK MESSAGES

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Significance: The US Food and Drug Administration (FDA) may enact a policy dramatically restricting nicotine in cigarettes to assist smokers with quitting. However, there is a concern that many smokers mistakenly believe that low nicotine content cigarettes (VLNC) are safer to smoke than current cigarettes. Few studies have investigated how to address this misperception. This qualitative study describes smokers’ perspectives on 18 messages intended to convey that VLNC are as harmful to smoke as current cigarettes, developed following cognitive psychology principles. Methods: Cigarette smokers were recruited to participate in semi-structured Zoom interviews. Participants read the same brief VLNC news story, reviewed messages about the risk of VLNC, and gave their perspective about the messages they thought would be most and least effective and why. The audio recordings were professionally transcribed and Dedoose software was used to conduct thematic content analysis. A codebook was constructed and refined and transcripts were independently coded. Results: 30 cigarette smokers participated (13 male, 15 female, 2 non-binary; mean age = 42.5). Central themes that emerged in preliminary analysis included: 1) confusion about the purpose of the nicotine reduction policy and the messages, 2) messages mentioning quitting should be supportive not forceful, and 3) direct and succinct messages were perceived as clear and attention grabbing. Participants found the rationale for nicotine removal unclear and many were confused about whether VLNC cigarettes would help people quit, whether they would reduce cravings, or whether they are safer than current cigarettes. When messages mentioned quitting, participants discussed their preference for messages that ‘sympathize with the difficulty’ of quitting and address the multicomponent nature of addiction. Participants responded more favorably to brief, direct and succinct messages. We will present representative quotes and discuss other emergent themes. Conclusion: Communication efforts to educate the public about the continued harm of VLNC cigarettes may be more compelling if they are brief, direct, and succinct to capture the attention of smokers. Messages may need to explain the reasoning behind the policy and explain why lower nicotine does not make cigarettes safer. When VLNC messages encourage quitting, they should acknowledge how difficult it is to quit and include supportive language.

FUNDING: Federal

THE EFFECT OF NICOTINE DEPENDENCE ON THE RISK OF DEVELOPING POST-TRAUMATIC STRESS DISORDER RESULTS FROM THE NATIONAL EPIDEMIOLOGIC SURVEY ON ALCOHOL AND RELATED CONDITIONS (NESARC)

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Significance: With the evident association between smoking and post-traumatic stress disorder (PTSD), we sought to investigate the effect of nicotine dependence on the risk of developing PTSD after exposure to trauma. We also evaluated other smoking measures and their effects on the risk of PTSD. We also looked to see if smokers (regardless of nicotine dependence status) compared to non-smokers had an effect on the risk of PTSD. Lastly, we investigated possible mediators of nicotine dependence severity and PTSD symptoms. Methods: We used longitudinal data from both waves of the National Epidemiologic Survey on Alcohol and Related Conditions (NESARC). We matched individuals with nicotine dependence to individuals without nicotine dependence using propensity score matching in order to estimate the risk of developing PTSD after trauma exposure. A number of covariates were considered in our analysis such as demographics, relevant clinical and familial characteristics. We also investigated other smoking measures (i.e., number of cigarettes smoked per day and Fagerström Test for Nicotine Dependence (FTND) score) on their risk of PTSD development. We also matched smokers, regardless of nicotine dependence status, to...
non-smokers using propensity score matching in order to estimate the risk of developing PTSD after trauma exposure. Lastly, we conducted a mediation analysis on the effect of nicotine dependence severity on PTSD symptoms using fear and withdrawal as mediators. **Results:** Individuals with nicotine dependence were more likely to develop PTSD after exposure to trauma (OR: 1.61; 95%CI: 1.09-2.38; p = 0.017). Individuals who smoked 15 or more cigarettes were also at more risk of developing PTSD than those who smoked less than cigarettes (OR: 1.61; 95%CI: 1.04-2.49; p = 0.033). We found no significant effect of risk of PTSD in those who scored 3 or higher on an approximation of the FTND (p = 0.47). Smokers (regardless of nicotine dependence status) compared to non-smokers had no significant effect on risk of PTSD (p = 0.27). Fear and withdrawal were found to be mediators of the effect of nicotine dependence severity on PTSD symptoms. **Conclusion:** Individuals with nicotine dependence who experience trauma are at more risk of developing PTSD. This provides important information that could aid in preventive strategies for individuals with nicotine dependence who are exposed to trauma.

**RR-91**
THE IMPACT OF ONLINE E-CIGARETTE AND CIGARETTE ADVERTISING ON TOBACCO USE AND SUSCEPTIBILITY AMONG YOUTH IN MEXICO AND GUATEMALA

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**Background:** Online tobacco and electronic cigarettes (e-cigarettes) advertisements have become widespread worldwide and can impact youth susceptibility to initiate tobacco use. We sought to assess the association between exposure to online advertisements for cigarettes and e-cigarettes and on each sample vs. none) was assessed in both samples. Generalized estimating equation models were used to estimate the associations between socio-demographic variables and exposure to online advertising for cigarettes and e-cigarettes in the past 30-day (any vs. none) was assessed in both samples. Generalized estimating equation models were used to estimate the associations between socio-demographic variables and exposure to online advertising for cigarettes and e-cigarettes and on each sample respectively. Furthermore, among never users, we examined the associations between susceptibility to use either product associated with online advertising exposure using multinomial logistic regression models. **Results:** Two separate analyses yielded similar results across both the Mexican and Guatemalan samples that being female (AORs ranging from 1.23 to 1.31), higher sensation seeking (AORs ranging from 1.14 to 1.30), using alcohol (AORs ranging from 1.10 to 1.71), compared with never users), having family members or friends who used both cigarettes and e-cigarettes (AORs ranging from 1.48 to 2.27) were positively associated with exposure to online advertising for both e-cigarettes and cigarettes. Exposure to online e-cigarettes advertisements (Guatemala, AOR: 1.90; Mexico, AOR: 1.94) was positively associated with both e-cigarettes and cigarettes product use susceptibility among adolescents who had not yet initiated tobacco use. **Conclusions:** Mexican and Guatemalan youth report high exposure to online cigarette and e-cigarettes advertisements and this may increase risk for tobacco use susceptibility. Policies and prevention efforts in Latin America are needed to limit exposure to online tobacco advertising in order to reduce tobacco initiation among youth in this region.

**FUNDING:** Federal

**RR-93**
ASSOCIATION BETWEEN LUNG FUNCTION AND OCCUPATIONAL EXPOSURE TO AIR POLLUTION IN HEATED TOBACCO PRODUCTS USERS - PRELIMINARY RESULTS OF A COHORT STUDY

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**Significance:** The use of heated tobacco products (HTP) is on the rise worldwide. However, little is known on the effect of HTP in individuals exposed to occupational air pollution. The aim of this study was to explore the association of lung function and occupational air pollution in HTP and conventional cigarette (CC) smokers. **Methods:** A cohort of 800 CC smokers and 400 HTP users matched by sex, age, education, and smoking history was recruited in Almaty city, Kazakhstan, and were followed-up for two years. Data on demographic, medical history, smoking habits, etc. was collected. Participants with lung disease, bronchial asthma, and COPD at the baseline, as well as those who have changed their smoking habits were excluded from this study. The participants with work related exposure to smoke, fumes, and dust were considered to have occupational exposure to air pollution. Participants with spirometry FEV1/FVC values of 0.70 or less after bronchodilatation were considered to have low lung function. The data was analyzed using descriptive statistics and multivariable logistic regression. Two-sided p<0.05 was considered to be significant. **Results:** The final sample consisted from 730 participants of which 238 (33%) were HTP users, 361 (50%) were women, and majority, 521 (71%), were Asian. The mean age of the studied population was 49 (SD 5), with 23 (SD 11) pack-years of average smoking experience, and duration of HTP use 7 (SD 4) months. Occupation exposure reported 106 (15%) participants. Multivariable logistic regression showed that participants with occupational exposure to air pollution had six times the odds of having low lung function compared to participants without occupational exposure (OR=6.562, 95%CI 1.576, 27.318). The interaction between type of smoking (HTP vs. CC) was not significant. **Conclusions:** This study has shown that the participants with occupational exposure to air pollution were at higher odds of having low (FEV1/FVC<0.7) lung function, but this association was not dependent on type of tobacco product consumed. Further research is needed to identify potential interaction between occupation air pollution and long-time consumption of HTP.

**FUNDING:** Federal

**RR-92**
A QUALITATIVE STUDY OF PERCEPTIONS OF NICOTINE, ADDICTION, AND VERY LOW NICOTINE CIGARETTE MESSAGES AMONG CURRENT SMOKERS, FORMER SMOKERS, DUAL USERS, AND NON-SMOKERS

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**Significance:** In 2017, the U.S. Food and Drug Administration (FDA) proposed a policy to reduce the amount of nicotine in cigarettes to minimally or non-addictive levels. This study aims to explore how people with different smoking statuses perceive nicotine and addiction in order to inform future communication efforts for policy mandating very low nicotine cigarettes (VLNcs). **Methods:** Focus group participants were exclusive smokers (n=27), dual users (n=25), former smokers (n=32), and young adult non-smokers (n=31). We held two online focus groups for each smoking status in Atlanta and San Francisco, resulting in 16 focus groups conducted in March-April 2020. Participants were asked about their perceptions of nicotine and addiction and were then shown a series of messages about VLNcs and asked about their perceptions of the policy. Analysis was conducted using inductive thematic analysis and results were compared across smoking status groups. **Results:** Perceptions of nicotine and addiction varied by smoking status. Exclusive and former smokers tended to have negative perceptions, whereas dual users were more neutral or positive. Non-smokers had varying levels of understanding, due to their lack of experience with nicotine. Conceptualizations of addiction to nicotine included the chemical properties of nicotine, oral fixation, routine, and response to internal and external cues. Experienced smokers tended to minimize the negative associations with their own addictions and differentiated tobacco use from other addictions. In response to the messages, participants in all focus groups expressed uncertainty about the policy, citing that other factors besides nicotine contribute to the addictiveness of tobacco. **Conclusion:** Our study suggests that personal experience with tobacco products plays an important role in perceptions of nicotine addiction, and messages tailored to specific smoking status groups may be more effective. The FDA should consider these complexities when creating and targeting messages to raise awareness of the VLNc policy.

**FUNDING:** Federal

**RR-94**
IDENTIFYING GAMING ELEMENTS FOR A TOBACCO PREVENTION BOARD GAME: A QUALITATIVE PARTICIPATORY DESIGN STUDY WITH ADOLESCENTS

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**FUNDING:** Tobacco Industry
Significance: Adolescent tobacco use remains a public health concern, and it can be addressed with carefully crafted behavioral programs. Research shows that game-based programs are effective for substance use prevention. To design a cooperative tobacco prevention board game, this qualitative study aimed to (1) test game-mechanics and graphics and (2) improve anti-tobacco messages designed under the transtheoretical model (TTM). Methods: We applied a co-design approach, allowing adolescents to have a hand in the design process. We randomly selected 26 adolescents (ages 12-18) who participated in a 90-minute online focus group (FG) or paired interview (PI). First, with 3 FGs and 1 PI, 14 participants took part in the design of the game mechanics, artwork, and narratives. Then, with 2 FGs and 2 PIs, 12 participants shared their personal tobacco experience and participated in designing anti-tobacco messages. We used semi-structured instruments, and participants completed a questionnaire on their tobacco use, gaming skills, and demographics. We identified common themes using thematic analysis. Results: Of all participants (63% Female; M(age)=15, SD=2.1), 81% were susceptible to use any tobacco product, and 22% reported ever using tobacco. Participants reported an average of 9 hours of gaming a week. During this co-design process, adolescents (1) balanced difficulty level with players' ability, (2) considered gaming competition and cooperation, and (3) designed messages tailored to their current beliefs about tobacco and relevant to their daily life. Conclusion: This study identified adolescents' beliefs about games and tobacco to guide the development of a tobacco prevention board game. The game must balance difficulty with player ability and cooperation with competition. The program may also benefit from new information about the dangers of emerging tobacco products (e.g., vaping products) among adolescents. Created messages and gaming elements will inform the design of the program for future pilot-testing. Our library of anti-tobacco messages can benefit the research community during the design of a comprehensive program driven by the TTM.

FUNDING: Federal

RR-95

STATE AND NATIONAL CHANGES IN ENDS SALES AFTER JUUL'S REMOVAL OF MINT-FLAVORED PODS, FLORIDA AND TOTAL U.S.

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BACKGROUND: The rapid increase in youth electronic nicotine delivery system (ENDS) use coincided with a rapid increase in JUUL sales, which prompted investigations and lawsuits aimed at this leading brand. In response, JUUL removed mint and sweet flavors. The increase in market share for seasonality and understand the ENDS market following JUUL's November 2019 removal of mint pods. We calculated percent changes between January 2019 and January 2020 to control for seasonality and understand the ENDS market following JUUL's November 2019 removal of mint pods. METHODS: We used 4-week aggregate Nielsen Retail Scanner data on ENDS products from convenience and large food stores from January 2019 to January 2020. Data for the US and Florida (FL) were analyzed separately. Standardized units were created for analysis. Flavors were categorized as tobacco, menthol, mint, other (e.g., fruit), concept, or undetermined. We calculated percent changes between January 2019 and January 2020 to control for seasonality and understand the ENDS market following JUUL's November 2019 changes. RESULTS: From January 2019 to January 2020, ENDS unit sales increased in the US (14%) and FL (47%), but JUUL sales decreased by -6% and -19%, respectively. JUUL's market share dropped from 67% (US & FL) to 55% (US) and 37% (FL) over the study period. By January 2020, top emerging brands were Vuse in the US (76% increase) and Puff Bar in FL, which first appeared in July 2019 and increased at a rate of 175% per 4-week period. Overall mint share decreased in the US (-66%) and FL (-73%), menthol share increased (157% & 102%, respectively), tobacco share increased (29% & 4%, respectively), concept share held steady in the US (<1%) and increased in FL (25%), and share of other flavors decreased in the US (-19%) but increased in FL (77%). CONCLUSION: JUUL's decline in mint sales was offset by increased sales from other brands, which continued to sell mint and sweet flavors. The increase in market share of menthol (US & FL) and other flavored ENDS (FL) following JUUL's removal of mint flavors suggests substitution. Change in FL differed from the US, demonstrating the importance of monitoring how changes by influential brands affect purchase patterns at both the national and state level.

FUNDING: State

RR-96

USE OF FLAVORED VAPING PRODUCTS AMONG CONCURRENT VAPERS OF NICOTINE AND CANNABIS FINDINGS FROM A PILOT STUDY

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Background: Use of vaping products that contain flavors (e.g., fruit, candy) represents an emerging public health concern. This study aimed to describe the use of flavored nicotine and cannabis e-liquids, and their association, among a sample of concurrent vapers of nicotine and cannabis. METHODS: One-hundred twelve concurrent users of vaped nicotine and cannabis were recruited from Amazon Mechanical Turk and responded to a survey on nicotine and cannabis product use. Participants who reported using nicotine-containing e-liquids (n = 112) and cannabis e-liquids (n = 86) were asked to select the flavor of nicotine or cannabis e-liquid they usually use from a list of 11 flavor categories. Responses for each were further classified into unflavored/tobacco vs. other flavor use. Descriptive statistics were used to describe flavor use across products, and logistic regression was used to examine associations between nicotine and cannabis flavor use adjusting for demographic factors. RESULTS: The majority of participants (85%) reported using flavored nicotine vaping products other than tobacco; the top three most popular nicotine flavors were menthol/mint (32%), fruit flavors other than berry or citrus (15%), and berry flavored e-liquids (13%). Fewer participants (56%) reported using flavored cannabis oils; unflavored product use was the most popular (41%), followed by candy/dessert/sweet flavors (14%), and fruit flavors other than berry or citrus (11%). Use of flavored nicotine e-liquids and cannabis e-liquids were weakly associated (χ²(1) = 6.54, Cramer's V=0.276, p = 0.016). Controlling for other factors, the odds of using flavored nicotine products was 4.61-fold higher among those who used flavored cannabis oils compared to those who did not (95% CI:1.19-17.75). Conclusions: Use of flavored e-liquids was more common for nicotine vaping than for cannabis vaping, where unflavored product use was more prevalent. Findings support the need for future studies to examine potential interactions between flavored product use among those who use nicotine and cannabis products.

FUNDING: Academic Institution

RR-97

TRENDS OVER TIME IN VAPING PREVALENCE AMONG YOUTH AND ADULTS IN QUEBEC AND ONTARIO, CANADA

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Significance: Surveillance tools such as the Canadian Tobacco, Alcohol, and Drugs Survey (CTADS) and the Canadian Student Tobacco, Alcohol, and Drugs Survey (CSTADS) have been used to examine vaping prevalence among Canadians. While these biennial surveys collect information on substance use among adults and students, respectively, they do not collect detailed sociodemographic data. To address this data gap, the current analysis examined data from the Canadian Community Health Survey (CCHS), an annual cross-sectional survey that collects health data for the Canadian population aged 12 years and older. METHODS: Data from optional modules of the Canadian Community Health Survey (CCHS) were analyzed to examine trends in the prevalence of past-30-day e-cigarette use over time among youth (aged 15 to 19) and adults (aged 20+). Data were available for Quebec from 2017 to 2019, and for Ontario from 2015 to 2018. Logistic regression models were used to examine correlates of past-30-day e-cigarette use in each province. RESULTS: In Quebec, vaping has increased over time, from 3% (233,000) in 2017 to 5% (333,000) in 2019, (a 40% change). Vaping increased among both youth and adults in Quebec, from 11% (40,000) in 2017 to 19% (77,000) in 2019, (a 78% change), and from 3% (193,000) in 2017 to 4% (256,000) in 2019, (a 30% change), respectively. In Ontario, vaping has not changed between 2015 (3% or 357,000) and 2018 (3% or 404,000). However, vaping increased between 2017 (3% or 309,000) and 2018 (3% or 404,000), (a 28% change). This increase is reflected in an increase in vaping among youth, from 6% (47,000) in 2017 to 10% (79,000) in 2018, (a 71% change). Correlates of past-30-day e-cigarette use will also be presented. CONCLUSION: Increases in youth vaping in Quebec and Ontario shown in CCHS data are consistent with trends in other provincial surveys. While vaping increased among adults in Quebec between 2017 and 2018, increases in vaping among youth in Quebec and Ontario occurred in more recent years, indicating a temporal difference in the uptake of vaping products by age among Canadians.

FUNDING: Unfunded
LONGITUDINAL EFFECTS OF PRENATAL EXPOSURE TO TOBACCO AND CANNABIS ON CHILD OBESITY TRAJECTORIES

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Co-use of tobacco and cannabis among pregnant women has become more prevalent in the last decade (3.3% vs. 9.0% between 2005 and 2014), and low-income young minority women have a higher risk of prenatal co-use of tobacco and cannabis than other women (Coleman-Cowger et al., 2018). Meta-analysis has shown that maternal smoking in pregnancy increases the risk of their offspring’s obesity in childhood (Rayfield & Plagge, 2017). However, little is known about associations between maternal co-use vs. use of tobacco only or non-use and children’s obesity trajectories. Data from 115 mother-child dyads recruited in the first trimester of pregnancy were analyzed using latent profile analyses. Based on child height and weight collected at 24 months child age, 5 years old, and 10 years old, child BMI percentile was constructed at each time point and used to examine the number of profiles. Mothers’ tobacco and cannabis use in pregnancy ascertained using calendar-based interview and several biomarkers (co-users of tobacco and cannabis: 48.7%, users of tobacco only: 26.1%, and non-users: 25.2%) were examined as predictors. Child sex (boys: 46.1%, and girls: 53.9%), child low birth weight (<2.5kg), and maternal obesity at middle childhood (BMI ≥ 30.0) were controlled. Missing data were handled by maximum likelihood with robust standard errors. A three-profile model was chosen as the best model to represent child obesity trajectories from toddlerhood to middle childhood (ABIC = 2632.84, entropy = .948). The errors. A three-profile model was chosen as the best model to represent child obesity trajectories from toddlerhood to middle childhood (ABIC = 2632.84, entropy = .948). The

IMPACTS OF COVID-19 ON CIGARETTE USE, SMOKING BEHAVIORS, AND TOBACCO PURCHASING BEHAVIORS

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Significance: The COVID-19 pandemic has had a significant global impact. As a respiratory illness, COVID-19 may pose unique risks to cigarette smokers. This study used concept mapping, a mixed-method participatory approach, to identify impacts of COVID-19 on cigarette smokers.

Methods: A total of 90 cigarette smokers (54% men; 66% White/European American; mean age = 40.8 years; SD = 11.3 years) were recruited to complete this online, multi-step study. Participants completed a brief demographic survey and brainstormed statements that completed the prompt: “A specific way that Coronavirus/COVID-19 has impacted/affect my cigarette use, smoking behaviors, tobacco purchasing behaviors, and/or other tobacco-related behaviors is...” After duplicate statements were removed, participants sorted the final list of 87 statements by similarity of content and rated how true statements were from them (1-Definitely NOT true to 7-Definitely true).

Results: Ten themes were identified: smoking more, smoking more to cope, smoking less, financial impacts and challenges to obtaining products, social impacts, reduction sharing cigarettes, increased COVID-19 concerns and precautions, restricted smoking, alternative product use, and no change in smoking habits. Preliminary analyses revealed that social impacts was the highest endorsed cluster with an average rating of 4.02 and smoking less was the lowest endorsed cluster with an average rating of 2.07. Conclusions: Cigarette smokers may experience additional COVID-19 impacts, such as increased cigarette and alternative tobacco product exposure, exacerbator financial burdens, and increased health risks.

FUNDING: Federal
COVID-19 transmission. Social-economic conditions resulting from the pandemic, including stay-at-home orders and loss of work, dramatically increased frequency of waterpipe smoking and risks for dependence and environmental smoke risks to others.

**FUNDING:** State

**RR-102**

**ANTI-TOBACCO ADVERTISING AND THE EXPERIENCE OF LUNG CANCER STIGMA**

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**Significance:** Stigma is often experienced by people affected by lung cancer due to the known links to smoking. Anti-smoking campaigns focus on decreasing lung cancer incidence by ‘de-normalising’ smoking, which may contribute to such stigma. The aims of the current study were to examine how people diagnosed with lung cancer recall anti-tobacco advertisements and their emotional responses to anti-tobacco advertisements post-diagnosis. **Methods:** People with a diagnosis of lung cancer were identified from a clinical cancer registry in one region of Australia. Potential participants were invited via mail and telephone to complete a qualitative telephone interview. The interview followed a semi-structured interview guide. Interviews were audio-recorded, transcribed and comparatively coded by two authors using NVivo software. **Results:** Sixteen participants completed an interview. Advertisements which had been prominent for the general population (e.g. “Sponge”) were similarly prominent for the participants. Some avoidance of anti-tobacco advertisements was reported. A wide array of emotional responses to the advertisements were reported, including discomfort, fear, guilt, relief, resignation, sadness, stupidity (for having smoked), fear for others, disininterest and no response. Participants were not however, opposed to the broadcasting of anti-tobacco advertisements. Rather, the advertisements were perceived as appropriate and necessary. **Conclusion:** Although people diagnosed with lung cancer reported experiencing some negative emotional responses to anti-tobacco advertising, they were supportive of its continuance. Consideration should be given to how future advertising might be framed or supplemented in a manner that minimises the psychological distress and stigma experienced by this group.

**FUNDING:** Unfunded; Academic Institution

**RR-103**

**“I JUST NEEDED IT”: A QUALITATIVE ANALYSIS OF CONTEXTUAL FACTORS INFLUENCING HOMELESS YOUTH’S DECISIONS TO SMOKE**

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**Significance:** Approximately 70% of homeless youth smoke cigarettes; many smoke daily and exhibit strong nicotine dependence. By identifying contextual factors that give rise to smoking among homeless youth, researchers can optimize smoking cessation interventions to target this high-risk population. The purpose of this study was (1) to describe the intrapersonal, social, and physical contexts associated with homelessness youth’s most recent smoking event and (2) identify differences in contextual factors by age. **Methods:** Thirty-six homeless youth current smokers aged 14-24 years were recruited from a drop-in center in a Midwestern city. Data from semi-structured, in-person interviews was analyzed qualitatively to understand patterns and determinants of smoking behaviors. Results: Over two-thirds of homeless youth reported stress and nicotine dependence as primary reasons for smoking. These factors intersected with daily stressors associated with homelessness, including finding safe spaces to sleep, accessing homeless services, and finding meals. Older youth reported smoking to de-escalate negative emotions associated with stressful events. Together, stressful events plus nicotine dependence produced strong physiological urges to smoke. For about 1 in 4 youth, smoking was described as part of a routine. This group was mostly comprised of older youth who used tobacco as a “morning wake up”, while traveling, and at mealtimes. Over 80% of youth smoked outside at the homeless drop-in center or the places they lived. Social prompts from drop-in center peers (e.g., seeking a “light”) regularly premitted smoking. Regardless of smoking location, younger youth (aged 14-17) reported smoking socially while older youth were most likely to smoke alone. Generally, youth in our study purchased tobacco products at area stores, gas stations, or from other young people; using cash and commodities to trade for single cigarettes. Conclusions: For homeless youth, smoking is integrated into daily life and is often used to manage stress and engage socially. Targeted smoking cessation interventions are needed to address the social and environmental influences unique to this population.

**FUNDING:** Federal

**RR-104**

**PREVALENCE OF ELECTRONIC NICOTINE DELIVERY SYSTEMS (ENDS) USE IN MIDDLE ADULTHOOD: USING MEASURES FROM STUDIES ARCHIVED IN NATIONAL ADDICTION AND HIV DATA ARCHIVE PROGRAM (NAHDAP)**

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**Significance:** Accurate description of drug use trends is essential to high-quality prevention and effective interventions. However, there have been challenges to collecting drug use data partly due to the difficulty of reaching out to drug-using populations and substantial costs related to that (Lambert, 1990). The incomplete data coverage may hamper accurate estimations of prevalence for specific groups. For example, despite a growing attention to the use of Electronic Nicotine Delivery Systems (ENDS) and its health impact (Everard et al., 2020; Lee & Fry, 2019), research on ENDS use among middle-aged adults (e.g., their 30s-50s) is lacking due to limited data on this age group. Several agencies, including NIDA, have emphasized the utilization of secondary data as a potential source to minimize the data-related challenges researchers face. In the current study, we will examine the prevalence of ENDS use among middle-aged adults from studies archived in the National Addiction and HIV Data Archive Program (NAHDAP). Methods: NAHDAP acquires, preserves, and disseminates drug use/addiction data, and thus provides the opportunity for researchers to conduct secondary analysis on various types of drug use, including ENDS. Data from the Population Assessment of Tobacco and Health (PATH) Study wave 4, accessible from the NAHDAP, was used to examine the prevalence of ENDS use by gender and race among those aged 35-54 (n=8,599). Survey-weighted logistic regression was used for multivariate models. Results: We found that 28.8% of middle-aged adults reported to ever use ENDS in our lifetime. We did not find gender differences in ENDS use (Odds Ratio [OR]=0.96, p>0.58) but found significant race differences; non-Hispanic Whites were more likely to ever use ENDS in their lifetime compared to non-Hispanic Blacks (OR=0.78, p<0.05) and Hispanics (OR=0.73, p<0.01). Conclusion: Our findings show that ENDS use among middle-aged adults may differ from that among youth (e.g., greater prevalence among boys, Kong et al., 2017). As earlier prevention and intervention are critical to various health outcomes in older ages, it is important to utilize existing data on ENDS use among middle-aged adults. We will further discuss the possibility of linking ENDS datasets in NAHDAP to contextual data.

**FUNDING:** Federal

**RR-105**

**YOUNG ADULT CIGARETTE USE AND VAPING DURING COVID-19**

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**Background:** Smokers and vapers may be more likely to suffer serious harm from COVID-19 infections due to the negative effects of smoking/vaping on respiratory health and immune system functionality. Further, smokers and vapers are more vulnerable to infection with COVID-19 and are more likely to develop serious health complications if infected. Despite these findings, research concerning the public’s opinion of the relationship between COVID-19 contraction and severity and vaping/smoking remains limited. **Objective:** The purpose of the current study was to survey young adults’ perceptions concerning susceptibility to contracting COVID-19 and to perceived severity of symptoms among regular users of vapes and cigarettes compared to non-vapers/smokers. **Methods:** The current study included a cross-sectional sample of 754 young adults aged 18 to 25 years old within the United States that was recruited through Amazon’s Mechanical Turk during the COVID-19 pandemic from July to October of 2020 (Mean age 23.34; 57.37% female; 61.01% Non-Hispanic White). Lifetime use and sharing of electronic vaping products was assessed. All participants were asked about perceptions regarding COVID-19, specifically if regular users of vapes and CTCs are...
more likely to contract COVID-19 and if regular users do contract COVID-19, if their symptoms would be more severe due to their use. Results: No significant differences were detected between proportions for ever users and never users for both EVPs and CTCs regarding the perceptions that use may lead to higher likelihood of contracting COVID-19. A significant difference was found between ever vapers and never vapers (chi-square (1, N = 681) = 28.01, p < .001) and ever smokers and never smokers (chi-square (1, N = 706) = 13.77, p < .001) for the perception that use may lead to more severe symptoms of COVID-19 if infected. Conclusion: Perceptions of COVID-19 symptoms appears to be influenced due to ever use of EVPs and/or CTCs. Further studies are needed to examine how COVID-19 may have impacted patterns of use for EVPs and CTCs.

RR-106
Tobacco Use and Cessation in the Context of Art Adherence Insights from a Qualitative Study in HIV Clinics in Uganda

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Background: Sub-Saharan Africa carries a disproportionate burden of human immunodeficiency virus (HIV). Tobacco use amongst people living with HIV is higher than in the general population even though it increases the risk of life-threatening opportunistic infections including tuberculosis (TB). Research on tobacco use and cessation amongst people living with HIV in Africa is sparse and it is not clear what interventions might help. Methods: We carried out qualitative interviews in Uganda in 2019 with 12 current and 13 former tobacco users (19 men and 6 women) receiving ART in four contrasting locations. We also interviewed 13 HIV clinic staff. Results and conclusions: We found that tobacco use and cessation were tied into the wider moral framework of ART adherence. Patients were advised to stop using tobacco; those who did not concede this from health workers, who associated tobacco and alcohol use with ART adherence failure. Most of those who quit tobacco did so following the biographical disruption of serious TB rather than the HIV diagnosis itself, but social support from family and friends appeared to be crucial to sustained cessation. Smoking and drinking formed part of a register of masculinity which involved enforced sociability as well as physical strength, itself linked to tobacco in the popular imagination. Men who stopped using tobacco and alcohol in order to meet ART adherence requirements could call on an alternative register of masculinity as family responsibility and respectability, particularly if they had the support of friends and family in this role. However, many participants suffered from food insecurity and social isolation and were therefore unable to fulfil the role of breadwinner and responsible father. This made them liable to depression and more likely to turn to validation through smoking and drinking with their peers.

FUNDING: Other

RR-107
Intentions to Continue Vaping During COVID-19 Findings from a Pilot Study of Concurrent Vapers of Nicotine and Cannabis

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Background: Potential links exist between vaping and susceptibility to COVID-19. Information on how COVID-19 may affect intentions to continue vaping is warranted. Information on how COVID-19 may affect intentions to continue vaping is warranted. Methods: A sample of 103 concurrent vapers of nicotine and cannabis were recruited from Amazon Mechanical Turk from June-August 2020 for a survey on vaping behaviors. Participants were asked two questions about the impact of COVID-19 on their intention to continue vaping nicotine and cannabis. Responses were classified as being more likely, about the same, or less likely to continue vaping. Associations between self-reported intentions to continue vaping, scores for past year internalizing, externalizing, and substance use problems, and vaping frequency were assessed using one-way analysis of variance and chi-square tests. Results: Over one-third (34%) of participants reported that COVID-19 made them more likely to continue vaping nicotine, while 47% reported that COVID-19 made them more likely to continue vaping cannabis. More participants reported that they would be less likely to continue vaping nicotine (21%) than cannabis (8%). More non-daily nicotine vapers (41%) reported they would be more likely to continue vaping nicotine than daily nicotine vapers (24%), while more daily nicotine vapers (33%) reported that they would be less likely to continue vaping nicotine than non-daily vapers (13%; χ²(2)=6.97, p<0.03). A similar pattern emerged for non-daily vs. daily cannabis vaping (χ²(2)=9.80, p<0.01). Compared to those reporting no intention to change, those who endorsed being more likely to continue vaping cannabis had higher scores for past year internalizing behaviors (mean: 3.5 vs 2.5, F(102)=3.98, adjusted p-value: 0.02) and substance use problems (mean: 2.5 vs 1.5, F(102)=5.35, adjusted p-value:0.01). Conclusions: Intentions to continue vaping due to COVID-19 differed by substance. Frequency of vaping, internalizing problems, and substance use problems were associated with intentions to continue vaping nicotine and cannabis. Findings can inform interventions to prevent COVID-19 among vapers.

FUNDING: Federal; State

RR-108
Youth and Young Adult Responses to Hypothetical E-Liquid Flavor Restrictions

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Background: The popularity of salt-based disposable vaping devices, currently exempt from flavor restrictions, among adolescents and young adults (AYA) has increased. Tobacco control policies that restrict e-liquid flavors to only menthol and tobacco might reduce AYA vaping, but data on anticipated responses to such policies among AYA are lacking. Methods: We compared responses to a hypothetical flavor ban (i.e., if e-liquid flavors were restricted to either menthol or tobacco only) by preferred e-liquid flavor among AYAs. Results: Past 30-day nicotine vapers from the United States aged 14-21 (n=15188; Mage=18.8 [SD=1.8]) completed a cross-sectional, anonymous, self-report survey in August 2020. Measures assessed preferred flavor (e.g., fruit, fruit-ice[menthol + fruit combination]), nicotine dependence, demographic characteristics, and intention to continue vaping given two hypothetical flavor bans (i.e., “Would you still vape if only [menthol][tobacco] flavors were available?”yes vs. no). Binary logistic regression modeled the odds of a “yes” (vs. “no”) response as a function of preferred flavor separately for menthol and tobacco. Results: Majority of respondents were female (77%), Non-Hispanic/Latinx (81%) and White (75%). Disposable (46%) and pod-style cartridge (33%) devices were the most popular devices used. 40% preferred fruit-e-liquid flavors, and 30% preferred fruit-ice. Compared to those who preferred fruit flavors, fruit-ice users had greater odds of indicating intention to continue vaping if only menthol (aOR=2.69 [95% CI:2.0, 3.3];p<0.01) or tobacco (aOR=1.3 [95% CI:1.0, 1.8];p<0.01) flavors were available. Conclusion: AYA nicotine vapers who used fruit-ice flavors were more likely than fruit vapers to indicate intention to continue vaping even if fruit-ice flavors were no longer available. Development of e-liquid flavor restriction policies intended to reduce AYA vaping should consider possible differential consequences across flavor categories. Future survey research should also assess use of fruit-ice as a distinct e-liquid flavor category to better understand how this emerging flavor may affect risk perceptions, use patterns, and abuse liability.

FUNDING: Other

RR-109
Perspectives of National Interventionalists on the Effectiveness and Captivating Features of Adolescent E-Cigarette Prevention and Cessation Programs

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Background: E-cigarettes are highly addictive and carcinogenic, yet have grown in popularity in the last decade, particularly among adolescents. Adolescent polysubstance use is also of concern. This quality improvement study asked experts to identify effective approaches for prevention and cessation of adolescent e-cigarette use. Methods: We conducted 30-60 minute semi-structured interviews with multi-sectoral tobacco control interventionalists (n=10) using Zoom. We developed an interview guide based on extant literature and in consultation with experts. We developed a codebook from review of transcripts, coded transcripts, and conducted thematic analysis using NVivo.12. Results: Respondents described prevalence and patterns of adolescent e-cigarette use through a socio-environmental lens. They detailed promising practices
for prevention and cessation of adolescent e-cigarette use, but agreed that e-cigarette specific evidence-based interventions were lacking; they relied heavily on evidence from combustible tobacco interventions. To enhance effectiveness of interventions, many believed it was important to address beliefs, social norms, and perceptions around life choices and behaviors rather than knowledge alone. When asked about captivating mean approaches for young people, physical and intellectual engagement were perceived to be critical. Active, intimate, relatable, and peer focused approaches were recommended. Although some respondents agreed on the importance of designing interventions to address poly-substance use, approaches to do so varied greatly due to the complex nature of multiple drug interactions and addictions. **Conclusions** Evidence-based approaches for e-cigarette intervention among adolescents are nascent but growing. In the absence of evidence-based strategies, interventionists are relying on best practices from combustible tobacco prevention. E-cigarettes are unique in several ways compared to combustible cigarettes, including acceptability and drivers of use and nicotine concentration, likely requiring tailored approaches. Additionally, interventions that consider the common poly-substance use of adolescents are critically needed.

**FUNDING:** Federal

**RR-110**

A CROSS COUNTRY FLAVORING COMPARISON OF E-LIQUIDS FROM THE US AND THE NETHERLANDS

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**Summary:** Different countries have different e-cigarette flavoring environments. It is unknown if e-cigarette flavoring compositions differ between countries and whether concentrations of signature flavoring compounds differ between countries and whether concentrations of signature flavoring compounds differ between tobacco-flavored e-liquids and sweeter, non-tobacco flavors. This study aims to compare concentrations of sweet e-liquid flavorings between countries and flavor descriptors.**Methods:** Five popular, sweet flavorings (Vanillin, Ethyl Vanillin, Ethyl Maltol, Maltol and Furaneol) were analyzed using quantitative GC/MS methods in US (n=152) and Dutch (n=178) e-liquids. Using the primary marketing flavor descriptor, all samples were assigned to a flavor category based on a published flavor wheel. Sweet (Dessert, Candy and Other Sweets) and non-sweet (Tobacco) flavor categories were selected for comparison. We examined differences in mean flavoring concentrations between-country within-category (US vs. Dutch e-liquids), and between-category (all e-liquids).**Results:** No significant differences in flavoring concentrations were detected between countries. Concentrations of Vanillin were significantly higher in Dessert (mean: 3.5±2.8mg/mL) and Other Sweets (mean: 3.4±4.1mg/mL) flavored e-liquids compared to Candy (mean: 0.9±1.2mg/mL) and Tobacco (mean: 0.9±0.9mg/mL) products (all p < 0.05). Similarly, concentrations of Ethyl Vanillin were significantly higher in Other Sweets (mean: 3.1±5.0mg/mL) compared to Candy (0.6±1.6mg/mL) and Tobacco (0.7±0.9mg/mL) (both p < 0.05). Significant differences were not observed for Ethyl Maltol, Maltol and Furaneol.

**Conclusions:** Our results suggest that concentrations of sweet e-liquids are similar across the US and the Netherlands. Furthermore, Tobacco-flavored e-liquids contained significantly lower concentrations of several flavoring compounds than e-liquids with sweeter flavor descriptors. Regulators could decide to reduce e-cigarette appeal, for example, by setting maximum concentrations of sweet flavorings in e-liquids.

**FUNDING:** Federal

**RR-111**

PERCEIVED COMMUNITY SOCIAL STATUS IS ASSOCIATED WITH CURRENT SMOKING AMONG ADULTS ACCESSING DAY SHELTER SERVICES

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**Background:** Smoking prevalence among homeless adults is alarmingly high and most homeless adults perceive themselves as worse off relative to the general population in the United State. These negative perceptions may contribute to high rates of smoking and poor health outcomes. **Methods:** Survey data were obtained from adults (N = 554) who received services from a day shelter in Oklahoma City. Subjective social status (SSS) was measured using the MacArthur national and community socioeconomic ladder. Self-reported current smoking was assessed by asking participants when they last used cigarettes (e.g., never, in the past year, in the past 30-days). Current smoking was also assessed biochemically using a carbon monoxide cut off score of 3. Logistic regression determined whether SSS at the national and community levels were associated with self-reported past 30-day smoking. Race, sex, age, education, and lifetime episodes of homelessness were included as covariates. **Results:** The sample was largely male (70.9%) and racially diverse, with 37.9% identifying as White, 27.2% as African American/Black, and 14.9% as American Indian/Alaskan Native. Participants were, on average, 45.7 (SD = 11.6) years of age and had been homeless 3.2 (SD = 2.4) separate times in their lives. More than three-quarters of the sample self-reported past 30-day smoking (75.2%). On average participants placed themselves on the 4th rung on the 10-rung national ladder (M = 4.7, SD = 2.9) and the community ladder (M = 4.9, SD = 2.9). Scores on both ladders were highly correlated (r = 0.75, p < 0.01), therefore these variables were analyzed in separate models. We observed a statistical trend (p = 0.06) such that higher SSS at the national-level was marginally associated with lower odds of self-reported current smoking (OR = 0.93 [95% CI = 0.87, 1.00]). Whereas, higher SSS at the community-level was associated with lower odds of self-reported current smoking (OR = 0.91 [95% CI = 0.85, 0.98]). **Conclusion:** Among homeless adults, high SSS at the community-level was associated with lower odds of past 30-day smoking. The subjective social status ladder provides unique information about how homeless adults perceive themselves and interventions aimed at improving these social perceptions could potentially be a useful component in smoking cessation programs.

**FUNDING:** State; Academic Institution

**RR-112**

IT’S NOT ALL ABOUT JUUL: USE OF NON-JUUL POD DEVICES AMONG YOUNG ADULTS

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**Background:** A recent generation of electronic vapor products (EVPs) called pod devices have appeared within the EVP market with JUUL being the most popular. Survey research on non-JUUL pod device (NJP) use remains limited to date with ever use rates of NJPs in a sample of high schools reporting 26.5% in 2018 (Morean et al., 2020). The purpose of the current study was to survey NJP use in young adults and determine whether participants identified reduction in cigarette use/smoking cessation as the primary motivation for NJP use. **Method:** The current study included a cross-sectional sample of 754 young adults (Mean age: 23.94 (SD = 1.88), 57.29% female, 61.01% non-Hispanic white) gathered through Amazon Mechanical Turk from July to October 2020. Participants were surveyed on lifetime use and past 30-day use for NJPs alongside other EVP device types (i.e., JUUL, Cigalikes, Vape Pens, E-hookah Pens, Mods/tanks) and conventional tobacco cigarettes. Participants were also surveyed on reasons for NJP use, and susceptibility to future NJP use. **Results:** NJP pod device ever use was substantial with 46.68% of the sample reporting ever use. JUUL ever use was found in 52.82% of the sample, with 23.28% of the sample reporting NJP ever use but deny JUUL ever use. Of participants who reported ever use of NJPs, roughly 52% reported using rechargeable NJPs in the past 30-days and the mean number of days used in the past thirty was 10.71. For the majority of young adults, cigarette smoking reduction or cessation did not appear to be the primary reason for pod device use with 63.50% of participants who had ever used a pod device purposes denying using for smoking reduction/smoking cessation purposes. A significant binary logistic regression (N = 391, chi-square(2) = 63.08, p < .001) found a smoking and/or vaping history to significantly predict susceptibility to future NJP use (chi-square(1) = 58.08, p < .001, OR = 5.72, 95% CI: [3.65, 8.96]). **Conclusion:** The current study is thought to contribute to the empirical survey research on pod devices, which appear to be gaining in popularity among young adults.

**FUNDING:** State; Academic Institution

**RR-113**

FLAVOR APPEAL IN WOMEN WHO DO NOT USE E-CIGARETTES: AN INTERNET EXPERIMENT

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**Objectives:** Understanding the basis of flavor appeal and its role in use initiation can inform future regulations of flavored tobacco products. To distinguish flavors that especially appeal to young adult (18-24) never smokers from flavors that attract older adult (25 +) current smokers we conducted this online experiment. We assessed and compared the emotional ratings, perceived harm, liking and openness to use (e-cigarette) four flavors (classical tobacco, cool mint, fresh strawberry, and top-shelf bourbon) in two groups of women: young adults who have never smoked cigarettes...
Polysubstance use and dependence among Mexican sexual minorities is somewhat higher than among heterosexuals, which should be considered in developing prevention and treatment approaches targeted to sexual minorities.

Significance: In high-income countries, sexual minorities engage in more substance use than heterosexuals. This study characterizes the similarities and differences in the patterns of smoking, vaping, other substance use (alcohol and marijuana), and mental health (depression) by sexual orientation in a sample of Mexican adult smokers.

Methods: Data came from six waves of an online survey of adult smokers in Mexico, recruited from a commercial research panel (92.5% heterosexual, n=4,786; 6.1% lesbian, bisexual, heterosexual = Reference), age, education, and household income.

Results: Among males, being gay was independently associated with greater smoking dependence (β=0.21, 95% CI: 0.02, 0.39), greater likelihood of preference for flavored capsule cigarette (adjusted odds radio AOR=2.07, 95% CI: 1.32-3.24) and depression diagnosis (AOR=2.46, 95% CI: 1.47-4.11). Male bisexuals had higher vaping dependence (β=0.36; 95%CI: 0.04, 0.68, among dual users only) and were more likely to have been diagnosed with depression (AOR=2.17, 95% CI: 1.25-3.76). Among women, lesbians had lower smoking dependence (β=-0.72; 95% CI: -1.43, -0.21), were more likely to prefer menthol cigarettes (AOR=3.22, 95% CI: 1.56-6.85) and were more likely to have used marijuana more than once in the last month (AOR=3.27, 95% CI: 1.86-5.75).

Conclusion: Polysubstance use and dependence among Mexican sexual minorities is somewhat higher than among heterosexuals, which should be considered in developing prevention and treatment approaches targeted to sexual minorities.

FUNDING: Unfunded; Academic Institution
Significance: The tobacco industry has targeted vulnerable populations (e.g., youth) in marketing efforts, and exposure to tobacco marketing is positively associated with smoking initiation and behaviors. There is a gap in the literature around exposure to tobacco marketing and smoking behaviors in Mexico. This study sought to fill this gap with a survey among adolescents and adults in Mexico City. Methods: In 2020, 1444 adolescents (1179 non-smokers, 265 smokers aged 13-17) and 950 adults (745 non-daily smokers, 205 daily smokers aged 18-34) from a range of socioeconomic status (SES) areas in Mexico City self-reported their tobacco marketing exposure and smoking behaviors/susceptibility in a cross-sectional survey. Data were analyzed using chi-square, analysis of variance and logistic regression models. Results: A high percentage of adolescents noticed cigarette pack displays in stores (84%) and found them colorful (78%). Low- and mid-SES participants were more exposed to tobacco marketing than high-SES participants through several channels, including the Internet (37% and 36% vs. 25%) and newspaper/magazines (32% and 30% vs. 22%) (p<0.05). After controlling for sex and SES, (1) adolescent and adult smokers who noticed cigarette pack displays in stores were more likely to smoke more than one cigarette/day (AOR=4.5, 95% CI 2.0-10.0 and AOR=1.9, 95% CI 1.4-2.6, respectively); (2) adolescent non-smokers who noticed pack displays were more likely to be susceptible to smoking (AOR=1.8, 95% CI 1.4-2.3); and (3) adult smokers and adolescent non-smokers who noticed more tobacco promotions were less likely to be certain about the risks of smoking (AOR=0.9, 95% CI 0.8-0.9 and AOR=0.7, 95% CI 0.6-0.8, respectively). Conclusion: Higher levels of exposure to tobacco marketing were associated with increased daily smoking and susceptibility and decreased risk perception. The evidence of the harmful effects of tobacco marketing on the perceptions and behaviors of adolescents and adults is a strong rationale for greater restrictions on Mexican marketing practices.

FUNDING: Nonprofit grant funding entity

RR-123

E-CIGARETTE ADVERTISING ON THE RADIO, 2015-2019

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Significance: E-cigarette use has skyrocketed in the US over the past decade. Exposure to e-cigarette advertising likely contributes to this trend. While radio ads for cigarettes and some other tobacco products are banned, there are no radio advertising restrictions for e-cigarettes. Radio advertising reaches a wide segment of the US population, but little is known about recent radio e-cigarette advertising expenditures. Methods: A sample of e-cigarette radio advertisements running between 2015-2019 was purchased from Numerator, a market intelligence firm. Satellite and digital radio ads were not available. Data collected included run date, ad spend, advertiser, market, and radio program type. Results: 491,272 total radio advertisement occurrences were analyzed: 10,481 (2.1% of total occurrences) in 2015; 10,703 (2.2%) in 2016; 4,116 (0.8%) in 2017; 104,136 (21.2%) in 2018; and 361,836 (73.7%) in 2019. Total ad spend over the full period was $51.8 million: $2.8 million (5.4% of total spend) in 2015; $1.8 million (3.6%) in 2016; $0.8 million (1.5%) in 2017; $15.0 million (29.1%) in 2018; and $31.3 million (60.4%) in 2019. Average spend per ad over the full period declined from $267/occurrence in 2015 to $87 in 2019. There were 15 total advertisers, with highest ad spend across the period from Juul ($36.8 million, 71.2% of total spend), Vuse ($6.3 million, 12.1%), and Logic ($4.8 million, 9.0%). Top markets were New York (14.8% of total spend), Houston (7.7%), and Dallas-Fort Worth (6.7%). E-cigarette advertisements were most common on News/Talk/Info (29.2% of total spend), Adult Contemporary (17.1%), and Rock (14.7%) programs. Conclusion: Both the number of ad occurrences and overall expenditures increased substantially in 2018 and 2019. This increase was driven largely by Juul in the second half of 2018, followed by Vuse and Blu in 2019. Together, Juul, Vuse, and Blu’s 2018 and 2019 expenditures accounted for 88% of expenditures over the full period. Tracking e-cigarette radio ads provides insight into audience exposure which can inform tobacco advertising regulations.

FUNDING: Academic Institution

RR-122

COMPARING SMOKING PREVALENCE, QUIT ATTEMPTS, AND HARM PERCEPTIONS AMONG YOUNGER AND OLDER SMOKERS

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Significance: Older smokers carry the greatest tobacco-related disease burden of all adults, but few studies focus on this age group. The aim of this study was to compare smoking behaviors between younger and older adults in New York. Methods: Data on smoking prevalence and frequency, as well as patterns and perceptions of smoking were taken from the 2019 New York Adult Tobacco Survey (NYATS) for adult smokers aged 18-34 years (N=134) and those aged 65 years and over (N=123). Chi-square and T-tests were used to compare and contrast these cohorts. Previous NYATS waves from 2003-2019 were used to compare trends over time. Results: Older smokers were divided evenly by gender and were primarily White race/ethnicity, whereas younger smokers were more likely to be female and of a more diverse race/ethnic distribution. In 2019, smoking prevalence was significantly higher among younger relative to older adults (15.9% vs 8.4%, p<0.0001). However, trends over time revealed that prevalence among older smokers has remained around 8% for at least 15 years, while rates for younger smokers have fallen by at least 8% during the same time period. Younger and older smokers did not differ significantly in average daily cigarette consumption (13.1 vs 12.8 cigarettes), past-year quit attempt rate (55.2% vs 57.5%), or in how they tried to quit (in quit strategies that included giving up cigarettes all at once, gradually cutting back, nicotine replacement therapy, or prescription medications (p>0.05 for all). In contrast, older smokers were significantly more likely to rely on clinics/classes/groups/counseling for quitting (20.8% vs 7.4%, p<0.05), while younger smokers were significantly more likely to try switching to e-cigarettes (13.4% vs 1.2%, p<0.0001). The majority of younger and older smokers surveyed wanted to quit smoking and believed they would be likely to succeed if they tried (no differences between groups; p>0.05). In addition, a large portion of respondents in both age groups inaccurately endorsed the idea that that nicotine causes cancer (87% younger and 79% older) and that nicotine is just as dangerous as smoking (50% younger and 44% older), even inpatches and gum. Conclusion: Overall, smoking prevalence rates among older smokers in New York state have not changed in over 15 years while rates for younger adults have decreased considerably. In contrast, older smokers strongly resemble younger smokers in their motivation to quit, approaches to quitting, and risk perceptions. Older smokers deserve greater attention in research, treatment, and policy in order to address these age-related differences in smoking patterns.

FUNDING: Federal; Other
PERCEPTIONS OF HEATED TOBACCO PRODUCTS AND SUPPORT FOR REGULATIONS IN HONG KONG

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SIGNIFICANCE: Heated tobacco products (HTPs) are promoted as less harmful with little or no regulation. The Hong Kong SAR Government has proposed to ban HTPs and electronic cigarettes. We assessed perceptions of HTPs and their associations with support for regulations in Hong Kong, where HTPs are not formally marketed yet.

METHODS: We analyzed data of 1985 Cantonese-speaking Chinese adults (48.6% male; 22.7% aged 260; 24% current HTP users) who had heard of or seen HTPs from two waves of Tobacco Control Policy-related Surveys in 2018 (respective response rate 73.5%, 82.4%) with oversampling of current and ex-smokers. Perceived harms of HTPs relative to cigarettes and effectiveness of HTPs for quitting were assessed. Their support for regulations included five types (e.g., ban on HTP promotions and advertisements, ban on use in smoke-free areas, ban on sales to minors, registration before sale, sale licence) and a total ban. Descriptive statistics were weighted by the sex, age and smoking status of 2018 Hong Kong adult population to improve representativeness. Associations of perceptions with support for regulations were adjusted for sociodemographic characteristics, smoking status and ever use of HTP using logistic regression. RESULTS: 99.1% (95% CI 97.4%-99.7%) supported at least one regulation, 68.8% (63.1%-73.0%) supported all five regulations and 63.5% (59.6%-67.3%) supported a total ban. Perceptions of HTPs as less harmful than cigarettes (vs. similarly/more harmful) was associated with lower support for at least one regulation (adjusted odds ratio [aOR] 0.15, 95% CI 0.02-0.88), all five regulations (0.64, 0.50-0.81) and a total ban (0.52, 0.40-0.67). The results were similar for perception of HTPs as effective for quitting (at least one regulation: aOR 0.17, 95% CI 0.03-0.88; all five regulations: 0.53, 0.40-0.69; a total ban: 0.32, 0.23-0.44). CONCLUSION: We observed lower support for regulations of HTPs associated with perceptions of HTPs as less harmful and effective for quitting in Chinese adults in Hong Kong. Our results support the government’s proposal for a total ban of HTPs. FUNDING: The Tobacco Control Policy-related Survey was funded by the Hong Kong Council on Smoking and Health. COMPETING INTERESTS: None declared.

FUNDING: Nonprofit grant funding entity

E-CIGARETTE ADVERTISING SPENDING IN THE UNITED STATES, 2015 TO 2019

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Significance: E-cigarette product sales and use have increased in the US over the past decade and are likely influenced by advertising. Understanding trends in e-cigarette ad spending, media channels and target markets can inform tobacco regulatory science. Methods E-cigarette ad spending from 2015 to 2019 was purchased from Numerator, a market research firm. Data provided included advertiser, run date, ad spend, occurrences, market and media type (online/mobile, print, radio, television). Changes in spending during the period were assessed overall and by market, advertiser and media type. Results Out of 583,553 ad occurrences, 23,172 (4%) were placed in 2015, 19,855 (3%) in 2016, 14,895 (3%) in 2017, 116,769 (20%) in 2018, and 408,856 (70%) in 2019. Total ad spend during the 5-year period was $405 million (m), including $36m (9%) in 2015, $35m (10%) in 2016, $29m (7%) in 2017, $85m (21%) in 2018, and $215m (53%) in 2019. There were 83 total advertisers in the sample, with Juul (48%), Vuse (21%), and blu (15%) accounting for 84% of ad spending. Excluding national ads, the top 5 markets by spending shifted from NYC (49%), Boston (13%), Miami (10%), Detroit (6%) and Chicago (5%) in 2015 to Los Angeles (7%), NYC (6%), Washington, DC (5%), Houston (5%) and Dallas (5%) in 2019. The spending in the top 5 markets in 2015 is spread across 29 markets in 2019. E-cigarette ad occurrences were concentrated on radio (84%) and TV (9%), but print ad occurrences (1%) accounted for 58% of all ad spending. Online and mobile ads peaked in 2017, accounting for 26% of ads, but comprised only 4% of placements in 2019. TV ads accounted for at least one-third of ad placements until 2018, when radio ads became the most prominent channel with 89% of the ads in 2018. In those years, companies still spent more on TV ads ($58m) than radio ads ($46m). Conclusion Ad occurrences and advertising spending for e-cigarettes increased during 2015-2019, with JUUL leading the way.

FUNDING: Academic Institution
Spending in specific markets became less concentrated in NYC and there was a shift towards the south and west.

RR-129
USING MACHINE-LEARNING TECHNIQUES TO CONDUCT A REAL-TIME REVIEW OF TOBACCO RESEARCH
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Significance: Novel nicotine and tobacco products (e.g., heated tobacco, nicotine salt-based products, etc.) which may be less risky to health relative to combustible tobacco have become the center of tobacco research in recent years. However, the rapidly evolving market poses the following knowledge gaps to tobacco research: 1) what are the absolute health risks that these novel products pose to health; 2) to what extent novel products are less risky compared to combustible tobacco products; 3) what policies are effective to curb novel tobacco product use; and 4) how to implement tobacco control policies that balance the risks and benefits of novel products (e.g., youth addiction vs. quitting combustible tobacco among adult smokers). Despite a rapidly growing literature on these topics, the study conclusions often contradict each other, and new findings continue to be discovered with more up-to-date data. Moreover, the polarized views and beliefs in the public health community regarding harm-reduction may further bias tobacco research. The goal of this project is to develop an approach that can review and summarize almost in real time findings and conclusions of tobacco research published in leading peer-reviewed journals, including textual conclusions of health and policy impacts related to novel products and non-textual figures and tables that can review and summarize almost in real time findings and conclusions of tobacco growing literature on these topics. The study conclusions often contradict each other, and new findings continue to be discovered with more up-to-date data. Moreover, the polarized views and beliefs in the public health community regarding harm-reduction may further bias tobacco research. The goal of this project is to develop an approach that can review and summarize almost in real time findings and conclusions of tobacco research published in leading peer-reviewed journals, including textual conclusions of health and policy impacts related to novel products and non-textual figures and tables that inform effect size, which will aid the current debate related to novel products in the tobacco control field.

Methods: We have developed a novel machine learning technique - DeepTabaccoWorks that automatically extracts tables, figures, policy highlights, and conclusions from journal articles. We will use this technique to extract information from articles that are relevant to the four identified knowledge gaps meeting the following criteria: 1) papers published in leading tobacco-specific research journals and public health journals (ranked by impact factor); 2) published from 2015 onward; and 3) relevant to novel products. This approach will generate data that allow us to make overall assessments of the four identified challenges and when applicable feed data for conducting meta-analyses on relevant topics, further updating these parameters (assessments, data, and research syntheses/meta-analysis) in real time. Impact: This study makes a significant contribution to the tobacco research debate by using machine learning, which has the potential to address knowledge gaps and manage bias resulting from perspectives on harm reduction. Our automated machine learning algorithms can be broadly reusable to help manage the research results in tobacco research and beyond.

FUNDING: Academic Institution

RR-130
E-CIGARETTE PREVALENCE, MOTIVATIONS FOR USE, AND RELATIONSHIP WITH TOBACCO IN TEENS - THE CHANGING SITUATION IN IRELAND
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Significance Adolescent e-cigarette use is increasing worldwide amidst concerns about: identified and as yet unknown harms; nicotine addiction; being a “gateway” drug; and renormalisation of smoking. This study aimed to establish, from available data, the changing prevalence of Irish adolescents’ e-cigarette use, reasons for use, and relationship with tobacco at first use. Methods We identified five Irish health datasets with questions on adolescent e-cigarette use. Of these, TFRI was PI for four studies, namely ECIGS-TFRI (2014), SILNE-R (2016) and ESPAD (European Schools Project on Alcohol and Drugs) 2015 and 2019. We also drew on disaggregated data from GUI (Growing Up in Ireland), Ireland’s national longitudinal study. All datasets comprised stratified random samples in school-based settings: ECIGS-TFRI 2014 (N=817), ESPAD-TFRI 2015 (N=1508), SILNE-R TFRI 2016 (N=2051), GIU 2017 (N=6216), ESPAD-TFRI 2019 (N=3556). We report on 16 and 17 year olds. Secondary analysis was carried out, using descriptive statistical techniques to estimate changes in prevalence, reasons for trying e-cigarettes, and relationship with tobacco at first use. Results Prevalence of ever-use increased from 2% in 2014 to 39% in 2019. The increase was rapid, particularly since 2016. By 2019, more adolescents tried e-cigarettes (39%) than smoking (32%). Boys were more likely to use e-cigarettes rising from 26% in 2014 to 46% in 2019. Girls’ use rose from 21% in 2014 to 33% in 2019. By 2019, curiosity (66%) and friends (29%) were the two main reasons adolescents said they first used e-cigarettes, with only 3% saying it was to quit smoking. Having never used tobacco when they first tried e-cigarettes increased from 32% in 2015 to 68% in 2019. Conclusion E-cigarette use has risen rapidly since 2014 especially among boys. E-cigarettes are not used by adolescents for smoking cessation. The majority of adolescents were not smokers when they started using e-cigarettes, pointing to a worrying new route into nicotine addiction. In addition to new regulations and legislation for e-cigarettes, current tobacco control regulations for young people should be extended to include e-cigarettes.

FUNDING: Federal; Academic Institution

RR-131
STORE VISITS AND CIGARETTE AND ELECTRONIC CIGARETTE SUSCEPTIBILITY AMONG GUATEMALAN ADOLESCENTS
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Significance: Point of sale (POS) is a key marketing channel for the tobacco industry and may convey with future, current, and former smokers. As a proxy for POS ad exposure, the frequency of visiting stores where tobacco is sold consistently predicts smoking onset among youth, but has not been explored for e-cigarette use. Methods: 7th through 11th grade students from a convenience sample of ten private schools in Guatemala City completed a self-administered survey. Those who had never smoked or used cigarettes were included in the analytic sample (n=1219). Students reported the frequency of visiting stores that sell tobacco (i.e., never, sometimes, often/very often) and susceptibility to smoking and e-cigarette use (yes, no) was assessed with standard measures (e.g., likelihood of smoking if a best friend offered a cigarette/e-cigarette). Separate logistic models estimated adjusted odds ratios (AORs), regressing susceptibility to smoking and, separately, e-cigarette use on frequency of store visits, controlling for sociodemographics, family and friend smoking and cigarettes and e-cigarette use, sensation-seeking, and perceived attractiveness of cigarette displays in stores (somewhat to very attractive vs. not attractive at all). Results: Susceptibility to use cigarettes and smoke were associated with more frequent store visits (AOR=2.03 and 1.89, respectively), with being female (AOR=1.48 and AOR=1.53, respectively), with younger age (e.g., AOR=0.88 and AOR=0.83, respectively), and with positive perceptions of cigarette displays (AOR=2.32 and AOR=2.22, respectively). Additionally, e-cigarette susceptibility was positively associated with having a friend who uses e-cigarettes (AOR=1.95) whereas smoking susceptibility was positively associated with having either a friend or family member who smokes (AOR=1.37 and AOR=1.42, respectively). Conclusions: POS ad exposures through convenience stores visits likely increase Guatemalan adolescents’ smoking and e-cigarette susceptibility and future use. As both products are widely advertised in stores in Guatemala, POS ad bans are urgently needed to prevent use among youth.

FUNDING: Nonprofit grant funding entity; Other

RR-132
INDIVIDUAL- AND STATE-LEVEL TOBACCO REGULATORY FACTORS INFLUENCE U.S. REGIONAL DIFFERENCES IN SMOKING CESSION IN THE EAGLES TRAIL
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Significance: Quit ratios (number of former smokers divided by the number of ever smokers) and smoking prevalence vary by state. The aim of this post-hoc secondary analysis was to examine regional differences in demographic, smoking, and psychiatric characteristics, as well as state-level epidemiologic, economic, and tobacco regulatory factors that may affect short-term quit rates among individuals motivated to stop smoking. Methods: We evaluated the subset of 4260 smokers enrolled from 29 states across 6 regions in the U.S. who participated in the EAGLES trial that evaluated the safety and efficacy of varenicline and bupropion versus placebo and the nicotine patch in smokers with and without psychiatric disorders. A stepwise logistic regression model that considered pharmacotherapy treatment, psychiatric diagnoses, and individual-level
characteristics (e.g. race, heaviness of smoking) was emboldened to include state-level median household income per capita, smoking prevalence, cigarette affordability, and American Lung Association (ALA) scores (that gauge a state’s tobacco control policies) to predict 7-day point prevalence abstinence at end-of-treatment. **Results:** Quit rates varied across regions (17.9% in the Great Plains to 31.6% in the Four Corners region). Using the Northeast (7-day PPA=23.7%) as the referent, odds of successful quitting were positively associated with being enrolled from the Four Corners (odds ratio (OR)=1.69; 95% confidence interval (CI)=1.08, 2.64), Midwestern (1.45; 95% CI = 1.04, 2.01), and Southern (1.47; 95% CI = 1.05, 2.06) regions. The ALA score was also positively associated with short-term abstinence (1.046 95% CI = 1.02, 1.11). State income levels were negatively correlated with smoking prevalence (r=-0.68, p<0.0001) and cigarette affordability (r=-0.47, p=0.0099); however, these three variables did not significantly affect the stepwise model. **Conclusions:** Alongside traditional predictors (e.g. pharmacotherapy, race), increased tobacco regulation and policy were associated with increased quit rates among U.S. smokers in the EAGLES trial. Our results may help explain regional differences in cessation outcomes across the U.S.

**FUNDING:** Pharmaceutical Industry
INTENTIONS AND FUTURE PLANS TO STOP VAPING AMONG E-CIGARETTE USERS IN THE US AND THE UK

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with cigarette use in men (p<.01) and Other Race Hispanic adults (p<.01); association with greater nicotine dependence was nearing significance. An exploratory logistic regression found that those who smoke are 0.69 times as likely as those who do not smoke to complete treatment (p<.01). Conclusion: This study was the first to examine tobacco cigarette use and nicotine dependence with SUD treatment outcomes by sex/ gender and race/ethnicity. Findings highlight the prevalence of smoking during SUD treatment for all demographics and importance of concurrent treatment.

FUNDING: Academic Institution

RR-140

TELEHEALTH OVERCOMES TREATMENT BARRIERS IN A TOBACCO TREATMENT PROGRAM

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Significance: Tobacco users face many barriers to in-person tobacco treatment including distance from a tobacco treatment provider, transportation, scheduling, mobility and illness. In response to COVID-19, health systems across the US began offering greater access to tobacco treatment through telehealth platforms. On March 20, 2020, the Duke Smoking Cessation Program transitioned from 100% in-person visits to 100% telemedicine visits. Methods: We conducted an observational study on patient outcomes from patients who received treatment at the Duke Smoking Cessation Program before and after the transition to telehealth-based treatment. The abrupt and complete transition offered a unique opportunity to compare in-person and telehealth outcomes. Data on patient outcomes were compared between two six-month periods - pre-telehealth implementation (April 1 - September 30, 2019) and post-telehealth implementation (April 1 - September 30, 2020). Results: Our sample showed no significant differences between groups on key baseline variables including age, gender, race, ethnicity, education, cigarettes per day, or nicotine dependence. Over the 6-month in-person period, there were 1,161 patient encounters; over the post-telehealth period there were 2,617 patient encounters, a 225% increase. In comparison to the same 6-month period 1 year prior, this increase was significant (p = 0.02). Conclusions: Observational data from the Duke Smoking Cessation Program shows that telehealth may increase access to clinical tobacco treatment services compared to in-person treatment. Data comparing smoking abstinence rates, cancellation and no show rates, follow up visit rates, treatment barriers and patient satisfaction are discussed.

FUNDING: Unfunded

RR-141

CANNABIS AND TOBACCO USE AMONG PATIENTS IN PRIMARY CARE CLINICS IN A LARGE, URBAN HEALTHCARE SYSTEM IN CALIFORNIA

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Significance. To describe the prevalence and clinical correlates of tobacco, cannabis, and tobacco and cannabis co-use among patients attending primary care (PC) clinics in a large urban healthcare system in Los Angeles, CA, after legalization of recreational cannabis use. Methods. We used electronic health record (EHR) data from patients seen at one of over 60 PC clinics. Records were eligible for inclusion in this analysis if the patient was ≥ 18 years of age and had an annual physical examination between July 2019 and May 2020. Tobacco and cannabis use was assessed by clinical staff and patients were asked about their smoking status and cannabis use. We also used the EHR to collect information on sociodemographic and clinical characteristics including current diagnoses and comorbidities. Results. 98,752 patients were included in the analysis: median age 49 years (range: 18-104), 56% female; 60% identified as white/Caucasian, 12% Asian, 11% and Hispanic/Latinx. Current cannabis use was reported by 13% (n=10,540), 5% (n=4,735) were current smokers, and 21% (n=20,854) were former smokers. Cannabis and tobacco co-use was reported by 1.7% (n=1,440). Cannabis and tobacco co-users had a higher prevalence of mental health diagnoses including anxiety, depression, and sleep disorders compared to tobacco only users (39% vs. 33%; p value<.01). However, tobacco only users were more likely to have a diagnosis of cardiovascular diseases including coronary artery disease, myocardial infarction, and hypertension compared to cannabis and tobacco co-users (47% vs. 27%; p value=.01). After adjusting for age, sex, and former smoking status, cannabis and tobacco co-users had a reduced odds of cardiovascular diseases (AOR=0.7; 95% CI 0.6-0.9) compared to tobacco only users. Adjusting for the same factors, cannabis and tobacco co-users had an increased odds of mental health diagnoses (AOR=1.5; 95% CI 1.3-1.7) compared to tobacco only users. Conclusion. The prevalence of cannabis use in adults in PC is high and a non-trivial proportion report co-use with tobacco. Patients may benefit from routine PC screening and brief advice regarding cannabis use, in addition to tobacco use.

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