RAPID RESPONSE ABSTRACTS

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SPECIAL SESSION: SOCIETY FOR RESEARCH ON NICOTINE AND TOBACCO ANNUAL MEETING: NASEM ABSTRACT

PREMIUM CIGARS: PATTERNS OF USE, HEALTH EFFECTS, AND PRIORITY RESEARCH

Cristine D. Delnevo and Rafael Meza. National Academies of Sciences, Engineering, and Medicine Committee on Health Effects and Patterns of Use of Premium Cigars.

Since the late 1990s, overall cigar consumption in the United States has increased every year. However, premium cigars are consistently a small percent of the U.S. cigar market; data suggest that the percentage of the cigar market that may be premium was 1.5–3.0 percent between 2010 and 2020. In 2016, FDA broadened its regulatory authority to include cigars; in 2018, it issued a call for additional information and comments on several aspects of premium cigars, including the definition, patterns of use, and public health impacts, to further inform its regulatory actions. Since 2016, various cigar associations have filed several lawsuits against FDA regarding how it regulates cigars in general and premium cigars specifically. At the request of the Food and Drug Administration (FDA) and the National Institutes of Health, the National Academies of Sciences, Engineering, and Medicine convened an expert committee to examine the available evidence about four premium cigar topics: product characteristics, patterns of use, marketing and perceptions, and health effects. Guided by research questions provided by FDA and other stakeholders, the committee completed a comprehensive assessment of the literature. However, there is not a single, consistent definition of premium cigars. Consequently, there is no clear distinction between premium and large nonpremium cigars or even with other cigar types. The literature on premium cigars specifically is limited, and most publications do not distinguish premium from other large cigars. The presentation will describe the committee's analysis of the product characteristics of premium cigars, demographics of premium cigar users in the United States, patterns of use of premium cigars, cigar marketing and perceptions, and the short and long-term health effects of premium cigars, including dependence. Presenters will discuss key findings and conclusions of the report, as well as the prioritized recommendations for future federally funded research on premium cigars. If implemented, the recommendations will considerably advance the knowledge base of premium cigars and cigars in general and better inform policy and regulatory decisions.

FUNDING: The National Academies report was supported by the Food and Drug Administration and the National Institutes of Health

RAPID SESSION 1: LESSONS FROM DIVERSE POLICY IMPLEMENTATION ACROSS THE GLOBE

POD15-1

EVALUATION OF THE U.S. FEDERAL TOBACCO 21 (T21) LAW AND LESSONS FROM STATE-WIDE T21 POLICIES: FINDINGS FROM POPULATION-LEVEL SURVEYS

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SIGNIFICANCE: On December 20, 2019, Tobacco 21 (T21) became U.S. federal law, raising the minimum age for tobacco purchases to 21 years. We evaluated the impact of this federal law at the one-year mark. **METHODS:** We examined shifts in actual and perceived ease of access among US middle and high school students using data from the 2011-2020 U.S. National Youth Tobacco Survey. Data were weighted to yield representative estimates. **RESULTS:** The overall percentage perceiving it was easy to buy tobacco products from a store decreased between 2019 (67.2%) and 2020 (58.9%). However, perceived ease of online purchases was high and plateaued between 2019 (86.6%) and 2020 (85.8%). Furthermore, while perceived ease of buying tobacco products from physical stores increased with increasing grade level during 2020 (p-trend<0.001), no significant trend was seen for perceived ease of online purchases (p-trend=0.261). Non-Hispanic blacks were the only racial subgroup to report no significant decrease in perceived ease of buying tobacco products from a store during 2011-2020. Overall, 10.1% of all students tried buying cigarettes from a store within the past 30 days, down from 14.1% in 2018 (p<0.001). Only 17.0% of those who attempted a cigarette purchase in 2020 reported that the sales clerk refused to sell it to them because they were underaged. **CONCLUSIONS:** Evaluation of the federal T21 law at the one-year mark shows it has the potential to reduce ease of tobacco access, but intensified efforts are needed with compliance. Over 4 in 5 US middle and high school students who attempted to buy cigarettes in the past 30 days were successful, underscoring the need for intensified efforts to reduce illegal sales of tobacco to minors through enforcement of local, state, and federal access laws. Targeted efforts are needed in minority communities as differential enforcement of T21 policies in white neighborhoods versus those of color may lead to uneven impact of T21 policies and may deepen disparities in tobacco use. **Funding statement:** No external funding.

FUNDING: Unfunded

RAPID SESSION 2: POSTER SESSION 4

PP-1

A PILOT RANDOMISED TRIAL OF A BRIEF VIRTUAL REALITY SCENARIO IN SMOKERS UNMOTIVATED TO QUIT: ASSESSING THE FEASIBILITY OF RECRUITMENT

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Significance: Individual-level interventions for smokers unmotivated to quit remain scarce and have had limited success. Little is known about the potential of virtual reality (VR) for delivering messaging to smokers unmotivated to quit. This pilot trial aimed to assess the feasibility of recruitment and acceptability of a brief, theory-informed VR scenario and estimate proximal quitting outcomes. **Methods:** Unmotivated smokers (recruited between February-August 2021) aged 18+ years who had access to, or were willing to receive via post, a VR headset were randomly assigned (1:1) using block randomisation to view the intervention (i.e., a hospital-based scenario with motivational stop smoking messaging) or a 'sham' VR scenario (i.e., a scenario about the human body without any smoking-specific messaging) with a researcher present via teleconferencing software. The primary outcome was feasibility of recruitment (i.e., achieving the target sample size of 60 participants within 3 months of recruitment). Secondary outcomes included acceptability (i.e., positive affective and cognitive attitudes), quitting self-efficacy and intention to stop smoking (i.e., clicking on a weblink with additional stop smoking information). We report point estimates and 95% confidence intervals (CIs). The study protocol was pre-registered (osf.io/95tus). **Results:** A total of 60 participants were randomised within 6 months (intervention: n=30; control: n=30), 37 of whom were recruited within a 2-month period of active recruitment following an amendment to gift inexpensive (£7) cardboard VR headsets via post. The mean (SD) age of participants was 34.4 (12.1) years, with 46.7% identifying as female. The mean (SD) cigarettes smoked per day was 9.8 (7.2). The intervention (86.7%, 95% CI=69.3%-96.2%) and control (93.3%, 95% CI=77.9%-99.2%) scenarios were rated as acceptable. Quitting self-efficacy and intention to stop smoking in the intervention (13.3%, 95% CI=3.7%-30.7%; 3.3%, 95% CI=0.1%-17.2%) and control (26.7%, 95% CI=12.3%-45.9%; 0%, 95% CI=0%-11.6%) arm were comparable. **Conclusions:** The target sample size was not achieved within the feasibility window; however, an amendment to gift inexpensive headsets via post appeared feasible. The brief VR scenario appeared acceptable to smokers unmotivated to quit.

FUNDING: State; Nonprofit grant funding entity

PP-3

RELAPSE TO SMOKING IS ASSOCIATED WITH INCREASED PAIN SENSITIVITY

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Significance: This study examined the relationships between smoking relapse, sex difference, and pain perception. Methods: Nicotine dependent men and women interested in cessation participated in a prospective study that included 3 laboratory sessions (during ad lib smoking, 24 hr after the quit day, 4 weeks after the quit day). This study also included nonsmokers who completed the same protocol as smokers except for the tobacco use. Abstinence from smoking was confirmed by self-reported measures and expired carbon monoxide. Relapse was defined as smoking 7 consecutive days after the quit day. To assess pain perception, the cold pressor test (CPT) was administered in each lab session. In the CPT, participants were instructed to place their hand into a container filled with an ice-water slurry. Participants rated their pain every 15 sec during 90 sec of CPT exposure (6 periods) and then every 15 sec during 90 sec of post-CPT recovery (6 periods). Results: Repeated measures ANOVAs, including smoking status (relapser [n=55], abstainer [n=52], nonsmoker [n=49]) and sex (males [n=83], males [n=73]) as predictors, showed expected increase in pain ratings across assessment periods during CPT and decrease in ratings over time after CPT in all sessions ($p < .001$). Females had greater pain than men ($p < .05$). Pain ratings during CPT were higher in relapsers than nonsmokers in all sessions ($p < .01$). In the post-quit lab, relapsers had greater pain than nonsmokers during the last three periods whereas abstainers had greater pain than nonsmokers during the last two periods ($p < .005$). Regarding pain ratings post-CPT, there was a smoking main effect in the quit day lab, indicating lower pain in relapsers than in other conditions ($p < .05$). Conclusion: These results extend previous findings that chronic smoking is related to increased pain perception regardless of withdrawal.

FUNDING: Federal

PP-22

RANDOMIZED CONTROLLED TRIAL OF A MINIMUM VIABLE PRODUCT (MVP) DIGITAL THERAPEUTIC FOR SMOKING CESSATION

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Significance: Few smartphone apps for smoking cessation have undergone rigorous evaluation. A minimum viable product (MVP) is a digital software application that contains the minimal feature set necessary to meet users' needs and establish efficacy. Clickotine®-MVP (CKT-M) is a digital therapeutic that delivers the essential elements of the U.S. Clinical Practice Guidelines for smoking cessation in a series of daily brief "missions." CKT-M also provides users with supportive 1-way text messages and other content based on cognitive behavioral therapy. Methods: We conducted a randomized controlled trial of CKT-M vs. QuitGuide (QG), a free app from the National Cancer Institute that also delivers content consistent with clinical guidelines. Participants (N = 158) were U.S. adults (68% female) who smoked at least 5 cigarettes daily and wanted to quit within the next 30 days. They were recruited from social media and mail sent to people covered by a value-based care program. After completing a baseline survey, participants were randomized to CKT-M or QG. To minimize bias, participants and investigators were blinded to app assignment and the study sponsor was not revealed until the study was over. Self-reported smoking and breath carbon monoxide (CO) were assessed after 8 weeks of use. Results: There were no statistically significant differences between CKT-M and QG in 7-day (30.4% vs. 31.6%) or 30-day (12.7% vs. 16.5%) self-reported abstinence, nor in mean CO (all p's > .05). Additionally, there were no significant differences between the apps in ratings (5-pt scales) of satisfaction, ease of use, or helpfulness (all p's > .05). More participants in QG (29.1%) dropped out than in CKT-M (16.5%) ($p = .09$). There were no adverse events related to use of either app. Conclusion: CKT-M is likely to meet the criteria for an MVP. CKT-M serves as a stable ("version-locked"), internal benchmark to inform development of novel current versions of CKT with features such as adaptive, personalized engagement messaging using artificial intelligence (AI), AI-supported 2-way text messaging with licensed clinical social workers, and integrated access to nicotine replacement therapy.

FUNDING: Federal; Other: Click Therapeutics

PP-51

THE HYPOTHETICAL IMPACT OF VAPING PRODUCT REGULATIONS ON VAPE SHOP CUSTOMER BEHAVIOR CHANGE INTENTIONS: OPINIONS OF VAPE SHOP RETAILERS IN LOS ANGELES COUNTY

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Significance: Understanding vape shop retailers' opinions of regulation is critical to inform U.S. Food and Drug Administration (FDA) enforcement, and to anticipate regulatory impact on the vape shop industry, including consumer behavior. This study examined vape shop retailers' perceived customer behavior change intentions given the hypothetical impact of FDA regulations. **Methods**: We conducted phone-based structured interviews of 46 vape shop owners/managers in Los Angeles County during December 2019 to October 2020. Respondents were asked, "For each proposal, please tell me whether you (1) favor it strongly, (2) favor it somewhat, (3) oppose it somewhat, or (4) oppose it strongly. Also, please give me your opinion on how customers would respond to each proposal." Linear regressions were conducted to assess the correlates of each perceived customer behavior change intention outcome, adjusting for vape shop position (i.e., owner, manager). **Results:** Participants were predominantly male (87%), and average age was 31.9 years (SD=8.5). Most participants (43.5%) were managers, followed by owners (26.1%) and clerks (26.1%). Most participants (87%) strongly opposed rules such that only tobacco flavored juices were allowed at all vape shops. Opposition to such rules was associated with opinions that customers would likely not purchase tobacco flavored e-liquids (B=-0.44, $p<0.01$), and would likely use

smokable tobacco products (B=0.47, p<0.05). More than half of participants (52%) strongly opposed rules such that all vape products must be standard, pre-set, or fixed size, and you could not make changes to the device such as watts, volts. Opposition to such rules was associated with opinions that customers would likely not purchase tobacco flavored e-liquids (B=-0.36, p<0.01) and would likely not continue to vape (B=-0.23, p<0.10). Nearly half of participants (39%) strongly opposed rules such that no price deals would be allowed on vape products and e-liquids. Opposition to such rules was associated with opinions that customers would likely not continue to vape (B=-0.19, p<0.10) and would likely smokable tobacco (B=0.23, p<0.10). **Conclusion:** This study found that vape shop retailers in Los Angeles County report potential FDA regulations, including tobacco-flavored e-liquids only or banning price promotions, would have negative impacts on customer behaviors (e.g., not purchasing tobacco-flavored e-liquids, consuming combustible tobacco). Current findings could inform future FDA regulatory actions.

FUNDING: Federal; FDA CTP

PP-74

ASSESSING THE TOXICITY OF DIY ADDITIVES IN RESPONSE TO A FLAVOR BAN IN ECIG LIQUIDS

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Significance. Electronic cigarettes (ECIGs) aerosolize liquids that contain nicotine, propylene glycol (PG), vegetable glycerin (VG), and appealing flavors. In the U.S., regulations have been proposed and implemented that may limit the availability of non-tobacco flavors in ECIG liquids. Research demonstrates that some ECIG users may attempt to make their own liquids (i.e., do-it-yourself (DIY) liquids) in response to a flavor ban. This study examined the toxicity of DIY flavored ECIG liquids. **Methods.** DIY liquid additives were identified by reviewing ECIG users' reported responses to a hypothetical flavor ban and a review of 15 ECIG internet forums to include essential oils, cannabidiol oil (CBD), sucralose, ethyl maltol. Concentrations of additives and PG/VG ratio were based on popular recipes identified in ECIG forums or DIY websites. A total of 27 liquids containing different levels and combinations of sucralose, CBD, essential oil, nicotine, and tobacco and menthol flavors were prepared. These liquids were used to assess reactive oxygen species (ROS) emissions in machine-generated aerosols. DIY flavor concentrates and commercially available flavored liquids were tested for comparison. **Results.** Data showed that aerosols generated from DIY flavor concentrates or from menthol and tobacco flavors mixed with DIY additives yielded similar ROS levels compared to commercially available flavored liquids. Moreover, mixing menthol flavor with CBD or essential oil yielded significantly higher, while sucralose yielded lower, ROS emissions than menthol or PG/VG liquid. Only CBD yielded significantly higher ROS with tobacco flavor. Varying sucralose concentration in the liquid yielded the same levels of ROS as PG/VG base liquid. However, increasing power within the same concentration condition yielded significantly higher ROS. Interestingly, nicotine form affected ROS emissions from a liquid containing sucralose. **Conclusion.** Our data showed that DIY liquids may be as toxic as commercially available flavored ECIG liquids. Restricting flavor availability while keeping DIY concentrates and DIY additives available for ECIG users reduces the impact of the introduced policy.

FUNDING: Federal; FDA CTP

PP-96

EFFECTIVENESS OF WHATSAPP ONLINE GROUP DISCUSSION FOR SMOKING RELAPSE PREVENTION: A PRAGMATIC RANDOMIZED CONTROLLED TRIAL

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Study aims This study aims to examine the effectiveness of WhatsApp group discussion intervention for smoking relapse prevention compared with SMS (short message service) text messages. **Design** This is a 2-arm open-labeled pragmatic randomized controlled trial. **Setting** The recruitment sites were smoking cessation clinics in Hong Kong. **Participants** Smokers who smoke at least one cigarette per day at the service intake and no smoking for 3 to 30 days before enrolment in the study (n=928; 79.7% male). **Interventions** Participants were randomized to receive 8-week standardized messages about relapse prevention in a WhatsApp discussion group led by trained moderators (experimental, n=469) or SMS with similar content for 8-weeks (3 messages each week, control, n=459). The messages sent in the experimental and control groups were based on the US Clinical Practice Guidelines on Treating Tobacco Use and Dependence. **Measurements** The primary outcome is biochemically validated tobacco abstinence at 12-month follow-up. Secondary outcomes include the prevalence of self-reported 7-day and continuous abstinence over the study period and relapse rate. Text-mining of the WhatsApp group conversations were conducted by using structural topic modelling. **Results** By intention to treat, the experimental group (13.6% and 11.5% at 6- and 12-month follow-up) and the control group (13.9% and 11.3% at 6- and 12-month follow-up) showed a similar rate of biochemically validated quit rate (RR (risk ratio) =0.98 and 1.02 for the 6- and 12-month follow-up, respectively, all p-values > 0.05). The self-reported 7-day quit rate (RR=0.97, 0.91 and 0.91 for 3-, 6-, 12-month follow-ups, respectively, all p-values > 0.05), continuous abstinence and relapse rate were similar in both groups. The text mining showed that the WhatApp groups facilitated moderators' delivery of quitting methods and psychological encouragement. Quitters were more likely than smokers to share experience in seeking help from healthcare proviers and quitting methods. The unsupervised text mining showed similar classifications as the pre-defined contextual lexicons in the heat-map visualization. **Discussion** The study's findings showed that the WhatsApp group intervention did not significantly improve relapse prevention results compared with the SMS messages. The unsupervised text mining apparently showed its validity in classifying posts as our pre-defined contextual lexicons, supporting its future application to analyze online health-related group conversation.

FUNDING: Other: Health and Medical Research Fund of Hong Kong

PP-104

CHANGING AGE PATTERNS OF CIGARETTE AND ENDS TRANSITIONS IN THE PATH STUDY: A MULTISTATE TRANSITION MODEL ANALYSIS OF ADULTS AND YOUTH BEFORE (WAVES 1-4) AND AFTER (WAVES 4-5) 2017

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Significance. The landscape of electronic nicotine delivery systems (ENDS) has changed dramatically, particularly with the rise of pods and disposables, starting in late 2017. It is not known how these changes have impacted transitions between cigarette, ENDS, and dual use and how those changes depend on age. Methods. A multistate transition model was applied to 24,306 adults and 12,168 youth in Waves 1-4 (2013-2017) of the Population Assessment of Tobacco and Health (PATH) Study and 23,709 adults and 12,217 youth in Waves 4-5 (2017-2019). One-year transition probabilities between product use were estimated for Wave 1-4 vs 4-5 as a function of age group and of continuous age (splines). Results. Among youth, the 1-year probability of ENDS initiation increased after 2017 from 1.4% (95%CI: 1.2-1.7%) to 2.6% (95%CI: 2.4-2.9). There was no significant change in ENDS initiation among adults. Persistence of sole ENDS use (the 1-year probability of not transitioning) increased after 2017 for youth from 42.4% (95%CI: 36.9-47.9%) to 70.5% (95%CI: 65.1-75.8%) and for adults from 56.9% (95%CI: 53.7-59.9%) to 78.5% (95%CI: 76.0-80.9%). After 2017, youth sole cigarette users were more likely to transitions to dual use (with 13.5% (95%CI: 7.6-19.3%) transitioning in 1-year before 2017 compared to 28.2% (95%CI: 17.2-39.2) after 2017), while dual users were more likely to transition to sole ENDS use (transition probability increased from 5.8% (95%CI: 1.5-10.1%) to 19.0% (95%CI: 5.4-32.7%)). For adults, there was little change after 2017 in the transitions of sole cigarette users, but dual use became more persistent (from 41.0% (95%CI: 38.7-43.4%) remaining after 1 year to 63.9% (95%CI: 60.0-67.8%)). Conclusions. Adult dual users have become less likely to return to sole cigarette use but not more likely to discontinue cigarettes. Youth cigarette or ENDS users have become more likely to become sole ENDS users.

FUNDING: Federal; FDA CTP

PP-123

DOES NICOTINE METABOLISM MODERATE RESPONSE TO SMOKING CESSATION TREATMENT IN RECENTLY HOSPITALIZED SMOKERS?

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SIGNIFICANCE: The nicotine metabolite ratio (NMR) is a biomarker for CYP2A6-mediated rate of hepatic nicotine metabolism. NMR predicts efficacy of smoking cessation treatment, but has not been studied among hospitalized smokers. **METHODS:** We conducted a secondary analysis of a multi-center RCT of two post-hospital discharge smoking cessation interventions: (1) a high-intensity (HI) approach with automated phone assessments, longitudinal counseling by an internal coach, and nicotine replacement therapy (NRT) in-hand at discharge vs. (2) a low-intensity (LI) approach of electronic referral to the state quitline for counseling and NRT. NMR was measured at baseline in 321 of 519 Nashville site participants who were dichotomized as slow (SM; NMR<0.22) or fast (FM; NMR≥0.22) metabolizers. We hypothesized that the effect of HI vs. LI would be greater in FM with respect to efficacy (verified 7-day point prevalence abstinence at 6 mo; 1° outcome) and engagement (use of counseling or medication at 1, 3, 6 mo; 2° outcome). Logistic regression models tested for interactions between intervention and NMR, controlling for age, sex, race, education, cigarettes per day (CPD), and years smoked. **RESULTS:** Mean age (50.5 y) and CPD (18.6) were the same in FM (n=241) and SM (n=80). FM (vs. SM) were more likely to be female (56.0% vs. 38.8%; p=0.007) and less likely to be black (12.9% vs. 22.5%; p=0.038). Treatment effects on engagement favored HI but did not vary by NMR (use of counseling or medication at 3 mo, HI vs. LI: aOR 3.46 in FM vs. 3.97 in SM, p-value of NMR x treatment interaction = 0.86). Treatment effects on efficacy did vary by NMR: abstinence was higher among FM randomized to HI vs. LI (16.8% vs. 9.8%, aOR 1.95, 95% CI 0.88-4.32) and lower among SM randomized to HI vs. LI (7.5% vs. 25.0%, aOR 0.28, 95% CI 0.07-1.16; interaction p=0.019). **CONCLUSION:** In this exploratory analysis, high-intensity post-discharge support was more effective than a low-intensity approach in fast nicotine metabolizers only. If validated, findings could inform trials testing whether tailoring interventions to nicotine metabolism improves quit rates in hospitalized smokers.

FUNDING: Federal; Academic Institution

PP-125

ASSOCIATIONS OF NICOTINE METABOLISM WITH SMOKING TRAJECTORIES AMONG A U.S. REPRESENTATIVE SAMPLE OF ESTABLISHED SMOKERS

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Significance: The rate at which a smoker metabolizes nicotine - estimated by the ratio of trans-3'-hydroxycotinine (3HC) to cotinine, or nicotine metabolite ratio (NMR) - is associated with smoking initiation, frequency, and cessation likelihood. However, these associations have not been explored longitudinally at a population level. We examined associations of baseline NMR with smoking outcomes at a subsequent wave of the Population Assessment of Tobacco and Health (PATH) Study. **Methods**: Wave 1 (2013-2014) of the PATH Study was restricted to adults who reported smoking ≥ 5 cigarettes daily and no established use of other commercial tobacco products. Wave 1 serum NMR was modeled based on tertile cutpoints and a clinical cutpoint of 0.31. Weighted regression models assessed associations of NMR with Wave 1 covariates and Wave 2 (2014-2015) smoking behavior. **Results**: Median NMR at Wave 1 was 0.36 (interquartile range: 0.25, 0.49). A higher NMR tertile was associated with the following Wave 1 covariates: female versus male sex (p<.0001), white race/ethnicity versus other race/ethnicity groups (p<.0001), older age (p<.0001), more days using alcohol in past 30 days (p=0.0013), longer smoking duration (p<.0001), and more cigarettes smoked per day (p=0.0002). When adjusting for covariates, people who smoke in the highest versus the lowest NMR tertile had a smaller change in number of cigarettes smoked from Wave 1 to Wave 2 (p=0.0104); however, NMR tertile was not associated with Wave 2 past 30-day smoking (p=0.3561), daily smoking (p=0.4295), or change in number of days smoking in past 30 days (0.3475). Results were consistent when using the clinical NMR cutpoint of 0.31. **Conclusions**: In a U.S. representative sample of established smokers, faster nicotine metabolism was associated with a smaller reduction in daily cigarette consumption at a subsequent PATH wave, even after controlling for confounding variables. Nicotine metabolism remains an important biobehavioral factor indicative of daily cigarette consumption and a potential treatment diagnostic.

FUNDING: Federal

PP-126

CALLING TO QUIT: A SURVEY OF NATIONAL SMOKING CESSATION QUITLINES IN EUROPE

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Significance: While many countries in Europe offer smoking cessation services through a quitline, there is no comprehensive overview of the services offered by each quitline. In addition, there is no formal European network for national quitlines at this time. This project aims to systematically collect, analyze, and share information about the goals and services offered by quitlines in Europe and to explore interest in a European quitline network. **Methods:** Representatives from 23 quitlines in Europe were invited to participate in a secure online survey about their country's quitline. The survey was informed by questions from North American Quitline Consortium (NAQC) surveys and included questions about operating hours, types of counselling and services offered, counselling topics, special interest groups, reach, and budget. **Results:** Representatives from twenty national quitlines participated in the survey. Data was collected from Austria, Belgium, Bulgaria, Czech Republic, Denmark, Finland, France, Germany, Iceland, Ireland, Italy, Latvia, Luxembourg, the Netherlands, Poland, Romania, Slovakia, Slovenia, Sweden, and Switzerland. The oldest quitline was established in 1994 while the youngest one was from 2016. Nineteen quitlines were funded by governmental or national public organizations such as cancer societies. The majority (N=18) offered behavioral support. Most quitlines offered brief advice (N=16) and multiple counselling sessions (N=17). Most offered one or more additional services, such as referrals to other services (N=16), mailed materials (N=12), online self-help tools (N=10), recorded messages (N=5), online interactive counselling (N=5), fax referrals to the quitline (N=4) and mobile apps (N=4). Two quitlines offered free smoking cessation medication. The survey found large differences in the yearly number of users, varying from a few dozen to more than 50,000 users. **Conclusion:** There are were large differences in the services that quitlines in Europe offer and the number of people that use the quitlines. A European quitline network may support quitlines by providing guidance about services and improving overall quality.

FUNDING: Federal

PP-127

NEXT STEPS FOLLOWING UNSUCCESSFUL SMOKING CESSATION TREATMENT: THE VALUE OF CHRONIC CARE

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Background: Chronic care smoking treatment has produced modest effects. This study explored different approaches to chronic care for smoking. ***Methods:*** This is a secondary analysis of a Sequential Multiple Assignment Randomized Trial (SMART) with 3 phases. Phase 1 provided a usual care Initial Quit Treatment (8 weeks of nicotine patch with counseling for <20 mins.) to primary care patients wanting to quit (*N*=1154). Those who relapsed within 6 months of the Phase 1 target quit day (TQD) were randomized to 1 of 3 Phase 2 Relapse Recovery Treatments intended to foster new quit attempts: 1) *Preparation Counseling* (nicotine mini-lozenges + smoking reduction counseling) with recurring offers of intensive cessation treatment after 1 month of reduction counseling; 2) *Recycling*: recurring offers of intensive cessation treatment beginning as soon as patients relapsed; or 3) *Quitline Referral*: encouragement to contact the Tobacco Quitline. Phase 3 New Quit Treatment (nicotine patch + mini-lozenges for 8 weeks and randomization to cessation counseling) was only offered to patients in Preparation or Recycling. Carbon monoxide (CO) confirmed 7-day point-prevalence abstinence was assessed 14 months after starting Phase 2. ***Results:*** The majority (63%; 728/1154) relapsed in Phase 1 and 80% (582/728) of those relapsing agreed to Phase 2 treatment. Of those randomized to active Phase 2 treatment (Preparation or Recycling), 5% (23/437) were abstinent at Phase 2 Month 14 versus 2% (3/145) of those in the Quitline control group. Among Phase 2 participants eligible for Phase 3 intensive cessation treatment,

30% (133/437) refused the treatment; their quit rate at Month 14 was <1% (1/133). Of those who accepted Phase 3 intensive cessation treatment, 7% (22/304) were abstinent at Month 14. ***Conclusions:*** Patients who relapse and agree to enter a more intense smoking cessation retreatment program appear to have modestly improved cessation rates relative to a) relapsed patients not offered more intense cessation retreatment and b) relapsed patients who refuse the retreatment. Thus, even when more intense smoking treatment is offered to those who relapse, long-term abstinence rates remain low.

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PP-128

TELEHEALTH SMOKING CESSATION INTERVENTION FOR LATINX WHO SMOKE AND HAD DEPRESSION AND/OR ANXIETY: FINDINGS FROM A FEASIBILITY STUDY

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Significance: Latinx smokers have a low probability of receiving evidence-based smoking cessation interventions. More research is needed to consider Acceptance and Commitment Therapy (ACT) as an evidence-based intervention for the co-occurrence of smoking, depression and anxiety among this population. This one-arm study evaluated the feasibility of recruitment, retention, and treatment acceptability of an ACT-based smoking cessation treatment for Latinx adults. Secondary objectives were the examination of smoking rates and levels of depression, anxiety, and psychological inflexibility (ACT core target). Method: The treatment entailed 8 sessions (1 in-person/video and 7 by phone), and nicotine patches. Participants (N=23) completed baseline assessments (B) and follow-ups at end of treatment (ETO) and 2-months after treatment completion (FU2). Measures included demographics, tobacco use (self-reported), depression (PHQ-8), anxiety (GAD-7) and psychological inflexibility (AIS). Results: Most participants were women (70%), ranging from young adult to middle-aged, partnered (57%), and working at least part-time (76%). Average number of sessions completed was six. Follow-up rates were 61% at both EOT and FU2. ACT treatment was highly acceptable as indicated by quantitative and qualitative measures. Point prevalence smoking abstinence was 35% at both follow-ups. Participants reported an average decline [% or M(SD)] across time in all secondary measures, as follows: everyday smoking [B=87%; EOT= 13%; FU2= 8.7%]; depression [B=13.7(6.3); EOT= 9.9 (6.6); FU2=7.4 (5.8)]; anxiety [B=12.7 (5.4); EOT= 9.7 (6.4); FU2=8.1 (5.2)]; and psychological inflexibility [B=50.6 (7.2); EOT= 33.0 (10.7); FU2=32.6 (12.4)]. Conclusion: Feasibility of recruitment and retention was moderate, likely influenced by the COVID-19 pandemic. This ACT-based smoking cessation intervention was highly acceptable for Latinx with depression and anxiety symptoms. Participant outcomes regarding smoking abstinence, reduction of depression and anxiety levels, as well as reduction in psychological inflexibility were in the expected direction and sustained at 2-month after EOT. Replication and expansion of the study is warranted.

FUNDING: Nonprofit grant funding entity

PP-129

TIME-VARYING MEDIATORS OF PRE- AND POST-QUIT NICOTINE PATCH THERAPY IN ADULTS ATTEMPTING TO QUIT SMOKING WITH VARENICLINE

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Background: Examining whether and when treatment enhancements affect their putative targets can help refine models of treatment processes. Such analyses of treatment mechanisms can suggest ways to better target key mediators at critical times in the quitting process. **Method:** Secondary analyses were conducted of peri-cessation nightly data (collected 2 weeks before and 2 weeks after a target quit day) from a randomized controlled trial of at least 12 weeks of active varenicline (starting 1-week pre-quit) with active (n=603) or placebo (n=599) nicotine patch (starting 2 weeks pre-quit). Ecological momentary assessment data on candidate mediators (cigarette craving, negative affect, positive affect, anhedonia, difficulty concentrating, sleep dissatisfaction, quitting confidence, and cessation fatigue) and smoking status (0=abstinent, 1=smoked) occurred nightly. Time-varying mediation models tested effects of active vs. placebo patch on mediators; relations between mediators and daily smoking; and mediated effects of patch condition on daily smoking via mediators on days -14 to 14 relative to the quit day. The mediation models were separately conducted for each mediator. **Results:** In unadjusted models, receiving active (vs. placebo) patches significantly increased positive affect days -2 to 14 and enhanced quitting confidence on days -14 to -2, but had no significant effects on other mediators. Mediators that predicted next-day smoking included: lower confidence (days -2 to 14) and positive affect (days 3 to 11); and greater craving (days -5 to 14), negative affect (days -2 to 14), difficulty concentrating (days 2 to 14), sleep dissatisfaction (days 1 to 5), and anhedonia (days 3-11). The only significant mediated effect was a protective effect against next-day smoking through increased positive affect on days 4-8. **Conclusion**: Adding active nicotine patches to varenicline in the peri-cessation period appears to enhance positive affect and quitting confidence, and the effect on positive affect may have time-limited mediated effects 4-8 days into a quit attempt. Many subjective ratings predictive of next-day smoking were not significantly improved by adding active patches to varenicline.

FUNDING: Federal

PP-130

INVESTIGATING THE APPLICATION OF THE ASK-ADVISE-REFER MODEL AMONG PRE-SURGICAL CANCER PATIENTS WHO SMOKE

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Introduction: Individuals who smoke are at increased risk of postoperative complications and a poorer overall cancer prognosis. Thus, the perioperative period represents a prime opportunity to intervene on patient's cigarette smoking. However, there is limited research on effective presurgical tobacco interventions for patients with cancer and cancer surgeons' current tobacco treatment practices. Therefore, we sought to understand if patient and/or surgeon factors are associated with tobacco-related care, specifically use of the 3A's model (Ask, Advise, Refer), prior to cancer surgery. **Methods:** This study describes a review of electronic health record data for patients who reported current smoking prior to undergoing surgery for cancer between May and November 2021 (N=132). We recorded patient demographics, patient smoking and cancer clinical characteristics, surgeon demographics, and whether a surgeon had implemented any of the 3 steps with patients prior to surgery. Descriptive statistics were used to summarize the sample and clinical outcomes. We then used multivariable logistic regression to evaluate factors associated with the likelihood of asking, advising, and/or referring patients for tobacco treatment. **Results:** Though most patients were asked about their smoking (71%), only a minority were advised to quit (27%) or referred for tobacco treatment (24%). Patients with a smoking-related cancer were less likely to be asked about their smoking [OR=.33 (95% CI: .12-.90), p=.03]. In addition, female patients [OR=3.77(95%CI: 1.24-11.50, p=.02] were more likely to be referred for tobacco treatment whereas as older patients were less likely to be referred [OR=.95 (95%CI: .91-.98), p=.003]. **Conclusions:** The results highlight important differences in how the Ask-Advise-Refer model is applied by surgical oncologists in relation to patient characteristics. These findings have implications for implementing tobacco-related care in oncology settings for patients during the perioperative period. Specifically, it will be important for future research efforts to increase rates of treatment referrals for smoking-related cancers and to encourage referrals for patients of all ages and genders.

FUNDING: Federal

PP-131

PILOT EVALUATION OF A MOBILE HEALTH INTERVENTION FOR SMOKING CESSATION IN RURAL AND URBAN GEORGIA

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Significance: Tobacco-related disparities by socioeconomic status (SES) and rurality are profound, with low-SES and rural populations exhibiting disproportionately high

smoking prevalence and related mortality. Mindfulness training via text messaging could be well suited for improving smoking cessation in these populations. **Methods:** This study evaluated the feasibility and acceptability of a text messaging program for smoking cessation (iQuit Mindfully) in urban and rural Georgia. Participants were adult cigarette smokers interested in quitting (N=60, 61.7% female, 41.7% African American, 50% white, 53.3% with annual household income <$30,000). At each site (urban Atlanta and rural Georgia), 30 participants were randomized to iQuit Mindfully or usual care. All participants received nicotine patches, nicotine lozenges, self-help materials, and Tobacco Quitline referrals. iQuit Mindfully participants also received daily personalized, interactive text messages that encouraged mindfulness strategies for quitting smoking for 8 weeks, with fewer texts during weeks 9-12. Participants completed program evaluations and remote expired carbon monoxide (CO) at 8 and 12 weeks. **Results:** Most iQuit Mindfully participants (88.9% overall; 100% rural and 78.6% urban) read most or all text messages. On average, iQuit Mindfully participants found the program helpful (median=8 on 1-10 scale) and recommended it for others (median=8 on 1-10 scale). Self-reported 7-day abstinence rates were 48.2% among iQuit Mindfully vs. 38.5% among usual care at week 8, and 37.0% among iQuit Mindfully vs. 33.3% among usual care at 12 weeks. CO-verified 7-day abstinence rates were 34.8% among iQuit Mindfully vs. 25.0% among usual care at week 8, and 13.6% among iQuit Mindfully vs. 8.3% among usual care at 12 weeks. Presenters will discuss feasibility and acceptability across rural and urban sites. Although text messaging was well received at both sites, there were issues with remote CO assessment at the rural site due to limited internet connectivity. **Conclusion:** Overall, mindfulness-based text messaging appears a feasible and acceptable strategy for smoking cessation in urban and rural Georgia.

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PP-132

SWEET FLAVOR AND NICOTINE IN ELECTRONIC CIGARETTE LIQUIDS: EFFECTS ON TOBACCO ABSTINENCE SYMPTOMS IN CIGARETTE SMOKERS.

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Significance: The use prevalence of sweet-flavored electronic cigarette (ECIG) liquids suggests that sweeteners may play an important role in the initiation and maintenance of ECIG use. This study examined the effects of sucralose and nicotine, alone and in combination, in otherwise unflavored ECIG liquids. **Methods:** Regular cigarette smokers (N=14; 9 men and 5 women) who smoked an average of 14.2 (SD=4.4) cigs/day completed a within-subject study during which they participated in 5 sessions that differed by product: a 30 W ECIG filled with either 0 mg/mL nicotine liquid that was unsweetened (U_0), 0 mg/mL nicotine liquid sweetened with sucralose (S_0), 15 mg/mL nicotine liquid that was unsweetened (U_15), or a 15 mg/mL nicotine liquid sweetened with sucralose (S_15; all liquids 30/70 PG/VG); own brand cigarettes served as a positive control (OB). During each session participants completed subjective measures before and after 10 puffs from the product of the day and again before and after a progressive-ratio task (PRT). **Results:** Mean (SD) ratings for the item "Craving a cigarette/nicotine" were reduced significantly for OB, from 75.2 (28.7) to 39.7 (22.8) following the directed bout and to 19.0 (16.3) following the PRT. Craving was also reduced for S_15 from a rating of 74.6 (25.7) to 51.9 (31.6) following the directed bout. Mean ratings for the item "Was the product satisfying?" were significantly higher in the OB condition (mean=6.1; SD=0.9) relative to U_0 (2.4; SD=0.9), S_0 (2.9; SD=1.4), U_15 (2.9; SD=1.1), and S_15 (3.6; SD=1.3); and ratings were significantly higher in the S_15 condition compared to the U_0 condition. Mean puffs earned during the PRT were significantly higher in the OB condition (9.9; SD=1.1) relative to the S_0 (6.2; SD=1.3) and the U_15 conditions (5.1; SD=1.4), but not the U_0 (7.6; SD=1.1) or the S_15 conditions (7.2; SD=1.4). **Conclusion:** Sucralose and nicotine in ECIG liquids influence craving suppression and satisfaction in cigarette smokers. Sweeteners may play an additive role in ECIG abuse liability.

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PP-133

SMOKING PATTERNS AND ACCULTURATION STRESS AMONG LATINOS FROM DIFFERENT COUNTRY OF BIRTH

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Introduction: The prevalence of current smoking is higher among the US Latinos than other subgroups. Latinos who have a higher level of acculturation to the dominant US culture have higher smoking prevalence rates. Acculturation stress may impact Latino smoking behaviors differently depending on their country of birth. **Objective:** Assess the association between acculturation stress dimensions and smoking patterns among Latinos from different countries of birth enrolled in a mobile smoking cessation randomized controlled trial (RCT). **Methods:** Participants (N=457) were enrolled in a mobile smoking cessation RCT. A 52 items version of The Hispanic Stress Inventory-2 (HSI-2) and smoking behaviors were assessed at baseline. Participants were classified according to their country of birth: USA, Mexico, Central America and Caribbean and South America. Data were analyzed through descriptive, non-parametric, and correlational analyses. **Results:** Half of participants (54.7%) were male with a mean age of 48.65 (SD=11.13). Overall, the x-item version of HSI-2 was highly reliable (Cronbach alpha = .93). HSI-2 scores reflected that 49.2% (N=226) of participants presented moderate to high levels of acculturation stress. Moreover, results revealed significant differences between HSI-2 domains according to countries of birth. Mexicans showed higher scores of acculturation stress (Median=73, IQR=58-101) compare to Latinos born in USA, Central America and the Caribbean and South America. Latinos born in the US had a weak positive association among Occupation/Economic stress and menthol cigarette use (r (103)=.23, p=.034). Interestingly, among Mexicans, Language Related Stress scores displayed a weak negative association with the number of cigarettes consumed per day (r (87)=-.37, p = .001). Central American and Caribbean participants' scores reflected a weak positive association between Immigration-Related Stress (r(158)=.26, p=.002) and menthol use. Finally, a weak positive association was found among South Americans between Acculturation Stress (r(110)=.30, p=.003) and menthol cigarettes use. **Conclusions:** Results confirm differences in smoking patterns and acculturation stress among Latinos in US. and highlighted the relevance of incorporating cultural components in smoking cessation programs.

FUNDING: Federal

PP-134

SMOKE-FREE CAR POLICIES AND PARENTAL TOBACCO SMOKING CESSATION

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Significance: Setting smoke-free (SFH) home rules helps reduce childhood tobacco smoke exposure (TSE) and is associated with increased parental cessation. Smoking in cars is known to create a reservoir for TSE but less is known about the impact of smoke-free car rules on parental cessation. Objective: To understand the potential relationship between smokefree car rules and quitting smoking among parents whose children were hospitalized. Methods: This is a secondary analysis of a randomized, controlled, single-blind clinical trial at Children's Hospital Colorado. Families of hospitalized children with at least one parent who used tobacco were eligible for participation, and were followed for 12 months. Consenting parents completed questionnaires at baseline and 12 months on patterns of use, and smoke free home and car rules. Cessation was determined by self-reported 7-day abstinence, and confirmed with urine cotinine (<10 ng/mL) when nicotine replacement therapy was not used. Analysis with SAS v9.4 used Fisher's exact tests and Wilcoxon tests for bivariate comparisons by quitting status, and generalized linear model with generalized estimating equations adjusting for potential confounders. Results: Of 1989 eligible families approached, 263 enrolled (13%), and 140 families had complete follow-up data at 12 months (57%); 28 (20%) reported having quit at 12 months. Only 39% of parents reported a strict rule (not allowing anyone to smoke in car) at baseline; this increased to 57% at 12 months. Parents were more likely to report having quit at 12 months if they had strict car rules either at baseline (29% with strict rules vs. 14% without, p=0.04) or at follow up (34% with strict rules vs. 2% without, p<0.0001). 32% of the parents who allowed smoking in the car at baseline but prohibited it at 12-month reported being quit at follow-up, similar to the 31% quit rate of parents who had strict rules at both baseline and follow up. None of the parents (N=41) who allowed smoking

in the car at both baseline and follow up had quit. In an adjusted model, prohibiting smoking in the car at any time while enrolled in the study was associated with a higher odds of quitting (adjusted odds ratio (AOR)=37 (95%CI 6-252), p=0.0002). Conclusions: Parents of hospitalized children who always had or who adopted smoke free car rules were more likely to have quit smoking at 12 months. Encouraging parents to set strict rules about not smoking in the car may support parental cessation.

FUNDING: Unfunded; Federal; Academic Institution

PP-135

USING ALL-PAYER CLAIMS DATA TO EXAMINE THE UTILIZATION OF COVERED TOBACCO CESSATION TREATMENT AMONG MEDICAID ENROLLEES IN ARKANSAS

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Significance: Smoking prevalence among Medicaid enrollees is above U.S. national average. Healthy People 2020 and 2030 recommend that state Medicaid programs cover all FDA-approved Nicotine Replacement Therapy (NRT: patch, gum, lozenge, nasal spray, inhaler)/medications (Chantix, Zyban) as well as cessation counseling. Little is known about the utilization of tobacco cessation treatments among Medicaid enrollees in Arkansas, and given AR's expansion of Medicaid through purchase of private marketplace plans, this study aimed to evaluate the utilization of smoking cessation therapies over time, and stratified by traditional Medicaid (TM) and Medicaid expansion (ME) plan type. Methods: We used Arkansas All-Payer Claims Data to obtain pharmaceutical and medical claims data from adult enrollees from January 2014 to June 2018, including those enrolled in Medicaid for at least a day in any given month. For each month, we calculated the number of claims for each tobacco cessation treatment and the number of unique enrollees who received treatment, separately calculated for TM ME plans. NDC codes were used to identify NRT/medication, and CPT codes were used for individual/group counseling. Results: The number of individuals receiving treatment per 1,000 members ranged from 1.2 to 2.9 (average: 2.2) for TM and from 3.2 to 8.9 for ME members (average: 5.4). The average number of monthly claims per 1,000 enrollees was higher for ME (8.4) compared to TM (2.3). The most common treatment for TM enrollees was the patch, whereas the most common treatment for ME enrollees was Bupropion (Zyban). In no months did greater than 0.5 per 1,000 members receive both, medication therapies and counseling. Conclusion: Arkansas TM enrollees do not utilize the comprehensive set of all cessation treatments. Overall, utilization of covered tobacco cessation treatments remains relatively low, with higher utilization among the ME population. Increasing access to all approved cessation pharmacotherapies and counseling, and prescribing them together would improve smoking cessation efforts in the state and lower the burden of smoking-related diseases, while increasing health equity.

FUNDING: Academic Institution

PP-136

RETHINKING TOBACCO TREATMENT FOR INCARCERATED ADULTS TO ACHIEVE HEALTH EQUITY

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The prevalence of tobacco use among those incarcerated in prisons and jails in the U.S. remains exceptionally high, with estimates ranging from 50% to 80% or more prior to incarceration. This represents a growing health disparity as it stands in stark contrast to the dropping prevalence of smoking in the general U.S. adult population. While many people stop smoking during incarceration due to forced abstinence from tobacco bans and related smoke-free policies, the majority resume smoking within a month of release from prison. With still limited evidence to inform relapse prevention programs in this population, we aimed to describe trends over the past decade in prevalence of smoking prior to incarceration, as well as perceptions, attitudes, and intentions related to relapse risk and treatment needs following release from prison. A tobacco survey was administered to all adult incarcerated persons (n = 5,289) entering a tobacco-free correctional facility in the U.S. Midwest between 2012 and 2020. Most respondents used tobacco products prior to incarceration (85-91%) and there was no change in pre-incarceration smoking rate over nine years (p's > .095). While most considered themselves addicted to tobacco before incarceration (75.8%), far fewer considered themselves addicted to tobacco currently (19.0%). The majority of respondents intended to remain tobacco free after release, and increasingly expected support to remain tobacco free from their home environment, despite no change in home tobacco use. Over this nine-year period, significantly fewer respondents wanted materials and help to remain tobacco free (33% in 2012 vs 8% in 2020, p<.01). This descriptive 9-year program evaluation survey highlights the very high stable prevalence of smoking prior to incarceration, numerous risk factors to return to smoking, and opportunities for targeted intervention. Developing effective evidence-based tobacco treatment relapse prevention programs for people who are incarcerated is one essential component of achieving health equity for this especially vulnerable population who continue to smoke at a high rate.

FUNDING: Unfunded; State; Academic Institution

PP-137

AN INACTIVATING ALDH2 VARIANT LEADS TO DIFFERENTIAL GENE EXPRESSION THAT EXACERBATES PULMONARY ENDOTHELIAL DYSFUNCTION EXPOSED TO ACETALDEHYDE IN RODENTS

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Background: E-cigarette aerosol and cigarette smoke contain aldehydes, including acetaldehyde, which contributes to pulmonary endothelial dysfunction and subsequently pulmonary hypertension. East Asian descent are possibly more susceptible to this pathophysiology due to an inactivating genetic variant in aldehyde dehydrogenase 2 (ALDH2), known as ALDH2*2, leading to inefficient acetaldehyde metabolism. Little is known how acetaldehyde present in cigarette smoke and e-cigarette aerosol, coupled with differences in ALDH2 genetics, influence pulmonary endothelial dysfunction. Therefore, we hypothesize that pulmonary endothelial cells from ALDH2*2 rodents will demonstrate worsened cell dysfunction and differential gene expression when exposed to acetaldehyde relative to wild type ALDH2 rodents. **Methods:** The knock-in ALDH2*2 mice closely resembles genotypic and phenotypic characteristics of human ALDH2*2 variant. Pulmonary microvascular endothelial cells isolated from ALDH2 and ALDH2*2 mice were treated with vehicle or acetaldehyde. Endothelial cells were investigated for cell viability, endothelial barrier integrity, angiogenesis ability, biomarkers for oxidative stress and transcriptional profiling. **Results:** When treated with acetaldehyde, pulmonary endothelial cells from ALDH2*2 mice showed a ~10% decrease in cell viability, a ~30% decrease in capillary tube formation, a ~1.5-fold increase in cell hyperpermeability, and ~2-fold increase in ROS production relative to ALDH2 cells. Volcano plot of differential expression gene (DEGs) between ALDH2*2 and ALDH2 cells when exposed to acetaldehyde demonstrated a total 1434 DEGs, of which 831 were upregulated and 603 were downregulated in ALDH2*2 cells. Generally, the ALDH2*2 cells revealed a significant upregulation in ROS, inflammation, and cell death associated genes. Particularly, the vascular cell adhesion molecule 1 (VCAM1), an important proinflammatory mediator of vascular endothelium regulated by nuclear factor kappa B (NF-κB) signaling pathway, was upregulated in ALDH2*2 cells relative to ALDH2 cells. **Conclusion**: Mice carrying an inactivating ALDH2 variant have upregulated inflammation and oxidative stress-associated genes in the presence of acetaldehyde which exacerbates pulmonary endothelial dysfunction relative to wild type ALDH2 mice. The study suggests East Asian descent with inactivating ALDH2 variant may be more susceptible to endothelial dysfunction when exposed to acetaldehyde present in e-cigarette aerosol or cigarette smoke.

FUNDING: Other: NIH, TRDRP

PP-138

ADDING MHEALTH TEXT MESSAGING REMINDERS TO A MULTICOMPONENT MATERNAL TOBACCO CESSATION PROGRAM IMPROVES POSTNATAL CESSATION RATES

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Maternal smoking is a potent risk factor for adverse birth outcomes. During 2012-2019, the Loma Linda University Health Comprehensive Tobacco Treatment Program (CTTP) used a multicomponent behavioral intervention for tobacco cessation for 1402 pregnant smokers with components of known efficacy (i.e., incentives, biomarker testing, feedback, and motivational interviewing). A subgroup of the CTTP cohort also included

the added mobile health (mHeath) component that involved text message reminders for participation in weekly sessions of the eight-week intervention by health educators and motivational follow-up messages after the eight-week session. We conducted a prospective cohort study to determine the effect of adding the mHealth component on 8-week prolonged abstinence, and also on follow-up at 3-9 months post-intervention. In multivariable logistic regression models with relapse as the outcome, we found that the added mHealth component tended to prevent relapse after 6 months post-intervention (OR [95% CI] for relapse for mHealth versus no mHealth = 0.98 [0.66, 1.47] at 8 weeks, 0.92 [0.62, 1.38] at 2-4 months, 0.53 [0.35, 0.81] at 6 months, 0.33 [0.12, 0.89] at 9 months). Since the 6-9 months follow-up data was almost entirely postnatal follow-up, our findings indicate that mHealth follow-up from prenatal cessation into the postpartum period was particularly effective in preventing relapse. This study provides real-world evidence of the success of mHealth in maintaining maternal tobacco cessation during the postpartum period.

FUNDING: Federal

PP-139

COCHRANE REVIEW: HEATED TOBACCO PRODUCTS FOR SMOKING CESSATION AND REDUCING SMOKING PREVALENCE

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Significance: Heated tobacco products (HTPs) are designed to heat tobacco to a high enough temperature to release aerosol, without burning it or producing smoke. To regulate HTPs appropriately, policy makers should understand their impact on health and on smoking cessation and prevalence. This Cochrane review evaluates relevant evidence into HTPs. **Methods:** We searched nine databases for relevant studies to Jan-2021. RCTs where people were randomised to switch to exclusive HTPs use or a control condition were included. Time-series studies were eligible if they examined the impact of HTPs on cigarette smoking prevalence or sales. **Results:** There were 13 completed studies, 11 of which were RCTs assessing safety (N=2666) and 2 were time-series studies. All RCTs were tobacco industry funded. No studies reported smoking cessation outcomes. There was insufficient evidence for differences in risk of adverse events between smokers randomised to switch to HTPs, continue smoking cigarettes, or attempt abstinence from all tobacco. There was also insufficient evidence for differences in risk of serious adverse events. There was moderate-certainty evidence for lower NNAL and COHb in HTP than cigarette smoking groups. There was moderate-certainty evidence for higher NNAL in HTP than tobacco abstinence groups, but results for COHb varied substantially across studies so they were considered of very low-certainty. Data from 2 time-series studies showed that the rate of decline in cigarette sales accelerated following the introduction of HTPs in Japan, but the evidence was of very low-certainty. **Conclusions:** No studies reported on cigarette smoking cessation, so the effectiveness of HTPs for this purpose remains uncertain. There was moderate-certainty evidence that HTP users have lower exposure to toxicants/carcinogens than cigarette smokers and very low- to moderate certainty evidence of higher exposure than those attempting abstinence from all tobacco. Independently funded research is needed. The rate of decline in cigarette sales accelerated after the introduction of HTPs in Japan, but falls in cigarette sales may not translate to declines smoking prevalence.

FUNDING: State; Nonprofit grant funding entity

PP-140

ADDICTION POTENTIAL OF COMBUSTIBLE MENTHOL CIGARETTE ALTERNATIVES: A RANDOMIZED CLINICAL TRIAL

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SIGNIFICANCE The FDA recently announced its intention to issue proposed product standards banning menthol as a characterizing flavor in cigarettes and cigars. The public health benefits of these product standards may be attenuated by the role of substitutes in the marketplace. The goal of this study was to assess the addiction potential of plausible combustible menthol alternatives compared to usual brand menthol cigarettes (UBMC) in adults who smoke menthol cigarettes. METHODS Eighty current menthol cigarette smokers aged 21-50 completed a 4-session clinical lab study using a within-subjects design, smoking their UBMC at the first session and one of the 3 menthol cigarette alternatives in random order at the subsequent visits: 1) a pre-assembled menthol roll-your-own cigarette (mRYO), 2) a menthol filtered little cigar (mFLC), and 3) a non-menthol cigarette (NMC). During each lab session, participants completed measures on subjective effects and demand indices, in addition to collection of data on smoking topography and exhaled carbon monoxide, eCO. Repeated measures models assessed differences in outcomes between study products, adjusted for post-hoc comparisons. RESULTS Compared to smoking UBMC, participants demonstrated: 1) a greater flow rate when smoking mRYO; 2) greater puff duration, total puffing time, and eCO boost when smoking mFLC, as well as a lower flow rate and max puff volume; and 3) shorter puffing time and smaller average, max and total puff volumes when smoking NMC (all p-values<.05). Participants reported significantly lower levels of positive subjective experience and greater demand across all items while using the study products compared to UBMC (p<.001). Among the study products, participants reported the highest level of positive subjective experience when smoking mRYO (p<.001), compared with mFLC and NMC. Similarly, participants were significantly more likely to want to try again (p<.001), purchase (p<.001), and use the mRYO product regularly (p<.001) compared with mFLC and NMC. CONCLUSION mRYO cigarettes were the most highly rated cigarette alternative among study products, suggesting their potential appeal as a menthol cigarette substitute.

FUNDING: Federal; FDA CTP

PP-141

ESTIMATING THE EFFECTS OF TOBACCO-21 ON YOUTH TOBACCO USE AND SALES

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Significance: Laws restricting the ability of young people to buy tobacco can reduce tobacco use and nicotine addiction. Recent efforts in the United States have focused on raising the minimum legal sale age to 21 (e.g., Tobacco-21 or T21). Hawaii and California became the first states to pass T21 in 2016, followed by New Jersey and Washington DC in 2017, four states in 2018, and ten states in 2019. At the end of 2019, the federal government implemented T21 nationally, though this is not yet being enforced federally. In the absence of federal enforcement, states continue to pass T21 and 13 states do not yet have a state T21 law on the books. In this study, we estimate the effect of both state and local T21 laws through mid-2019, prior to the federal law coming into place. Methods: We estimate the effect of T21 using Monitoring the Future (MTF) survey data for over 300,000 respondents and Nielsen Retail Scanner data for 26,269 stores for the years 2012 to mid-2019. Granular data permits studying the effects of both state and local laws. Our outcomes include cigarette and e-cigarette use and sales, and potential mechanisms of T21 such as perceived risks of using cigarettes and e-cigarettes, and retailer ID checking. Results: We find that T21 sizably reduces 12th grade cigarette use by 35 percent and modestly reduces cigarette use for 8th and 10th graders. We also find some evidence that T21 reduces e-cigarette use across all grades. We find that T21 increases ID checking and perceived risks of both tobacco products. Finally, analyses of the 2012-2019 Nielsen Retail Scanner Data suggests that in counties with the highest quartile of the share of individuals under the age of 21, T21 reduced cigarette sales by 12.3% and e-cigarette sales by 49.1%. Conclusion: T21 appears effective in reducing tobacco product use and this matches findings from objective sales data. The finding that perceptions of e-cigarette risk increase by more for e-cigarettes than cigarettes suggests a possible unintended effect of the law.

FUNDING: Federal

PP-142

PERCEIVED RELATIVE HARM OF VERY LOW NICOTINE CONTENT CIGARETTES VS. REGULAR CIGARETTES AMONG MIDDLE AND HIGH SCHOOL STUDENTS IN THE UNITED STATES, 2019-2020

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Significance: In 2018, the United States (US) Food and Drug Administration published an advance notice of proposed rulemaking to reduce the nicotine content in cigarettes, and in 2019, granted pre-market authorization to two very low nicotine content (VLNC) cigarettes. In 2021, two VLNC cigarettes were given exposure modification marketing

approval. A VLNC product standard seeks to prevent smoking initiation, which could relate to perceived harm of these products. The aim of this study was to assess perceived relative harm of VLNCs compared with regular cigarettes (RCs) among US youth. **Methods**: Data from the 2019/2020 National Youth Tobacco Surveys were pooled to characterize perceived relative harm of VLNCs (less, equally, or more harmful than RCs) among middle and high school youth (N=33,549). Survey-weighted multinomial logistic regression analyses were conducted to examine the relationship between perceived relative harm (referent=equally harmful) and demographic/tobacco use characteristics. **Results**: VLNCs were accurately perceived as equally harmful to RCs by 38.8% of youth in 2019 and 41.5% in 2020. Compared to 2019, youth in 2020 had lower odds of perceiving VLNCs as more harmful than RCs (vs. equally harmful) (OR=0.86, 95% CI=0.77-0.97). Males (vs. females) and current tobacco users (vs. non-users) had higher odds of perceiving VLNCs as both less and more harmful than RCs (p's<0.05). Youth identifying as Black non-Hispanic (NH) (OR=3.29, 95% CI=2.91-3.72) and Hispanic (OR=2.13, 95% CI=1.92-2.35) (vs. white NH) had higher odds of perceiving VLNCs as more harmful than RCs. High school (vs. middle school) students had lower odds of perceiving less (OR=0.83, 95% CI=0.77-0.90) or more harm (OR=0.60, 95% CI=0.53-0.67). **Conclusions**: Misperceptions of relative harm were more common in 2019, among males, racial/ethnic minoritized groups, and current tobacco users. While misperceptions are lower among non-users of tobacco, other vulnerable youth sub-populations may be at risk for perceiving VLNCs as safe; however, non-users who misperceive VLNCs as more harmful may be unlikely to try them. As VLNC policies are considered or planned (e.g., New Zealand), further surveillance and research on product perceptions are needed.

FUNDING: Unfunded

PP-143

ASSESSING ADULT TOBACCO USE BEHAVIOR CHANGE IN ASSOCIATION WITH LOCAL MENTHOL SALES RESTRICTIONS IN MINNESOTA

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INTRODUCTION: In 2018, Minneapolis and St. Paul, Minnesota implemented sales restrictions on menthol-flavored tobacco products (including ENDS), exempting certain retailers (e.g., adult-only liquor stores and licensed tobacco shops). We examined changes in tobacco use prevalence and purchasing locations among adults in the area including these cities using survey data collected before and after policy implementation. METHODS: We used 2017 and 2019 Behavioral Risk Factor Surveillance System data for the 7-county Twin Cities metro area (TCMA), containing Minneapolis and St. Paul, and the rest of the state of Minnesota (ROS). We compared annual, TCMA- and ROS-specific estimates of adult tobacco product use prevalence (excluding ENDS); past 30-day use of menthol/mint tobacco products among all adults and among current tobacco users; and usual purchase location among past 30-day menthol/mint tobacco users. RESULTS: Overall tobacco use prevalence remained stable in the TCMA and the ROS from 2017 to 2019. Menthol/mint tobacco use prevalence increased in both areas overall (TCMA, 4.4% to 5.5%, p = 0.043; ROS, 5.1% to 6.3%; p = 0.027), and among tobacco users (TCMA, 28.4% to 38.1%, p = 0.001; ROS, 24.4% to 29.2%; p = 0.022). The rate of menthol/mint tobacco users who reported usually purchasing these products from a "tobacco store" increased in the TCMA (15.6% to 25.4%, p = 0.038) and remained stable in the ROS. CONCLUSIONS: Although survey data used in our analysis lacked geographic identifiers specific to policy jurisdictions, we found that that menthol/mint tobacco use prevalence among adults in the TCMA did not decrease after implementation of menthol sales restrictions in Minneapolis and St. Paul, suggesting menthol/mint tobacco users may have shifted their purchasing locations to policy-exempt retailers within their jurisdictions or to retailers in nearby non-policy jurisdictions. Continued evaluation of the effects of local menthol tobacco sales restrictions can improve understanding of intended and unintended policy outcomes and inform policy development.

FUNDING: Federal; FDA CTP

PP-144

THE NEW ZEALAND SMOKEFREE 2025 ACTION PLAN: SUPPORT FOR AND ANTICIPATED BEHAVIOURAL RESPONSES TO KEY MEASURES AMONG SMOKERS IN THE ITC NEW ZEALAND (EASE) 2018 AND 2020 SURVEYS

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SignificanceThe New Zealand (NZ) Government's Smokefree 2025 Action Plan proposes a comprehensive strategy including innovative endgame measures: large reductions in retail availability, mandated very low nicotine cigarettes, and the tobacco-free generation proposal. We investigated support and perceived impact of these action plan measures in 2018 and 2021. **Methods**Data are from people who smoked or who had recently quit smoking in Wave 2 (W2, Jun-Dec 2018, 1010 respondents, CATI interviews) and Wave 3 (W3, Oct 2020-Feb 2021, 1266 respondents, online survey) of the ITC NZ cohort study (EASE). Respondents were recruited from a national health survey (W2); and from an online survey panel, social media advertising and community networks (W3) with Māori and Pacific peoples and young adults (18-25 years) over-sampled. We present cross-sectional analyses with estimates weighted to reflect the NZ population of smokers and recent quitters. **Results**Most respondents (76%, W3) supported mandated very low nicotine cigarettes (VLNCs), the tobacco-free generation proposal (78%, W2), and increased campaigns to foster cessation (70%, W3) or prevent youth smoking (93%, W3). There was less support for large reductions (from around 6000 to 300) in retail availability (36%, W3). Support for these measures was similar among Māori, Pacific, and non-Māori, non-Pacific respondents. When asked what they would do if VLNCs were mandated, 20% of smokers stated they would reduce their smoking and 27% would stop smoking (of whom half said they would quit nicotine entirely and half would switch to vaping). If there was a major reduction in tobacco product retailers, 23% stated they would reduce their smoking and 24% would stop smoking (about evenly split between quitting nicotine entirely and switching to vaping). **Conclusion**There was strong support among New Zealand smokers and recent quitters for key measures of the NZ Smokefree 2025 Action Plan. Smokers' anticipated behavioural responses to these key measures, with a significant proportion stating that they would quit smoking, suggests that the Plan could greatly reduce smoking prevalence and ameliorate the health inequities caused by smoking.

FUNDING: Nonprofit grant funding entity

PP-145

TOBACCO INDUSTRY INFLUENCE ON SMOKE-FREE POLICIES IN MULTI-UNIT HOUSING

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Background: The tobacco industry's efforts to undermine clean indoor air policies is well documented, but less is known about its efforts to challenge such policies in multi-unit housing. Secondhand smoke can travel from smoking units to non-smoking units along air ducts, through the walls, floors, cracks, elevator shafts, plumbing and even electrical routes. Because of the dangers associated with secondhand smoking, some local governments, public housing agencies, and privately owned apartment buildings have instituted smoking bans in indoor living areas in their properties. In this paper, we examined the tobacco industries' efforts to weaken smoke-free policies in public multi-unit housing starting in 1988 when the first smoking ban for multi-unit housing was implemented. **Methods:** Focusing on the period between 1988 to 2018, we searched the UCSF Tobacco Industry Documents Inventory, using initial search terms and snowball searching strategy **Results:** Drawing from 30 relevant documents, we found that the industry used two primary strategies to influence smoke-free policies in Multi-Unit Housing: 1) distortion, which included funding studies that downplayed the role of SHS in causing asthma among low-income inner-city residents and, 2) deflection, which included engaging in corporate responsibility for youth living in public low-income MUH. Despite these efforts, local jurisdictions implemented smoke-free policies in MUH. **Conclusion:** Local policies and advocacy among non-smokers' rights groups are important levers to block industry influences in MUH policies. These efforts may improve tobacco-related health equity for MUH residents who are disproportionately impacted by tobacco exposure.

FUNDING: Unfunded; State; Academic Institution; Nonprofit grant funding entity

PP-146

ELECTRONIC CIGARETTE MARKETING EXPENDITURES IN THE U.S., 2016-2021: TARGETED MEDIA OUTLETS AND CONSUMER DEMOGRAPHICS

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Significance: Electronic cigarette (ECIG) initiation among U.S. youth peaked in 2018-2019 and was associated with heightened levels of ECIG advertising (ad) exposure during that time. Although use prevalence declined in 2020, ECIGs continue to be the most commonly used tobacco product among youth. The current study examined 1) trends in ECIG ad expenditures and 2) whether regional ECIG ad expenditures vary as a function of sociodemographic characteristics. **Methods:** ECIG ad expenditure data (January 2016-July 2021) were purchased from Numerator Ad Intel (print, TV, radio, online video, online display, and mobile). Ad expenditures for specific U.S. designated marketing areas (DMAs) were harmonized with U.S. Census sociodemographic data through Nielsen DMA/zip code designations. Descriptive statistics and Pearson correlation coefficients (p<0.05) were used to evaluate ad expenditure trends and associations with sociodemographic characteristics of DMAs. **Results:** Out of all brands, JUUL, Vuse, and Blu ECIGs spent the most on ECIG ads, which peaked in late 2018/early 2019. TV channels targeted during the spike were those with broad family content (e.g., TNT, TBS, and AMC). In 2018 and 2019, greater spending was significantly associated with non-rural/metro DMAs (r range= 0.38 to 0.40) and those having fewer housing units per person (e.g., a proxy for higher socioeconomic status; r range= -0.19 to -0.24). Greater spending on online video advertising was significantly correlated with DMAs having a higher percentage of residents under 18 years of age (r range= 0.18 to 0.24). In late 2019/early 2020, there was a sharp decline in ad expenditures for the three top brands that continued through the end of the data collection period. **Conclusions:** These longitudinal data show how popular ECIG brands focused their advertising on media channels geared toward youth and in urban areas with larger youth populations. Importantly, these data show parallel declines in ECIG ad expenditures to those seen with use prevalence from national surveys after federal policies implemented marketing restrictions. Results demonstrate the important role that federal policies have on protecting youth.

FUNDING: Federal; Academic Institution; FDA CTP

PP-147

THE EFFECTS OF ELECTRONIC NICOTINE DELIVERY ON VOLUNTARY ETHANOL DRINKING AND LOCOMOTION IN MALE AND FEMALE C57BL/6J MICE

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SIGNIFICANCE: In humans, alcohol and nicotine consumption often coincide and co-occurring dependence of both substances is common. The rising popularity of electronic cigarettes underscores the need for improved understanding of their effects. Notably, the role that electronic nicotine delivery plays in alcohol consumption is still not fully understood. In this study, we examined the effects of electronic nicotine delivery and withdrawal on voluntary ethanol drinking in female and male C57BL/6J mice. METHODS: We used an intermittent access two-bottle choice (IA-2BC) model of voluntary drinking over 2 weeks to establish a baseline. Mice were then exposed to electronic nicotine vapor (12%) or propylene glycol/vegetable glycerol (PG/VG) control for 3 h sessions daily for 4 weeks and voluntary alcohol consumption was monitored. Nicotine vapor exposure was then stopped and voluntary alcohol drinking was measured for a 2 week withdrawal period. We also examined the effects of alcohol and nicotine on locomotion, temperature, and nicotine serum levels. RESULTS: We found that in the first week of vaping alcohol consumption was increased in male nicotine mice compared to PG/VG, but not in female mice. We also observed a difference in core body temperature between the nicotine and the PG/VG groups in both male and female mice. Immediately following the final session after 4 weeks of vapor exposure, both male and female nicotine mice had significantly increased locomotor activity. In the first week of withdrawal, we observed an increase in alcohol consumption in female nicotine mice, but only a difference in water consumption in male mice. After 1 week of withdrawal, locomotor activity in male nicotine mice was elevated compared to PG/VG controls, with no significant differences in female mice. CONCLUSION: Nicotine vapor exposure increases locomotor activity in ethanol-drinking male and female mice, but only increases voluntary ethanol drinking in male C57BL/6J mice. Collectively, these results suggest that while both male and female ethanol-drinking mice experience the stimulatory effects of nicotine vapor, only in males is there a parallel increase in ethanol drinking.

FUNDING: Unfunded

PP-148

ELECTRONIC CIGARETTE EXPOSURE INCREASES ANTIOXIDANT RESPONSE GENES IN MOUSE LUNGS

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Recently, there has been a rapid rise in electronic cigarette (e-cig) use among youth. Studies have demonstrated that e-cig's can induce cell death, oxidative stress, oxidative damage, and altered metabolic activity. However, the specific components and mixtures in e-cig aerosols that cause these toxic effects are still unknown. Studies have pinpointed flavorings and metals as cytotoxic components. Ethyl maltol (EM), a flavoring, is found in approximately 50%-80% of e-liquids and has been demonstrated to facilitate metal uptake into cells. We investigated the toxicity of EM and metals from e-cigs in a mouse model. Mice (8-10 weeks old) were exposed to one of the following 5 conditions: room air, Propylene Glycol/Vegetable Glycerin (PG/VG), PG/VG+nicotine, PG/VG+ethyl maltol, and PG/VG+EM and nicotine (n=6 per exposure). Mice were exposed 5 hours a day, 5 times a week for 3 weeks in a whole-body exposure chamber using the popular Suorin air pod device. One day after the last exposure organs were harvested, airway function was assessed with a FlexiVent, the diffusion capacity of carbon monoxide was evaluated, and blood metal levels were determined. Aerosol from each condition was collected and analyzed for metals using ICP-MS. Increases in Pb and Cu blood metals were observed in exposed mice. Mice in the EM exposure group had increased compliance at baseline and increased total bronchial alveolar lavage cells. mRNA was extracted from lungs for real-time PCR of genes in the nuclear factor-erythroid factor 2-related factor 2 (Nrf2) antioxidant defense pathway. An increase in Nrf2 and glutathione-s-transferase mRNA was observed in EM and nicotine-exposed mice. Increases in nicotinamide adenine dinucleotide phosphate (NADPH) oxidase 1 mRNA levels were observed in EM exposed mice. Lastly, increases in glutathione peroxidase 2 and catalase were observed in mice exposed to nicotine only. These results indicate that e-cig aerosols with EM or nicotine can increase oxidative stress.

FUNDING: Federal; State

PP-149

ARSENIC SPECIATION OF MOD, POD, AND DISPOSABLE POD ELECTRONIC CIGARETTE AEROSOLS: A PILOT STUDY

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SIGNIFICANCE: The growing popularity of electronic cigarettes (e-cig) has raised questions about the health effects of e-cig use, or vaping. Previous studies have reported the potential of exposure to arsenic (As), and other metal(loid)s from vaping, but little is known about the speciation of As in the inhaled aerosols, an important determinant of toxicity. Inorganic As (iAs) species As^{III} and As^{V} are generally more hazardous than organic As species. METHODS: This study investigated As speciation in condensed e-cig aerosols of newer commercial products by high-performance liquid chromatography coupled to inductively-coupled plasma mass spectrometry. The analysis included samples from three types of e-cig devices: mods, reusable pods, and disposable pod devices. RESULTS: iAs species were identified in all 23 analyzed e-cig aerosol condensate samples, with higher levels measured in disposable pod devices on a mass basis (geometric mean 6.6 ± 1.8 (geometric standard deviation) ng/g, n=11) compared to in mods and reusable pods (4.7 ± 1.6 ng/g, n=12). Mod devices, which aerosolize greater mass per puff, contained higher iAs levels in the aerosol phase (0.8 ± 1.7 μg/m^3) compared to disposable (0.1 ± 2.8 μg/m^3) and reusable (0.2 ± 2.9 μg/m^3) pod devices. The maximum iAs concentration of 1.8 μg/m^3 observed in this study approaches the recommended exposure limit of 2 μg/m^3 for 15-min or shorter inhalation exposure set by the National Institute for Occupational Safety and Health. CONCLUSIONS: These

preliminary results suggest that iAs species are present in inhalable e-cig aerosols at levels approaching regulatory limits for iAs inhalation exposure and are abundant in the newest disposable pod devices.

FUNDING: Federal

PP-150

SEX AND AGE DEPENDENT EFFECTS OF NICOTINE VAPOUR EXPOSURE ON REWARD- AND WITHDRAWAL-LIKE BEHAVIOUR IN RATS

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Significance: Youth nicotine exposure is a continued concern due to the prominent use of electronic cigarettes and their largely unknown addiction liability, especially during vulnerable periods such as adolescence. Thus, the aim of the following research is to assess developmental differences in nicotine vapour-associated reward and withdrawal. **Methods:** Experiment 1 - adult and adolescent rats of both sexes (n = 5-7/group) were exposed to either nicotine (JUUL, 5% nicotine) or vehicle (30:70 propylene glycol to glycerol) vapour using the open-source vapour exposure apparatus, OpenVape, for 10 minutes at 4 doses (2, 4, 8 or 10 minutes of active vapour puffs). To evaluate the reward-like properties of nicotine, a biased place conditioning paradigm was implemented. Experiment 2 - adult and adolescent rats of both sexes (n = 7-8/group) were exposed to either JUUL or vehicle vapour for 10 minutes 3 times a day for 2 weeks. Locomotion was measured following the second exposure of the day on day 1, 7, 10, and 14. 16 hours following their final exposure, rats were injected with 1.5 mg/kg mecamylamine. Twenty minutes following injections, rats were scored for somatic signs of withdrawal for a period of 10 minutes. **Results:** Experiment 1 - Three-Way ANOVA revealed a significant effect of age ($F(1,109)=6.960$, $p=0.0096$) and dose ($F(4,109)=5.507$, $p=0.0004$), as well as significant dose by sex interaction ($F(4,109)=3.729$, $p=0.0070$). All but adolescent females showed significant increases in place preference for the nicotine-paired side, with adolescent males displaying significant increases at lower doses than adults. Experiment 2 - Three-Way ANOVA revealed a significant effect of treatment ($F(1,49)=10.601$, $p=0.002$) and sex ($F(1,49)=4.742$, $p=0.034$) on locomotion with males showing increased locomotion and females showing no effect. There was also a significant effect of treatment ($F(1,51)=15.99$, $p=0.0002$) and sex ($F(1,51)=15.91$, $p=0.002$) but not age ($F(1,51)=1.151$, $p=0.2880$) on somatic withdrawal, with only males showing significant precipitated nicotine withdrawal. Significant day x treatment interactions were observed on weight in adult female ($F(14,196) = 5.447$, $p=0.0001$) and adolescent male ($F(14,168) = 2.198$, $p=0.001$) rats, indicating less weight gain during nicotine vapour exposures. **Conclusions:** Our results show that the reward- and withdrawal-like effects as well as physiological effects of nicotine vapour are age and sex dependent.

FUNDING: Federal

PP-151

THE IMPACT OF THE REAL COST VAPING AND SMOKING ADS ACROSS TOBACCO PRODUCTS

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Introduction: Little research has examined spillover effects of tobacco communication campaigns, such as how anti-smoking ads affect vaping. **Methods**: Participants were a national sample of 623 US adolescents (ages 13-17) from a probability-based panel. In a between-subjects experiment, we randomly assigned adolescents to view one of four videos online: 1) a smoking prevention video ad from the Food and Drug Administration's (FDA) The Real Cost campaign, 2) a neutral control video about smoking, 3) a vaping prevention video ad from The Real Cost campaign, or 4) a neutral control video about vaping. We present effect sizes as Cohen's *d*, standardized mean differences, with 95% confidence intervals (CIs). **Results**: Exposure to The Real Cost vaping prevention ads led to more negative attitudes toward vaping compared with control (d=0.30, 95% CI: 0.07, 0.53), while exposure to The Real Cost smoking prevention ads did not affect smoking-related outcomes compared with control (p-values >0.05). Turning to spillover effects, exposure to The Real Cost smoking prevention ads led to less susceptibility to vaping (d =-0.34, 95% CI: -0.56, -0.12), more negative attitudes toward vaping (d=0.43, 95% CI: 0.20, 0.65) and higher perceived likelihood of harm from vaping (d=0.26, 95% CI: 0.04, 0.48), compared with control. Exposure to The Real Cost vaping prevention ads did not affect smoking-related outcomes compared with control (p-values >0.05). **Conclusions**: This experiment found evidence of beneficial spillover effects of smoking prevention ads on vaping outcomes and no detrimental effects of vaping prevention ads on smoking outcomes. This suggests that tobacco prevention campaigns may have positive effects that extend beyond the tobacco product targeted by the campaign.

FUNDING: Federal; FDA CTP

PP-152

PRESENCE OF REQUIRED HEALTH WARNING STATEMENTS ON ENDS ADVERTISEMENTS BEFORE AND AFTER THE AUGUST 10, 2018 ENFORCEMENT DATE

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Significance. Effective 08/10/2018, the FDA requires electronic nicotine delivery system (ENDS) advertisements to state: "WARNING: This product contains nicotine. Nicotine is an addictive chemical." Although warning statements may effectively communicate ENDS health risks, limited data exist on their presence in ENDS advertising. **Methods.** We acquired ENDS advertisements that ran six-months before (02/10/2018-08/09/2018)) and six-months after (08/10/2018-02/09/2019) the effective date. The sample included static (i.e., print, online/mobile, social media, and outdoor ads without video or animated graphics; n=166 before; n=198 after), video (n=16 before; n=50 after), and radio ads (n=9 before; n=21 after). Ads were coded for presence of verbatim FDA warning. Static and video ads containing the warning were coded for required formatting: warning located at top of ad; black/white warning text and border; warning text written in same direction as ad text. We reviewed radio ads for time-point (beginning/middle/end) and relative speed (slower/same/faster) at which warning was read. **Results.** Overall, of the acquired ENDS advertisements 28% of static (n=46/166), 62% of video (n=10/16), and 67% of radio ads (n=6/9) that ran before the effective date contained the verbatim warning versus 84% (n=167/198, p<0.001), 94% (n=47/50, p=0.005), and 86% (n=18/21, p=0.329) of ads that ran after, respectively. Following the effective date, nearly all static ads placed the warning as required at the top of the ad (76% (n=35/46) before vs. 97% (n=162/167) after, p<0.001), and most video ads featured the warning statement for the entire ad duration (0% (n=0/10) before vs. 60% (n=28/47) after, p<0.001). All radio ads (n=18/18) with warnings that ran after the effective date read the warning at the end of the ad; 50% (n=9/18) were read at a faster speed than the product promotion. **Discussion.** Based on the acquired ENDS advertisements, presence of required ENDS ad warnings increased after 8/10/2018, but some ads were missing the required warning. Results may inform FDA's surveillance efforts on required warning statements.

FUNDING: FDA CTP

PP-153

ELECTRONIC NICOTINE DELIVERY SYSTEM (ENDS) ADVERTISEMENT PLACEMENT IN RADIO AND TV OUTLETS BY AUDIENCE DEMOGRAPHICS, 2019-2020

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Significance. ENDS advertising can introduce consumers to product features, like flavors, and may contribute to different use rates by age, gender, and race, and ethnicity. This study examined disparities in flavored ENDS promotion on radio and TV by audience demographics. **Methods.** We acquired 463 unique ENDS ads that ran on US radio stations (n=438 ads; n=431,607 occurrences across 562 radio stations) and cable TV (n=25 ads; n=23,392 occurrences across 648 TV shows) from 2019-20. Ads were double-coded for presence of flavored ENDS content. We merged coded data with Nielson Media audience demographic estimates for 2019 and 2020. Data were matched at the occurrence level for each radio station or TV show by year and included the proportion of audience by age (6-17 (radio)/2-17 (TV); 18-34; 35+), gender (male; female), and race/ethnicity (Black; Latino; all Other race/ethnic groups). We ran separate multilevel logistic regressions to estimate the odds of flavored ENDS content. Each model included a single demographic predictor (e.g., % male TV show viewers) plus year as a covariate and accounted for clustering by radio genre (e.g., Rock) or TV channel (e.g., A&E). All demographics were scaled by 10%. **Results.** Among radio

ads, an increase in the proportion of each listener demographic group significantly predicted flavored ENDS content [odds ratio range: 1.02-1.17, all p<0.001]. Notably, there were 1.27 [95%CI:1.23-1.31], 1.16 [95%CI:1.14-1.18], and 1.13 [95%CI:1.13-1.15] greater odds of flavored ENDS content for every 10% increase in the proportion of 6-17 year old, female, or Latino radio station listeners, respectively. Among TV ads, there were 1.99 [95%CI:1.49-2.66] and 1.28 [95CI:1.18-1.37] greater odds of flavored ENDS content for every 10% increase in 2-17 year old and female TV show viewers, respectively. There were no significant differences in flavored ENDS content by viewer race/ethnicity. **Discussion.** Based on the acquired ENDS ads, our study suggests differences in flavored content by audience demographics. We found that flavored ENDS ads on radio and TV may disproportionately target youth, women, and Latino groups.

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PP-154

COVID-19 VACCINE HESITANCY AMONG SMOKERS IN OHIO

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Background: Studies have shown that smokers are at increased risk of COVID-19 related symptoms, hospitalization, and death. Given the risks, smokers should be encouraged to get vaccinated. However, studies show that smokers, in general, tend to avoid vaccines. We examined trends in vaccine hesitancy among smokers and non-smokers in Ohio.**Methods:** The Ohio COVID-19 Survey (OCS) is a longitudinal survey that was launched in April 2020. Participants are adults aged 19 years and older recruited from the Ohio Medicaid Assessment Survey (OMAS), a biannual repeated cross-sectional survey aimed at measuring the health status of Ohioans. Since January 2021, the OCS asked participants whether they had received a COVID-19 vaccine. For those who had not, the survey asked whether they intended to get one. We coded participants with the responses 'not too likely' or 'not likely at all' as vaccine hesitant. We analyzed five waves of data from January 11, 2021 to October 3, 2021. The dependent variable of interest was vaccine hesitancy whereas smoking status (current/former/never smokers) was the independent variable. Smoking status was ascertained from the 2019 OMAS. We used survey-weighted logistic regression model controlling for age, gender, race/ethnicity, region, education status, and current employment. **Results:** We found that smokers, compared to never smokers, were significantly had higher odds of being vaccine hesitant. The odds ratio increased from 1.86 (95% CI: 1.21-2.87) from the end of February to mid-April with the highest odds ratio of 2.02 (95% CI: 1.27-3.21) observed in mid-April to mid-June. The difference attenuated in mid-June to mid-August (OR: 1.79; 95% CI: 1.15-2.78) and mid-August to mid-October (OR: 1.27; 95% CI: 0.89-2.24). **Conclusion:** Our findings suggest that smokers tend to be more vaccine hesitant. The increasing and decreasing trend in vaccine hesitancy comparing smokers to non-smokers coincides with decreasing cases/hospitalizations/deaths and the surge of the delta variant in Ohio, respectively. The findings suggest that targeted interventions may be needed to encourage smokers to get vaccinated to prevent serious COVID-19 infection.

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PP-155

DOES IT COME FROM TOBACCO? YOUNG ADULT'S KNOWLEDGE ABOUT THE SOURCES OF NICOTINE IN CIGARETTES, E-CIGARETTES, SMOKELESS TOBACCO, AND NICOTINE POUCHES AND THEIR INTERPRETATION OF THE TERM TOBACCO-FREE NICOTINE

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Background. Electronic nicotine delivery systems (ENDS) historically contained tobacco-derived nicotine (TN), but tobacco-free (TFN) products containing synthetic nicotine now are available. In addition to bypassing FDA regulations on TN, TFN products may inaccurately decrease product risk perceptions. Education and regulatory efforts may be warranted.Effectively communicating messages about TFN may depend on the public's ability to differentiate TN from TFN. Before developing messaging, we must establish the public's level of knowledge about the source of nicotine in commonly used products and what they believe "Tobacco-Free Nicotine" means.Methods. In 2021 we surveyed 2464 young adults aged 18-25 years online. Participants reported whether cigarettes, ENDS, smokeless tobacco, and nicotine pouches contain nicotine that comes from tobacco (always, sometimes, never). Correct responses were "always" for cigarettes/smokeless and "sometimes" for ENDS/pouches. Participants also reported "what [they] think tobacco-free nicotine vapes contain" (nicotine only [no tobacco]; tobacco only [no nicotine]; nicotine and tobacco; neither nicotine nor tobacco). We ran descriptive statistics and chi-squares for correct responses for nicotine source and TFN product contents by current product use status (cigarettes, smokeless, ENDS, pouches). Results. Rates of correctly identifying nicotine source were modest (Range: 23.6% pouches - 61.9% cigarettes). Except smokeless tobacco, using a given substance was associated with identifying its nicotine source correctly (e.g., "cigarettes always contain nicotine from tobacco": 72.6% of cigarette users; 58.3% non-users). Participants reported that TFN means a product contains nicotine only (57.8%), tobacco only (10.8%), both (14.1%), or neither (17.1%). Product use was not associated with correctly identifying TFN contents. Conclusion. There is confusion about the source of nicotine in products even among users, and 42.2% of participants incorrectly interpreted TFN to mean something other than containing nicotine but no tobacco. Research on the implications of the label TFN should consider how misunderstanding of the term impacts results.

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PP-156

IDENTIFYING EFFECTIVE IMAGES FOR CIGAR WARNINGS

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Significance: Nearly 9 million adults in the US use cigar products that cause a variety of negative health effects, including multiple cancers. In this study, we sought to identify the most effective images to pair with our newly developed cigar warning statements. **Methods:** In September 2021, we conducted an online survey with US adults who used little cigars, cigarillos, or large cigars in the past 30 days (n=753). We developed eleven warning statements about health effects and chose three images to pair with each warning (internal harm, external harm, or both). Participants were randomized to view one image pairing from 5 of the 11 warnings. To identify the best images for each warning statement, we measured perceived message effectiveness (PME), visual verbal redundancy, and affect (range 1-5, higher is better) for each warning. **Results:** For each warning statement, either the internal representation of harm or both internal/external representation of harm were higher on PME than the external representation of harm. Results indicate that the highest rated warning statement and image pair as measured by PME and affect score was a warning about colon cancer with both internal and external harm depicted (mean of 4.37 and 4.22, respectively.) This warning was also highly rated per PME in key demographics including African Americans (mean 4.7) and ages 18-34 (mean 4.5). **Conclusions.** Images depicting the internal harm or both internal and external harm of smoking cigars were more effective in cigar warning labels. Insights from this study can inform regulators about the types of images to include in pictorial warnings for cigar products.

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PP-157

WERE COVID-19 MITIGATION MEASURES ASSOCIATED WITH INCREASED CIGARETTE PURCHASING, CONSUMPTION, AND SMOKING AT HOME AMONG US ADULT SMOKERS IN THE SPRING OF 2020?

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Significance: Evidence of the impact of COVID-19 and mandatory stay-at-home orders on cigarette smoking is mixed. In the United States (US), household tobacco purchases increased in early 2020, but it is unclear whether smokers increased daily consumption or whether they might have been stockpiling cigarettes. No longitudinal studies have compared population-level differences in cigarette smoking and purchasing behaviors

during the initial outbreak of COVID-19 against an earlier, but comparable, calendar period. **Methods:** Using longitudinal data from the US arm of the International Tobacco Control Four Country Smoking and Vaping Survey (n=3046), this study tested whether (1) carton purchases of cigarettes increased in early 2020 relative to the same calendar period in 2018, (2) more smokers permitted smoking inside their homes, and (3) smokers increased the number of cigarettes they smoked per day. In each year, respondents were classified into three calendar periods according to survey interview date: (1) before March 19, (2) March 19-April 23 (when 36 states had stay-at-home orders in effect in 2020), and (3) after April 23. Weighted multivariable logistic regression tested whether trends in carton purchasing and smoke-free homes differed in 2020 compared to 2018 while weighted multivariable linear regression tested whether trends in cigarette consumption differed in 2020 compared to 2018. Regression models were fit using generalized estimating equations to estimate average marginal effects (i.e., adjusted percentages and means). **Results:** Overall, 24.0% of US smokers last purchased cigarettes by the carton in early 2018; this increased to 28.8% in early 2020 (p=0.007). Average daily cigarette consumption and the percentage of smokers reporting that smoking was not allowed inside their homes did not differ significantly between 2018 and 2020 (p=0.92 and p=0.054, respectively). **Conclusions:** Results suggest that COVID-19 mitigation measures implemented in the spring of 2020 may have influenced cigarette purchasing behaviors of US adult smokers but had little impact on their smoking behaviors and were not associated with rules banning smoking inside their homes.

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PP-158

DOES CORRECTIVE COHERENCE INCREASE MESSAGE EFFICACY TO CORRECT THE MISPERCEPTION THAT NICOTINE CAUSES CANCER?

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Introduction: Many smokers incorrectly believe that nicotine causes cancer, which may create barriers to switching to noncombustible products. In many cases, the presentation of corrected information is not enough to counter the influence of misinformation, a phenomenon known as the Continued Influence Effect (CIE). Existing evidence on the CIE suggests that a coherent corrective that provides 1. a causal explanation for why the corrected information is accurate and 2. an explanation for why or how the misperception came to be believed, can help to mitigate the CIE. Methods: A 2x2 factorial experiment was conducted on Amazon Mechanical Turk to test the effects of these two components of corrective coherence. Established smokers who believed nicotine causes cancer were randomized to see one of four message conditions. Paired t-tests tested differences in the belief that nicotine causes cancer and consideration of switching pre vs post message exposure for all conditions. ANCOVAs were employed to test difference by condition for these outcomes. Logistic regression was used to assess if accuracy of relative risk perceptions comparing e-cigarettes, smokeless tobacco, NRT, and cigarillos to cigarettes differed by message condition. Results: Message exposure significantly reduced belief in the misperception that nicotine causes cancer (p<.0001). Participants also reported significantly increased consideration of switching to a noncombustible product after message exposure (p<.0001). These outcomes did not differ significantly by message condition. No condition significantly improved the efficacy of messages to increase accuracy of relative risk perceptions about e-cigarettes, smokeless tobacco, NRT, or cigarillos beyond the control condition. Conclusions: Messaging that nicotine does not cause cancer can significantly reduce belief in this misperception and may increase consideration of switching to a noncombustible. It is not clear that coherent correctives increase the efficacy of corrective messaging, but larger studies should test these effects.

FUNDING: Academic Institution

PP-159

ASSOCIATIONS BETWEEN BASELINE BIOMARKERS OF NICOTINE/TOBACCO EXPOSURE AND FOLLOW-UP RESPIRATORY SYMPTOMS AMONG CIGARETTE SMOKERS IN THE US: FINDINGS FROM THE PATH STUDY WAVES 1-4 (2013-2017)

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Significance: In general, cigarette smokers are at higher risk for respiratory disease compared to non-smokers. Determining if certain tobacco-related biomarkers are associated with respiratory disease onset is an important public health tool that can be used to evaluate the potential harm of different tobacco products. Disease onset can take years or decades to develop; therefore, exploring the association between biomarkers and respiratory symptoms could provide an important intermediate measure. **Methods:** Adult data were selected from Waves 1-4 (2013-2017) of the Population Assessment of Tobacco and Health Study. Data from current exclusive cigarette smokers (N=3,809) were stacked to examine associations between baseline and follow-up within wave pairs (W1-W2, W2-W3, W3-W4). Weighted generalized estimating equation models were used to evaluate associations between urinary biomarkers of nicotine/tobacco exposure (BOE: TNE2, NNAL, NNN, CEMA, CYMA, cadmium, and lead) at baseline and respiratory symptom(s) (wheezing/whistling in the chest, wheezing during exercise, and/or dry cough in the past 12 months) at follow-up. Covariates included baseline age, sex, race/ethnicity, education, secondhand smoke exposure, marijuana use, diagnosed respiratory disease, and pack-years.**Results:** Among exclusive cigarette smokers, higher cadmium (aOR=1.40, 95% CI=1.10, 1.77) and acrolein metabolite (CEMA; aOR=1.39, 95% CI =1.02, 1.88) levels at baseline were associated with increased odds of respiratory symptoms at follow-up. When stratifying by daily/nondaily smoking status, only higher baseline cadmium levels were associated with increased odds of respiratory symptoms at follow-up for daily smokers (aOR=1.41, 95% CI=1.08, 1.85). There were no significant associations between baseline BOE and follow-up respiratory symptoms for nondaily smokers.**Conclusions:** Cadmium and acrolein are identified as respiratory toxicants on FDA's list of harmful or potentially harmful constituents in tobacco products. Their association with respiratory symptoms among exclusive cigarette smokers warrants further study and may have implications for evaluating the potential health harm of tobacco products.

FUNDING: Federal; Academic Institution; FDA CTP

PP-160

20-YEAR TRENDS IN TOBACCO CONSUMPTION IN AMERICA: EXAMINATION OF SELF-REPORTED AND SALES DATA DURING 2000-2020

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SIGNIFICANCE: In the past two decades, key tobacco control policies have been passed and several new/modified products have been introduced into the US marketplace. We examined US trends in tobacco use over the past 20 years using sales and self-reported data. **METHODS:** Taxable removals (sales) of cigarettes, cigars, roll-your-own tobacco (RYO), and pipes were obtained from regulatory filings by tobacco companies. Self-reported past 30-day tobacco use was assessed from The National Survey on Drug Use and Health for adults ≥18 years. Sales were standardized to cigarette packs and cigarette pack equivalents (CPEs), and trends were measured using Joinpoint regression. **RESULTS**: During 2000 to 2019/2020, declines occurred in per capita sales of cigarettes (101.01 to 42.29 packs per capita), little cigars (0.54 to 0.03 CPEs per capita), RYO (1.34 to 0.21 CPEs per capita), chewing tobacco (7.46 to 1.96 CPEs per capita), and scotch/dry snuff (0.55 to 0.10 CPEs per capita) (all p<0.05). Conversely, sales increased for pipe tobacco (0.81 to 3.62 CPEs per capita), moist snuff (9.80 to 14.17 CPEs per capita), and snus for the period captured during 2008-2019 (0.02 to 0.23 CPEs per capita) (all p<0.05). Large cigar sales did not change significantly. Consistent trends were seen with self-reported use, except for RYO smoking (decreased sales but increased prevalence), and pipe smoking (increased sales, but trivial use prevalence <1% throughout). Aggregate self-reported current use remained unchanged over the study period. **CONCLUSIONS**: During the past 20 years, there were upward trends in self-reported use of certain tobacco products (e.g., RYO), downward trends in others

(e.g., cigarettes and cigars), and no change for some (e.g., pipe tobacco). Harmonizing tax/regulatory structure within and across the diversity of tobacco products may help reduce US aggregate tobacco consumption. **Funding statement:** No external funding.

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PP-161

YOUTH SUSCEPTIBILITY TO TOBACCO-FREE ORAL NICOTINE PRODUCTS IN COMPARISON TO CIGARETTES AND E-CIGARETTES

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Significance: Tobacco-free oral nicotine products are easy to use, discreet, and flavored. It is unclear whether these products primarily appeal to youth already susceptible to inhalable nicotine products, or whether they may entice youth who would not otherwise use nicotine. This study examined susceptibility to inhalable and oral nicotine product use in a youth cohort. **Methods:** Ninth- and tenth-grade students from Southern California completed an online survey in Fall 2021 assessing susceptibility to inhalable (i.e., cigarettes, e-cigarettes) and oral (e.g., pouches, gum, gummies) nicotine products among youth with no history of any nicotine product use. Multinomial logistic regression analyses evaluated whether likelihood of susceptibility to inhalable products, oral products, or both products differed across sociodemographic groups. **Results:** The analytic sample (N=3,130) was 46.5% female and 44.9% Hispanic. Most participants (73.3%) were not susceptible to inhalable or oral nicotine product use; 12.7% were susceptible to both, 11.1% to inhalable products only, and 2.9% to oral products only. Compared to males, females (inhalable products: OR=1.62; 95% CI: [1.27,2.07]; both products: OR=1.55[1.24,1.95]) and youth of other genders (inhalable: OR=2.73[1.85,4.04]; both: OR=2.31[1.57,3.39]) were more likely to be susceptible to inhalable products and to both oral and inhalable products. Compared to Asian youth, Hispanic youth were more likely to be susceptible to inhalable only (OR=1.51[1.16,1.97]) and to both products (OR=1.55[1.21,1.98]). Lower-socioeconomic status (SES) youth (inhalable: OR=1.75[1.33,2.31]; both: OR=1.53[1.17,2.01]; oral: OR=1.96[1.20,3.18]) and sexual minority youth (inhalable: OR=2.08[1.61,2.69]; both: OR=2.35[1.85,2.98]; oral: OR=2.25[1.43,3.53]) were more likely to be susceptible to oral products, inhalable products, and both products, compared to higher-SES and heterosexual youth. **Conclusions:** Youth nicotine never-users reported susceptibility to oral nicotine product use, with disparities evident by SES and sexual identity. Oral nicotine products may attract some youth who would not otherwise use nicotine, including youth from vulnerable populations.

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PP-162

ESTIMATING THE IMPACT OF COVID-19 ON CHANGES IN TOBACCO CONSUMPTION IN THE UNITED STATES

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SIGNIFICANCE: As part of COVID-19 risk mitigation strategies, many US states implemented lockdowns at various points which restricted movements, including to tobacco points of sale. The restrictions, together with the shock of COVID-19, the economic fallout from job losses, and the psychosocial stress may have contributed to smoking as a coping mechanism. We, therefore, examined the potential impact of COVID-19 on changes in trends in tobacco consumption. **METHODS:** We analyzed monthly sales data for selected tobacco products obtained from the U.S Department of the Treasury during June 2018-June 2021. Interrupted time series were used to measure associations of the COVID-19 "shock" (taken as June 2020 or 6 months after the first US case) and volume sales. Negative binomial regression was used to evaluate associations between volume sales and changes in community mobility. **RESULTS**: Within interrupted time series analysis, the shock of the COVID-19 reality was associated with an initial increase in the number of little cigars consumed by 18.31 million sticks and a subsequent increase of 1.41 million sticks per month (all p<0.001). The COVID-19 shock also resulted in an initial increase in sales of large cigars, to the amount of 53.90 million sticks; subsequent increase in monthly large cigar sales attributable to the COVID-19 shock was however not statistically significant (p=0.633). Every 10% reduction in mobility to retail stores was significantly associated with reduced sales of cigarettes (IRR = 0.92, 95% CI, 0.88 to 0.98), little cigars (IRR = 0.84, 95% CI, 0.71 to 0.98), and large cigars (IRR = 0.92, 95% CI, 0.88 to 0.96). **CONCLUSION**: COVID-19 was associated with increased volume sales for cigars and there was a significant association between reduced mobility to points of sale and tobacco volume sales. COVID-19 has stalled tobacco control progress; intensified efforts are needed to meet national targets to reduce tobacco use. **Funding statement:** No external funding.

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PP-163

ADDICTIVE AND CARCINOGENIC POTENTIAL OF SMOKELESS TOBACCO PRODUCTS MARKETED IN MUMBAI, INDIA

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Background: Smokeless tobacco (SLT) products marketed in India are highly diverse in their formulations. This diversity, along with the mostly unregulated manufacturing, including cottage- and vendor-preparation practices, result in high variations in SLT chemical composition across product types. This study aimed to better characterise the variability of nicotine and tobacco-specific N-nitrosamine (TSNA) levels across and within several product types marketed in Mumbai. **Methods**: Multiple samples of products representing 8 popular varieties/types of manufactured SLT products were purchased from 5 different local markets in Mumbai using previously developed standardized protocols. Product pH, moisture content, total and unprotonated nicotine, and TSNA levels were measured at the Advanced Centre for Treatment, Research and Education in Cancer (ACTREC) in Mumbai, using methods that were transferred from an established U.S. tobacco testing laboratory, after a cross-laboratory validation. Reference SLT products CRP1 and CRP2 were used as quality controls. **Results**: A total 321 SLT product samples were analysed. This included multiple replicates of 15 popular brands of chewing tobacco, 3 brands of khaini, 12 brands of dry snuff, 2 brands of creamy snuff, 17 brands of paan masala with tobacco, 7 brands of gutkha, 3 brands of gul and 1 brand of mishri. Total nicotine content in all products ranged from 0.4 to 38.5 mg/g dry weight. Product pH ranged from 4.9 to 12.8. Low pH values were found in chewing tobacco products that are intended to be used with slaked lime, whereas other manufactured products mostly alkaline pH. Unprotonated nicotine contributed to 0.1 to 100% of total nicotine. The levels of the carcinogenic TSNA NNN, NNK and NNAL varied from 0.06 to 115.0 ug/g dry weight, 0.03 to 29.1 ug/g dry weight and 0.01 to 10.0 ug/g dry weight, respectively. In addition, substantial variations in the levels of the measured constituents were observed across various brands of the same product type, as well as across samples of the same brand purchased at different markets. **Conclusions:** This is the first within-country study on inter-and intra-product variability in chemical composition of SLT products marketed in India. The high variability of the addictive and carcinogenic potential of products analysed in this study emphasizes the critical need for systematic surveillance of Indian SLT products and implementing effective tobacco control policies. **Funding**: NIH Grant R01-TW010651

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PP-164

AN INSTANT MESSAGING-BASED SMOKING CESSATION INTERVENTION FOR SMOKERS IN WORKPLACES IN HONG KONG: A PRELIMINARY ANALYSIS OF A RANDOMIZED CONTROLLED TRIAL

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Significance: Instant messaging apps (IM apps, e.g., WhatsApp) are increasingly used to deliver smoking cessation (SC) intervention. We assessed the effectiveness of an IM-based SC intervention on smoking abstinence in smoking employees. **Methods:** In this two-arm, individually randomized controlled trial, we recruited smoking employees

(≥1 cigarette daily) aged 18 years or older from companies of various industries in Hong Kong (ClinicalTrials.gov: NCT03870906). At baseline, all participants joined a 1-hour occupational-specific health talk delivered by registered social workers or nurses, which consisted of occupational specific hazards of smoking and benefits of quitting. All participants received a self-help SC booklet. The intervention group received 12-week personalized IM-based support including regular tailored SC messages and real-time chatting through IM apps. Those who remained smoked at 12-week post-treatment initiation were encouraged to join an additional 1-month IM group consisted of ≥5 participants and moderated by an experienced SC counsellor. Participants chatted and supported each other on quitting in the IM group. The control group received text messages of similar intensity on general health and follow-up reminders. All participants were followed at 1-week, 1-, 3-, 6-, 9-, and 12-month. The primary outcome was the self-reported 7-day point prevalence abstinence (PPA) at 6-month. Secondary outcomes included 7-day PPA at 9- and 12-month, biochemically validated abstinence, smoking reduction at 6-, 9-, and 12-month. Intention to treat analysis and complete case analysis have been used. **Results:** 558 participants (90.7% male) were randomly assigned to the intervention (n=280) and control (n=278) groups during March 2019-December 2020. The self-reported 7-day PPA and smoking reduction rate at 6-month follow-up were similar between the intervention and control groups (18.0% vs. 18.4%; P=0.80 and 18.6% vs. 19.8%; P=0.79, respectively). The results were similar for 7-day PPA and smoking reduction between two groups in complete case analyses. **Conclusion:** The IM-based SC intervention has similar effect with text messaging on abstinence in smoking employees.

FUNDING: Other: Tobacco and Alcohol Control Office, Department of Health, HKSAR

PP-165

YOUNG ADULTS' VAPING RISK PERCEPTIONS AND VAPING SUSCEPTIBILITY IN RESPONSE TO EVALI INSTAGRAM POST

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Significance. Inhaling aerosolized nicotine and cannabis (i.e., "vaping") is prevalent among young adults. Vaping products are often promoted by Instagram influencers. However, Instagram posts discouraging vaping received national media attention during the 2019 outbreak of e-cigarette or vaping-associated lung injury (EVALI). This experiment tested the impact of viewing Instagram posts about EVALI, which varied in image and text valence, on young adults' perceived harmfulness of and susceptibility to vaping. **Methods.** Participants (*N*=1229) ages 18-25 (*M*=21.40, *SD*=2.22) were recruited through Qualtrics Research Services, oversampling participants reporting ever vaping (50.3%). Participants were randomly assigned to view Instagram posts from young people portraying their experiences of EVALI in a 2 (image valence: positive or negative) X 2 (text valence: positive or negative) between-subjects design. Positive images were attractive, aesthetically pleasing selfies. Positive text was supportive and uplifting. Negative images and text were graphic and fear-inducing. After viewing three posts, participants reported perceived harmfulness of and susceptibility to vaping nicotine and cannabis. Ordinal logistic regression models assessed the main effects and interactions of image and text valence on perceived harmfulness of and susceptibility to vaping nicotine and cannabis, adjusting for age, sex, ever vaping nicotine, and ever vaping cannabis. **Results.** Participants who viewed negative images (OR = .85, CI [.76, .94]) were more likely to agree that "young people are at risk of respiratory problems due to e-cigarettes and vaping." Participants who viewed positive images (OR = 1.16, CI [1.03, 1.32]) were more susceptible to vaping nicotine. There were no significant main effects of text valence and no significant image and text valence interactions (*p*-values>.05). **Conclusion.** Regardless of the post's text, Instagram posts about EVALI that employ positive imagery may encourage young adults to vape, while negative imagery may better convey the harms of vaping. FUNDING: Federal; Academic Institution

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PP-166

ADOLESCENT SUSCEPTIBILITY TO USING DIFFERENT FLAVORED COMMERCIAL NICOTINE GUM, LOZENGE, AND GUMMY PRODUCTS

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Singifcance: Tobacco-free oral nicotine products (i.e., pouches, gum, lozenges, and gummies) come in non-tobacco flavors that may appeal to youth. This study randomized exposure to oral nicotine products in either fruit or mint flavor to assess interest, if flavors influence adolescents' willingness to try, and whether certain youth may be more vulnerable to trying these products. **Methods:** Youth (N = 3,496) in 9th or 10th grade from 11 high schools in Southern California were surveyed in Fall 2021 about ever- and past 6-month use of oral nicotine products, other tobacco products (e.g., e-cigarettes), willingness to try oral nicotine products (i.e.,dichotomous outcome (never vs. most likely not - absolutely), and sociodemographics. Multivariable logistic random effect-repeated measures regression modeling examined associations of product type, flavor, sociodemographics, and other covariates with prevalence of willingness to try. **Results:** Over 1,300 adolescents participated in the experimental paradigm. Compared to traditional smokeless tobacco (Willingness prevalence=17.8%; Adjusted odd ratios [aORs]=1.25-1.84; p-values<.001), adolescents reported significantly higher willingness to try oral nicotine products (gum, 28.2%; pouches, 21.1%; lozenge, 22.4%; gummies, 24.1%). Mint flavor (23.3%), compared to fruit flavor (21.4%), was preferred across all product categories. Adolescents who were younger (9th 24.2% vs. 10th grade; 21.4%), Hispanic (26.2%; vs. Asian[20.7%] or another race/ethnicity[21.9%]), struggling or in poverty (32.4% vs. not in poverty[22.5%]), and sexual /gender minority groups vs. heterosexual (35.7% vs. 19.7%) and cisgender (33.8% vs. 18.8-24.8%) groups were more willing to try these products. After adjusting for all covariates simultaneously, mint flavor significantly increased odds of use willingness compared to fruit flavor by 15% (aOR[95%CI]=1.15[1.05, 1.26], p=.004). **Conclusions:** Adolescents may be at greater risk to try new tobacco-free oral nicotine products compared to traditional smokeless tobacco. Across the spectrum of traditional and novel flavored oral nicotine products, there are concerns regarding socioeconomic, ethnic, sexual, and gender disparities in youth use.

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PP-167

ANALYSIS OF VAPING PRODUCTS FOR NICOTINE ISOMERS AND MINOR TOBACCO ALKALOIDS AS POTENTIAL INDICATORS OF SYNTHETIC NICOTINE

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Significance: Increasing sales of vaping products claiming to contain synthetic or tobacco-free nicotine has been reported. Nicotine is a major tobacco alkaloid that exists in the tobacco plant predominantly in the S-isomer form. Minor tobacco alkaloids (MTAs), including nornicotine, myosmine, anatabine, and anabasine, can also be extracted from the tobacco plant during nicotine extraction processes. Identification of isomeric forms of nicotine and traces of MTAs in vaping products could indicate whether nicotine was derived from tobacco or was chemically synthesized. **Methods**: Commercially available refill solutions and pods were obtained from local vaping stores. Half of the products claimed to contain tobacco-free or synthetic nicotine. Reference vaping solutions were also prepared using purified standards of R-, S-, and racemic (R,S-) nicotine as well as four MTAs. All vaping solutions were diluted with methanol and analyzed using chromatography methods with mass spectrometry (LC-MS/MS and GC/Q-TOF). **Results**: Similar ratios of R- and S- isomers of nicotine were observed in a reference solution with racemic (R,S-)nicotine and commercial products with synthetic or tobacco-free claims. By contrast, all products claiming to have tobacco-derived nicotine contained mainly S- and minimal levels of R-nicotine. Products with claims of tobacco-derived nicotine also contained all four MTAs, while products with claims of synthetic nicotine contained detectable levels of myosmine only. Reference solutions of synthetic R-, S-, and R,S- nicotine contained traces of nornicotine and myosmine, but did not contain any anatabine or anabasine. Finally, we identified two commercial products labeled as containing tobacco-free nicotine with a presence of S-nicotine only and high concentration of all MTAs, suggesting that those products actually contained tobacco-derived nicotine. **Conclusions**: Analysis of nicotine isomeric ratio and MTAs has the potential to be used as complementary methods to confirm presence of tobacco-derived vs. synthetic nicotine in vaping products. Further evaluation is needed to understand the combined sensitivity and specificity of these two assays.

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PP-168

ANALYSIS AND DIFFERENTIATION OF TOBACCO-DERIVED AND SYNTHETIC NICOTINE PRODUCTS: ADDRESSING AN URGENT REGULATORY ISSUE

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Significance:There is significant regulatory and economic need to distinguish analytically between tobacco-derived nicotine (TDN) and synthetic nicotine (SyN) in commercial products. Currently, commercial e-liquid and oral pouch products are available that contain tobacco-free nicotine, which could be either extracted from tobacco or synthesized. While tobacco products that contain TDN are regulated by FDA Center for Tobacco Products, those with SyN are currently not in the domain of any regulatory authority. This regulatory difference provides an economic incentive to use or claim the use of SyN to remain on the market without submitting a Premarket Tobacco Product Application. Methods and Results:TDN is ~99.3% (*S*)-nicotine. SyN can vary from racemic (50/50 (*R*)/(*S*)) to ≥ 99% (*S*)-nicotine, i.e., chemically identical to the tobacco-derived compound. Here we report efforts to distinguish between TDN and SyN in various samples by characterizing impurities, (*R*)/(*S*)-nicotine enantiomer ratio, (*R*)/(*S*)-nornicotine enantiomer ratio, and carbon-14 (^{14}C) content. Only ^{14}C analysis accurately and precisely differentiated TDN (100% ^{14}C) from SyN (35-38% ^{14}C) in all samples tested. ^{14}C quantitation of nicotine samples by accelerator mass spectrometry is a reliable determinate of nicotine source and can be used to identify misbranded product labelled as containing SyN. Conclusions: This is the first report to distinguish natural, bio-based nicotine from synthetic, petroleum-based nicotine across a range of pure nicotine samples and commercial e-liquid products.

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RAPID SESSION 3: POSTER SESSION 1

PS1-16

RTMS DOSING FOR SMOKING CESSATION: PRE-COVID PRELIMINARY RESULTS

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Significance: High frequency Repetitive Transcranial Magnetic Stimulation (rTMS) is a promising treatment for smoking cessation, but the optimal dosing parameters for long-term cessation are unknown. While increasing intensity and duration might improve outcomes, this may also increase participant burden, negatively affecting outcomes. **Methods:** Preliminary results from an ongoing study aimed to determine optimal 20Hz rTMS (110% MT) dosing of the left dorsolateral prefrontal cortex for long-term smoking cessation are presented. We examined the effect sizes of two dosing parameters, duration (8, 12, or 16 days of stimulation) and intensity (900 or 1800 pulses per day) on delay discounting rate (the therapeutic target), latency to relapse, and 6-month abstinence rates among participants who received active rTMS (n=23) prior to the pandemic. We also examined research burden among participants who received active and sham rTMS (n=51) using the Perceived Research Burden Assessment (PeRBA). We hypothesized that greater rTMS duration and intensity will result in lower discounting rates and greater latency to relapse, abstinence rates, and research burden.**Results:** Increasing the duration of rTMS showed a large effect size ($100 magnitude: F=4.50, p=.035, η2=.429; $1000 magnitude F=5.66, p=.019, η2=.485). Increasing intensity showed a small effect size ($100 magnitude: F=0.83, p=.78, η^2=.007; $1000 magnitude F=5.66, p=..88, η^2=.002). Increasing duration from 8 to 12 and 16 days showed a medium and large effect size respectively for latency to relapse. The odds ratios suggest that increasing duration increased the odds of long-term abstinence 7-8 fold, and increasing intensity nearly doubled the odds of abstinence. Increasing duration and intensity had a medium and small effect size, respectively, on participant burden (F=.376, p=695,η^2=.059; F=.008,p=.930,η^2=.001). **Conclusions:** These preliminary findings show promise that greater duration and intensity of rTMS will result in improved long-term smoking cessation without undue burden on participants.

FUNDING: Federal

PS1-40

BIORELEVANT IN VITRO RELEASE TESTING OF ALTERNATIVE NICOTINE DELIVERY SYSTEMS (ANDS)

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According to the Food and Drug Administration, each day over 800 youth will try smokeless tobacco (ST) or oral nicotine products (ONPs). Therefore, it is important to fully characterize these products for potential exposure and toxicity, and facilitate the regulator policy decisions to promote public health. Characterization can be considered in two approaches, 1) characterizing the product itself, or 2) biomarkers of exposure. Alternative nicotine delivery systems (ANDs) come in many forms but oral nicotine products are gaining popularity among youth are as of yet, not regulated as closely as traditional smokeless tobacco or combustible tobacco products. These oral nicotine pouches are available in many flavors, and according to referenced Nielsen data on the truth initiative site, sales increased 470% for Zyn nicotine pouches over the first part of 2020. Therefore, potential exposure (i.e., nicotine release) from noncombustible tobacco products will facilitate regulatory decisions. In vitro dissolution, release and permeation testing is a common practice during drug product research and development. We integrated a previously optimized bidirectional apparatus to evaluate the release of nicotine from ONPs and compared to smokeless tobacco (ST). This novel in vitro device, the bidirectional transmucosal apparatus (BTA), was designed and fabricated to simulate the oral cavity and its physiological variables to evaluate ONPs and ST in a more realistic fashion. The BTA was evaluated with various ONPs and Camel Snus. A validation was performed using high performance liquid chromatographic (HPLC) method with photodiode array (PDA) detection to assess in vitro nicotine release and permeation (Linearity: 0.4 - 500 µg/mL). Further, future studies of the apparatus will include different BTA parameters for their impact on in vitro rate of nicotine permeation that can be employed for the optimization of an in vitro in vivo relationship (IVIVR) for ONPs such as media temperature, adipose tissue simulation, artificial saliva versus hanks balanced salt solution. A multifactorial experimental design integrating these parameters alongside flow rate variations will be tested. The application of the bidirectional transmucosal apparatus for other types of ONPs including other flavors will also be further investigated.

FUNDING: Federal; FDA CTP

PS1-94

EFFECT OF HARM PERCEPTION ON ENDS INITIATION AMONG US ADOLESCENTS AND YOUNG ADULTS: FINDINGS FROM THE POPULATION ASSESSMENT OF TOBACCO AND HEALTH (PATH) STUDY, 2013-2018

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Background: Electronic Nicotine Delivery Systems (ENDS) have become the most popular tobacco products among youth in the United States (US). This study aims to investigate how ENDS harm perception predicts ENDS initiation among never ENDS users. **Methods:** Data were from the youth and adult sample of the Population Assessment of Tobacco and Health (PATH) Study conducted from 2013-2018. Cox proportional hazards regression models were used to assess the relationship between harm perception and ENDS initiation among adolescents and young adults separately. Weighted adjusted hazard ratios (HRs) with 95% confidence intervals (CIs) were reported. **Results:** 17.1% of the 11,633 adolescents and 25.5% of the 5,089 young adults from baseline initiated ENDS use across four waves. Among adolescents, perceiving ENDS as less harmful than cigarettes (HR=2.69; 95%CI: 2.21-3.27) and ENDS as no or little harm (HR=2.78; 95%CI: 2.31-3.34) significantly increased risks of ENDS initiation. Young adults who perceived ENDS as less harmful than cigarettes were more likely to initiate ENDS (HR=2.04; 95%CI: 1.73-2.41). Additionally, adolescents and young adults who ever used any other tobacco products or substance were associated with an increased risk of ENDS initiation. **Conclusions:** Among a representative longitudinal cohort of adolescents and young adults who had never used ENDS, perceiving ENDS as a reduced or low-harm product significantly predicted ENDS initiation across four waves. These findings underscore the need for appropriate ENDS prevention projects such as risk communication interventions targeted to young people to help curb ENDS initiation and diminish ENDS use in the US.

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PS1-103

TOBACCO SMOKE IS A MAJOR SOURCE OF AROMATIC AMINE EXPOSURE IN US ADULTS: NHANES 2013-14

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Cigarette smoking increases risk of cancer and cardiovascular diseases, as well as premature death. Aromatic amines (AAs) are found in cigarette smoke and are well-established human bladder carcinogens. In this study, we measured the urinary levels of 1-aminonaphthalene (1AMN), 2-aminonaphthalene (2AMN), and 4-aminobiphenyl (4ABP) in adult exclusive cigarette smokers and adult nonusers of tobacco products among a nationally representative sample of the non-institutionalized U.S. population, National Health and Nutrition Examination Survey (NHANES) 2013-14 (a 1/3 sub-sample of adults aged 18+ years old). Exclusive cigarette users are participants who answered yes to smoking cigarettes in the past 5 days and no to smokeless tobacco products, and other combustible tobacco products such as cigars, hookah, e-cigarettes. Total urinary AAs were measured by isotope dilution Gas Chromatography-Triple Quad Mass Spectrometry. Sample-weighted geometric mean concentrations of AAs in adult exclusive cigarette smokers compared to adult nonusers of tobacco products were 30 times higher for 1AMN and 4-6 times higher for 2AMN and 4ABP. Tobacco smoke exposure analyses were performed using sample-weighted multiple linear regression models to control for age, sex, race, and urinary creatinine. Tobacco exposure status was categorized using serum cotinine among adult nonusers of tobacco products (SCOT ≤ 10 ng/mL) and reported cigarette smoked per day CPD (self-reported average number of CPD in the 5 days prior to NHANES physical exam) among exclusive cigarette users (SCOT > 10 ng/

mL). Sample-weighted regression models show total urinary 1AMN, 2AMN, and 4ABP increased proportionally with the number of cigarettes smoked per day ($p < 0.001$). We also investigated the relationship between AA levels and U.S. Department of Agriculture (USDA)dietary categories. Dietary intake was examined using the amounts participants reported for each USDA food group in the 24-hours recall period, midnight to midnight. Sample-weighted multiple linear regression models were fit to each of the three analytes to include demographic covariates, tobacco exposure status, as well as 24-hour dietary recall and fasting time as covariates. We observe no consistent significant association between USDA 24-hour recall dietary intake and all three AAs. To our knowledge, this is the first time exposure to AAs from cigarette smoking is characterized among the adult US population, and we confirmed significantly higher levels of 1AMN, 2AMN, and 4ABP in adult exclusive cigarette smokers.

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PS1-149

SELF-REPORT MEASURES OF ELECTRONIC CIGARETTE DEPENDENCE: COMPARISON OF PSYCHOMETRIC PROPERTIES

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Background: Several electronic cigarette (ECIG) dependence measures have been adapted from those designed for cigarette smoking, though few have been evaluated for their psychometric properties. This study examined the reliability and validity of four self-report dependence measures in never-smoking ECIG users. **Methods:** Participants (N=134) reported less than 100 cigarettes lifetime and regular use of a nicotine-containing ECIG [mean (SD) = 6.5 (.90) days/week for 2.5 (1.4) years]. Dependence measures were completed online: Diagnostic and Statistical Manual 5th Edition (DSM), Penn State Electronic Cigarette Dependence Index (PSECDI), Glover Nilsson Behavioral Questionnaire (GNBQ), and E-cigarette Dependence Scale (EDS-4). Dependence was qualified as low for EDS-4 [2.2 (.99)] and GNBQ [17.1 (8.5)], moderate for PSECDI [10.1 (4.4)], and moderate-high for DSM (24.6% moderate and 43.3% high). Pearson correlations and Cronbach's alpha were used to assess internal consistency, and concurrent and convergent validity. **Results:** The majority of inter-item correlations were significant for the PSECDI, GNBQ, and EDS-4 (mean *r's*=.32, .36, and .51, respectively), while less than half were significant for the DSM (mean *r*=.27). All but one item-total correlations were significant across measures [mean *r's*=.45 (DSM) to .79 (EDS-4)]. Internal consistency was highest for the EDS-4 (Cronbach's alpha=.88) followed by GNBQ (.75), PSECDI (.72), and DSM (.71). Significant correlations were observed for all measures and the number of vaping days/week (*r's*=.29 to .44, *p's*<.01); PSEDCI and EDS-4 scores and vaping years (*r's*=.28 and .23, respectively); and DSM scores and number of past quit attempts and initiation age (*r's*=.27 and -.25, respectively). Convergent validity was highest for comparisons between the EDS-4 and the GNBQ (*r*=.73) or the PSEDCI (*r*=.67), though all comparisons were significant (*r's*=.51 to .60, *p's*<.001). **Conclusions:** Psychometric properties were strongest for the EDS-4, though all measures demonstrated adequate reliability and validity. Importantly, measures differ slightly in terms of those aspects of dependence (e.g. physiological, behavioral, social) they reflect.

FUNDING: Academic Institution

PS1-152

MINING ANTI-TOBACCO CAMPAIGNS ON SOCIAL MEDIA THROUGH NATURAL LANGUAGE PROCESSING FOR EFFECTIVE CAMPAIGN DEVELOPMENT AND IMPLEMENTATION

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Background: Anti-tobacco campaigns on social media are important channels for tobacco use prevention and control. In the present study, we conducted content analysis of major anti-tobacco campaigns on Facebook and examined the factors that may influence effective anti-smoking information dissemination and users engagement. Methods: We collected 3,515 posts and 28,125 associated comments from seven large national and local anti-tobacco campaigns on Facebook between 2018 and 2021 including Behind the Haze VA, Campaign for Tobacco-Free Kids, Smoke Free US, The Real Cost, Tobacco Prevention Toolkit, Truth Initiative, and CDC Tobacco Free. Natural language processing methods were used for content analysis including parsimonious rule-based models for sentiment analysis. Multinominal logistic regression models were fitted to examine the relationship of anti-smoking message framing strategies and viewer responses and engagement. Results: Although posts from anti-smoking campaigns that were positively framed (sentiment scores > 0.05) were 35% more likely to receive positive comments than neutral posts (RRR = 1.35, 95% CI: 1.14 - 1.61, p < 0.01), posts that were more likely to receive positive comments on average had 15.31 (95% CI: -26.90 - -3.73, p < 0.05) fewer shares compared to posts that were more likely to receive neutral comments. On the other hand, we found that negative comments were more common (31.9 times more common than neutral comments, 95% CI 19.18 - 44.62, p < 0.01), where numbers of positive comments were similar to neutral comments (2.15; 95% CI -10.36 - 14.66). Posts framed negatively had 108.51 more shares compared to neutral posts (95% CI 19.73 - 197.30, p < 0.05). Compared to neutral-framed posts, negatively framed posts were 32% more likely to receive negative comments (RRR = 1.32, 95% CI: 1.13- 1.54, p < 0.01). Conclusion: Although positive posts tended to receive more positive comments, Facebook (now named META) users, in general, were more responsive to negative posts, leaving more negative comments. Framing strategies taking into account such negativity bias should be implemented in future campaign development.

PS1-158

SYMPTOM BURDEN, TOBACCO USE, AND QUIT INTENTIONS AMONG INDIVIDUALS WITH CANCER: AN ANALYSIS OF THE US FDA POPULATION ASSESSMENT OF TOBACCO AND HEALTH (PATH) STUDY

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Background: Understanding the relationship between symptom burden and smoking/vaping may inform tobacco treatment interventions tailored to the needs of individuals with cancer during and after treatment. **Methods:** Analyses used data from FDA PATH Wave 5, a representative survey of US adults. Chi-square, t-tests, and linear regression were used to compare symptom burden [fatigue, pain, sleep problems, emotional problems, quality of life (QOL)] between patients (diagnosed in past 12 months; N=605) and survivors (in remission; N=863) and to compare symptom burden by smoking status (current=478, former=496, never=394), vaping status (current=94, former/never=1374), quit attempts, level of interest in quitting, and intentions among patients/survivors. Fatigue, pain, emotional problems, and QOL were assessed with single item Likert scales, and past month sleep problems were dichotomized.**Results:** Compared to survivors, patients reported worse fatigue (mean difference (*MD*)=.34, *p*<.0001), pain (*MD*=.46, *p*=.02), emotional problems (*MD*=.22, *p*=.007), and perceived QOL (*MD*=.16, *p*=.01), but no difference in sleep problems. Among patients, current smokers reported worse pain (*MD*=1.56, *p*<.0001), emotional problems (*MD*=.63, *p*<.0001), and QOL (*MD*=.47, *p*=.0002) compared to former smokers, and worse fatigue (*MD*=.40, *p*=.0007), pain (*MD*=2.08, p<.0001), emotional problems (*MD*=.37, *p*=.03) and QOL (*MD*=.73, *p*<.0001) compared to never smokers. Currently vaping patients reported higher pain (*MD*=1.63, *p*=.003), more emotional problems (*MD*=.68, *p*=.03), and more sleep problems ($\chi^2(1)=5.35$, *p*=.02) compared to patients not currently vaping. Among patients/survivors, no facets of symptom burden were associated with quit attempts, interest, or intentions, but currently smoking survivors who made a quit attempt in the past year had higher pain (*MD*=.99, *p*=.04) and worse QOL (*MD*=.39, *p*=.04).**Conclusion:** Among cancer patients and survivors alike, current tobacco use is associated with significantly greater symptom burden. Despite this, cancer patients and survivors expressed interest and intentions to quit. Future research should examine the role of smoking cessation in improving symptom burden.

FUNDING: Unfunded

SRNT Notes

RAPID SESSION 4: POSTER SESSION 2

PS2-84

DETERMINANTS OF WEIGHT CONCERNS AMONG SMOKERS IN A PHYSICAL ACTIVITY (PA)-BASED CESSATION PROGRAM

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Significance: Concern about weight gain is a barrier to smoking cessation, but how it relates to PA behavior and perceptions is unclear. This has implications for targeting PA as a cessation strategy. Method: Baseline data were analyzed from a cessation trial of 392 adults who received nicotine patch and cessation counseling and were randomized to community-based PA or general wellness counseling. Outcomes were 1) use of smoking to control weight ("control"; continuous score) and 2) anticipating relapse if weight gain occurred ("relapse"; yes vs. no) using validated instruments. Exposures were self-reported PA and PA perceptions (self-efficacy, enjoyment of organized and unorganized PA, personal and environmental barriers). Covariates were treatment group and known determinants of post-cessation weight concerns including socio-demographics, smoking behavior, diet, and BMI. From bivariate models examining main and sex interaction effects, significant variables were entered into a generalized linear regression model or a logistic regression model to identify determinants most strongly associated with control and relapse, respectively. Results: Both control and relapse were significantly ($p<0.05$) associated with being female (standardized b= 0.52, SE=0.10), white (-0.12, 0.05), and less motivated to quit (-0.14, 0.05). Higher control scores also were associated with engaging in less moderate intensity physical activity (-0.10, 0.05) and higher BMI (0.21, 0.05). A significant interaction indicated that men with higher BMI anticipated relapsing if weight gain occurred, but no such association was found for women (OR=2.54, 95% CI= 1.42-4.56). No other PA behaviors or perceptions were associated with weight concerns. Conclusion: Smoking to control weight was associated with engaging in less moderate intensity PA, but was not associated with perceptions about PA. Anticipating relapse if weight gain occurred was not associated with PA behavior or perceptions. These results indicate that concerns about post-cessation weight gain are unlikely to influence engagement in PA in the context of a community-based smoking cessation program.

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PS2-143

REAL-TIME EXPOSURE TO ANTI-TOBACCO MESSAGING AMONG YOUNG ADULTS

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Objective: The tobacco industry has become increasingly adept at marketing targeted to young adults (YAs) that engage in high-risk activities (i.e., on social media), in high-risk locations (i.e., near a tobacco retail outlet), and in minority neighborhoods. Little is known about whether anti-tobacco marketing is reaching young people exposed to such messaging in environments at high risk for this pro-tobacco marketing. This study used ecological momentary assessment (EMA) to assess demographic and real-time correlates of exposure to anti-tobacco marketing among YAs. **Methods:** This study used EMA data to assess context (e.g., location and activity) of anti-tobacco marketing exposure using four mini-surveys per day over two weeks. YA non-current tobacco users living in Washington D.C. (n=145; ages 18-24) recorded 5,219 surveys, including 19 participants (13.1%) living in neighborhoods with high proportions of racial/ethnic minority residents, and high smoking rates. Adjusted multilevel regression models assessed the association between exposure to anti-tobacco marketing, demographics and real-time contextual variables. **Results:** A total of 61 respondents reported at least one exposure to anti-tobacco marketing, for 141 exposures over the EMA period. In adjusted analyses, odds of exposure were higher for those living in a minority neighborhood (aOR=4.3, all p's<.05), in the presence of someone using tobacco products (aOR=1.7), at work/school (aOR=2.3), outside/in transit (aOR=2.1) and online/social media (aOR=1.9) vs. home. There were no significant differences in anti-tobacco exposure by age, sex, race/ethnicity or education, or for other locations and activities (i.e., at a bar/restaurant, clubs, or in a retail store) vs. at home. **Conclusion:** Almost 43% of YA non-current tobacco users were exposed to anti-tobacco messaging in their daily lives. Findings suggest anti-tobacco marketing is reaching young adults in minority neighborhoods and during some high-risk activities like online. Yet improved targeting is needed to reach this population with messages to counter industry marketing when in high-risk environments such as at bars/restaurants and in retail stores.

FUNDING: Federal

RAPID SESSION 5: POSTER SESSION 3

PS3-140

A RANDOMIZED, CROSSOVER, CLINICAL STUDY TO ASSESS NICOTINE PHARMACOKINETICS AND SUBJECTIVE EFFECTS OF THE BIDI STICK ENDS COMPARED WITH COMBUSTIBLE CIGARETTES AND A COMPARATOR ENDS IN ADULT SMOKERS

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Background: Nicotine pharmacokinetic assessments of electronic nicotine delivery systems (ENDS) are crucial to understand their ability to provide an alternative to cigarette smoking. Subjective e!ects data also strongly contribute to this understanding. The BIDI® Stick is a disposable ENDS product which contains 6% nicotine benzoate salt and various flavours. **Methods:** In this study we assessed nicotine pharmacokinetics and subjective e!ects of BIDI® Stick ENDS in adult smokers, compared to cigarettes and a comparator ENDS product. During each of eight (8) study visits, volunteer smoker subjects randomly used one of either their usual brand (UB) of cigarette, a BIDI® Stick ENDS, or a comparator ENDS (JUUL 5% with Virginia Tobacco flavour), during both defined (10 pu!s, 30 seconds apart) and ad libitum pu"ng sessions. Blood samples were collected at various time points and subjective e!ects questionnaires were administered. **Results:** Plasma nicotine Cmax0-120 was not significantly di!erent between BIDI® Stick ENDS with any flavour (range 15.3 (9.90) ng/ml for BIDI® Stick Winter to 17.6 (9.00) ng/ml for BIDI® Stick Classic) and UB cigarettes [16.2 (9.17) ng/ml]. AUC0-120 and Tmax0-120 values were also not significantly di!erent between BIDI® Stick ENDS and UB cigarettes, while subjective e!ects measures were also similar between BIDI® Stick ENDS and UB cigarettes. **Conclusions:** BIDI® Stick ENDS delivered nicotine to users comparably to their UB combustible cigaretteand also elicited similar subjective e!ects such as satisfaction and relief. Thus, the BIDI® Stick ENDS may be a satisfying alternative to cigarettes among current smokers and may support their transitioning away from cigarette smoking.

FUNDING: E-cigarette/Alternative nicotine products Industry; E-cigarette Company

PS3-147

UTILIZATION AND RELIABILITY OF SMARTPHONE-ENABLED CARBON MONOXIDE DEVICES IN A REMOTE SMOKING CESSATION TRIAL

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Significance: Researchers have increasingly taken advantage of smartphones to collect data, particularly in studies conducted remotely. Unlike conventional clinical studies, many "remote" studies do not require participants to attend in-person visits. A critical challenge in conducting remote smoking studies is the biochemical verification of smoking and abstinence status. Smartphone-enabled mobile carbon monoxide (CO) devices have become available to address this issue. Laboratory research has indicated that these devices provide reliable CO measures for verifying smoking and abstinence status. However, little is known about the real-world utilization and reliability of mobile CO devices in a treatment study. **Methods:** To fill this gap, we examined mobile CO device data from an ongoing remote smoking cessation trial (NCT04604509). Each participant received a smartphone for counseling and completing questionnaires, a mobile CO device, and cessation medications. Participants were instructed to measure CO levels 3 times during the 12-week treatment but were allowed to take extra CO measures during this time. **Results:** Among the 219 participants included in this analysis, we found that on average, participants submitted almost 6 CO measures with over 190 participants submitting > 3 measures. Participants submitted about 3 times more measures during the day than during the night. Participants also showed interest in tracking their CO records: on average, participants viewed their CO records over 6 times. In terms of reliability, we found that participants' CO levels were significantly correlated with their self-reported cigarette consumptions (Pearson's r > 0.5). Moreover, with the assumption that self-reported consumptions were true values, using a cutoff of < 6 ppm as abstinent, the CO measures could differentiate abstinent status with desired specificity and sensitivity (both around 0.85). **Conclusion:** To conclude, participants in a remote smoking study were utilizing smartphone-enabled CO devices to a greater extent than required by the study protocol, and CO measures derived from the devices were reliable to identify smoking and abstinence status.

FUNDING: Federal; Academic Institution

PS3-155

CANNABIS PREVALENCE, MISUSE, AND PROBLEMS BY US STATE-LEVEL CANNABIS LEGALITY

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Significance: Cannabis use among young adults is at a record level. Many who use cannabis also use tobacco, a pattern linked with higher toxicant exposure, greater dependence, and worse cessation outcomes. As more US states make cannabis use legal, there is concern that cannabis use, misuse, and problems may increase. The present study investigates how cannabis use, misuse, and problems vary by US state cannabis legality.**Methods:** Young adults aged 18 to 25 years (N=1,039; mean age=20.9 years; 52.9% annual income < $35,000; 54.3% students) were surveyed from February 16 to May 1, 2021 through a Qualtrics panel. Recruitment focused on states where marijuana was fully legal (n=524) or fully illegal (n=515) for at least four years preceding data collection. Fully legal was defined as both medical and non-medical cannabis use permitted for adults 21 and over, while fully illegal was neither medical nor non-medical cannabis use permitted. Sampling was stratified by race/ethnicity (approximately one third of sample Hispanic, non-Hispanic Black, and non-Hispanic white) and gender (approximately half male and half female). Cannabis misuse was measured with the Cannabis Use Disorder Identification Test-Revised. Marijuana problems were measured with the Marijuana Problems Scale. **Results:** In legal states, current cannabis use was reported by 46.6% and in illegal states by 41%, X^2 (1,1,039)=3.8, p=.05. Cannabis misuse scores were 11.7 (*SD*=7.9) for those in legal states, and 12.6 (*SD*=7.0) for illegal states, t(504)=1.3, p=.2. The number of marijuana problems was 6.3 (*SD*=6.2) for those in legal states, and number of problems was 7.6 (*SD*=6.6) for those in illegal states, t(498)=2.3, p=.02. Severity of problems was 8.1 (*SD*=8.9) for those in legal states, and severity was 10.1 (*SD*=9.4) for those in illegal states, t(498)=2.1, p=.03.**Conclusion:** Cannabis use and misuse were comparable in states in which cannabis was legal compared to illegal, while cannabis problems and severity were lower in legal states. The state-level macro-environment legality of cannabis may contribute to greater problems associated with cannabis use, some of which are external (e.g., jobs, relationships).

FUNDING: Academic Institution

PS3-158

CIGARETTE SMOKING IN RESPONSE TO COVID-19: EXAMINING CO-MORBID MEDICAL CONDITIONS, COPING, AND RISK PERCEPTIONS

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Introduction: During the initial wave of the Coronavirus Disease 2019 (COVID-19) pandemic in the U.S., information was mixed about relative COVID-19 risks and potential benefits associated with cigarette smoking. Therefore, we sought to understand individual differences in the impact of COVID-19 on cigarette smoking in a sample of adults who reported recent use, with a particular focus on general strategies to cope with the pandemic and chronic medical conditions likely associated with increased COVID-19 risk. **Methods:** Participants completed an anonymous, online Qualtrics survey of these constructs as well as smoking behavior, demographic variables, and COVID-19 risk perceptions between July and August 2020 (N=287). These factors were examined using multivariable logistical regression models of smoking in response to the pandemic. Participants were recruited through paid advertisements on Facebook and Instagram. Separate ads targeted specific age groups to achieve similar numbers of each group: (1) ages 18-30; (2) ages 31-40; (3) ages 41-50: (4) ages 51-60; (5) ages ≥ 61 years of age. We ran ads longer for the last two categories to oversample older participants for whom medical co-morbidities are more common. **Results:** In models evaluating reduced smoking, greater COVID-19 risk perceptions was associated with higher odds of reducing (OR=1.30, 95%:1.05-1.61, p=.02) whereas using avoidant coping strategies was associated with lower odds (OR=.45, 95%:23-.91, p=.03). Conversely, having at least one co-morbid medical condition was related to higher odds of increased smoking (OR=1.91, 95%: 1.01-3.63, p=.048). **Conclusions:** Following the first wave of

the COVID-19 pandemic in the U.S., greater perceived risks from COVID-19 and the ability to cope more effectively with the unique challenges of the pandemic appeared to promote reductions in cigarette use for some. Though people with co-morbid medical conditions perceived greater COVID-19 risks, they were less likely to decrease their use. The results have important implications for tobacco cessation treatment and preventive healthcare during public health threats.

FUNDING: Federal

PS3-160

EPISODIC FUTURE THINKING AS AN INTERVENTION FOR DEPENDENT E-CIGARETTE USERS

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Significance: There has been an alarming increase in e-cigarette use and dependence among young people, many of whom would like to quit using e-cigarettes but are finding it difficult to do so. Impulsivity is associated with drug taking across many different types of drugs including nicotine. In prior research with cigarette smokers, cognitive interventions designed to reduce impulsivity, such as Episodic Future Thinking (EFT), have been shown to reduce cigarette demand and self-administration. The aim of the present study was to test if a brief EFT intervention decreases nicotine craving, impulsivity, and smoking choice among daily young adult e-cigarette users. Methods: Participants (N = 24; M = 21 years of age; ~50% female; M = 12 e-cig uses per day) attended three within-subjects experimental sessions administered via Zoom. After a baseline acclimation session, participants attended two experimental sessions in counterbalanced order: 1) EFT in which they pre-experienced and described positive future events and 2) A control intervention in which they described their experiences watching three short videos. Measures of craving, mood, and delay discounting across three commodities: money, e-cigarette products, and food were completed before and after the manipulations. Results: Within-subjects repeated measures ANOVAs revealed decreases in craving and mood in response to the manipulations, but no differences between EFT and control on any self-report measures. At the end of each session, participants also took part in a 40-minute vaping vs. money choice task. Approximately 30% of participants chose to smoke after the EFT condition compared to ~40% after the control condition. Conclusions: EFT may be an effective brief intervention for helping e-cigarette users increase their ability to abstain. Additional findings, methodological issues, and future directions will be discussed. Funding: American University CAS Graduate Research Fund Awards - Spring & Fall 2021

FUNDING: Academic Institution

RAPID SESSION 6: POSTER SESSION 5

PS5-2

CHEMICAL AND PHYSICAL CHARACTERIZATION OF TOBACCO AND FLAVORED E-LIQUIDS AND PILOT DATA ON THE RELATIONSHIP BETWEEN NICOTINE YIELD AND NICOTINE EXPOSURE

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Significance: This study characterized chemical and physical constituents of e-liquids and aerosol and investigated e-liquid flavor effects on aerosol 1) nicotine yield, 2) physical characteristics, and 3) carbonyl emissions. Additionally, we conducted a pilot analysis of the relationship between nicotine e-liquid concentration, aerosol nicotine yield, and nicotine exposure in humans. Methods: Physical and chemical analyses were conducted on 0% nicotine fruit (Mardi Gras) and 1.2% nicotine tobacco (Tobacco Row, Jamestown), fruit, and menthol (Arctic Blast) flavored e-liquids (70/30 propylene glycol/vegetable glycerin). Aerosol was generated using a machine-generated puffing regimen (55 mL puff volume, 2 sec puff duration, 30 sec puff frequency) with the same e-liquids and an electronic nicotine delivery system (ENDS; CUPTI, 35W; 0.5 Ω; KangerTech Technology Co., Ltd). Experienced ENDS users (i.e., used ENDS for at least 25 days of the past month and used ENDS for more than 3 months) completed four crossover visits; during each visit, participants completed prescribed (10 puff) and ad libitum ENDS use sessions. Blood draws were conducted to assess nicotine pharmacokinetics. Results: Arctic Blast 1.2% e-liquid had the highest pH while Mardi Gras 1.2% had the highest density. In machine-generated aerosol, nicotine yield and total particulate matter were highest in Tobacco Row 1.2%, and mass median aerodynamic diameter was smallest in Mardi Gras 0%. Aerosol formaldehyde concentrations were highest in Mardi Gras 1.2%, while acetaldehyde and acetone were highest in Tobacco Row 1.2%. Nicotine area under the curve following both prescribed and ad libitum use had positive correlations with machine-generated nicotine yield. Conclusions: Findings suggest that flavor affects chemical and physical characteristics of e-liquids and aerosol. Pilot data suggests a positive relationship between nicotine concentration in e-liquid, nicotine yield in aerosol, and nicotine exposure.

FUNDING: Federal

PS5-3

A TOBACCO FLAVORED E-LIQUID IS ASSOCIATED WITH LOWER NICOTINE EXPOSURE THAN A FRUIT AND MENTHOL FLAVORED E-LIQUID, BUT STILL ALLEVIATES WITHDRAWAL SYMPTOMS

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Introduction: E-liquids have been sold in several flavor categories, including tobacco, menthol, and fruit. While electronic nicotine delivery system (ENDS) users have identified flavor as an important criterion for selecting e-liquids, little is known about how flavor affects nicotine delivery and nicotine withdrawal symptoms. This clinical study assessed nicotine exposure and subjective withdrawal effects from *ad libitum* use of tobacco, menthol, and fruit flavored e-liquids. Methods: Forty-six (seven females) experienced ENDS users (ENDS use on ≥ 25 of the past 30 days) completed a four-day randomized crossover study where they used a refillable, variable power, ENDS set to 35 watts with 0% (fruit flavor) or 1.2% nicotine concentrations (fruit, tobacco, or menthol flavor). At each study visit, participants completed a 10-puff prescribed use session (data not described here), followed by 2 hours of abstinence and 1 hour of *ad libitum* use. Primary outcome measures included subjective ratings of product liking and withdrawal symptoms, measured immediately following *ad libitum use*, and plasma nicotine concentrations (i.e., C_{max} and $AUC_{0\text{-}120}$) measured immediately following and 1 hour after *ad libitum* use. Results: Following *ad libitum* use, participants rated liking the menthol and fruit flavors more than the tobacco flavor (*p*'s<0.001). On the Abstinence Symptom Suppression Rating scale participants indicated greater reduction in "craving" and "urge" from nicotine-containing flavors relative to the non-nicotine containing fruit flavor (*p*'s<0.05). For nicotine-containing e-liquids, there was a significant effect of e-liquid flavor on nicotine C_{max} (p<0.001) and $AUC_{0\text{-}120}$ (p<0.001): menthol and fruit flavor had significantly higher nicotine C_{max} and $AUC_{0\text{-}120}$ than the tobacco flavor (*p*'s<0.001). Conclusions: These results are consistent with other studies demonstrating that e-liquid flavor can affect nicotine exposure and subjective liking. This study further demonstrates that a tobacco flavored e-liquid, although associated with lower subjective liking and lower nicotine exposure, can effectively manage withdrawal symptoms among regular ENDS users.

FUNDING: Federal; FDA CTP

PS5-4

THE DUAL UTILITY OF CG05575921 METHYLATION IN LUNG CANCER SCREENING DECISION MAKING: THE VALUE OF RACIAL AND GENDER BIAS FREE PRECISION EPIGENETICS APPROACHES IN GUIDING LOW DOSE COMPUTERIZED TOMOGRAPHY (LDCT) USE AND SMOKING CESSATION.

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Annual low dose computerized tomography (LDCT) screening of high-risk smokers for lung cancer can save lives. However, only a small fraction of those who are screened will benefit, all will be subjected to radiation and potential harms from unnecessary biopsies. Therefore, methods to identify those at risk are desperately needed. Currently, eligibility criteria for screening are based only on age and pack-years. The previously developed $PLCOM_{2012}$ risk formula can identify a subset of these eligible smokers most likely to benefit from screening. However, its inclusion of gender, race and SES based variables makes it not only inaccurate but ethically unacceptable. As a result, the United States Preventive Services Health Task Force (USPSTF) has called for new methods to predict lung cancer risk to support persons engaging in shared decision making about LDCT screening. In response to that call and in follow up of Bojesen and colleagues' 2017 findings that in the Copenhagen City Heart Study cohort cg05575921 methylation predicted need for LDCT, we examined cg05575921 methylation in DNA specimens from the National Lung Cancer Screening Trial (NLST) using methylation sensitive digital PCR. We found that cg05575921 methylation significantly predicted risk for lung cancer, particularly among former smokers, and that a formula that uses just pack-year consumption and cg0557921 methylation predicts need for LDCT better than pack year consumption alone. In a separate study, we present meta-analytic results showing that cg05575921 accurately assesses daily cigarette consumption and that stopping smoking decreases heart disease risk as well. We conclude that Precision Epigenetics approaches using cg05575921 methylation can not only be used to guide LDCT decision making, but also monitor and motivate smoking cessation in those undergoing assessment.

FUNDING: Federal

PS5-5

EFFECT OF VERY LOW NICOTINE CONTENT CIGARETTES ON ALCOHOL DRINKING AND SMOKING AMONG ADULT SMOKERS WHO ARE AT-RISK ALCOHOL DRINKERS

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Significance. Alcohol drinking and tobacco smoking are closely related, but the underlying mechanism for the association is unclear. We assessed drinking and smoking behaviors while smoking a research cigarette (SPECTRUM) delivering moderate nicotine (0.80 mg, MNC) or very low nicotine (0.03 mg, VLNC) in participants with (n=23) and without (n=24) at-risk drinking (ARD). **Methods**.Daily drinking and smoking of SPECTRUM were recorded in a crossover study where participants exclusively smoked VLNC or MNC for 7 days. Smoking topography, subjective effects, and plasma nicotine levels were assessed at laboratory visits at the beginning and end of the experimental weeks. **Results**. At baseline, the groups had no significant differences in age, race, sex, cigarettes/day, nicotine dependence or scores on the Nicotine and Other Substance Interaction Expectancies Questionnaire . As expected, the ARD group had higher daily drinks (2.1) than the non-ARD (0.2) group. There was no effect of experimental cigarette (VLNC vs. MNC) or ARD group (ARD vs. non-ARD) on mean alcohol drinks per day after adjusting for baseline drinking behavior. Laboratory smoking was similar in both groups regardless of cigarette condition. Both groups rated the MNC significantly more

acceptable (satisfying) than the VLNC. There was a marginally significant (p=0.09) three-way interaction for the effect of sex*experimental cigarette*ARD group on mean alcohol drinks per day; inspection of the model-adjusted means suggested that non-ARD male participants and ARD female participants may increase drinking when smoking VLNC compared to MNC, which is not observed for ARD male participants or non-ARD female participants. **Conclusions.** The results tentatively suggest that alcohol use history does not alter the impact of varying nicotine content cigarettes on drinking or smoking behavior.

FUNDING: Federal

PS5-6

CHANGES IN INSOMNIA LEVELS IN SERIOUSLY MENTALLY ILL SMOKERS MAKING A QUIT ATTEMPT: A PILOT STUDY

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Background: Both cigarette smoking and serious mental illness (SMI) such as bipolar (BD) or schizophrenia spectrum disorder (SSD) have been linked to increased risk for insomnia. However, it is not known: (1) to what extent SMI smokers exhibit insomnia at the start of a quit attempt, and (2) how sleep patterns change in SMI smokers making a varenicline- and counseling-assisted quit effort. **Methods:** Participants were 27 adult cigarette smokers (44.4% female) who met DSM-5 criteria for either BD (51.8%) or SSD who were motivated to quit smoking and enrolled in a 12-week randomized trial of low- (0.5 mg twice daily) versus standard-dose (1.0 mg twice daily) varenicline combined with Acceptance and Commitment Therapy. Participants completed baseline and bi-weekly Insomnia Severity Index (ISI) assessments. Weekly self-reports of smoking and other nicotine use were also obtained. Participants were grouped into three categories by self-reported change in smoking by Week 12: a) quitters; b) moderate reducers (≥ 40% reduction); and c) minimal reducers (≤ 40% reduction). We conducted linear mixed models to examine change in insomnia over 12 weeks of active treatment. **Results:** At baseline, 57% of BD participants and 77% of SSD participants reported clinically relevant levels of insomnia (ISI scores >8). By week 12, these percentages decreased to 50% for each group. There were significant main effects of diagnosis (p=.047) and nicotine use (p=.009) on ISI scores; BD had lower ISI scores compared to SSD over time; and the moderate reducers had significant reduction in ISI scores compared to minimal reducers and quitters. **Conclusions:** While the majority of SMI smokers report clinically relevant insomnia symptoms prior to a quit attempt, sleep disturbances improved, on average, over a 12-week course of treatment with varenicline and counseling. Reductions in insomnia were greatest in individuals who titrated smoking levels downward but continued to smoke. Future research will need to clarify the relations among cigarette use, nicotine withdrawal, treatment condition, and insomnia levels in SMI smokers.

FUNDING: State

PS5-7

A SYSTEMATIC REVIEW AND META-ANALYSIS OF COMPARISONS OF ELECTRONIC VERSUS TOBACCO CIGARETTE DEPENDENCE

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Significance: The use of electronic cigarettes (EC) is now the second most popular tobacco product, after tobacco cigarettes (TC). Most scientists believe that ECs are less harmful than TCs, but evidence indicates that ECs can cause dependence. We tested whether EC dependence is less severe than TC dependence. To examine this, we conducted a systematic review and meta-analysis. **Methods:** We examined observational studies reporting one or more between- or within-participant measures of dependence on exclusive EC use, exclusive TC use, or dual using (DU) adults. In December 2020 our search of PubMed, PsycInfo, and personal libraries yielded a total of 46 comparisons among 18 studies. A three-level mixed-effects regression model was used to adjust for the dependence among the effect sizes. We used Cohen's d score cutoffs (strong=0.8 or more; moderate=0.5 to <0.8, small=0.2 to <0.5) to categorize the magnitude of differences between EC and TC dependence reported by each study. **Results:** The median sample size was 393 and the majority of participants were male (56.8%) with a median age of 39. Six studies provided 32 between-group comparisons of exclusive EC vs exclusive TC users and yielded a pooled effect size of 0.6 (95% CI=0.3, 0.8), indicating EC use is associated with less dependence. Three studies provided eight within-group comparisons evaluating exclusive TC users who switched to ECs. The pooled size was 1.0 (95% CI= -0.5, 2.5) and not significant. Eight studies provided 25 within-group comparisons of EC vs TC dependence among dual users and yielded a pooled effect size of 0.5 (95% CI= -0.1, 1.1), indicating EC dependence was numerically but not significantly less than TC dependence. Among all included comparisons, 41% yielded strong, 23% moderate, and 23% small effect sizes indicating less dependence from ECs than TCs. 5% found no effect and 7% found ECs resulted in more dependence than TCs. **Conclusions:** Between-group comparisons of observational data indicate EC use is associated with less dependence than TC use. Limitations include a paucity of data based on more potent ECs and the large variability in results within studies and thus our analysis may underestimate the magnitude of reduction compared to current products.

FUNDING: Federal

PS5-8

NICOTINE INSENSITIVITY AND CUE-CONTROLLED SMOKING BEHAVIOR IN PEOPLE WITH SCHIZOPHRENIA

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Significance: People with schizophrenia display tobacco dependence rates 3x higher than the general population, which contributes to the higher morbidity and lower life expectancy seen in this population. Prior research suggests that smokers with schizophrenia (SmoSz) are less sensitive to the subjective effects of nicotine than healthy control smokers (SmoCon), which may promote the switch to automized, stimulus-driven smoking behavior. Furthermore, impaired executive functioning, a hallmark of cognitive deficits associated with schizophrenia, is also reportedly associated with habitual, cue-locked drug taking. We hypothesized that smoking patterns in SmoSz reflect automatized conditioned routines decoupled from the subjective effects of nicotine to a higher degree than in SmoCon. **Methods**: To date, 7 SmoSz (2 female, 85.7% African American, 40.0±10.5 years of age, 16.1±7.6 cigarettes smoked per day, Fagerstrom test for nicotine dependency (FTND) score: 4.9±2.3) and 5 SmoCon (2 female, 80% African American, 49.8±7.1 years of age, 14.0±6.5 cigarettes/day, FTND: 4.4±1.1) have been enrolled in the study. Ad libitum smoking of virtually nicotine-free cigarettes in the presence of transdermal nicotine replacement is measured in 8-hour laboratory sessions after overnight abstinence as an index of automatized nicotine-decoupled smoking. Measures of executive functioning and of sensitivity to the subjective effects of nicotine are also being obtained. **Results**: Despite matched breath CO concentrations at baseline, there was a pattern of higher end-of-day breath CO in SmoSz as compared with SmoCon (69.1±26.4 ppm vs. 50.0±25.5 ppm). Furthermore, the total number of virtually nicotine-free cigarettes smoked over the 8 hours was significantly higher in SmoSz (19.6±7.1) than in SmoCon (11.8±4.8) [t(10)=2.260, p=.047]. **Conclusion**: Preliminary findings suggest that PSZ are more prone to automated, cue-locked smoking behavior, decoupled from the subjective effects of nicotine. Further investigation hopes to clarify the relationship of blunted subjective effects of nicotine and cognitive control deficits with this phenomenon. Funded by R21 DA048198 to B. Hahn.

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PS5-9

PROJECT MINDUP: AN OPEN PILOT STUDY EXAMINING THE USE OF MINDFULNESS TRAINING TO REDUCE ANXIETY IN PEOPLE WITH HIV WHO SMOKE

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Significance: People with HIV (PWH) smoke at higher rates than the general population and have lower cessation rates, often responding poorly to traditional smoking cessation treatments. Difficulty managing anxiety and daily life stress have been reported as key barriers to initiating a quit attempt and maintaining abstinence. **Methods:** We examined the feasibility and acceptability of a mindfulness-based intervention for non-treatment seeking PWH who smoke daily and reported anxiety/stress as a barrier to cessation. *Unwinding Anxiety*, a smart phone-based app with 30 modules designed to reduce anxiety and stress in users, was introduced at baseline, and participants were encouraged to complete one module daily. We examined the mean number of modules completed, session attendance, and number of study completers. We used

generalized estimating equations (GEE) to examine change in self-reported anxiety (GAD-7) and readiness to quit at baseline, week 4, and week 8. **Results**: Fifteen daily smokers with HIV were enrolled: mean age 51.5 (SD=13.2), mean cigarettes per day 11.4 (SD=5.4), mean lifetime quit attempts 5.3 (SD=6.7). Acceptability of the program was high with 93% of participants completing the study. The mean number of study sessions completed was 2.7 (SD=.59), and the mean number of modules completed of 16.0 (SD 16.8). Anxiety was high at baseline (M=14.4, SD=3.9), but lower at week 4 (b=-5.5; SE=1.9; *p*=.004) and week 8 (b=-5.1; SE=1.9; *p*=.008), and stable between weeks 4 and 8 (b=0.48; SE=1.3; *p*=0.706). Readiness to quit increased from baseline M=5.5 (SD=1.6) to week 4 (b=0.56; SE=.18; *p*=.002) but was not significantly different from baseline at week 8 (b=0.34; SE=.33; *p*=.30). Ad-hoc moderation analyses found that anxiety had a small positive association with readiness to quit at baseline (main effect: b=0.10; SE=.03; *p*<.001) but attenuated the increase in readiness to quit observed at week 4 (interaction with time at week 4: b=-0.08; SE=.03; *p*=.009). **Conclusions**: App-based mindfulness training appears to be feasible and acceptable for PWH who smoke and report anxiety as a barrier to quitting. At week 4, anxiety was reduced and readiness to quit was increased, perhaps a key timepoint for a cessation attempt.

FUNDING: Academic Institution

PS5-10

MEASURING PERCEIVED RESEARCH BURDEN OF A NOVEL THERAPEUTIC INTERVENTION: A STUDY OF TRANSCRANIAL MAGNETIC STIMULATION FOR SMOKING CESSATION

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Clinical research relies on voluntary participation of individuals with different perspectives on the burden of study participation. Measurement of research burden is simple and non-invasive, presenting no significant methodological challenges, however the benefits may be significant both for participants and researchers, suggesting that understanding perceived research burden is a methodological necessity in the rigorous and ethical development of new and/or enhancement of existing therapeutic treatments and even more generally in the development of any novel research methods. Repetitive Transcranial Magnetic Stimulation (rTMS) for short-term smoking cessation requires meaningful participant commitment, and understanding perceived burden associated with this novel approach is essential. In this double-blinded, sham-controlled, randomized design, the effects of treatment duration (8, 12, or 16 days of stimulation), intensity (900 or 1800 pulses per day), and active/sham rTMS assignment on research burden were examined across 6 months of study participation. Participants (n=51) were primarily middle-aged (M=50.53); 62.7% were female, 68.6% were white, and 48% had household income less than $24,999. Overall level of perceived research burden was low (M = 31.68 (SD 7.86) and experienced burden (M = 26.50, SD = 8.80), t = 3.53, p = .001) was significantly lower than anticipated burden (M = 34.12, SD = 15.62). Repeated-measures ANOVA revealed no main effects or interactions among time, (F=2.18, p=.15), active or sham condition, (F=.19, p=.68), duration (F=.06, p=.95), intensity (F=1.27, p=.30), race (F=.07, p=.80), or income (F=.17, p=.85) on perceived research burden. There was no evidence that perceived burden varies with race or income. Incorporating measures of research burden as a standard methodological practice may provide a significant opportunity to identify, assess and implement ways to manage participant research burden, thereby helping improve recruitment, retention, and generalizability of findings. Factors that might have mediated perceived burden include participants' motivation, the novelty of the intervention, research personnel, financial compensation and other study related administration, i.e., reminder appointments, free parking, and flexible scheduling.

FUNDING: Federal

PS5-11

A PSYCHOMETRIC EVALUATION OF THE PENN STATE CANNABIS VAPING DEPENDENCE INDEX

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Objective: Vapes are commonly used with cannabis. Dependence on cannabis vaping has been understudied and there are no validated assessment tools for measuring cannabis vaping dependence. The current study assessed the psychometric properties of an adapted version of Penn State Electronic Cigarette Dependence Index that asked specifically about cannabis vaping instead of e-cigarette use, referred to as the Penn State Cannabis Vaping Dependence Index (PSCVDI). **Methods:** Amazon's Mechanical Turk platform was used to survey adult cannabis vapers on their vape and tobacco use behaviors and responses on the PSCVDI, cannabis Severity of Dependence Scale (SDS), and the Diagnostic and Statistical Manual of Mental Disorders Cannabis Use Disorders Criteria (DSM). After extensive data cleaning, we assessed the PSCVDI psychometric properties of internal consistency; factor structure; criterion validity between each dependence measure and self-reported dependence; convergent validity with vaping behaviors, polysubstance use, and mental health; and predictive validity with lifetime quit attempts. **Results**: The final sample included 357 dual nicotine and cannabis vapers and 40 cannabis only vapers. The PSCVDI had a 2-factor structure with high internal consistency for the first factor (alpha=.85) and lower consistency for the second factor (alpha=.44). The PSCVDI was positively correlated with the SDS (r=.49, p<.001) and the DSM (r=.67, p<.001) scales. The PSCVDI was correlated with related constructs, including more years of use (r=.20, p<.001), THC concentration (r=.30, p<.001), and symptoms of depression (r=.39, p<.001), and anxiety (r=.32, p<.001). Mean PSCVDI scores were significantly higher among those who had made a failed quit attempt in their lifetime compared those who had not (M=10.43 vs. 6.09, p<.001). Higher PSCVDI scores were corelated with fewer days quit during the longest quit attempt (r=-.31, p<.01), but not with the number of quit attempts (r=.03, p>.05). **Conclusions:** The adapted PSCVDI has good criterion, convergent, and predictive validity and appears to be an adequate measure of cannabis vaping dependence among adults.

FUNDING: Unfunded; Academic Institution

PS5-12

THE INFLUENCE OF ACUTE CANNABIS SMOKING ON CIGARETTE AND E-CIGARETTE PUFF TOPOGRAPHY AND SUBJECTIVE EFFECTS IN DUEL USERS OF CIGARETTES AND E-CIGARETTES

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Rationale: Simultaneous use of tobacco and cannabis is commonplace and increasing as cannabis legalization expands. Few controlled studies have examined if cannabis acutely influences tobacco subjective drug effects, and it is unknown whether puff topography of tobacco products differs when individuals are intoxicated from cannabis. *Methods:* Participants (n=5; dual users of cigarettes/e-cigarettes) completed seven double-blind outpatient drug administration sessions. Participants first smoked a fixed dose of cannabis (active or placebo). After cannabis smoking, they were allowed to use a tobacco product *ad-libitum* for 5 hrs which was either: own brand cigarettes or the JUUL e-cigarette with either 3% or 5% liquid nicotine strength (both tobacco flavor). Puff topography was assessed for each tobacco product and subjective effects indicative of abuse liability were also assessed. *Results:* Active cannabis administration decreased time to first cigarette and e-cigarette use relative to when placebo cannabis was used. Cannabis administration increased mean inter-puff-interval and decreased total puffing time and puff number as well as mean puff duration and puff volume relative to placebo for own brand cigarettes and both JUUL conditions. Regardless of cannabis condition, puff topography for own brand cigarettes and 5% JUUL were comparable, but topography was more intensive (e.g., longer puff durations/larger puff volumes) in the 3% JUUL conditions which is indicative of nicotine titration. Subjective drug effects (e.g., "Do you want another cigarette/e-cigarette right now?") were increased following cannabis administration vs. placebo. *Conclusion:* Participants elected to use cigarettes and e-cigarettes sooner after smoking active vs. placebo cannabis but puff topography (e.g., puff duration/puff volume) was generally more intensive when placebo cannabis was used; this suggests participants may have been attempting to boost their cannabis high under placebo conditions by smoking/vaping more intensively. Use of active cannabis increased desire for more cigarettes/e-cigarettes, highlighting that cannabis use may promote continued use of tobacco products.

FUNDING: Federal

PS5-13

A PRELIMINARY EVALUATION OF VARENICLINE COMBINED WITH ORAL NICOTINE REPLACEMENT THERAPY AND SMARTPHONE-BASED MEDICATION REMINDERS FOR SMOKING CESSATION

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SIGNIFICANCE: Previous studies have evaluated the efficacy of combining varenicline and nicotine patches for smoking cessation. However, no studies have evaluated the combination of varenicline and oral nicotine replacement therapy.METHODS: The current study employed a 2x2 factorial design. Participants (*N*=34) were randomized to 12 weeks of 1) varenicline + nicotine gum or lozenges (VAR+NRT; *n*=20) or varenicline alone (VAR; *n*=14) and 2) smartphone medication reminders messages [REM; *n*=11] or no reminder messages [NREM; *n*=23]. Participants assigned to VAR+REM (*n*=2) received varenicline reminder prompts, and those assigned to VAR+NRT+REM (*n*=9) also received reminders to use gum/lozenges every 3-6 hours (during waking hours) with decreasing frequency over time. Participants assigned to VAR+NREM (*n*=12) and VAR+NRT+NREM (*n*=11) did not receive medication reminders. All participants were offered 6 counseling sessions. Enrollment in the trial was discontinued early due to the varenicline recall. The primary outcomes were biochemically-verified point prevalence smoking cessation at 12 and 26 weeks after the scheduled quit date. Twelve-week follow-up visits were completed by October 2021, and 26-week follow-up visits will be completed by February 2022. Daily smoking, medication use, and medication side effects were assessed via smartphone daily diary.RESULTS: Participants were predominantly White (71%) or Black (15%), 6% reported Hispanic ethnicity, and 50% were female. Participants reported an average age of 54 (*SD*=9) years, and smoked an average of 19 (*SD*=9) cigarettes per day for 35 (*SD*=13) years. At the 12-week follow-up, smoking abstinence rates were 30% (VAR+NRT) vs. 21% (VAR) and 55% (REM) vs. 13% (NREM). Across all 4 groups, abstinence rates at 12-week follow-up were: 56% (VAR+NRT+REM), 50% (VAR+REM), 17% (VAR+NREM), and 9% (VAR+NRT+NREM). Final 26-week cessation outcomes and the findings of daily smartphone-based assessments will be described by treatment group in the presentation. CONCLUSION: Preliminary findings support further investigation of the combination of varenicline and oral NRT, as well as smartphone-based medication reminders for smoking cessation.

FUNDING: Federal; State; Pharmaceutical Industry

PS5-14

PHARMACOKINETICS AND SUBJECTIVE EFFECTS OF NICOTINE SALT-BASED VAPING PRODUCTS WITH TOBACCO OR UNFLAVORED E-LIQUIDS

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SIGNIFICANCE: “Pod”-style ENDS devices have grown popular of late. Each pod holds a nicotine salt solution, as opposed to freebase nicotine solutions used in other ENDS device types. The pharmacokinetics of nicotine delivery for salt-based liquids is not fully understood. METHODS: Seven daily vapers (who were not current smokers) used one of four e-liquids across four laboratory sessions: unflavored freebase, unflavored salt, tobacco-flavored freebase, or tobacco-flavored salt solutions. Participants arrived after overnight abstinence and puffed throughout sessions according to a standardized protocol (10-minute bout, 20 puffs, 30 second inter-puff interval). Blood was drawn at multiple time points during each visit for nicotine pharmacokinetic analysis, and participants provided standard subjective effects measures at the same time points. RESULTS: Participants reported that all four nicotine solutions relieved nicotine withdrawal symptoms similarly, but that all four conditions tasted worse than their regular device & e-liquid. The unflavored and flavored freebase solutions were rated as harsher than both of the salt nicotine solutions ($p<0.05$), while other subjective effects such as user satisfaction, harm perceptions, and speed of effect did not differ across the four conditions ($p>0.05$). Preliminary serum nicotine data indicated that the unflavored (mean $AUC_{0\text{-}20\ min}$: 92.2 ng/ml/min; mean Cmax:) and flavored (mean $AUC_{0\text{-}20\ min}$: 72.4 ng/ml/min; mean Cmax:) salt nicotine solutions had larger AUC and higher Cmax than the unflavored (mean $AUC_{0\text{-}20\ min}$: 60.5 ng/ml/min; mean Cmax:) and flavored (mean $AUC_{0\text{-}20\ min}$: 55.9 ng/ml/min; mean Cmax:) freebase nicotine solutions. CONCLUSIONS: Nicotine salt solutions appear to deliver nicotine more efficiently than freebase solutions. Their taste may also be more tolerable to users, compared to similar nicotine concentrations via freebase nicotine solutions.

FUNDING: Federal; FDA CTP

PS5-15

SMOKING AND OPIATE WITHDRAWAL SYMPTOMS: THE IMPACT OF PSYCHOSOCIAL VARIABLES AMONG INDIVIDUALS RECEIVING MEDICATION-ASSISTED TREATMENT

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Significance: Individuals with opioid use disorder (OUD) endorse high rates of combustible smoking (Zale et al., 2015) which is associated with poorer outcomes (e.g., opioid craving and lower detoxification completion rates) among individuals receiving medication-assisted treatment (MAT; Mannelli, Wu, Peindl, & Gorelick, 2013) and lower smoking cessation rates in smoking cessation treatment (Okoli et al., 2010). The complex pharmacological relationship between opioids and nicotine may help explain these findings (Kohut, 2017), however little is known about psychosocial variables that influence MAT processes among combustible smokers with OUD. Methods: The present study sought to expand upon prior work (Mannelli et al., 2013) by examining the impact of psychological factors and smoking-related variables on opiate withdrawal symptoms among smokers with OUD receiving Suboxene at baseline at an inpatient substance use treatment facility. Current smokers with OUD (N = 59) completed a battery of psychological measures at baseline. The present study tested the influence of daily smoking rate, nicotine dependence, smoking urges, and depression on opiate withdrawal symptoms. Results: Findings revealed that smoking urges predicted severity of opiate withdrawal symptoms while controlling for daily smoking rate and nicotine dependence. However, when depression was added as a predictor, severity of withdrawal symptoms while controlling for smoking-related variables. Conclusions: Results highlight the importance of considering psychological factors, specifically depression, that impact treatment processes among smokers with OUD to help inform the development of effective treatment interventions.

FUNDING: Unfunded; State; Academic Institution

PS5-16

NICOTINE DEPENDENCE AND MEDICATION-ASSISTED TREATMENT FOR OPIATE WITHDRAWAL

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Significance: Individuals with opioid use disorder (OUD) endorse high rates of combustible smoking (Zale et al., 2015) which is associated with poorer outcomes (e.g., opioid craving and lower detoxification completion rates) among individuals receiving medication-assisted treatment (MAT; Mannelli et al., 2013) and lower smoking cessation rates in smoking cessation treatment (Okoli et al., 2010). Buprenorphine, a particle opiate agonist, has become the standard of care in MAT, and therefore its interaction with nicotine needs to be better understood among smokers with OUD. This research should inform smoking cessation efforts in this population. Methods: The present study sought to expand upon prior work (Mannelli et al., 2013) by examining the influence of smoking-related variables on opiate withdrawal symptoms among smokers with OUD receiving Suboxone at an inpatient substance use treatment facility. Current smokers with OUD (N = 49) completed a battery of psychological measures at baseline and monitored opiate withdrawal symptoms for the subsequent 6-day period. The present study tested the influence of daily smoking rate, nicotine dependence, and smoking urge on opiate withdrawal symptoms. Participants were 58% male, 95% White, with a mean age of 31.8 (6.5) years, mean daily smoking rate of 14.5 (5.3) cigarettes per day, mean FTND of 7.3 (3.3), mean 13.0 (6.4) years smoking, and mean CO of 24.6 (11.1). Seventy-one percent of participants were in the preparation stage of change for smoking.Results: As expected, negative affect and opiate withdrawal symptom severity steadily decreased over the course of the 6-day detox period, while smoking urge remained constant. Linear regression analyses showed that daily smoking rate significantly predicted opiate withdrawal symptom severity as measured by the Subjective Opiate Withdrawal Scale (SOWS), such that heavier smoking predicted more severe opiate withdrawal symptoms (p’s $< .01$ on day 2 and 3, $p < .05$ on day 4).Conclusions: Smoking rate predicted severity of opiate withdrawal symptoms, such that heavier smoking predicted more severe withdrawal. These findings suggest that

the efficacy of Suboxone (partial opioid agonist) is limited in smokers, as has been found with opioid agonists (e.g., Methadone). This provides a compelling rationale for provision of smoking cessation intervention early in the treatment process for OUD.

FUNDING: Unfunded; State; Academic Institution

PS5-17

SWITCHING PEOPLE WHO SMOKE TO UNFILTERED CIGARETTES: EFFECTS ON SMOKING TOPOGRAPHY

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Significance: Smoking topography (ST) describes smoking behavior and patterns via puffing variables. Past ST research has explored modification of cigarette filter design and nicotine delivery, but removal of the filter and impact on topography has not been investigated. Changes in ST (adaptations or compensatory smoking) may occur without a filter. This is the first clinical trial comparing ST for filtered (FU) and unfiltered cigarettes (UF) in naturalistic smoking settings. **Methods:** We conducted a randomized crossover trial involving established cigarette smokers (n=32) who were tested for two-weeks under both treatments. Participants (50% female, mean age 38.3 yr.) smoked in each treatment followed by a 3-week post-treatment washout of normal smoking. ST (puff volume, puff duration, peak flow) was measured at 6 time-points. Statistical analysis included a linear repeated mixed-effects model of FU versus UF smoking treatments by visits and sex. This was across two arms, the treatment and sequence, which accounted for the randomization to the first or second treatment. **Results:** Average flow (mL/sec) was significantly less for FU smoking treatment (-6.92 lower (95% CI: -13.44 to 0.39), $p<0.05$), thus demonstrating less impedance on inhalation. No significant differences were found between smoking FU or UF for other ST variables. Trends in average volume (mL) and average peak flow (mL/sec) were higher in UF. Lower mean puff counts/cigarette were observed for UF compared with FU. **Conclusion:** ST measurements comparing FU and UF cigarette smoking may determine if product regulatory changes are feasible in changing cigarette palatability. In this study, we demonstrate that higher flow rates are associated with FU cigarette smoking suggesting less impedance on airway function. Perhaps these findings are a compensatory mechanism used by smokers when smoking FU cigarettes. This pilot study demonstrated a proof of principle that ST may be assessed in a larger clinical trial to determine feasibility and safety of removing FU cigarettes from the market.

FUNDING: State

PS5-18

INTERACTIVE EFFECTS OF FINANCIAL STRAIN AND DISTRESS TOLERANCE ON PRE-QUIT TOBACCO WITHDRAWAL SYMPTOMS IN SMOKERS PREPARING TO INITIATE A QUIT ATTEMPT

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SIGNIFICANCE: Smokers experiencing greater financial strain are less likely to successfully quit smoking, possibly due to greater severity of tobacco withdrawal symptoms. However, scarce work has explored whether specific psychological traits, such as distress tolerance, may buffer the deleterious effects of financial strain on tobacco withdrawal. The current study examined the main and interactive effects of financial strain and distress tolerance on tobacco withdrawal prior to quitting smoking amongst smokers preparing to initiate a quit attempt. **METHODS:** 116 daily cigarette smokers (35.3% Female; *M* age=33.14 years old) interested in quitting smoking completed a baseline session including a self-report measure of financial strain and subjective and behavioral assessments of distress tolerance. Participants were then instructed to initiate a quit attempt without any assistance within 14 days following the baseline session. Daily experiences of tobacco withdrawal symptoms were assessed for a period of three days prior to the scheduled quit date via daily diaries. Linear regression models were conducted to evaluate main and interactive effects between financial strain and distress tolerance assessments on severity of daily withdrawal symptoms prior to quitting. **RESULTS:** Findings demonstrated significant interactions between financial strain, distress tolerance, and daily experiences of tobacco withdrawal. Among smokers reporting high financial strain, those with lower (vs. higher) levels of distress tolerance reported greater perceptions of tobacco withdrawal and negative mood-related symptoms as being more "difficult to tolerate" prior to quitting (Beta interaction terms=-.36 to -.28, *ps*<.005). **CONCLUSIONS:** Financial strain may negatively impact one's perceived ability to tolerate mood- and tobacco-related withdrawal symptoms prior to a quit attempt, yet higher distress tolerance may serve as a protective factor to mitigate the effects of financial strain on smoking cessation processes. Psychosocial interventions designed to promote tolerance of distress originating from internal and external sources, such as financial strain, may benefit smoking cessation efforts among socioeconomically disadvantaged smokers.

FUNDING: Federal

PS5-19

HIGHER SMOKING LEVEL MEDIATES THE ASSOCIATION BETWEEN URBAN STRESS AND LOWER READINESS TO QUIT SMOKING AMONG ADULTS EXPERIENCING HOMELESSNESS

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Significance: Over 70% of homeless adults are cigarette smokers, a prevalence that is five times higher than the general U.S. population. Many homeless adults seek shelter and services in urban areas and experience unique urban-life related stressors such as lack of reliable transportation, crime, and violence. Although there is a known association between stress and readiness to quit, the potential explanatory role of smoking level has yet to be examined. The current study redressed this gap among adults experiencing homelessness in urban Oklahoma. **Methods:** Overall, 457 smokers (65% male, 57.1% White, 18.1% Black, 11.1% Multiracial/Other, 10.6% Native American/Alaskan Native, 3.1% Hispanic/Latino, M_{age}=43.19±11.76) were recruited from 6 homeless serving agencies in Oklahoma City. Participants self-reported on their sociodemographic characteristics, cigarettes smoked per day (non-daily, light [1-10], moderate [11-20], or heavy [21+]), and readiness to quit smoking. They also completed the Urban Life Stress Scale. Mediation models with bootstrapping of 5000 iterations were used to test the indirect effect of smoking level on the association between urban life stress and readiness to quit adjusting for age, sex, race, and serious mental illness diagnosis. **Results**: Overall, 12.9% of participants were non-daily smokers, 27.9% were light smokers, 44.7% were moderate smokers, and 13.5% were heavy smokers. Results indicated that urban stress was indirectly associated with readiness to quit via smoking level (*b*=-.04, SE=.02, CI_{95}=-.08,-.01). Greater urban life stress was associated with heavier smoking, which was associated with lower readiness to quit. **Conclusions:** Interventions that specifically focus on improving coping skills for urban stressors could reduce smoking rate and thereby increase readiness to quit smoking among adults experiencing homelessness.

FUNDING: State; Academic Institution

PS5-20

STATEWIDE ASSESSMENT OF TOBACCO-FREE POLICIES AND EVIDENCE-BASED PRACTICES IN TEXAS AGENCIES PROVIDING SUBSTANCE USE TREATMENT

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Significance: People with substance use disorders (SUDs) smoke cigarettes at higher rates than the general population (~65-90% vs ~14%). Agencies providing substance use treatment can reduce tobacco use by implementing comprehensive tobacco-free workplace policies and evidence-based treatment practices (e.g., the 5 A's). A 2016 survey (Marynak et al., 2018) suggested only ~34% of Texas substance use treatment agencies had smoke-free workplace policies, 70% screened for tobacco use, and 55% provided tobacco cessation counseling. Various grant-supported statewide tobacco control efforts have ensued since then. **Methods:** Here, we present results from a follow-up 2021 statewide needs assessment on tobacco control policies and practices

within Texas agencies that serve individuals with SUDs. Overall, 161 professionals (109 direct service providers, 52 general staff; representing ~17% of 806 agencies solicited) completed the survey. **Results:** Results indicated that 49.23% (n=68) of agencies had a policy that completely prohibited tobacco use indoors and outdoors. Direct service providers reported asking, advising, and assessing for tobacco use between half and most of the time and assisting with cessation and arranging follow-up with tobacco users less often, between sometimes and half of the time, on average. Likewise, although 45.96% of respondents reported that their agency offered training to providers on how to screen for tobacco use, only 35.4o% indicated that their agency offered training on how to treat tobacco use, 37.27% on how to motivate clients to quit, and 32.30% on how to treat tobacco concurrently with substance use. Finally, only 55.90% of respondents indicated their organization was familiar with the Texas Tobacco Quitline. **Conclusions:** Despite the modest results for organizational tobacco policies and provider assessment, there remains a clear gap in the ability of providers within these agencies to treat tobacco use, and thus a dire need to enhance specialized tobacco training. Furthermore, the Texas Tobacco Quitline is a valuable resource for Texas smokers, yet direct service providers report rarely using this resource to assist smokers in quitting.

FUNDING: State

PS5-21

TRENDS IN HEALTHCARE ACCESS MEASURES AMONG LOW-INCOME ADULT SMOKERS, 2012-2019

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Background: Healthcare access among cigarette smokers, who remain disproportionately low-income, is not well characterized. We examined overtime trends in access measures among low-income adult smokers in Ohio. Methods: We used data from the Ohio Medicaid Assessment Survey pooled across four consecutive cycles (2012, 2015, 2017, and 2019). We evaluated five access measures among Medicaid-eligible low-income smokers: i) presence of a usual source of care; ii) unmet dental care needs; iii) unmet mental, emotional health, or counseling needs; iv) unmet medical exam or supply needs; and v) difficulty paying medical bills using survey weighted logistic regression models, adjusted for age, gender, educational attainment, race, region, and presence of a severe mental condition. Results: Among 28,976 low-income adults, 11,104 (40.5%) were current cigarette smokers. Compared to 2012, there were improvements in some healthcare access measures among smokers. The odds for unmet medical exam and supply needs were lower in 2015 [OR: 0.66; 95% CI: 0.40-1.08], 2017 [OR: 0.58; 95% CI: 0.35-0.96] and 2019 [OR: 0.49; 95% CI: 0.28-0.86]. Similarly, the odds for unmet dental care needs were lower in 2015 [OR: 0.68; 95% CI: 0.45-1.01], 2017 [OR: 0.54; 95% CI: 0.36-0.83], and 2019 [OR: 0.65; 95% CI: 0.40-1.06], despite the difference only reaching statistical significance in 2017. The odds for difficulty paying medical bills were lower in 2015 [OR: 0.62; 95% CI: 0.43-0.90], 2017 [OR: 0.58; 95% CI: 0.40-0.85], and 2019 [OR: 0.58; 95% CI: 0.38-0.89]. There were no notable changes in having a usual source of care and unmet mental, emotional, or counseling care needs. Conclusion: Following Medicaid expansion in 2014, unmet dental care needs, unmet medical exam and supply needs, and difficulties in affording medical expenses were lower among low-income adult smokers in Ohio. Overall, these results suggest that Medicaid expansion has improved healthcare access for low-income smokers. However, an all-rounded improvement in access is vital for both prevention and management of health conditions as well as successful delivery of tobacco cessation services for smokers.

FUNDING: State; Academic Institution

PS5-22

TEACHING EMPLOYERS TO ACTIVELY COMMUNICATE WITH EMPLOYEES ABOUT A WORKPLACE SMOKING CESSATION PROGRAM

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Significance We developed a training to teach employers how to use an active, personal communication approach to stimulate employees with a lower socioeconomic position (SEP) to participate in a workplace smoking cessation program. **Methods** Together with a stakeholder group, we developed a communication training using Intervention Mapping. The training showed the relevance of personal communication and included an interactive role play of a conversation between a manager and a smoking employee. Managers of Dutch companies were recruited via newsletters and social media to participate in the training, which was delivered in a live webinar in 2021. We used online questionnaires to assess self-efficacy and intention to talk to employees about smoking cessation. In addition, we are conducting qualitative interviews with 20 managers to evaluate their experiences in communicating with employees and to assess the remaining barriers. Changes in self-efficacy were analyzed using paired-sample t-tests. The interviews were transcribed and analyzed thematically. **Results** 107 people participated in the webinar. 50 people completed the questionnaires. Immediately after the training, 54% of respondents were committed to personally talk to employees about smoking cessation over the next three months. The mean self-efficacy increased significantly from 3.2 to 3.5 (scale of 1-5, p=0.015). The qualitative interviews showed that the training convinced managers that an active, face-to-face communication approach is essential to reach lower-SEP employees. The interactive role play was considered very helpful. Few respondents had talked with smoking employees since the training. Remaining barriers were absence of a personal relationship with employees and the lack of support from other managers within the organization. **Conclusion** The training slightly increased self-efficacy among managers and created awareness that an active, face-to-face communication approach is needed to recruit lower-SEP employees for a workplace smoking cessation program. Wider implementation of the training among line managers within a company may be necessary to have a substantial impact on employee smoking cessation. **Funding:** ZonMw grant #531003019

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PS5-23

THE ASSOCIATION BETWEEN TOBACCO RETAILER OUTLET DENSITY AND PREVALENCE OF CIGARETTE SMOKING IN VIRGINIA

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Objective: We examine the association between tobacco retail outlet density and adult smoking prevalence at the county level in Virginia, controlling for spatial autocorrelation. Methods: Pooling data from 2020 County Health Rankings (compile data from various sources including, but not limited to, the National Center for Health Statistics - Mortality Files, the Behavioral Risk Factor Surveillance System (BRFSS), and the American Community Survey) and Counter Tools, we conducted regression analyses that accounted for spatial autocorrelation (spatial lag models , LMlag) and adjusted for county-level access to healthcare, demographics, SES, environmental factors, risk conditions or behaviors, and population health measures. Results: Our estimates provide evidence that every increase of one tobacco retail outlet per 1000 persons was associated with 1.16 percentage points (95%CI:0.80- 1.15) higher smoking prevalence at the county level in Virginia after controlling spatial autocorrelation. But the effect of outlet density was largely explained by social determinants of health such as SES, risky conditions or behaviors, and environmental factors. We further noticed that the impact of social determinants of health were closely related and can be explained by indicators of population health (rates of mental distress (β=1.49,95%CI:1.31- 1.67) and physical inactivity (β=0.07,95%CI:0.04- 0.10). Conclusions: Although higher tobacco outlet density was associated with an increase in county-level smoking prevalence, the impact of outlet density was largely explained by social determinants of health and mental illness. Improving well-being at the community level could be a promising strategy in future tobacco control policies.

PS5-24

THE SOCIODEMOGRAPHIC IMPACT OF THE 2012 CANADIAN GRAPHIC WARNING LABEL POLICY ON SMOKING PREVALENCE: A DIFFERENCE-IN-DIFFERENCE-IN-DIFFERENCE MODEL

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Significance: Little is known about the effectiveness of GWL revisions across sociodemographic groups. Using a quasi-experimental design, we examined the relative impact of the 2012 Canadian GWL policy revisions (increasing size from 50% to 75% and revising content) on key indicators of warning impact and on quit intentions among national cohorts of Canadian and US smokers. Methods: We pooled data from waves 1-9 (2002-2015) of the International Tobacco Control (ITC) Four Country

Surveys, and waves 1-3 (2016-2020) of the ITC Four Country Smoking and Vaping Surveys in Canada and the US. The outcome measures were a GWL impact index (GWLII) combining warning salience (noticing), cognitive responses (thoughts of harm/quitting), and behavioral responses (forgoing cigarettes), as well as quit intention. A difference-in-difference (DD) regression model estimated overall policy impact, and a difference-in-difference-in-difference (DDD) model estimated differences in policy impact by sex, education, and income, comparing Canada (treatment group) with the US (control group). Results: The DD model showed a significant increase in GWLII in Canada from pre-policy to post-policy, compared to the US (β= 0.84, 95% CI 0.35,1.33). The DDD model showed that this DD effect was greater among low-income smokers than in high-income smokers (β= 0.80, 95% CI 0.05, 1.54). This pattern of results was the same for quit intention: the DD model showed increased odds of quit intentions among Canadian smokers compared to US smokers (OR= 1.89, 95% CI 1.51,2.36), and the DDD model showed that this positive effect on quit intentions was greater in the low-educated group than in high-educated group (OR= 1.54, 95% CI 1.05-2.25). Conclusion: The 2012 Canadian GWL enhancement led to significantly greater impact and greater likelihood of quit intentions among adult smokers when compared to the US. Further and importantly, policy impact was greater among low-income and low-educated smokers, yielding a positive equity impact. Together, these findings reaffirm and strengthen the need for countries to implement and revise/enhance GWLs, in line with the WHO Framework Convention on Tobacco Control.

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PS5-25

EFFECT OF E-CIGARETTE RISK PERCEPTION ON SMOKING BEHAVIOR OF AFRICAN AMERICAN AND LATINX INDIVIDUALS WHO SMOKE

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Background: Trends in knowledge and beliefs about e-cigarette (EC) harm has been changing. There are misperceptions among individuals who smoke that ECs are equally or more harmful than combustible cigarettes (CC). Currently, there is limited information on EC risk perception among African American and Latinx individuals who smoke and its influence on smoking behavior. **Objective:** Examine whether baseline risk perception of ECs predicts the number of cigarettes smoked per day (CPD) among African American and Latinx participants at week 6, the end of EC provision. **Methods:** We analyzed data from one arm of a 6-week EC randomized clinical trial of individuals who smoke attempting to switch to nicotine salt pod system ECs. Our analysis included 111 participants (African American, n=57; Latinx, n=54). Our explanatory variable was baseline risk perception of ECs compared to that of CCs measured as "less harmful," "about the same" or "more harmful," or "I don't know." Our outcome was CPD measured by 7-day TLFB. A negative binomial GEE model was conducted to examine the association between risk perception and CPD at baseline and week 6. **Results:** At baseline, 88.3% of participants had a high school diploma/GED, 73.9% were at the 200% FPL or lower, and 61.3% had better than good health. 28.8% of participants indicated ECs were "less harmful," 11.7% "about the same" or "more harmful" than CCs, and 59.5% indicated "I don't know" at baseline. Baseline mean CPD was 85.3 cigarettes and decreased to 17.9 by week 6. Those who perceived ECs as "about the same" or "more harmful" than CCs smoked fewer CCs at baseline [IRR= 0.66; 95% CI (0.43,0.99); p=0.047] than those who perceived ECs as "less harmful." The number of cigarettes smoked at baseline significantly increased with every 1-year increase in age [IRR=1.03; 95% CI (1.0, 1.1); p=0.008]. **Conclusion:** Baseline risk perception of ECs did not impact CPD at week 6 among African American and Latinx individuals who smoke. Given that most of the sample did not know the risk of ECs relative to CCs, it is important that people who smoke know that ECs are a less harmful option than CCs, as this perception impacted baseline CPD.

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PS5-26

THE PROSPECTIVE ASSOCIATION BETWEEN TOBACCO COUPON RECEIPT AND SHORT-TERM SMOKING CESSATION AMONG ADULT CIGARETTE SMOKERS IN THE US

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Significance: Although tobacco companies often use coupons as part of a marketing strategy to decrease the cost of cigarettes and offset the effects of taxes, few studies have examined the longitudinal association between coupon receipt and smoking cessation. **Methods**: Using adult data from Waves 1-5 (2013-2019) of the Population Assessment of Tobacco and Health Study, we examined the longitudinal association between tobacco product coupon receipt and short-term smoking cessation. Multivariable discrete-time survival models were fit to an unbalanced person-period data set (person n=9,472, risk period n=29,784) for adult respondents (18+) who were current established smokers at baseline. To ensure that coupon receipt preceded smoking cessation, coupon receipt was included as a time-varying variable, lagged by one wave. We controlled for sociodemographic variables (age, sex, race/ethnicity, education), time-varying tobacco dependence, and time-varying cigarette intensity. Effect modification by age, sex, education, and race/ethnicity was assessed by examining interaction terms in separate models. **Results**: We found that established US adult cigarette smokers who received a coupon were 20% less likely to quit smoking compared to those who did not receive a coupon, adjusting for all covariates (adjusted hazard rate: 0.80, 95% CI: 0.73-0.88). While non-Hispanic Blacks and adults with lower educational attainment were less likely to report smoking cessation relative to non-Hispanic Whites and adults with higher educational attainment, respectively, the association between coupon receipt and smoking cessation did not vary by sociodemographic group. **Conclusions**: We found that coupon receipt reduced the likelihood of short-term smoking cessation, even after controlling for nicotine dependence and cigarette intensity. Our findings suggest that coupons are one way that tobacco companies seek to circumvent policies aimed at reducing smoking. Policies restricting coupon use could help facilitate smoking cessation.

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PS5-27

EXPERIENCES OF SOCIOECONOMIC LOSSES, RACIAL AND ETHNIC DISCRIMINATION, AND COMMERCIAL TOBACCO USE

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Significance: Inequitable social and economic conditions and the distribution of resources contribute to persistent tobacco product-related disparities. In this study, we sought to examine both the independent and joint associations of experiences of socioeconomic losses and racial and ethnic discrimination during the past year, and current use of commercial tobacco products.**Methods**: We utilized data from the 2021 *Summer Styles* survey, which is a web-based panel survey of adults in the U.S. aged 18+ years old (N=4,085) fielded from June 2-21, 2021. Our outcome was current use of any tobacco products in the past 30 days. Respondents who reported that they experienced any of the following three events since March 2020 were considered to have experienced a socioeconomic loss: (1) lost job, (2) unable to meet basic needs (food/rent), or (3) evicted from home. Experiences of racial and ethnic discrimination in the past year were assessed by the question: "Have you been prevented from doing something, or made to feel inferior due to your race, ethnicity, or color?" A combined, four-level exposure variable (neither, socioeconomic losses only, discrimination only, both) was created. We conducted logistic regression models, adjusted for sociodemographic characteristics, and weighted to account for the sampling design.**Results**: In adjusted models, individuals who experienced a socioeconomic loss were more likely to use tobacco products compared to those who did not experience a socioeconomic loss (PR: 1.53; 95% CI: 1.24, 1.89). In models with the combined exposure, individuals who experienced both socioeconomic losses and discrimination were more likely to use tobacco products compared to those who did not have either of these experiences (PR: 1.69; 95% CI: 1.13, 2.52).**Conclusion**: Experiencing socioeconomic losses alone and also experiencing both socioeconomic losses and racial and ethnic discrimination in the past year were associated with current commercial tobacco use. Understanding how multiple socio-contextual stressors are associated with commercial tobacco use can further our efforts to advance health equity. *Disclaimer: The findings and conclusions in*

this report are those of the authors and do not necessarily represent the official position of the Oak Ridge Institute for Science and Education or the Centers for Disease Control and Prevention.

PS5-28

CHANGES IN THE PREVALENCE OF SMOKING AMONG DISAGGREGATED ASIAN AMERICANS AND NATIVE HAWAIIANS AND OTHER PACIFIC ISLANDERS (AANHPI) SUBPOPULATIONS ON MEDICAID USING THE POPULATION ASSESSMENT OF TOBACCO AND HEALTH (PATH) STUDY

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Introduction: Asian Americans and Native Hawaiians and other Pacific Islanders (AANHPI), a diverse group of people representing over 50 ethnicities, are often categorized into one group in tobacco research, yet AANHPI have the greatest variations in smoking rates. What is more, smoking behaviors of socioeconomically disadvantaged AANHPI by subpopulations are understudied. The current study aims to examine changes in the rates of smoking over time among AANHPI subgroups on Medicaid. Methods: The Population Assessment of Tobacco and Health (PATH) dataset from Wave 1 (2013/14, n=33,822) and Wave 4 (2016/18, n=32,320) were used. Unadjusted weighted smoking rates (past 30 days) by AANHPI subgroups (i.e., Asian Indian, Chinese, Filipino, Japanese, Korean, Vietnamese, "Other Asian," Native Hawaiian, and "Other Pacific Islanders") and Medicaid status over time were reported. Results: Smoking rates among AANHPI on Medicaid at Wave 4 was 17.1 %. However, these rates ranged from 6.2% (Indian women) to 56.5% (Korean men). Overall, smoking rates among US adults as well as AANHPI on Medicaid decreased from Wave 1 to 4 (US: from 36.1% to 34.1%, AANHPI: from 19.3% to 17.1%). However, smoking rates among AANHPI men on Medicaid increased (from 23.1% to 26.7%). At the same time, further disaggregating revealed that among those on Medicaid, only Filipino men showed an increase in smoking rates (from 15.0% to 29.1%). On the other hand, while smoking rates among AANHPI women on Medicaid decreased (from 16.4% to 11.6%), Korean, Hawaiian, and "Other Asian" women showed considerable increases. In addition, among those not on Medicaid, smoking rates among men in all subgroups decreased except Koreans while smoking rates among women in all subgroups increased except Chinese, Koreans and "Other Asians." Conclusion: There are considerable differences in smoking rates across AANHPI subgroups including those who are socioeconomically disadvantaged. The decline in aggregated rates among AANHPI on Medicaid can be misleading as it masks high-risk subgroups who showed increases in smoking rates. These findings highlight the importance of looking beyond aggregates and underscore how current policies and interventions may be failing specific minoritized groups.

PS5-29

THE ASSOCIATION BETWEEN LOCAL TOBACCO RETAIL LICENSING ORDINANCES AND CIGARETTE SMOKING BY RACE/ETHNICITY, INCOME, AND EDUCATION (2012-2019): THE CASE IN CALIFORNIA

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Background: Evidence suggests that strong tobacco retail licensing (TRL) regulations are associated with lower cigarette and e-cigarette use among youth and young adults, but there is limited evidence on their relationship with adult smoking, particularly across sociodemographic groups. This study investigates the association between the strength of city-level TRL ordinances and adult cigarette use, and differences in the relationship by sociodemographic characteristics, using California as a case study. **Methods:** We pooled data from the California Health Interview Survey (CHIS) and the State of Tobacco Control Reports from the American Lung Association (ALA) from 2012 to 2019. The ALA graded each city (A-strongest to F-weakest) based on the strength of the local TRL ordinance. We assessed cigarette use as current use, defined as respondents who had smoked 100 or more cigarettes in their lifetime and currently smoke cigarettes every day or some days. We estimated multilevel logistic regression models to test the relationship between the strength of the city-level TRL ordinance and current cigarette use among adults aged 25 and older, nesting by city. We also examined the potential for effect modification of the relationship by race/ethnicity, income, and education in separate models. All models controlled for smoke-free laws. **Results:** 11.6% of sample participants from all the years (n=132,209) were current cigarette smokers. Adults in cities with stronger grades (A to D) had lower odds of current smoking (OR= 0.89, 95% CI: 0.79-1.01) compared to adults in cities with the weakest grade (F), but the association was not significant (p<0.07). We found no evidence of effect modification by race/ethnicity, income, or education. **Conclusion:** We found limited evidence that stronger city-level TRL ordinances is associated with lower adult cigarette smoking in California. Future studies testing the impact of TRL ordinances on adult smoking outcomes should include more comprehensive TRL policies such as pharmacy bans, zoning laws, or retail density caps

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PS5-30

THE DEVELOPMENT OF A TAILORED SMOKING CESSATION INTERVENTION PATHWAY FOR CANCER SERVICES IN IRELAND

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Significance: The benefits of smoking cessation (SC) post cancer diagnosis are undervalued despite substantial evidence of benefit. A comprehensive cancer management strategy should include a tailored SC approach. The National Cancer Institute's Cancer Moonshot initiative also supports collaborative research. Our Irish Cancer Society-funded research outlines novel development of a SC pathway for cancer services, co-developed with cancer patients who smoke. Methods: A review of smoking rates among cancer inpatients using a national inpatient database (2014-2018) and an audit of adult specialist cancer hospitals to document existing SC services (SCS) was completed. A rapid review of smoking interventions in cancer patients (registered on Prospero), and semi-structured interviews with cancer patients who smoke and cancer healthcare professionals are underway. Collated results/key questions will be discussed with patients who smoke at a Patient Voice in Cancer (PVCR) research workshop. Results: Current and past smoking rates among all cancers combined increased (10.5%-11.4% and 15.2%-21% respectively) and are lower than current smoking in Irish general population (23%-20%). Due to possible under-ascertainment, trend analysis was the focus. Current smoking rates overall were highest in 50-59-year-olds (14%-16%), contrasting with general population (24-35 years at 32%-28%). Lung cancer patients had highest current (range 24.7%-24%), and past smoking (range 30.3%-38%) rates. Breast cancer patients had the lowest current (range 5.7%-6.6%) and past smoking (7.2%-12.8%) rates during this period.6 (75%) of 8 hospitals provided SCS to patients diagnosed with cancer attending either outpatient clinics, day units, inpatients or other (radiology/emergency depts). However, many hospitals acknowledged low referral numbers. Although 6 (75%) hospitals recorded data on overall SCS uptake, only 1 recorded it for patients diagnosed with cancer. Conclusion: Irish in-patient cancer services have limited engagement with SCS despite high smoking prevalence in people diagnosed with cancer. Opportunities exist for improvement and our research will lead the development of a tailored SC pathway.

FUNDING: Nonprofit grant funding entity

PS5-31

NOVEL CHEMICAL ADDUCTS IN E-CIGARETTE LIQUIDS AND THEIR TOXICOLOGIC EFFECTS ON HUMAN LUNG EPITHELIAL CELLS

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According to the 2021 National Youth Tobacco Survey, 44% of high school students and 17.2% of middle school students regularly abuse flavored e-cigarettes, vaping 20-30 days per month. E-cigarette manufacturers have systemically marketed numerous flavor varieties that contain unstable constituents and underreported compounds that lack toxicological data. Amongst the unspecified components, our lab has reported flavorant acetals produced exclusively by reactions between the parent flavorant aldehyde and propylene glycol (PG) or vegetable glycerin (VG) solvents. Additionally, we have shown multiple PG acetals activate TRPA1 and TRPV1 sensory irritant ion-channels more robustly than some parent aldehydes in transfected human embryonic kidney (HEK) cells. Also, immortal bronchial epithelial cells (BEAS-2B) treated with PG acetals for

24 hours show significant increases in cytotoxicity and cytostasis while exhibiting reduced cellular metabolism and proliferation. Here, we assessed the toxicological effects of vegetable glycerin (VG) acetals present in e-cigarette liquid compared to their parent flavor aldehydes. Calcium microfluorimetry demonstrated that VG acetals activate TRP irritant receptors in transfected HEK cells, some more robustly than the corresponding parent aldehydes. Using toxicological assays (LIVE/DEAD, LDH, MTT and mitochondrial functional assay), 24-hr VG acetal exposures of BEAS-2B cells caused significant increases in cytotoxicity compared to parent aldehyde, while reducing cellular proliferation and metabolism. Moreover, gene expression analysis revealed that VG acetals modulate proinflammatory cytokine and oxidative stress transcriptional profiles in treated BEAS-2B cells. Thus, our results indicate that e-cigarettes contain unreported components that are toxic and may harm the lung health of e-cigarette users. This study will address knowledge gaps regarding the safety of e-cigarettes and inform the FDA about toxicological effects of novel flavor adducts.

FUNDING: Federal; FDA CTP

PS5-32

DEVELOPMENT OF A WECHAT-BASED MOBILE MESSAGING SMOKING CESSATION INTERVENTION FOR CHINESE IMMIGRANT SMOKERS

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Background: Smoking rates are disproportionately high among Chinese immigrants. Mobile messaging interventions can reach large audiences and expand smokers' access to cessation programs. This study described the development of a culturally adapted WeChat-based mobile messaging smoking cessation intervention for Chinese immigrant smokers. (WeChat is the most frequently used social media platform among Chinese globally.) **Methods:** We developed a mobile message library based on Social Cognitive Theory. Then, we conducted in-depth interviews with 20 Chinese immigrant smokers (7 women) in New York City between July and August 2021. The interviews explored participants' smoking and quitting experiences, followed by the assessment of messages. Participants reviewed 17 messages on their phone via WeChat. They rated each message on a 0-10 visual analog scale to indicate to what extent the message enhanced their motivation to quit, promoted confidence in quitting, and increased awareness about quitting strategies. We assessed participants' understanding of the messages, sought feedback on poorly rated messages, and explored their preferences for content, length, and format. Participants also provided feedback about their concerns with the WeChat cessation intervention and recommendations for frequency and timing of messages. **Results:** Participants generally reported that the messages enhanced their motivation to quit, offered encouragement, and made them more informed about how to quit. They particularly liked the messages about the harms of smoking and strategies in quitting. Barriers to applying some of the quitting strategies included the lack of skills to cope with stress and stay abstinent at work. Participants expressed strong interests in the WeChat cessation intervention and commented on its potential to expand their access to smoking cessation treatment (e.g., take minimum time). **Conclusions:** Mobile messages are well accepted by Chinese immigrant smokers. Research is needed to assess the feasibility, acceptability, and efficacy of WeChat mobile messaging smoking cessation interventions on promoting abstinence among Chinese immigrant smokers.

FUNDING: Federal; Academic Institution

PS5-33

TRENDS IN CIGARETTE SMOKING PREVALENCE AND CESSATION AMONG PEOPLE WITH DISABILITIES, 2015-2020

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Significance: The prevalence of current cigarette smoking is higher in people with disabilities as compared to those without. Although there has been a decrease in overall smoking cessation in adults, little is known about trends in smoking and cessation behavior among people with disabilities. Methods: Combined data from the 2015–2020 National Surveys on Drug Use and Health were used to estimate prevalence of cigarette smoking, nicotine dependence using the Fagerström Test for Nicotine Dependence, and quit ratios for people with any disability and six disability functioning domains. Quit ratios were calculated as the proportion of former smokers among the full sample of lifetime smokers. Odds ratios of quit ratios by disability categories were estimated with logistic regression models adjusting for sociodemographic factors. Results: In each year, the prevalence of current cigarette smoking was higher in people with any disability compared to those without; the highest prevalence of past-month daily cigarette use for all years combined was for people with cognitive, independent living, and self-care disabilities. From 2015-2020, a higher percentage of people with any disability were nicotine dependent compared to people without a disability (14.1% 95% confidence interval [CI]: 13.5, 14.7 vs 7.8%; 95% CI: 7.6, 8.0). The quit ratio was similar for those with no disability (50.7%; 95% CI: 50.1, 51.4) and those with any disability (50.7%; 95% CI: 50.0, 52.0). However, compared to those without a disability, people with a cognitive (adjusted odds ratio [AOR]=1.14; 95% CI: 1.01, 1.28) or vision disability (AOR=1.19; 95% CI 1.08, 1.32) had a significantly higher quit ratio; people with a hearing disability had a significantly lower quit ratio (AOR=0.70; 95% CI 0.64, 0.76). Conclusion: People with disabilities consistently had higher smoking prevalence and higher nicotine dependence than people without disabilities. Similar cigarette quit ratios for people with and without any disability masked differences by disability type. Findings underscore the need for public health efforts that tailor prevention tactics and cessation programs specifically for people with disabilities.

FUNDING: Federal

PS5-34

DECIDETEXTO: ASSESSING TEXT MESSAGING ENGAGEMENT IN A MOBILE SMOKING CESSATION INTERVENTION AMONG LATINO SMOKERS

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Introduction: Evidence supports the efficacy of mobile interventions for smoking cessation. Latinos - the largest minority group in the U.S. - are the highest users of text messaging, but there is limited research on engagement in text messaging programs and message content that promotes engagement among Latino smokers.**Objective:** To assess text messaging engagement in a smoking cessation mobile intervention among Latino smokers.**Methods:** As part of a randomized controlled trial, Latino smokers (n=229) were randomized to *Decídetexto* - a mobile smoking cessation intervention that includes a 24-week text messaging counseling program with interactive capabilities. The text messaging program (available in English and Spanish) consists of 712 messages covering ten themes: 1) education, 2) logistics, 3) intra-treatment social support, 4) coping with triggers, 5) extra-treatment social support, 6) stimulus control, 7) vicarious experience, 8) relapse prevention, 9) social norms, and 10) reward. We assessed text messaging engagement by theme. The rate of engagement was defined as the average proportion of participants responding to text messages within a thematic area.**Results:** Average age of participants was 48.5 (SD=10.8), half of them were male (55.9%). A total of 71.6% of participants selected Spanish as their language of preference. During the 24-week intervention period, participants sent an average of 51.8 (SD=78.2, range=1-684) messages in response to the program. The logistics messages prompted the highest engagement (0.18), followed by intra-treatment social support (0.12), social norms (0.12), and education (0.11) messages. The themes with the lowest engagement were extra-treatment social support (0.08), coping with triggers (0.08), and vicarious experience (0.07).**Conclusion:** *Decídetexto* generated high engagement among Latino smokers. Mobile interventions may yield greater engagement among Latinos by emphasizing messages focused on social norms, social support from the program, and smoking cessation education. Further studies should assess the relationship of text messaging engagement impact on psychological effects (e.g., therapeutic alliance) and smoking cessation among Latino smokers.

FUNDING: Federal

PS5-35

ESTIMATING THE CONTRIBUTION OF INCOME LEVEL TO CIGARETTE USE PREVALENCE IN THE UNITED STATES: A MATHEMATICAL MODELING STUDY

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Background. Despite the long-term declines in cigarette use prevalence in the United States (US), there remain stark income-based disparities. *Objective.* Determine the contribution of income (population attributable fraction [PAF]) to cigarette use prevalence among adults in the US over a 10-year period. *Methods.* We developed a dynamic mathematical model of cigarette and e-cigarette use among adults, incorporating stratification by age, sex, and annual household income level. Data from the Population Assessment of Tobacco and Health Study and Monitoring the Future Study were used to parametrize the model. The model projected 10 years of cigarette use (from 2015 to 2024). We then modeled a counterfactual scenario in which all participants had the same likelihood of cigarette use transitions (e.g., initiation, cessation) associated with being in the highest income group (>$100k annually). PAF was calculated as the difference in cumulative person-years of smoking between the status quo and counterfactual scenarios over 1, 5, and 10-year periods, both overall and among different subgroups in 2014 (never smokers, current smokers, former smokers). *Results.* Overall, our baseline model accurately projected the cigarette use prevalence among US adults would fall from 17% in 2014 to just below 14% in 2019 and that it would fall to 13.6% in 2024. In comparison, the high-income scenario projected that cigarette use prevalence would fall to 7.7% in 2024, resulting in 113.9 million fewer cigarette use-years over 10 years - approximately half of which were among those reporting current cigarette use in 2014. Overall, we found that income contributed to 12.3%, 25.2%, and 32.8% of cigarette use-years after 1, 5, and 10 years, respectively. Among individuals who reported never smoking cigarettes in 2014, income contributed to 75.6%, 79.2%, and 81.2% of cigarette use-years after 1, 5, and 10 years, respectively. *Discussion.* Our findings indicate that income contributes substantially to cigarette use among adults in the US. Policies which improve household finances, such as a universal basic income, are likely to reduce cigarette use prevalence in the US.

FUNDING: Unfunded; Academic Institution

PS5-36

LABORATORY SELF-ADMINISTRATION OF CIGARETTES WITH VARYING NICOTINE CONTENTS BEFORE AND AFTER 3 WEEKS OF AT-HOME EXPOSURE: A BEHAVIORAL ECONOMIC ABUSE-LIABILITY ANALYSIS

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Significance: The Family Smoking Prevention and Tobacco Control Act gave the FDA authority to regulate cigarette nicotine levels. Studies suggest reduced-nicotine cigarettes result in decreased nicotine intake and decreased nicotine dependence, however, questions remain about the abuse liability of reduced-nicotine cigarettes, whether exposure to reduced-nicotine cigarettes lowers use of both reduced- and full nicotine cigarettes, and whether reduced-nicotine cigarettes substitute for full-nicotine cigarettes. To that end, this double-blind study examined demand for reduced- and full nicotine cigarettes using a behavioral economic abuse-liability approach. **Methods:** Dependent non-treatment-seeking smokers (N = 43) completed laboratory self-administration procedures to examine consumption of reduced- and full-nicotine cigarettes under various response requirements before and after 3 weeks of at-home exposure. Participants were randomized to full (15.8 mg nicotine/g tobacco) or varying levels of reduced-nicotine cigarettes (5.2, 2.4, or 1.3 mg/g) to determine the role of experience on the abuse liability of reduced-nicotine cigarettes. Abuse liability was assessed by 2 behavioral economic demand metrics: intensity (consumption when cost is minimal) and alpha (sensitivity of consumption to increases in price). This study also examined the degree to which reduced-nicotine cigarettes would substitute for full-nicotine cigarettes - testing whether a reduced-nicotine policy would achieve the goal of reducing full-nicotine cigarette consumption. **Results:** Overall, exposure to reduced-nicotine cigarettes for 3 weeks resulted in lower demand (decreases in intensity and increases in alpha) for reduced- and full-nicotine cigarettes relative to the pre-exposure period. Reduced-nicotine cigarettes also served as substitutes for full-nicotine cigarettes in the self-administration procedures as the cost of full-nicotine cigarettes escalated. **Conclusions:** Exposure to reduced-nicotine cigarettes may lower consumption of full- and reduced-nicotine cigarettes and reduced-nicotine cigarettes may serve as substitutes as costs of full-nicotine cigarettes increase.

FUNDING: Federal; Nonprofit grant funding entity

PS5-37

A CONTENT ANALYSIS OF WEBSITE MARKETING FOR MENTHOL FLAVORED E-LIQUIDS IN A SAMPLE OF BRICK AND MORTAR VAPE SHOPS IN LOS ANGELES COUNTY

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Significance: Menthol is a characterizing flavor in combustible cigarettes and electronic nicotine delivery systems (ENDS). E-liquids, specifically, are recognized as an important reason for ENDS use. Yet, compared to menthol cigarettes, menthol flavor e-liquids for ENDS are an understudied area of investigation. The present study examined menthol flavor e-liquid website marketing among brick-and-mortar vape shops in Los Angeles County. Methods: A total of 104 brick-and-mortar vape shops were identified, and 38 were found to have active websites. Each e-liquid per website was coded (e.g., *menthol* or not) and grouped into categories (e.g., type of *menthol*). Cohen's kappa scores were calculated to determine agreement (any *menthol*, κ=0.98; *menthol*, κ=0.98; *ice*/*iced*/*icy*, κ=0.98; *mint*, κ=0.89; others, κ=0.92) and disagreements were revisited to reach consensus. Results: A total of 1,327 e-liquid flavors were identified from 38 active websites. Among them, 207 (15.6%) were coded as *menthol*/*mint*/*ice* flavor e-liquids. Frequencies included *ice*/*iced*/*icy*" (n=123, 55.2%), *menthol* (n=32, 14.4%), *mint* (n=23, 10.0%), and *other* (n=44, 19.7%). Fruit flavors, including apple and melon, were most observed in each ice/iced/*icy* (83, 70.3%) and "menthol" (19, 63.3%) category. *Other* category was related to *ice*/*iced*/*icy*-related flavor descriptors (e.g., "Arctic Air", "Brain Freeze", "Frozen Hulk Tears", "Polar Breeze", "SubZero"). Conclusion: Brick-and-mortar vape shops in Los Angeles County are marketing a variety of menthol flavor e-liquids on their websites. Such marketing focused largely on *ice*/*iced*/*icy* fruit flavor combinations (i.e., fruit and menthol combination). Future research is needed to understand how exposure to, and appeal of menthol flavor e-liquid marketing differs among diverse consumer groups, including, adult menthol cigarette smokers and nonsmoking youth.

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PS5-38

IMPACT OF PICTORIAL HEALTH WARNING LABELS ON SMOKING BELIEFS AND PERCEPTIONS AMONG WATERPIPE SMOKERS: AN ONLINE EXPERIMENTAL STUDY

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Significance: Waterpipe tobacco smoking (WTS) has witnessed alarming popularity among young people in Lebanon, where it is perceived safer than cigarette smoking. Health warning labels (HWLs) can inform smokers about the adverse effects associated with smoking. Thus, their application to waterpipe offers a favorable policy to limit the WTS epidemic. This study aimed to assess the effectiveness of pictorial HWLs and their placements on waterpipe parts (device, tobacco package and charcoal package) on several communication outcomes among young Lebanese adults. **Methods:** We conducted a randomized cross-over experimental study among 276 waterpipe smokers (aged 18-34) between August 13 and August 26, 2021. Participants observed 3 conditions: pictorial HWLs on the tobacco package, pictorial HWLs on the 3 parts of waterpipe (device, tobacco package, and charcoal package), and the text-only (control) on the tobacco package in random order. Participants completed baseline and post-exposure assessments evaluating HWLs effectiveness on attention, reaction, attitudes and beliefs, perceived effectiveness of HWLs, and intention to quit WTS. Planned comparisons using Friedman test followed by pairwise Wilcoxon signed-rank test for multiple comparisons were used to examine differences of outcomes between the 3 conditions. **Results:** Compared to text-only, pictorial HWLs on tobacco package elicited greater attention (p= 0.011), higher cognitive elaboration (p=0.021), perceived message effectiveness (p=0.007), negative affect reactions (p<0.01) and greater psychological reactance (p=0.01). On the other hand, no significant differences were found for most

communication outcomes between pictorial HWLs on 3 parts of the waterpipe compared on tobacco package only. **Conclusions:** Pictorial HWLs on the tobacco package were superior to text-only for several communication outcomes. These findings provide strong evidence for the potential of implementing pictorial HWLs on waterpipe tobacco packages to increase smokers' awareness of the health effects of WTS and correct false safety perceptions. In addition, our findings can help advance WTS-specific HWLs regulations, which will likely play a crucial role in decreasing WTS at the population level.

FUNDING: Federal

PS5-39

THE EFFECTS OF ENDS AD FEATURES ON YOUNG ADULTS' PERCEPTIONS OF AD EFFECTIVENESS AND LIKING

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Introduction: The use of electronic nicotine delivery systems (ENDS) among young adults is at an all-time high with 9.3% reporting current use. ENDS use exposes young people to harmful toxicants and increases risk of using more harmful combustible products in the future. Advertising impacts use of ENDS among young adults, and the U.S. Food and Drug Administration (FDA) needs firm scientific evidence to regulate ENDS advertisements (ads). In this study, we tested whether the inclusion of popular ENDS advertising features (imagery and text) impacted perceived ad effectiveness (PE) and liking of the ad. **Methods:** Young adults (N=127) aged 18 to 26 years, who reported never or formerly using ENDS, and were currently living in the United States were recruited via the crowdsourcing platform, Prolific. Participants were randomized to see 2 ENDS ads from a pool of 173 ads that had been content analyzed for popular features. After each ad, participants rated PE and liking of the ad. Associations between ad features and PE and liking were estimated using linear regression GEE models that controlled for age, gender, sexual orientation, race, and ethnicity. **Results:** Ads including humans (p=.03), product packaging (p<.001), actual ENDS products (p<.001), and ENDS products in use (p=.01) were associated with significantly greater PE than ads without those features. Ads featuring product packaging (p=.001), actual ENDS products (p=.004), and a textual descriptor about the product being an alternative to smoking (p=.01) were rated higher in liking than ads without those features. **Conclusions:** Results suggest that young adults who do not use ENDS may find the inclusion of humans, ENDS product packaging and actual ENDS products, and ENDS products in use effective and likeable. In addition, participants reported greater liking of ads that described the product as an alternative to smoking. Findings provide preliminary evidence for ENDS advertising features that could be regulated to reduce appeal among young adult ENDS nonusers, and highlight the need for continuing health communication interventions.

FUNDING: Federal; Academic Institution

PS5-40

CHARACTERISING SMOKING AND SMOKING CESSATION BEHAVIOURS AMONG ADULTS AT RISK AND THOSE NOT AT RISK OF ALCOHOL DEPENDENCE IN ENGLAND

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Significance: There is a strong shared association between smoking and drinking. Heavier drinking can make quitting smoking more difficult, though those receiving alcohol treatment are less likely to receive smoking cessation support. This study aimed to describe smoking prevalence among the general population in England at risk of alcohol dependence and compare their smoking characteristics with drinkers not at risk of alcohol dependence. ***Methods:*** We used cross-sectional data from a monthly, nationally representative survey of adults in England (weighted n=144,518; 2014-2021). Smoking and smoking cessation characteristics were regressed on to alcohol dependence (drinkers at risk versus not at risk), adjusting for survey year. ***Results:*** Past-year smoking prevalence was 63.4% (95% CI=59.8-66.9) among those at risk of alcohol dependence compared with 31.4% (95% CI=30.7-32.1) among drinkers not at risk of alcohol dependence, and 19.2% (95% CI=18.8-19.7) among non-drinkers. Current smoking prevalence was 58.0% (95% CI=54.3-61.7) among those at risk of alcohol dependence, 28.8% (95% CI=28.1-29.5) among drinkers not at risk of alcohol dependence, and 18.1% (95% CI=17.7-18.5) among non-drinkers. Among past-year smokers, those at risk of alcohol dependence (compared with drinkers not at risk) smoked on average three more cigarettes per day (95% CI=2.3-3.8) and were more likely to smoke their first cigarette within 5 (versus >60) minutes of waking (OR=2.81, 95% CI=2.25-3.51). ***Conclusions:*** In a representative sample of adults at risk of alcohol dependence in England, past-year smoking prevalence was 63% and current smoking prevalence was 58%, with a graded effect where smoking prevalence increased with level of alcohol consumption. Past-year smokers at risk of alcohol dependence had higher levels of cigarette dependence than drinkers not at risk of alcohol dependence. The high smoking prevalence among those at risk of alcohol dependence has important policy implications as efforts need to be focused on this group to reduce overall prevalence in line with the UK Government's target of <5% by 2030.

FUNDING: State; Academic Institution; Nonprofit grant funding entity

PS5-41

BOTS AND PROFESSIONAL SURVEY TAKERS: RECRUITMENT CHALLENGES FOR TOBACCO REGULATORY SCIENCE ONLINE SURVEYS

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Significance: Online surveys are increasingly common due to lower costs and increased convenience. However, bots that automate survey completions and professional survey takers present recruitment challenges. We describe issues encountered and risk mitigation strategies employed by the Vaping and Patterns of E-cigarette use Research (VAPER) Study. **Methods**: The VAPER Study is an online cohort survey that recruits adults (21+) who use e-cigarettes 5+ days/week. Initially, we aimed to recruit 1200 participants using social media (e.g., Facebook) ads in three U.S. cities. The survey was anonymous, incentives were delivered by email with minimal review, and fraud detection software was used to prevent multiple completions by each participant. **Results**: Recruitment began slowly but accelerated quickly, raising concerns that halted data collection. Survey submissions (n=1624) were investigated for evidence of bots or professional survey takers; 363 survey completions were assessed to be valid. We subsequently restarted recruitment and implemented a risk mitigation strategy. Participants were required to undergo identity verification using LexisNexis, CAPTCHA, two-factor authentication, data quality reviews, and were mailed their incentive (via USPS). High costs and slow recruitment also forced a transition to Craigslist postings (125 locations). Subsequently, recruitment pace stabilized and data quality was high. Despite these efforts, a sophisticated bot breached our procedures, in part, by using personal information likely obtained from the dark web; these submissions were removed. Additional mitigation procedures included requiring a photo of participants' e-cigarettes, verifying photos were unique and authentic, and regularly reviewing open-ended responses. We have since completed two waves (53% follow-up rate). **Conclusions**: Online data collection is a promising methodology but strong risk mitigation strategies must be implemented to ensure data quality. Regulators and researchers can have confidence in the data online surveys provide when these strategies are applied.

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PS5-42

EVALUATING TOBACCO INDUSTRY 'TRANSFORMATION': A PROPOSED RUBRIC AND ANALYSIS

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Significance Some tobacco companies claim to be 'transforming' by adopting harm reduction objectives or seeking a 'smokefree' world. Yet, what characterises tobacco

industry (TI) transformation and whether it is occurring remains unclear. We critically investigated TI transformation by assessing whether it is feasible and examining if it is underway. **Methods** We identified and critiqued transformation characteristics inferred from TI statements and the Tobacco Transformation Index (TTI), a scale developed by the Foundation for a Smokefree World. We developed a definition and criteria for transformation, and assessed whether these criteria are being met using documentary evidence, the TTI report and Euromonitor tobacco sales data. **Results** We define a transforming tobacco company as one demonstrating substantial, rapid and verifiable progress towards eliminating the production and sale of conventional smoked and oral tobacco products within five years in all markets where the company operates. We developed three essential criteria that a tobacco company must meet to be categorised as transforming.Our assessment revealed that no tobacco company meets our three essential criteria: rapid progress towards eliminating conventional products, ceasing to obstruct effective tobacco control measures, and acting to minimise smoking uptake and disparities. While some companies are developing new nicotine product portfolios (e.g. e-cigarettes), their actions are more consistent with profit maximisation than with eliminating conventional tobacco product use. Critical analysis suggests replacing conventional products with new nicotine products is not a viable long-term business model. **Conclusions**The current TI approach is best described as 'pseudo-transformation' likely designed to bolster companies' credibility and delay implementation of effective tobacco control policies. Public health practitioners should not rely on TI claims but should lead the debate, establish credible definitions, criteria and metrics, and monitor and assess whether true transformation is occurring.

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PS5-43

INTENTIONS AND BEHAVIOR MODIFICATIONS OF THE ENDS COMMUNITY ON REDDIT IN REACTION TO THE PACT ACT AMENDMENT ANNOUNCEMENT

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Significance: The 2020 PACT Act Amendment banned the transport of electronic nicotine delivery systems (ENDS) using the USPS. However, the USPS repeatedly delayed releasing rules governing the PACT Act until October 21, 2021. We examine the content of Reddit posts in ENDS user communities about behavior modifications over this period to understand the impact of the policy announcement on ENDS-related intentions and behaviors. **Methods**: Posts related to the ban were collected from December 21, 2020 to September 1, 2021 using Reddit and Reveddit, a Reddit archive with enhanced search capabilities. Topics were iteratively and qualitatively coded for mentions of intended or actual behavior modifications. These included: online purchasing related to the ban, seeking alternate vendors, changing device type due to availability concerns, mixing DIY liquids, changing purchase method to brick and mortar stores, using policy loopholes, hesitating to purchase for legal reasons, and reducing/quitting ENDS use. **Results**: A total of 224 posts were collected. Online purchasing related to the ban (n=154, 69%), seeking alternate sources (n=51, 23%), and changing device type (n=22, 10%) were the most common topics. DIY mixing (n=20, 9%), brick and mortar stores (n=19, 8%), and loopholes (n=15, 7%) were less common. Few posts were about hesitancy to purchase (n=7, 3%) or ENDS use reducing/quitting (n=7, 3%). In posts on ban-related purchases, ENDS users mentioned purchasing mod devices/parts (n=70, 31%), liquids (n=51, 23%) materials for DIY liquids (n=22, 10%), or other devices/parts (n=11, 5%). **Conclusion**: Our results suggest that ENDS communities on Reddit mostly discussed their intentions and preemptive actions related to purchasing devices and liquids, changing device type, and mixing DIY liquid. Many were also interested in alternate online or in-person vendors to continue purchasing devices, parts, and liquids. Interestingly, the unenforced ban resulted in few posts about ENDS use reduction/cessation or hesitancy to purchase online. It will be important to monitor the effects of these stated intentions and behavior modifications now that the PACT Act is being enforced.

FUNDING: Academic Institution

PS5-44

CHARACTERIZING ENFORCEMENT OF FLAVORED TOBACCO PRODUCT SALES RESTRICTIONS WITHIN STATES AND LARGE JURISDICTIONS

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Significance: US states and jurisdictions have increasingly enacted sales restrictions on flavored tobacco products (FTPs). Policy enforcement is a critical component for point of sale tobacco policies in maximizing policy impacts; however, little is known about enforcement provisions within FTP policies. This study examines enforcement provisions in a sample of current state and local FTP policies. **Design**: We analyzed publicly available legislative documents and resources that outline FTP sales restrictions in US states (n=7) and localities (n=15) with populations larger than 250,000. We coded policy enforcement variables highlighted in tobacco control literature, including compliance monitoring, stipulations on license suspensions and revocations, the enforcement body, retailer education, and protocols for identifying FTPs. **Results**: We analyzed 24 US FTP sales restrictions. All jurisdictions required retailers to have a tobacco retail license. Most (n=19, 79.2%) policies had an identifiable enforcement body, most commonly law enforcement (n=9, 37.5%). Over half (n=15, 62.5%) of policies included compliance monitoring, with 60% of them indicating use of youth decoys. Retailer penalties for violating an FTP policy included fines (n=20, 83.3%), license suspension (n=14, 58.3%), and license revocation (n=14, 58.3%). Retailer education was described in half (n=12, 50%) of policies, most commonly through online engagement (58.3%) and direct outreach to retailers via mail or in-person visit (50%). About a third (n=7, 29.2%) of policies outlined protocols for identifying FTPs, with over half (57.1%) stating a list of prohibited FTPs, exempted products, or terms that qualify a tobacco product as flavored will be made publicly accessible. **Conclusion**: Most FTP sales restrictions include recommended enforcement provisions, though some may be strengthened by including protocols for identifying FTPs and compliance monitoring with youth decoys. This study can inform researchers and policymakers on ways to both strengthen FTP policy language and subsequent adherence to those policies once enacted. Future research may incorporate key informant interviews as well as data on FTP use and sales pre- and post-policy to determine the most effective enforcement practices.

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PS5-45

CHANGES IN YOUTH TOBACCO USE AFTER LOCAL SALES RESTRICTIONS ON FLAVORED AND MENTHOL TOBACCO PRODUCTS IN MINNESOTA

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BACKGROUND: Minneapolis and St. Paul, Minnesota implemented sales restrictions on flavored (excluding menthol, mint-, wintergreen-, and tobacco-flavored) tobacco products (including ENDS) in 2016 ("flavor policy") and expanded the restrictions to include menthol-, mint-, and wintergreen-flavored products in 2018 ("menthol policy"). The policies exempted adult-only liquor stores and licensed tobacco shops. We examined changes in current tobacco use prevalence among Minnesota youth before and after implementation of the flavor and menthol policies. METHODS: We measured changes in past 30-day use prevalence among survey respondents in the Twin Cities area (including Minneapolis and St. Paul), and as a comparator, the rest of the state of Minnesota (ROS) using data from two surveys. We assessed changes following the flavor policies with the Minnesota Youth Tobacco Survey (MYTS) and changes following the menthol policies with the Minnesota Student Survey (MSS). We analyzed use prevalence for overall tobacco products and, where possible, by product category and flavor. RESULTS: Following the flavor policies, MYTS data showed current youth use of any tobacco product(s) significantly increased in ROS (by 26.6%) but did not change in the Twin Cities. Following the menthol policies, MSS data showed current youth use of any tobacco product(s) increased to a greater extent in ROS (by 44.6%) compared with the Twin Cities (by 34.6%). Following each policy, increases in youth use of particular tobacco product categories (e.g., e-cigarettes; non-menthol-flavored non-cigarette tobacco products) were less pronounced in the Twin Cities relative to ROS. CONCLUSION: These Minneapolis and St. Paul sales restrictions on flavored and menthol tobacco products may have been associated with attenuated increases in youth use of some tobacco product categories as compared to ROS. Retail exemptions allowing sales of flavored and menthol products in some stores within each policy jurisdiction, and availability of restricted products in proximal non-policy jurisdictions, may have diluted the effect of these policies on overall tobacco product use among youth tobacco users.

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PS5-46

CIGARILLO CHARACTERISTICS AND CO-USE OF CIGARILLOS AND CANNABIS: A STRUCTURAL EQUATION MODELING APPROACH

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Significance: Concurrent use of tobacco and cannabis ("co-use") is common and has increased over time. Research shows that availability of flavors facilitates cigarillo use, but it is unknown if flavor impacts patterns of co-use with cannabis. The aim of this study was to determine the role of the cigarillo flavor in the co-use of cigarillos and cannabis among young adults. **Methods**: Data were collected (2020-2021) in a cross-sectional online survey administered to young adults who smoked at least two cigarillos per week recruited from 15 urban geographic target areas. We measured past 30-day cannabis use and usual use of a flavored cigarillo. A structural equation model was used to test the study hypotheses. Several covariates were included in the model, including price usually paid for cigarillos and flavor/cannabis policy. Appeal of flavored cigarillos and perceived cigarillo harm were hypothesized parallel mediators. **Results**: Participants who used cigarillos in the past 30 days (N=360) were on average 24.6 years of age, and the majority self-identified as Black (43.1%) or White (36.6%), non-Hispanic (76.5%). Most (81.8%) reported usually using a flavored cigarillo and past 30-day co-use (64.3%). Flavored cigarillo use was not significantly associated with past 30-day co-use (p=0.67), however, perceived harm (OR=1.18, 95% CI=1.05-1.34), number of smokers in the household (OR=1.40, 95% CI=1.11-1.76), and past 30-day use of other tobacco products (OR=2.00, 95% CI=1.49-2.68) were significant predictors of co-use. In addition, participants exposed to a flavored cigarillo ban had 31% (95% CI=11%-47%) lower odds of co-use than those not exposed. **Conclusions**: Flavor of cigarillos was not associated with co-use of cigarillos and cannabis in this study. However, exposure to a ban on flavors in cigarillos was associated with reduced odds of co-use. These findings may inform potential effects of tobacco regulatory measures on co-use with cannabis. Specifically, a product standard to ban flavors in cigars may reduce co-use with cannabis among young adults. Further research is needed to explore the interaction between tobacco and cannabis policy and use of these products.

FUNDING: Federal; FDA CTP

PS5-47

PUBLIC SUPPORT FOR ASSIGNING R-RATINGS TO MOVIES THAT DEPICT SMOKING: FINDINGS FROM THE 2020 HEALTH INFORMATION NATIONAL TRENDS SURVEY (HINTS)

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Significance: Research suggests a causal relationship between exposure to tobacco imagery in movies and youth tobacco initiation. Assigning such films an R-rating could reduce adolescent exposure to smoking in movies, thereby preventing tobacco use and averting future tobacco-related disease. Understanding public perceptions of tobacco-related movie policies can inform communication efforts to increase awareness of their benefits. Little is currently known about this topic, and given the potentially significant policy impact, efforts to examine population-level support for movie-specific tobacco policies are warranted. **Objective**: To assess the proportion of US adults who support, oppose, or are neutral toward an R-rating policy for movies depicting smoking, and to identify predictors of policy opposition/neutrality in a nationally representative sample of US adults. **Methods**: Data from HINTS 5 Cycle 4 (N=3,865) were analyzed to estimate the prevalence of support for or opposition to a policy that would require R-ratings for movies that depict smoking. Weighted, multivariable logistic regression was used to assess sociodemographic predictors of policy neutrality/opposition. **Results**: 47% of US adults supported the policy, nearly 20% opposed, and 30% were neutral. Compared to those aged 18-34, older adults had lower odds of being opposed or neutral: ages 50-64 (OR: 0.56; 95% CI:0.35, 0.87), 65-74 (OR: 0.39; 95% CI: 0.24, 0.64), and 75+ (OR: 0.27; 95%CI: 0.16, 0.45). Non-Hispanic Asian individuals had lower odds of being opposed or neutral compared to non-Hispanic Whites (OR: 0.46; 95% CI: 0.25, 0.84). Those specifying Other sexual orientation (vs. heterosexual) had higher odds of being neutral or opposed (OR: 2.43; 95% CI: 1.03, 5.75). Policy support did not differ by smoking status, e-cigarette use, sex, education, income, or political viewpoint. **Conclusions**: The relatively low levels of support for the R-rating policy suggest that efforts are needed to raise awareness of the benefits of such a policy for reducing adolescent initiation of tobacco use. Given differential policy support among groups, continued and targeted efforts are needed to educate the public of the value of policies to protect adolescent health.

PS5-48

CONCEPT DESCRIPTORS ON IQOS HEETS IN MEXICO

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Background Flavored cigarette use is high in Mexico, including among youth. Flavors are communicated via colorful cigarette packs, flavor capsule imagery, and concept descriptors (usually in English), influencing consumers' perception of harm and appeal. However, little is known about how flavor is communicated on packaging for other tobacco products, such as sticks used with heated tobacco products (HTPs). We describe the availability and packaging characteristics of heated tobacco sticks in Mexico. **Methods** The Tobacco Pack Surveillance System (TPackSS) systematically purchases unique tobacco packs in low- and middle-income countries. In October/November 2021, we collected heated tobacco sticks in 12 low, middle, and high socioeconomic areas within Mexico City, Guadalajara, Leon, Durango and Merida. The team visited vendors within a selected area in search of unique packs and completed an observational checklist noting if stores sold heated tobacco sticks; where available, all unique packs of heated tobacco sticks were purchased. **Results** Across all cities, we visited 117 stores. Heated tobacco sticks were observed in 5 stores in middle and high socioeconomic areas and were found in all cities except for Durango. In total, 9 unique heated tobacco stick packs were purchased across 3 stores; all packs were from the brand HEETS, presented concept descriptors in English (e.g., Russet Selection, Sienna Selection, Purple Wave, and Green Zing), which had different font colors. Mexican health warning labels (HWLs) were present on all packs. **Conclusion** IQOS Heets are communicating a flavor, taste or sensation via packaging similar to cigarettes in Mexico. Considering Mexico's prominent market of flavored cigarettes, which includes multiple flavor capsules in one pack, the availability of new tobacco products with a range of concept descriptors might appeal to new consumers, such as youth. HTPs have yet to be clearly regulated in Mexico. Current packaging regulations are not applicable to HTPs, despite the voluntary addition of HWLs. Moreover, to the extent that concept descriptors are still allowed on tobacco products overall, youth's interest in tobacco products might persist. **Funding** This work was supported with funding from Bloomberg Philanthropies' Bloomberg Initiative to Reduce Tobacco Use (bloomberg.org).

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PS5-49

CUMULATIVE E-CIGARETTE DISCOUNT COUPON EXPOSURE AND TRAJECTORIES OF E-CIGARETTE USE IN U.S. ADULTS

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Introduction: While e-cigarettes may be less harmful than cigarettes, they may cause respiratory illnesses, nicotine addiction, and combustible tobacco use. Cigarette discount coupons influence cigarette smoking behaviors; less is known about e-cigarette coupon exposure and subsequent e-cigarette use. This prospective study examined whether cumulative e-cigarette coupon exposure is associated with e-cigarette use initiation, cessation, and relapse among US adults. **Methods:** We analyzed data from a nationally representative cohort of US adults (N=19,824) in Waves 2-5 surveys of the Population Assessment of Tobacco Health (PATH) Study from 2013 to 2018. In Waves 2-4, participants reported whether they received coupons/promotions for e-cigarettes during the previous year (0-3 years). In Waves 2 and 5, e-cigarette use status (never e-cigarette user; current e-cigarette non-daily user; current e-cigarette user; former e-cigarette user) was assessed. Multiple logistic regressions were used to examine the weighted associations of number of years exposed to e-cigarette coupons with e-cigarette use behaviors, adjusted for demographics at Wave 2. **Results:** Overall, 8.0%, 1.7%, and 0.4% of US adults received e-cigarette coupons for 1, 2, and 3 years, respectively. At Wave 2, 81.5%, 12.9%, 4.1%, and 1.5% of them were never, former, current non-daily and current daily e-cigarette users. Among adults who had never used e-cigarettes at Wave 2, each year increment of exposure to e-cigarette coupons was

associated with greater odds of currently using e-cigarettes at Wave 5 (Adjusted Odds Ratio [aOR]=1.42, 95% Confidence Intervals [CI]= 1.14–1.77). Among e-cigarette users at Wave 2, each year increment of e-cigarette coupon exposure predicted lower odds of quitting e-cigarette use by Wave 5 (aOR=0.74, 95% CI=0.63–0.87). Among former e-cigarette users at Wave 2, each year increment of e-cigarette coupon exposure predicted greater odds of having relapsed to e-cigarette use by Wave 5 (aOR=1.36, 95% CI=1.12–1.66). **Conclusions:** E-cigarette coupon marketing promotes e-cigarette use initiation and relapse while hindering cessation in a dose-response relationship.

FUNDING: Federal

PS5-50

ACHIEVING A TOBACCO-FREE POLICY AT RUTGERS, THE STATE UNIVERSITY OF NEW JERSEY

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SIGNIFICANCE: Almost 100% of adult cigarette smokers first start smoking before age 26. Colleges and universities that have comprehensive tobacco-free policies have effective tools in place to reduce exposure and intention to smoke on campus. A complete tobacco-free policy is likely to promote community health by reducing initiation, reducing secondhand smoke exposure, increasing cessation, and protecting the environment. This abstract described a successful campaign to achieve a 100% tobacco-free policy for Rutgers University, a Big Ten institution with four campuses and more than 90,000 students, faculty, and staff. **METHODS:** The following strategies were employed to understand the current tobacco product landscape on campus: 1) Two surveys were launched to assess faculty/staff and student attitudes and behaviors surrounding tobacco use; and 2) a university-wide environmental scan examined the physical presence of smoking urns and signage. Student leaders also conducted outreach and engagement activities both virtually and in-person to build support and awareness for the campaign. Two parallel tracks were used to support the policy amendment. We engaged with the University Senate that makes policy recommendations to the Office of the President and simultaneously, student leaders presented findings from data collection to University leadership. **RESULTS:** The Senate created a committee to investigate potential benefits and downsides related to adopting a tobacco-free policy. Concerns included: defining campus boundaries, fair and equitable application among faculty, staff, and students, safety, and overall freedom. Deliberations prepared campaign and student leaders to win support of both the Senate and University leadership for a 100% tobacco-free policy. **CONCLUSION:** Given the size and geography of Rutgers University, complimentary strategies were necessary to gain support for a 100% tobacco-free policy amendment and guarantee resources for a professional communication campaign leading to implementation. This protocol could inform other academic institutions on how to engage in institutional level policy change.

FUNDING: Nonprofit grant funding entity

PS5-51

LEVERAGING IMPLEMENTATION SCIENCE FRAMEWORKS TO GUIDE THE EXPANSION OF TOBACCO TREATMENT FOR CANCER PATIENTS

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Significance: Although unequivocal evidence abounds for the value of evidence-based tobacco treatment programs (TTP) for oncology patients, broad implementation of tobacco treatment as part of standard care is limited. Implementation Science(IS) frameworks address both the barriers and facilitators to scale evidence-based programs in clinical settings. Through a competitive grant provided through NCI's Cancer Center Cessation Initiative (C3I), we expanded our fledgling TTP to **all** cancer patients who were current smokers or recently quit. Over six months, a multi-disciplinary team of tobacco specialists, clinicians, behavioral researchers, and informatics teams built an automated and systematic program including an EMR driven tobacco registry, case management system for programmatic data and patient follow-up, collaborative teams across the institution to provide cessation services and training/education for all clinical and non-clinical staff. **Methods:** Two data sources were used for the IS evaluation, including an analysis of detailed planning meeting notes using IS frameworks (Saldana's Stages of Implementation and the Consolidated Framework for Implementation Research (CFIR)) and a pre-implementation clinician survey. Detailed meeting notes were entered in a spreadsheet and coded using the CFIR domains and consensus reviewed by the research team. A clinician survey was emailed throughout the cancer center to identify key barriers to implementation. **Results:** Within the innovation domain, adaptability and complexity were most frequently cited. For example, EMR changes to collect appropriate smoking history required a system-wide change, not just for the cancer center which was considered a "heavy burden". Outer setting factors were favorable as indicated by importance of NCI funding. Inner setting issues focused on changing processes and staff training to improve consistent collection of smoking history, and process domain focused on the need for internal champions. The clinician survey showed over half were unaware that the TTP program existed and didn't know how to refer. **Conclusion:** Using IS frameworks to guide the planning process to broaden and disseminate the evidence-based TTP provided critical insights to address implementation barriers proactively and provides a road map for future expansion throughout the health system.

FUNDING: Federal; Academic Institution

PS5-52

PERCEPTIONS OF HARMFULNESS OF HEATED TOBACCO AND NICOTINE VAPING PRODUCTS COMPARED TO CIGARETTES AMONG ADULT SMOKERS IN KOREA FINDINGS FROM THE 2020 ITC KOREA SURVEY

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Significance: The global tobacco landscape has changed dramatically in the last decade with the emergence of non-combustible alternative nicotine products (ANDS), including nicotine vaping products (NVPs) and heated tobacco products (HTPs). A key factor in the use of ANDS is the perception that they are less harmful than cigarettes. As both NVPs and HTPs are legal in the Republic of Korea, but messaging about relative risks differ between industry and government, there is a need to understand how smokers perceive these products relative to cigarettes. This study examined Korean smokers' harm perceptions of NVPs and HTPs relative to cigarettes, and whether these relative harm perceptions differed among exclusive smokers, dual users (NVPs-cigarettes and HTPs-cigarettes), and triple users (NVPs, HTPs and cigarettes). **Methods:** Data were from the 2020 ITC Korea Survey: 3713 adult (19+ yrs) cigarette smokers (≥ weekly), of whom 1845 (50%) were exclusive smokers, 1130 (30%) were HTP-cigarette dual users, 224 (6%) were NVP-cigarette dual users, and 514 (14%) were triple users. The outcome measure assessed the relative risk of ANDS compared to cigarettes: 'less harmful' vs. 'not less harmful'. Adjusted logistic regression models were conducted using weighted data. **Results:** Less than half of smokers (28%) perceived HTPs to be less harmful than cigarettes, and exclusive cigarette smokers were less likely to believe this (18%) than HTP-cigarette dual users (35%), NVP-cigarette dual users (35%), and triple users (38%); all $p<0.001$. With respect to the relative harmfulness of NVPs, 29% of smokers perceived NVPs to be less harmful, with exclusive smokers being less likely to believe this (17%) than were NVP-cigarette dual users (24%), HTP-cigarette dual users (47%), and triple users (34%); all $p<0.001$. **Conclusions:** Our findings demonstrate that Korean smokers who use ANDS are more likely to hold the belief that they are less harmful than cigarettes relative to exclusive smokers. However, further investigation is required to determine the reasons for using ANDS while continuing to smoke, as dual or poly use would reduce or nullify their harm reduction potential.

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PS5-53

ASSOCIATIONS BETWEEN STATEWIDE TOBACCO 21 POLICY AND TOBACCO USE BEHAVIORS AMONG YOUTH AND ADULTS IN THE UNITED STATES: FINDINGS FROM THE PATH STUDY 2018/2019

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Significance: In 2018/19, 17 states in the US had implemented Tobacco 21 (T21) policy, making age 21 the legal age to purchase tobacco. T21 should be evaluated in terms of its associations with tobacco use prevalence among those aged 18-20 compared to other age groups. We examined associations between statewide T21 policy and tobacco use prevalence in the US in 2018/2019. **Methods**: Data from the Population Assessment of Tobacco and Health (PATH) Study were used. Past 30-day use of cigarettes, e-cigarettes, and cigars was assessed. Presence/absence of statewide T21 policy in 2018/19 (wave 5) was determined. Three age groups were used: Ages (1) 12-17; (2) 18-20; and (3) 21-24. The Rao-Scott chi-square tests were conducted to examine associations between statewide T21 policy and past 30-day use of cigarettes, e-cigarettes, and cigars, stratified by age. Analyses were weighted to be nationally representative and were run on the PATH Wave 5 Restricted Use Files. Results shown here were released from NAHDAP/ICPSR on 10/20/2021. **Results**: Findings indicate that states with T21 policy had lower cigarette use prevalence than states without across all age groups: Ages 12-17 (1.6% vs. 2.9%), ages 18-20 (12.1% vs. 16.7%) and ages 21-24 (18.9% vs. 22.6%). However, findings also indicate that states with T21 policy had lower e-cigarette and cigar use prevalence than states without T21 policy only among ages 12-17 (7.7% vs. 9.4% for e-cigarettes; 0.6% vs. 0.9% for cigars) and ages 18-20 (27.4% vs. 32.1% for e-cigarettes; 9.4% vs. 11.5% for cigars), whereas no T21 policy differences in e-cigarette or cigar use prevalence were found among ages 21-24, who were not subject to T21 policy. **Conclusion**: E-cigarette and cigar use prevalence were lower in states with T21 policy vs. without only for those aged 12-17 and 18-20, consistent with there being a T21-specific difference in prevalence of use for these products. Findings will be examined longitudinally by taking state-level pre-/post-T21 policy conditions and other statewide tobacco regulatory policies (e.g., comprehensive smoke-free laws or cigarette taxation) into account. **Funding**: This research was supported by the National Institute on Drug Abuse of the National Institutes of Health under Award Number R21DA053614-01. The content is solely the responsibility of the authors and does not necessarily represent the official views of the National Institutes of Health. **Ethical approval**: The research reported here was approved by the Roswell Park Institutional Review Board.

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PS5-54

EXAMINING THE EFFECT OF VERY LOW NICOTINE CONTENT CIGARETTES ON WEIGHT AMONG VULNERABLE POPULATIONS

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Significance: There is a pharmacological effect of nicotine on weight, such that reductions in nicotine exposure lead to weight gain. Weight gain may be an unintended consequence of a nicotine reduction policy. To our knowledge, two studies have examined the relationship between very low nicotine content cigarettes (VLNCs) and weight; in these studies with general-population smokers, weight gain was observed in smokers adherent to VLNCs. The aim of this study is to examine associations between VLNCs and weight among vulnerable populations. **Methods:** This is a secondary analysis of a double-blind, randomized controlled trial evaluating the effects of VLNCs among individuals (n=775) from three vulnerable populations: smokers with affective disorders (n=258), opioid use disorder (OUD; n=260), or disadvantaged women (n=257). Participants were assigned to smoke one of three research cigarettes (15.8, 2.4, 0.4-mg/g) over 12-weeks in lieu of their usual brand. Preliminary analyses indicated that biomarker levels did not differ considerably by cigarette dose among smokers with OUD, suggesting this population was less adherent. Thus, linear mixed models were run to examine differences in weight change over time by cigarette dose, grouping smokers with affective disorders and disadvantaged women together and examining smokers with OUD separately. **Results:** Among participants with affective disorders and disadvantaged women, there was a graded effect of dose on weight, with the 0.4-mg/g condition having the highest average weight gain, then the 2.4-mg/g condition, followed by the 15.8-mg/g condition, although only the comparison between the 0.4 and 15.8-mg/g conditions was statistically significant (3.1 vs. 1.7 lbs, p=.01). Among smokers with OUD, we found no effect of cigarette dose or time on weight change. **Conclusion:** Consistent with observations in the general population, smokers with affective disorders and disadvantaged women gained weight when smoking VLNCs. However, the amount of weight gained does not meet a commonly accepted definition of clinically significant weight change (i.e., > 5% baseline weight). These findings are reassuring and suggest few, if any, adverse consequences of implementing a nicotine reduction policy with regard to weight.

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PS5-55

TOBACCO CESSATION TREATMENT TRAINING AND EVALUATION AMONG MEDICAL TRAINEES: AN ONGOING GAP

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Significance: Tobacco use is undertreated in the medical setting. One driver of this may be inadequate tobacco dependence treatment training (TDTT) for clinicians in specialties treating tobacco-dependent patients. Objectives: To evaluate current TDTT for medical trainees and how these skills are assessed in credentialing exams. Methods: The American Thoracic Society (ATS) Tobacco Action Committee convened a multidisciplinary subcommittee charged with improving TDTT. We performed a focused literature review of current TDTT exposure and reported accreditation exam contents around tobacco and tobacco dependence treatment. Our review primarily focused on clinicians served by the ATS and those whose practices comprise a large proportion of patients impacted by tobacco use. Results: Among medical students, participants in reviewed studies reported anywhere between forty-five minutes to three hours of TDTT included throughout their four-year programs, most often in the form of didactic sessions. Similarly, little TDTT was reported at the post-graduate (residency, fellowship, continuing medical education) levels, even for specialties and practices (e.g. pulmonary medicine) that heavily treat patients affected by smoking-related diseases. Training reported was typically delivered as time-based (expected hours of instruction) rather than competency-based (demonstration of mastery) learning. Knowledge of tobacco dependence treatment is also minimally evaluated on certification exams. The United States Medical Licensing Exam, taken by most graduating medical students, includes 'tobacco' as a subset of several topics on its blueprint, but does not explicitly mention treatment. The American Board of Internal Medicine blueprint lists tobacco treatment as less than two percent of one subtopic on both the pulmonary and internal medicine exams. Similarly, the American Board of Surgery In-Training Exam, North American Pharmacist Licensure Exam, and National Council Licensure Exam report very limited content on tobacco and tobacco dependence treatment. Conclusion: Although tobacco use and dependency is a global public health threat, TDTT for many clinicians is minimal, does not assess competency, and is minimally evaluated on certification exams. Effective, competency-based tobacco dependence treatment training should be integrated into medical education at all levels, with attention paid to inclusion on subsequent certifying exams. *indicates co-senior authors

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PS5-56

CANADA'S EXPERIENCE IN BANNING MENTHOL AND OTHER FLAVOURS FROM TOBACCO PRODUCTS

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Objective: To explore the history of how Canada was able to implement tobacco flavour bans including menthol and to relay this experience and recommendations to other jurisdictions. **Background:** Measures to ban or restrict menthol and other flavours in tobacco products are under consideration or recently implemented in an increasing number of jurisdictions across the world. As one of the world leaders,

Canada's experience in successfully developing and implementing such measures can be instructive for other jurisdictions. **Methods:** This study explores the history of how Canada was able to implement tobacco flavour bans including menthol and examines some of the opportunities, challenges, and lessons learned for other jurisdictions. **Results:** The crucial motivation for these bans emerged from surveillance data showing high rates of flavoured tobacco use by youth, including menthol cigarette smoking, that was publicized by nongovernmental organizations. Further data showed that early legislation in 2010 contained loopholes (exemptions for menthol and for cigars weighing more than 1.4 grams) that limited the benefits of the legislation. Leadership by several provinces which banned menthol flavoured tobacco products between 2015 and 2017 created an environment that contributed to the implementation of a federal ban on menthol ingredients in 2017. **Conclusions:** A number of lessons can be drawn from the Canadian experience that can be transferred to other jurisdictions. While the situation in Canada has many unique characteristics, there are some elements that can be applicable broadly based on this experience. In Canada, provincial legislation made up for policy shortcomings in the initial national legislation in effect in 2010, and later paved the way for strengthening national amendments. Bans on flavoured tobacco, including menthol cigarettes, were implemented with no credible indication of an increase in contraband sales volumes, despite the pre-existing substantial availability of contraband products in the two largest population provinces. **Significance:** Canada was the first country to implement a partial ban on flavoured tobacco products in 2010 followed by a national ban on menthol ingredients in 2017. This study reviews the opportunities and challenges involved and it provides lessons and recommendations to other countries that are exploring flavoured tobacco bans.

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PS5-57

QUANTITATIVE COMPARISON OF EMISSIONS FROM ENDS

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Significance: This study introduces an unbiased approach to comparing emissions from Electronic Nicotine Delivery Systems (ENDS), demonstrated using thirteen pen- and pod-style ENDS products. **Methods:** An emissions regression model is applied to each product individually. The maximal response from each product analysis is used as input to a meta-analysis conducted between tobacco products. **Results:** A three-dimensional emissions response surface is provided to quantify emissions (Total Particulate Matter, TPM, and nicotine) from each of 13 ENDS. Results demonstrate that emissions vary as a function of puff duration, flow rate, E-Liquid composition, and device operating power. Results illustrate that desired public health outcomes may not be achieved by regulating design characteristics of ENDS consumables. It is feasible and effective to directly regulate maximum permissible emissions (TPM, nicotine and HPHC yield) from ENDS. TPM yield per puff, TPM mass concentration, and nicotine mass ratio are proposed for standardized reporting. **Conclusions:** The approach was demonstrated to compare maximal emissions from ENDS products spanning their entire operating envelope and evaluate ENDS device/consumable design characteristics as potential regulatory parameters. A product emissions dashboard is proposed enabling consumers to evaluate the relative exposure potential between ENDS. Maximum nominal power dissipated in the ENDS coil shows promise as an effective regulated product design characteristic.

FUNDING: Federal; Academic Institution; FDA CTP

PS5-58

"I KNOW THAT MY MOD HAS DIFFERENT COLORS AND DIFFERENT TYPES OF DESIGNS THAT YOU CAN PICK FROM": A FOCUS GROUP STUDY OF GENERAL REASONS/DEVICE SPECIFIC FOR ELECTRONIC NICOTINE DELIVERY SYSTEMS (ENDS)

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Significance: A scientific consensus on the public health impact of electronic nicotine delivery systems (ENDS) remains elusive. Part of this is due to the wide variation in products characteristics often lumped together under this product category. Research is needed to better understand what ENDS device type characteristics motivate their use by adults. **Methods**: Nine focus groups of 32 current ENDS users who were 18+ years old, had used ENDS in the previous 30 days, and had been using ENDS for more than two months were held either in person or online between February and June 2020. **Results**: Participants' reasons for their choice of ENDS characteristics included both general, applying to all ENDS products, and specific to particular ENDS characteristics. Health benefits and lack of offensive odor were commonly identified as important reasons for the use of ENDS in general. Flavor and product discreteness were both general and device-specific determinants of ENDS use. Conversely, nicotine delivery, cloud size, battery properties, aesthetics, ease of use, and cost were device-specific drivers of participant' s choice.**Conclusions:** The reasons that adults chose to use NDS are complex and sometimes related to both ENDS as a category and as specific ENDS types. Regulations and public communication campaigns should consider both general and specific motivations when attempting to achieve public health objectives.

FUNDING: Federal; Academic Institution; Marijuana Company; Nonprofit grant funding entity

PS5-59

EFFECTIVENESS OF NICOTINE REPLACEMENT THERAPY SAMPLE FOR SMOKERS' RECRUITMENT AND QUIT ATTEMPTS: A CLUSTER RANDOMIZED CONTROLLED TRIAL

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Background and aims Nicotine replacement therapy (NRT) sampling is effective to increase the use of smoking cessation services and tobacco abstinence in primary care settings. This study examined this strategy's effect on smokers' recruitment and cessation outcomes when it was applied at outdoor smoking hotspots. **Design** A pragmatic two-arm cluster-randomized trial. **Setting** Outdoor smoking hotspots in Hong Kong. **Participants** Daily cigarette smokers (n=834; 81.3% male). **Interventions** Participants were cluster-randomized to receive 1-week free NRT sampling and brief cessation counseling (experimental, n=482) or brief cessation counseling only (control, n=352). **Measurements** Recruitment outcomes included the number of smokers who were approached, received brief advice, received nurses' onsite counseling, screened for the RCT eligibility, and enrolled in the RCT study. The primary outcomes were self-reported use of cessation services and any quit attempt at 1-month post-enrolment. Secondary outcomes included any quit attempt at 3-month post-enrollment, use of NRT in the past month at 1- and 3-month follow-up, self-reported and biochemically validated abstinence at 6-month. The outcome assessors were blinded to group assignment. **Results** By intention to treat, the NRT sample significantly attracted more participants to receive nurses' onsite counseling (Adjusted incident rate ratio=1.35, 95%CI, 1.12-1.62, p<0.01). Group differences in other recruitment outcomes were not significant. The two trial groups showed similar quit attempts (RR (risk ratio) =1.02 and 0.90 at the 1-, and 3-month follow-up, respectively, all p-values > 0.05), but the experimental group reported lower use of cessation service (RR=0.72, and 0.85 at the 1-, and 3-month follow-up, respectively, respectively, all p-value < 0.05). Tobacco abstinence at 6-month was similar in both groups. At 1-month follow-up, in the experimental group who received the NRT sample, 51.7% had ever used the NRT sample and 34.1% completed the full course of NRT samples. At 1-month follow-up, no significant group difference in the use of any NRT in the past month was detected (39.8% and 34.4%, p>0.05). **Conclusion** Delivery of NRT samples at outdoor smoking hotspots increased uptake of onsite nurses' brief counseling. This strategy reduced enrolment of smoking cessation services, but it did not alter quit attempts and long-term tobacco abstinence.

FUNDING: Other: Health and Medical Research Fun, Health Care and Promotion Scheme

PS5-60

SMOKING CESSATION PREVALENCE BY MENTHOL CIGARETTE USE, RACE/ETHNICITY, AND SEX AMONG ADULTS IN THE UNITED STATES, TUS-CPS, 2003-2019

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Significance: Menthol cigarette smokers, particularly non-Hispanic Black smokers, are less likely to achieve successful smoking cessation. This project examined trends in cigarette smoking cessation among US adult smokers from 2003-2019 and assessed cessation cross-sectional trends by menthol cigarette smoking status, race/ethnicity, and sex. **Methods**: We analyzed the 2003-2019 Tobacco Use Supplement to the Current Population Survey (TUS-CPS) harmonized data to estimate prevalence of smoking cessation by menthol status at the time of quitting, stratified by race/ethnicity and sex. The analytic sample included all respondents who smoked for at least two years (i.e., both current smokers and former smokers who reported quitting during the past year). Joinpoint regression models were used to estimate annual percent change (APC) by smoking cessation overall, and menthol cigarette smoking status stratified by race/ethnicity and sex. **Results**: The prevalence of non-menthol smoking cessation remained stable (APC=0.7%; 95% CI:-1.1, 2.4) from 2003-2019. The prevalence of menthol smoking cessation significantly increased from 1.3% in 2003 to 2.5% in the 2018/2019 wave (APC=5.2%; 95% CI: 2.4, 8.1) overall and increased for both sexes (male, APC=6.1%; 95% CI: 3.2, 9.0; female, APC=4.4%; 95% CI: 1.4, 7.4) broadly. Menthol smoking cessation significantly increased for non-Hispanic White smokers (APC=4.9%; 95% CI: 2.2, 7.5) but remained stable for non-Hispanic Black smokers (APC=2.4; 95% CI: -0.3, 5.2) from 2003-2019. **Conclusions**: Increases in cigarette smoking cessation were not observed for non-menthol smokers; however, increases were observed for menthol smokers, overall and for both sexes. Increases in menthol smoking cessation were observed for non-Hispanic White smokers but not for non-Hispanic Black menthol smokers. **Implications**: Menthol smoking cessation is increasing overall, for both sexes, and for non-Hispanic White adults but remains low and stable for non-Hispanic Black adults, who overwhelmingly use menthol cigarettes. Efforts are needed to explore differences in urban/rural residence among non-Hispanic Black adults and target cessation in this group. **Disclaimer**: The views and opinions expressed in this abstract are those of the authors only and do not necessarily represent the views, official policy or position of the U.S. Department of Health and Human Services or any of its affiliated institutions or agencies.

FUNDING: Federal; FDA CTP

PS5-61

CHANGES AFTER COVID-19 AMONG PEOPLE WHO SMOKE CIGARETTES

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Introduction: The effect of COVID-19 on cigarette smoking rates, and the attitudes of smokers towards vaccination remains unclear in the US. The aim of this study is to assess adult tobacco users' attitudes towards receiving the COVID-19 vaccine along with changes in their tobacco use behavior. In particular, we examined cigarettes per day (CPD), smoking rates and beliefs, attitudes toward vaccines, and intent to vaccinate. **Methods:** From April 2019 - March 2020, 248 adult cigarette smokers in a large Southeastern city were recruited to join a study registry via advertising on Craigslist, newspapers, Internet forums, and flyers. The current study involved a follow-up survey conducted from June-July 2021. Participants were sent a follow up survey to assess changes in cigarette smoking from their initial screening survey as well as attitudes and intentions towards receiving the COVID-19 vaccine. **Results:** From the 248 initial participants, 19 responded to the follow up survey. Independent sample t-test and chi-square showed responders did not significantly differ from non- responders in age, p= .42), cigarettes per day (p = .22), and race (p = .24). However, they were more likely to be female, 63.2% vs. 36.5%, (p =.02). A paired t-test showed there was a significant reduction in cigarette smoking among respondents (pre-pandemic M=14.2 CPD, SD = 6.6 to present-day 11.0 CPD, SD = 9.2, p= .04). A qualitative assessment showed reasons for this reduction included decreased access to cigarettes and beliefs that COVID-19 might negatively impact health. Additionally, 57.1% of respondents were unwilling or against getting the COVID-19 vaccine. If the COVID-19 vaccine was available, 50.0% of respondents would never get it or avoid getting it for as long as possible. Amongst those who held negative attitudes, 83.3% chose not to get vaccinated. **Conclusion**: Participants who completed the follow up survey showed a significant reduction in cigarette smoking since their pre COVID-19 survey. However, no participants quit smoking. Also, a majority of respondents had negative attitudes towards beings vaccinated against COVID-19 and were unwilling to receive a vaccine. Future research is needed to replicate results and understand how COVID concerns can help target vaccination efforts and reduce cigarette smoking.

FUNDING: Academic Institution

PS5-62

CIGARETTE SMOKING AND NICOTINE DEPENDENCE AMONG MALE OFFENDERS AT CORRECTIONAL CENTRES IN TSHWANE, SOUTH AFRICA

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Significance: Tobacco use dependence is driven by smokers' dependence on nicotine, an addictive drug. Inmates of correctional centres have been found to have a higher prevalence of smoking and a higher level of nicotine dependence. Support for smoking cessation within this setting is also low. This study sought to investigate loss of autonomy (LOA) due to nicotine dependence as well as quit attempts by male inmates who are due for release within 6 months at 6 correctional facilities in Tshwane metropolis, South Africa. **Methods**: The study used a quantitative cross-sectional design with a convenience sample of 160 participants. The questionnaire was self-administered and included questions on demographic information, lifetime and past month cigarette use, and the Hooked-on-Nicotine Checklist (HONC) which is used to assess LOA as a result of nicotine dependence. We used descriptive analyses to determine the sample characteristics, prevalence of smoking, and loss of autonomy due to nicotine dependence. **Results**: Of 160 participants in the study, 78.1% (n=125) reported being current smokers. Among current smokers, 78.6% (n=96) reported having made a previous attempt to quit smoking. About 58% (n=109) reported smoking less than 10 cigarettes per day. Median cigarettes smoked per day was 7 sticks (n=109; Mode= 20). Based on the HONC instrument, 95.2% (n=118) reported at least one symptom of LOA. About 77% of current smokers (n=96) reported 5 or more symptoms of LOA. The mean HONC score for the sample was 6.6 (SD=2.94). **Conclusion**: There was a high proportion of smokers in the correctional facilities. However, a high proportion of the smokers also reported a previous attempt to quit smoking. The majority of smokers reported symptoms of LOA. Despite this high prevalence of LOA, there is a possibility of a high reception of smoking cessation interventions in this population based on their previous attempts to quit smoking. Smoke free laws in prison settings may be beneficial to protect both inmates and workers from exposure to second-hand smoke.

FUNDING: Unfunded; Nonprofit grant funding entity

PS5-63

A MACHINE LEARNING APPROACH FOR DISCOVERING TOBACCO BRANDS, PRODUCTS, AND MANUFACTURERS IN THE UNITED STATES

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Significance: Thousands of independent tobacco companies market products in the US. The sheer number of brands, products, and manufacturers (BPM) associated with these companies make tracking BPMs in the US tobacco marketplace challenging. Our goal was to develop a strategy to discover BPMs in the US, not yet measured by other data sources. **Methods:** First we created a seed list (N=91) of ENDS product and brands compiled from several sources (e.g., academic publications, survey results). Second, we compiled roughly 3 million public posts on Reddit (a social media site with 52 million daily active users) spanning 28 forums (or subreddits) such as r/vaping between January 2009 and April 2020. Third we applied word embeddings, a machine learning method, to discover names of potential ENDS related BPMs by locating words used in a similar way on Reddit with the seed list of ENDS products (e.g., "*Juul* is my new fave vape" vs "*Myle* is the best vape"). Fourth, we investigated each of the discovered words to evaluate if they are ENDS related and, if so, whether they are ENDS related brands, products, or manufacturers. We define brands as titles which a specific product

is sold under and products as unique identifying products for the brand. **Results**: We qualitatively reviewed 1,800 words most similar to our seed list of ENDS products with an interactive process of searching for the term online and studying its use in our data. With adequate reliability between coders, we found over 1,380 new terms were ENDS related BPMs; 577 were brands, 477 were products, and 327 were manufacturers. The remainder were unrelated products (e.g., CBD vapes), product synonyms, or slang (e.g., Juul vs. juuls). **Conclusions:** Practitioners may investigate the utility and limitations of incorporating this approach into an applied system to discover BPMs, such as new tobacco products from social media or any text data. This work can inform surveillance of the tobacco product marketplace.

FUNDING: Federal; Academic Institution; Nonprofit grant funding entity; FDA CTP

PS5-64

QUITTING SMOKING DURING THE COVID-19 PANDEMIC: A CALL FOR TOBACCO CONTROL READINESS

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Significance. Use of tobacco products may increase the risk of severe illness from coronavirus disease (COVID-19), an acute infectious respiratory illness first reported in December 2019. Little is known about the interest to quit tobacco and the methods used among adults during the COVID-19 pandemic. This study investigated the interest in quitting among adult users, the methods used to help with quitting during the pandemic, and an inquiry about ways public health professionals and others could provide support for quitting smoking during the pandemic. Methods. Participants were from a convenience sample of adult tobacco users from a registry maintained by the Penn State Center for Research on Tobacco and Health. We used Research Electronic Data Capture (REDCap) to send survey invitations via email to collect data in April 2021. We assessed demographics, tobacco use history, and participants' attempts to quit prior to and during the pandemic. An open-ended question solicited suggestions from participants on ways to improve quitting assistance from public health professionals and other stakeholders. Results. Overall, 168 participants responded to the survey and were 35.6% male, 88.7% White, 3.6% Hispanic, and a mean age of 47.0 (SD 11.8) years. Since the start of the pandemic, 39.3% (n=66/168) of participants reported a quit attempt, with 34.4% (n=22/66) of those reporting their motivation to quit was to reduce COVID-19 risks. Among those who attempted to quit, 45.5% (n=30/66) reported using nicotine replacement therapy (NRT). Participants expressed the need for improved access and cost of treatment along with support to encourage quitting from public health professionals and stakeholders. Conclusion. Adults were interested in quitting tobacco during the pandemic and most adults used NRT to quit. Feedback from participants suggests more support is needed to increase access to smoking cessation services at a lower cost. More support is needed to encourage those who smoke to quit.

FUNDING: Federal

PS5-65

USABILITY TESTING OF A SMARTPHONE APP FOR PREGNANCY SMOKING CESSATION WITH PEER SUPPORT

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Significance: In the context of increasing smartphone ownership worldwide, there are very few pregnancy-specific smoking cessation mobile apps. We report on the usability of the Smoke-Free Together 2.0 (SFT 2.0), an app for pregnancy smoking cessation with peer support.Methods: We conducted moderated and unmoderated usability testing (UT) with nine pregnant women and two nominated peer supporters recruited through Facebook Ads in November and December 2021. The moderated UT procedure included a one-hour, 10-item think-aloud protocol, a semi-structured debriefing interview, and the System Usability Scale (SUS). For the unmoderated UT, Smartlook was used to record the screens of the users while they navigated the SFT 2.0 app for two weeks. Users were later invited to participate in an exit interview and to fill out the SUS. Data was triangulated to identify usability issues. Results: Mean age of app users was 30.67 (SD=3.20; range=27-35) for the pregnant women and 36 (SD=9.89; range=29-43) for peer supporters. Among women, 80% were daily smokers. Women preferred for the information in the app to be presented gradually (vs. all information to be available from the beginning), to have access to step-by-steps plans for quitting, to be able to view their progress towards quitting and to have access to more testimonials of women who were successful quitters. Peer supporters mentioned the need for activities that will help them put in practice the information learned from the app. The 742 minutes of Smartlook screen recordings revealed mostly technical errors (i.e. repeated taps on items) and the fact that it might be difficult for some women to grasp the role of dyad activities suggested by the app. The mean SUS score was 87 (SD=18.46; range=52.5-100) for pregnant women and 92.5% (SD=3.53; range=90-95) for peer supporters using the SFT 2.0 app, indicating high usability. Conclusion: Data suggests that the SFT2.0 app has good levels of usability and high acceptability among smoker pregnant users and their peer supporters. Our findings will improve the SFT 2.0 app and have the potential to inform the development of future pregnancy smoking cessation apps.

FUNDING: Federal

PS5-66

MULTIPLE TOBACCO PRODUCT USE AMONG YOUTH E-CIGARETTE USERS: NATIONAL YOUTH TOBACCO SURVEY (NYTS), 2020

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Significance: Limited information exists on multiple tobacco product use, particularly among youth. This study assessed the prevalence of current youth use of e-cigarettes with other tobacco products and their associated characteristics using 2020 National Youth Tobacco Survey (NYTS) data. **Methods:** Prevalence estimates were calculated for current users of e-cigarettes, by multiple product use status and product combination. Demographic characteristics, e-cigarette use behaviors, age at first use, and tobacco dependence symptoms were compared between current e-cigarette users who used combustible tobacco and current exclusive e-cigarette users. **Results:** In 2020, 61.1% (95% CI: 56.7%-65.3%) of all current e-cigarette users reported exclusive use of e-cigarettes and 38.9% (95% CI: 34.7%-43.3%) used e-cigarettes with other tobacco products. Among those who use e-cigarettes with other tobacco products, 85.0% (95% CI: 80.6%-88.5%) used combustible tobacco (cigarettes, cigars, hookah), with cigarettes (49.8%, 95% CI: 44.6%-55.0%) being the most commonly used other tobacco product. Compared to current exclusive e-cigarette users, higher proportions of current users of e-cigarettes and combustible tobacco reported: frequent e-cigarette use; obtaining e-cigarettes from gas stations, person other than a family member or friend, vape shops, or the internet; and having any tobacco dependence symptoms. Among current users of e-cigarettes and combustible tobacco, 34.5% started using these products at the same age, and 31.2% used their first combustible product after initiating e-cigarettes. **Conclusion:** Approximately 4 in 10 youth current e-cigarette users reported using multiple tobacco products, with a large majority using combustible tobacco. Frequent e-cigarette use and tobacco dependence symptoms were more prevalent among users of e-cigarettes and combustible tobacco; about one-third reported first combustible product use after e-cigarette initiation. Continued monitoring of multiple tobacco product use among youth is critical along with ongoing efforts to ensure sustained progress in preventing youth tobacco use.

FUNDING: Federal; Other: CDC; FDA CTP

PS5-67

TRENDS IN ELECTRONIC NICOTINE DELIVERY SYSTEM (ENDS) DEVICE TYPES USED BY US YOUTH AND ADULTS: FINDINGS FROM THE POPULATION ASSESSMENT OF TOBACCO AND HEALTH STUDY, 2013-2019

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Background: Little is known about the use of various electronic nicotine delivery system (ENDS) device types over time among youth and adults. This study examined the proportion of ENDS device types used by ENDS users in a nationally representative sample of US youth and adults from 2013 to 2019. **Methods:** We analyzed longitudinal data of the Population Assessment of Tobacco and Health (PATH) Study between Wave 1 (2013-2014) and Wave 5 (2018-2019). For each Wave, we calculated the weighted proportion of current ENDS users using major device types (i.e., disposable, refillable cartridge, nonrefillable cartridge, refillable tank, refillable mod, and replaceable prefilled cartridge (a new type measured in Wave 5 only)). Calculations were conducted among

youth (12-17 years), young adults (18-34 years), and older adults (>34 years). **Results:** Across all age groups, the proportion of current ENDS users using 3 device types (i.e., disposable, refillable and nonrefillable cartridge) decreased over time; refillable tanks became increasingly popular from Waves 1-4 but less popular in Wave 5. The proportion using refillable mod devices decreased in youth but increased among young and older adults. Among youth and young adults, refillable tank was the most popular type in Waves 1-4, but replaceable prefilled cartridge devices became most popular in Wave 5. Among older adults, nonrefillable cartridge devices were most popular in Wave 1, but refillable tank became the dominant type in later Waves. **Conclusions:** ENDS users of different ages exhibited various patterns of preferences for device types over time. Tobacco regulations and public health interventions that focus on addressing ENDS use need to consider device types.

FUNDING: Federal; FDA CTP

PS5-68

HOME TOBACCO SMOKE EXPOSURE STATUS AND SCHOOL SUCCESS AMONG U.S. CHILDREN

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Significance: Tobacco smoke exposure (TSE) among children is associated with many negative health consequences, but less is known about its association with school success. The objective of this study was to assess the associations of home TSE status with school success factors among U.S. school-aged children. Methods: A secondary analysis was conducted using data from 17,466 U.S. 6-11-year-olds who participated in the 2018-2019 National Survey of Children's Health. Children were categorized into three home TSE groups: child does not live with a smoker (no home TSE); child lives with a smoker who does not smoke inside the home (home THS exposure only); or child lives with a smoker who smokes inside the home (home SHS and THS exposure). Weighted adjusted ordinal and logistic regression models were built including the following covariates: child's age, sex, race/ethnicity; child's mental, emotional, developmental, or behavioral problem; parent education; family structure; and federal poverty level. Results: Concerning home TSE, 12.9% of children had home THS exposure only and 1.8% had home SHS and THS exposure. Ordinal regression model results indicated that children with home THS exposure only were 1.49 times more likely to miss more school days, compared to children with no home TSE (95%CI=1.23, 1.81). Additionally, relative to children with no home TSE, children with home THS exposure only were 1.76 times more likely to have more school-to-home contacts about child problems with school (95%CI=1.46, 2.12). Logistic regression model results indicated no differences between child home TSE status and history of repeating a school grade. Conclusion: Results suggest U.S. school-aged children with home THS exposure only were more likely to have an increased number of missed school days and school-to-home contacts about child problems with school. Prevention efforts are needed to reduce the current TSE trends to optimize school success among school-aged children.

FUNDING: Federal; FDA CTP

PS5-69

LUNG CANCER SCREENING PREFERENCES AND KNOWLEDGE AMONG OLDER, SCREEN-ELIGIBLE QUITLINE CALLERS

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SignificanceLung cancer screening (LCS) using low-dose CT is estimated to reduce lung cancer mortality by 20% compared to chest x-ray. Although the 2021 United States Preventive Services Task Force (USPSTF) guidelines broadened LCS eligibility criteria, screening rates are expected to remain low without interventions designed to improve LCS knowledge and awareness. In this trial we partnered with the Maryland Quitline (MQ) to compare the impact of two educational interventions on knowledge and awareness of LCS and the decision to undergo LCS among screen-eligible quitline callers. Here we report baseline characteristics, screening eligibility by race, and LCS-related knowledge and preferences. **Methods**Individuals with a long-term smoking history (20+ pack-years, age 50-80) and no prior lung cancer diagnosis or LCS within the past year who were seeking cessation treatment from the MQ were recruited. Participants completed a baseline interview with Georgetown University staff and were randomized to receive web- or print-based LCS information. **Results**Participants (N=243) averaged 61.7 years old (SD=6.6); 53.5% were Black, 63.8% were female, and 54.3% reported a HS degree/GED or lower. Participants reported smoking a median of 15 cigarettes per day; 90.1% reported smoking within the past 7 days. Overall, 8.6% of participants had a 20-29 pack-year history while 91.4% had 30+ pack-years. Under the 2021 USPSTF guidelines, 26.9% of Black participants vs. 13.7% of whites were newly eligible for LCS. Although only 28.0% of participants (N=68) had previously heard about LCS, 75.7% overall said they would get LCS and 91.0% said they probably/definitely would if their doctor recommended it. On a 9-item LCS knowledge measure, the mean score was 63.2% and was not associated with awareness of LCS. **Conclusion**Prior to the study's intervention, most participants had not heard of LCS but expressed a preference for getting screened. In a racially diverse sample, in which many were newly eligible for LCS per the 2021 guidelines, it will be important to provide information to screen-eligible quitline callers to bridge the gap between eligibility, LCS awareness, and screening completion.

FUNDING: Nonprofit grant funding entity

PS5-70

EXPOSURE TO SECOND-HAND AEROSOLS FROM ELECTRONIC CIGARETTES AT HOME: A REAL-LIFE STUDY IN FOUR EUROPEAN COUNTRIES

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Significance: Electronic cigarette (e-cigarette) use is known to emit toxicants and deteriorate outdoor and indoor air quality. Home is a place where e-cigarette users may frequently use their devices amid increasing prohibition of e-cigarette use in public places. This study aims to assess the real-life scenario of bystanders' exposure to second-hand e-cigarette aerosol (SHA) at home.**Methods:** A one-week observational study was conducted in Greece, Italy, Spain, and the United Kingdom within the TackSHS Project (www.tackshs.eu) including: 1) homes of e-cigarette users living together with a non-user/non-smoker; and 2) control homes with no smoker nor e-cigarette user. Indoor airborne nicotine and $PM_{2.5}$ concentrations were measured as environmental markers of SHA. Moreover, biomarkers, including nicotine and its metabolites, tobacco-specific nitrosamines, propanediol, glycerol, and metals in participants' saliva and urine samples were also measured. E-cigarette use characteristics, such as e-cigarette refill liquid's nicotine concentration, e-cigarette type, place of e-cigarette use at home, and frequency of ventilation, were also collected. A total of 29 e-cigarette users' homes and 21 control homes were included.**Results:** The concentrations of 7-day airborne nicotine were quantifiable in 21 (72.4%) out of 29 e-cigarette users' homes; with a median concentration of 0.01 µg/m^3, but significantly higher than those found in control homes (p=0.010). Concentrations of 7-day $PM_{2.5}$ in e-cigarette and control homes were similar. Airborne nicotine and $PM_{2.5}$ concentrations did not differ according to different e-cigarette use characteristics. Non-users/non-smokers residing with e-cigarette users had low but significantly higher concentrations of nicotine, cotinine, 3'-OH-cotinine, and 1,2-propanediol in saliva, and cobalt in urine than non-users/non-smokers living in control homes.**Conclusions:** E-cigarette use at home exposes bystanders to SHA regardless of the e-cigarettes' conditions of use. Smoke-free home rules should be extended to e-cigarettes in order to protect bystanders from any exposure to SHA.

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PS5-71

A CLOSER LOOK AT HOW CIGARETTE NICOTINE CONTENT, E-LIQUID NICOTINE CONTENT, AND E-LIQUID FLAVOR AVAILABILITY CONTRIBUTE TO CHOICES BETWEEN SMOKING AND VAPING: EVIDENCE FROM AN ONLINE DISCRETE CHOICE EXPERIMENT

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SIGNIFICANCE: Despite the availability of e-cigarettes and other non-combusted options, most nicotine consumers smoke cigarettes. Regulations aiming to lower the relative appeal of cigarettes might increase rates of switching and facilitate harm reduction. For instance, limiting cigarette nicotine content to very low levels may help minimize cigarette appeal. Separately, allowing for greater nicotine delivery and a wide variety of flavors in e-cigarettes may help maximize their appeal. Understanding how people weigh and prioritize these features when making choices between smoking and vaping can help us better anticipate how potential regulatory scenarios will affect nicotine use patterns. **METHODS**: Adults (21+) who reside in the US, smoke daily, and vape at least once a week were recruited via Amazon Mechanical Turk. To elicit preferences, each participant made 18 hypothetical choices between a cigarette and an e-cigarette, per complete enumeration of a 3 x 3 x 2 design (cigarette nicotine content: very low, low, or normal; e-liquid nicotine content: very low, low, or moderate; e-liquid flavor availability: tobacco/menthol, or tobacco/menthol/fruits/desserts). Estimated choice models were used to predict the probability a cigarette would be chosen over an e-cigarette under different combinations of product characteristics. **RESULTS**: Cigarette nicotine content and e-liquid nicotine content generally influenced choices more than e-liquid flavor availability. The estimated probability of preferring a cigarette over an e-cigarette was lowest when cigarette nicotine content was very low or low, and e-liquid nicotine content was moderate. However, latent class analyses indicated heterogeneity in choice patterns with respect to whether cigarettes or e-cigarettes were preferred, and whether product type or nicotine content was most important. Measures of dependence and harm perceptions varied across the identified subgroups. **CONCLUSIONS**: A marketplace with low nicotine content cigarettes and moderate nicotine e-cigarettes may be optimal for reducing smoking. However, the *extent* to which those conditions reduce smoking could differ widely across people who smoke.

FUNDING: Federal

PS5-72

USING THE NICOTELLINE/ANATALLINE RATIO TO DISTINGUISH BETWEEN EXCLUSIVE USERS OF DIFFERENT TOBACCO PRODUCTS

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Background- Biomarkers that are able to distinguish between types of tobacco product use are vital to track the impact of regulatory action and associated health effects. The goal of this study is to measure nicotelline and anatalline, minor tobacco alkaloids associated with tobacco smoke particulate matter, in urine biospecimens of exclusive cigarette, smokeless tobacco (SLT), and electronic nicotine delivery system (ENDS) users from Wave 1 of the Population Assessment of Tobacco and Health Study. We hypothesize that the anatalline/nicotelline ratio will distinguish between different types of tobacco product use.Methods- Quantified nicotelline and anatalline in urine samples by liquid chromatography tandem mass spectrometry. Compared levels of exposure using nonparametric Kruskal-Wallace analysis of variance and calculated Receiver Operating Curve (ROC) characteristics to determine cut-points for distinguishing different tobacco product use.Results- The anatalline/nicotelline ratio is highest among exclusive SLT users (55.2 pg/mL), moderate among exclusive cigarette smokers (12.1 pg/mL), and lowest among exclusive ENDS users (4.8 pg/mL; $p < 0.001$). Cotinine analysis indicates that exclusive SLT users have greater nicotine exposure than exclusive cigarette smokers, who in turn, have greater nicotine exposure than exclusive ENDS users. ROC analyses indicate that the anatalline/nicotelline ratio is very good at distinguishing between cigarette and SLT use at a threshold of 2.9 (AUC = .90; Sensitivity =89.3%, Specificity= 86.4%), and e-cigarette from SLT use at a threshold of 2.6 (AUC = .90; Sensitivity 96.4%, Specificity= 76.3%). It is moderately accurate in distinguishing cigarette from e-cigarette use at a threshold of 1.5 (AUC = .72; Sensitivity =96.4%, Specificity= 55.7%), although specificity is reduced. Conclusions- The anatalline/nicotelline ratio can distinguish between SLT and other product use. However this metric may not be sufficient to distinguish between cigarette and ENDS use. Future research will evaluate use of the ratio in conjunction with other biomarkers (i.e., NNAL) to discriminate between us of various tobacco products.

FUNDING: Federal; FDA CTP

PS5-73

DELIVERING TREATMENTS FOR SOUTH ASIAN SMOKELESS TOBACCO CESSATION: A MIXED METHODS PROCESS EVALUATION

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SIGNIFICANCE Evidence-based interventions to support people to quit smokeless tobacco are lacking in South Asia. We conducted a feasibility trial of two smokeless tobacco cessation treatments in Bangladesh, India and Pakistan. Treatments were a culturally adapted behavioural intervention (BISCA) and nicotine replacement therapy (NRT). This embedded process evaluation aimed to explore implementation, mechanisms of impact and contextual influences for the two treatments. METHODS A mixed methods study comprising qualitative interviews/focus groups with 65 trial participants (25 Bangladesh, 24 India, 16 Pakistan), 5 cessation advisors (2 Bangladesh, 1 India, 2 Pakistan); and fidelity assessment of BISCA cessation sessions (pre- quit, quit, post-quit) and NRT support for 60 participants (24 Bangladesh, 12 India, 24 Pakistan). Qualitative data were analysed using a modified Framework approach. Descriptive statistics were run for the fidelity data. Data sets were triangulated using meta-themes informed by three process evaluation functions: implementation, mechanisms of impact and context. RESULTS *Implementation:* Mixed levels of fidelity to treatment protocols (range 40-67%). Didactic components were more fully implemented than interactive components. Cessation advisors found the flipbook useful to prompt discussion. Telephone delivery during lockdown hindered rapport and use of resources. *Mechanisms of impact:* Venue, flexible scheduling of appointments and cessation advisors were highly rated by participants. BISCA gave them knowledge, strategies, and confidence to try to quit smokeless tobacco. NRT was helpful for some in managing cravings, others were deterred by side effects. *Context:* Advisors and participants acknowledged the importance of social support for quitting. Easy access and extensive use by others were significant barriers to quitting. CONCLUSIONS This process evaluation will usefully inform the adaptation of these evidence-based treatments and training for cessation advisors in future trials of smokeless tobacco cessation in low- and middle-income countries.

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PS5-74

DEVICE BRAND AND FLAVOR PREFERENCE AMONG HEATED TOBACCO PRODUCT USERS OVER TIME: FINDINGS FROM THE 2018-2020 ITC JAPAN SURVEYS

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Significance: Heated tobacco products (HTPs) continue to hold a substantial share of the overall tobacco market in Japan. A diverse assortment of HTP device brand, such as IQOS, glo, and Ploom, are sold with tobacco-containing cartridges with a wide variety of flavors. We aimed to examine device and flavor popularity among HTP users in Japan over time. Methods: We analyzed repeated cross-sectional data from the ITC Japan Survey, a nationally-representative web survey of individuals aged 20+, in 2018 (n=4,615), 2019 (n=4,228), and 2020 (n=4,482). Weighted prevalence estimates of primary HTP device and flavor preferences among current (at least monthly) HTPs users were computed. Chi-square tests assessed differences in HTP device and flavor preferences across sociodemographic variables (sex, age, education, and income) and cigarette smoking status. Results: Among current HTP users, there was a decrease

in the proportion who preferred IQOS as their primary HTP device—from 64.9% (95% CI: 60.5-69.1%) in 2018 to 39.6% (35.4-44.0%) in 2019, 40.1% (35.5-44.8%) in 2020. Conversely, there was an increase in the proportion of current HTP users who preferred Ploom—from 20.6% (17.2-24.4%) in 2018 to 41.8% (37.8-45.9%) in 2019, 40.6% (34.8-46.7%) in 2020. Preference in glo or other device remained similar (glo: 22.9% in 2018, 26.2% in 2019, 25.7% in 2020; other: 0.2% in 2018, 0.2% in 2019, 0.9% in 2020). Slightly less than two-thirds of current HTP users preferred menthol and mentholated fruity flavors (menthol: 42.1% in 2018, 24.3% in 2019, 39.8% in 2020; mentholated fruity: 20.4% in 2018, 30.0 in 2019, 16.0% in 2020) while one-third of current HTP users preferred tobacco flavor (2018: 34.4%, 2019: 33.7%, 2020: 33.6%). Across all three waves, there was a significant association between age and HTP device preferences (younger preferred IQOS, older preferred Ploom), along with sex and flavor preferences (male preferred tobacco, female preferred menthol). Conclusion: From 2018 to 2020, there was a shift in preferences for HTP devices while preferences for HTP flavors remained stable. Sociodemographic characteristics play a role in HTP device and flavor preferences.

FUNDING: Federal; Nonprofit grant funding entity; FDA CTP

PS5-75

THE IMPACT OF THE COVID -19 PANDEMIC ON ADVERTISING EXPOSURE AMONG YOUTH IN GUATEMALA

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Background: In Guatemala, advertising of cigarettes and e-cigarettes at point of sale (POS) is highly prevalent and unregulated. On March 2020 due to the COVID-19 pandemic, Guatemala adopted lockdown measures, which could have affected POS and online advertising exposure. We sought to determine the differences on adolescents' advertising exposure before and after the lockdown measures.**Methods:** We analyzed data from a cohort of adolescents in 9 private schools in Guatemala City including before (wave 1) and after (wave 2) the COVID-19 lockdown measures (n=2666). Students reported past month frequency of visiting stores where tobacco is typically sold (never, sometimes, frequently, very frequently) and exposure to online advertising (never, rarely, occasionally, frequently, very frequently) for cigarettes and e-cigarettes, assessed separately. Responses were dichotomized to frequently or very frequently vs other response options. Logistic regression models assessed changes in exposure over time, adjusting for sociodemographics and tobacco use risk factors. **Results:** POS exposure decreased from before to after lockdown (32% vs 17%, p=0.00), as did exposure to online advertising for cigarettes (11.3% vs 4.6%, p=0.00) and for e-cigarettes (17.7% vs 8.9%, p=0.00). Compared to wave 1, wave 2 is significantly associated with lower odds of visiting the POS (OR=0.46, CI [0.39 - 0.54]), being exposed to online cigarette advertising (OR=0.44, CI [0.34 - 0.58]) and being exposed to e-cigarette advertising (OR=0.55, CI [0.45- 0.67]). Having a friend that smokes was associated to online cigarette advertising exposure (OR=1.49, CI [1.13- 1.94]). Having a friend or family member that uses e-cigarettes was associated to e-cigarette advertising exposure (OR=1.76, CI [1.36- 2.27] and OR=1.45, CI [1.16- 1.82] respectively). **Conclusions:** Our data suggest that lockdown measures were significantly associated with decreases in exposure to advertising both at POS and online. Policies addressing advertising of such products are needed in a country with no current e-cigarette regulation.

FUNDING: Federal

PS5-76

DUAL USE OF E-CIGARETTES AND CIGARETTES AMONG REPRODUCTIVE-AGED WOMEN WITH DISABILITY

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Significance: The popularity and use of e-cigarettes have increased steadily among reproductive-aged women, despite our limited understanding of their effect on reproductive health. This study examined the associations of e-cigarettes, cigarettes and dual use of e-cigarettes and cigarettes with disability in reproductive-aged women. **Methods**: Data for this study were obtained from reproductive-aged women (18-44 years; n=24,904) from the 2020 Behavioral Risk Factor Surveillance System. Descriptive statistics and adjusted logistic regression analyses were conducted to assess the associations of tobacco use patterns (dependent variable, i.e., non-use, current e-cigarette use, current cigarette use and current dual use of e-cigarettes and cigarettes) with overall disability and type of disability (independent variables). **Results**: Among women who reported e-cigarette, cigarette, dual use and non-use, 40.3%, 32.4%, 44.3%, and 15.0% reported ≥1 disability, respectively. In the adjusted analysis, compared to non-use, women who reported ≥1 disability had higher odds of e-cigarette (2.19 [1.52-3.14]), cigarette (1.56 [1.23-1.98]), and dual use (1.84 [1.35-2.52]) compared to women without disabilities. Furthermore, women who reported disabilities in cognitive and daily activities had higher odds of e-cigarette, cigarette and dual use. We found no significant associations of sensory disabilities with the tobacco use patterns examined in this study. **Conclusions**: This study found higher odds of current e-cigarette use, cigarette use and dual use of e-cigarettes and cigarettes among women of reproductive age with ≥1 disability. Improved screening, dissemination and implementation of evidence-based tobacco control strategies may be necessary to lessen the use of nicotine products in this vulnerable population.

FUNDING: Academic Institution

PS5-77

CIGARETTE TAXES INCREASE PRESCRIPTION CESSATION MEDICATIONS, BUT E-CIGARETTE TAXES DO NOT

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Significance: We study the effect of state e-cigarette and cigarette taxes on prescription fills for smoking cessation medications. Cigarette taxes may induce some smokers to quit smoking as cigarettes are more expensive post-tax, leading to increases in the use of cessation medications and increases in the use of e-cigarettes, an alternative nicotine product option. E-cigarette taxes may reduce use of e-cigarettes for smoking quit attempts and increase use of cessation medications. **Methods:** We use all-payer prescription claims data combined with two-way fixed-effects methods over the period 2009 to 2017 to study the impact of e-cigarette and cigarette taxes on prescription medications for smoking cessation. We use pharmacy claims transactional data from Symphony Health Solutions. These data include all-payer insurance prescription claims filled from 2009 to 2017, and the full life cycle of pharmacy claims data from initial submission through final disposition for over 90% of retail, 60% of mail-order, and 70% of specialty pharmacies in the U.S. Our data include fills for Chantix, Zyban, and their generics as well as insurance-financed NRTs. We use standardized e-cigarette tax values as recently published in Cotti at al. 2021 to compensate for the different magnitudes in e-cigarette tax sizes. We estimate two-way fixed effect regression models controlling for a host of other time-varying tobacco control policies (e.g.: cigarette taxes, indoor air laws) and economic climate variables. **Results:** We observe no change in prescription medications following an increase in the e-cigarette tax rate. However, following a $1.00 increase in the cigarette tax rate, we observe a 3.9% increase in prescription fills. **Conclusion:** Our findings suggest that, during a period when e-cigarettes are widely available, cigarette tax increases remain effective in increasing use of these medications, but e-cigarette taxes do not increase use of prescription medications.

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PS5-78

USING MACHINE LEARNING TECHNIQUES TO IDENTIFY LONGITUDINAL PREDICTORS OF MENTHOL/MINT FLAVORED ELECTRONIC NICOTINE PRODUCT USE IN YOUNG ADULTS

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Introduction: The ban on flavored cartridge-based electronic nicotine products (ENPs) was intended to reduce ENP use in young adults. However, because of exceptions made for menthol and tobacco flavors, this ban would not affect those who prefer menthol/mint flavors. This study uses machine learning (ML) to identify longitudinal predictors

of menthol/mint flavored ENP use in young adults. **Method:** Yearly Waves 4 and 5 (12/2016 - 11/2019) of the Population Assessment of Tobacco and Health (PATH) survey was used. Participants were young adults (18 - 24 years) who used ENPs in the past 30 days in both Waves and who in Wave 5 have ever used ENPs everyday/someday and reported the outcome of the study (n = 719). The outcome was use or nonuse of menthol/mint flavored ENPs in the past 30 days in Wave 5. Feature selection algorithms and gradient boosted trees were used to create the predictive models from Wave 4 data. Prediction accuracy was estimated with repeated cross-validation and interpretable ML methods were used to determine important longitudinal predictors. **Result:** About 44% (n = 317) of the participants reported past 30-day menthol/mint flavored ENP use. The maximum area under the curve (AUC) was 0.88 (mean = 0.74, SD = 0.07). The most important predictor from Wave 4 for menthol/mint flavored ENP use in Wave 5 was enrollment in a degree program (i.e., being in college). Other important predictors were high self-perception of place on social ladder relative to others, past 30-day menthol/mint flavored ENP use, using ENPs much more when with other people, regular/last brand of ENP used was menthol/mint flavored, and noticing warning labels on smokeless tobacco products in the past 30 days. **Conclusion:** College students, young adult social ENP users and prior users of menthol/mint flavored ENPs are more likely to use menthol/mint flavored ENPs in the future and are at increased risk of the harmful effects of these products. These findings raise more concerns about the continued availability of characterizing menthol flavors in ENPs. Additionally, our study shows the ability of ML to identify longitudinal predictors of ENP use.

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PS5-79

PREDICTORS OF TOBACCO COUNSELING AND MEDICATION ADHERENCE AMONG SOCIOECONOMICALLY DISADVANTAGED ADULTS

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Significance: Counseling and pharmacological interventions are known to facilitate smoking cessation. However, poor adherence may reduce the overall impact of these interventions. This study identified personal and clinical factors associated with smoking cessation treatment adherence among socioeconomically disadvantaged adults. **Methods:** Participants were adults (*N=442*) enrolled in smoking cessation treatment. Poisson and negative binomial regression models were used to identify sociodemographic, mental health, and substance use characteristics associated with adherence to tobacco cessation treatment. Adherence was indicated by 1) the number of counseling sessions attended, 2) weeks of moderate/high medication adherence assessed via the Medication Adherence Questionnaire, and 3) weeks when both counseling and moderate/high medication adherence occurred. **Results:** Participants were 53 (SD=12) years of age, on average, and were predominantly female (55%) and White (57.7%). Most reported an annual income of <$21,000 (51.4%), 42.4% were uninsured/had Medicaid insurance, and participants reported an average 13 years (SD=2) of education. Participants reported smoking 16 (SD=10) cigarettes per day for an average of 30 years (SD=15), and 41% reported depression (Center for Epidemiological Studies Depression Scale [CESD] score ≥10). White race, increasing age, higher education, and years of smoking were associated with completing more counseling sessions. Being uninsured/having Medicaid insurance and being depressed were associated with fewer counseling sessions completed. Greater age, alcohol use (past 7-days), other tobacco product use (past 30-day), and non-Hispanic ethnicity were associated with having more weeks of moderate/high medication adherence. Older age and past week alcohol use were associated with more weeks of combined counseling and moderate/high medication adherence. **Conclusions:** Interventions to improve medication and counseling adherence among socioeconomically disadvantaged smokers may warrant more attention to patient-level factors. Culturally-specific efforts are needed to improve treatment adherence among non-White and Hispanic adults. **Acknowledgments:** This research was supported by Oklahoma Tobacco Settlement Endowment Trust (TSET) grant R21-02, the National Institute on Minority Health and Health Disparities (NIMHD) grant R25MD011564, and NCI Cancer Center Support Grant P30CA225520 awarded to the Stephenson Cancer Center.

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PS5-80

PREVALENCE AND CORRELATES OF TOBACCO-FREE ORAL NICOTINE PRODUCTS AMONG ADOLESCENTS IN SOUTHERN CALIFORNIA

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Significance: Sales of tobacco-free oral nicotine products, including nicotine pouches, gum, lozenges, and gummies, are increasing in the United States. Little is known about how common tobacco-free oral nicotine product use is among adolescents, and whether certain groups are at greater risk. **Methods:** In this cross-sectional study, adolescents in 9th or 10th grade from 11 high schools in Southern California were surveyed about their nicotine and tobacco use between September-December 2021. We examined prevalence of self-reported ever and past 6-month use of nicotine pouches, other oral nicotine products (i.e., gum, lozenges, and/or gummies), e-cigarettes, combustible cigarettes, hookah/waterpipe, cigars, cigarillos, and snus. We additionally we examined whether sociodemographic factors and tobacco-product use correlate with use of tobacco-free oral nicotine products. **Results:** Prevalence of ever use was 9.6% for e-cigarettes, 3.1% for nicotine gum, lozenges, and/or gummies, 2.0% for any combustible tobacco product, 0.6% for nicotine pouches, and 0.3% for snus. Prevalence of past 6-month use was 5.5% for e-cigarettes, 1.4% for nicotine gum, lozenges, and/or gummies, 1.4% for nicotine pouches, 1.3% for any combustible tobacco product, and 0.3% for snus. Ever use of tobacco-free oral nicotine products was 43.4% among dual users of e-cigarettes and combustible tobacco, 29.4% among exclusive users of combustible tobacco, 22.2% among exclusive users of e-cigarettes, and 0.83% among never users of e-cigarettes or combustible tobacco. Use of any tobacco-free oral nicotine product was greater for Hispanic (vs. all other races/ethnicities except for Asian, adjusted OR [aOR]: 2.4, 95% CI: 1.3-4.4), gender minority (vs. male, aOR: 2.3, 95% CI: 1.2-4.6), female (vs. male, aOR: 1.9, 95% CI: 1.2-3.0), and sexual minority participants (vs. heterosexual, aOR: 1.6, 95% CI: 1.0-2.4). **Conclusion:** Tobacco-free oral nicotine products were the second most prevalent nicotine product used by adolescents in Southern California in Fall 2021. Surveillance of tobacco-free oral nicotine products should be a national policy and public health priority.

FUNDING: Federal; FDA CTP

PS5-81

EXCLUSIVE, DUAL, AND POLY TOBACCO USE IS ASSOCIATED WITH THE INCIDENCE OF ACUTE BRONCHITIS AMONG YOUTH

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Significance: Little is known about the health consequences of multiple tobacco product use. This study aims to evaluate prospective associations between exclusive, dual, and poly tobacco use and self-reported diagnosed bronchitis, pneumonia, or chronic cough among a nationally representative sample of US youth. Methods: We used data (ages 12-17) from Waves 1-5 of the Population Assessment of Tobacco and Health Study (2013-19), including aged-up shadow youth and the Wave 4 replenishment sample. We categorized time-varying past 30-day tobacco use as exclusive use of 1) cigarettes, 2) electronic nicotine delivery systems (ENDS), or 3) other combustible products (OC; pipes, hookah, and cigars); dual use of 4) combustible products (cigarettes/OC) + ENDS or 5) cigarettes + OC; or 6) polyuse of all three tobacco product groups. We defined the outcome as an incident diagnosis of bronchitis, pneumonia, or chronic cough. We conducted weighted multilevel Poisson models (person n=17,546, 43,461 observations) to examine the longitudinal exposure-outcome relationship, adjusting for respondent's baseline covariates: sex, age, race/ethnicity, parental education, body mass index, secondhand smoke exposure, and household use of combustible products. Finally, we recalibrated cross-sectional sample weights into the conditional, scaled wave-specific Level-1 weights and the respondent-specific Level-2 weights to accommodate the PATH longitudinal hierarchy. Results: About half of the sample were male and were 12 years old at baseline (due to the inclusion of aged-up youth). Compared to non-use, exclusive cigarette use (IRR=1.82, 95% CI 1.27-2.61), exclusive ENDS use (IRR=1.53, 95% CI 1.10-2.12), combustible products + ENDS dual use (IRR=1.87, 95% CI 1.19-2.95), cigarettes + OC dual use (IRR=1.90, 95% CI 1.12-3.21), and polytobacco use (IRR=2.79, 95% CI 1.54-5.05) were associated with a higher incidence of diagnosed bronchitis, pneumonia, or chronic cough. Conclusions: We found an association between exclusive, dual, and polyuse and the incidence of acute bronchitis, pneumonia, or chronic cough

among youth; this association was stronger for polyuse of tobacco products. These findings provide evidence that ENDS use among youth is associated with negative acute respiratory health outcomes.

FUNDING: Federal; Academic Institution

PS5-82

DOES ALCOHOL USE MODIFY THE RELATIONSHIP BETWEEN INTENTION TO QUIT AND QUIT ATTEMPTS AMONG ADOLESCENT AND YOUNG ADULT SMOKERS IN NIGERIA?

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Significance: Nicotine and alcohol usually constitute gateway psychoactive substances. The concurrent use of alcohol and tobacco products can influence smoking cessation behaviours and uptake.**Objective**: This study examines alcohol use as a potential effect modifier of the relationship between intention-to-quit and quit-attempts among smokers in Lagos, Nigeria.**Methods**: This was an online cross-sectional survey of 944 participants aged between 15-35 years. The survey obtained sociodemographic information, alcohol use, smoking status, intention-to-quit and quit-attempts, in the past 12-months. Logistic regression models and interaction terms were used to identify the relationship between alcohol use, intention-to-quit and quit-attempts among smokers. P-values <0.05 were considered significant. Ethical approval was obtained from the Lagos State University Teaching Hospital Health Research Ethics Committee.**Results**: The mean age of respondents was 23years (SD: 4.0). About 23.4% of respondents were smokers and 27.8% consumed alcohol in the past 12-months. Based on the bivariate logistic regression model, participants with intention-to-quit (OR: 15.40; 95% CI:4.80,49.37; p:<0.001) and those who consumed alcohol currently (OR:2.00; 95% CI:0.99,4.03; p:0.052), had increased odds of quit-attempts. However, in the adjusted model, age, sex, and alcohol use were not significantly associated with quit-attempts, while intention-to-quit was associated with increased odds of quit attempts (aOR: 24.57; 95% CI:6.41,94.24; p:<0.001). Interaction terms demonstrated that the relationship between intention-to-quit and quit-attempts is not modified by alcohol use (p: 0.64). **Conclusion**: Our findings suggest that alcohol use does not modify the relationship between intention-to-quit and quit-attempts among adolescent and young adult smokers in Nigeria. Therefore, tobacco users with intention-to-quit, and subsequently a higher likelihood of quit-attempts should be encouraged to quit smoking through exposure to smoking cessation interventions, irrespective of alcohol use status.

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PS5-83

PREDICTORS OF CHANGE IN YOUTH TOBACCO PRODUCT USE ACROSS WAVES 1-4 OF THE POPULATION ASSESSMENT OF TOBACCO AND HEALTH (PATH) STUDY

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Significance: Adolescence is a vulnerable period during which experimentation with substances such as tobacco often occurs. This secondary data analysis examined intraindividual changes in tobacco product use, and also predictors of these changes, across Waves 1-4 (2013-2018) of the Population Assessment of Tobacco & Health (PATH) study. **Methods:** Participants were 975 youth aged 12-17 years who reported past 30-day use of at least one tobacco product (i.e. cigarettes, electronic cigarettes [ECIGs], large cigars, small cigars, cigarillos, smokeless tobacco [SLT], snus, hookah) at any wave. Latent growth models examined changes in product use, as measured by days per month, across waves. Predictors of change included baseline assessment of demographics, parent use, tobacco rules reported by parents or by youth, externalizing/internalizing problems, tobacco use motives, and sensation seeking. **Results:** Model fit was acceptable for all products except large cigars and hookah (data not shown for these latter products), and significant increases in use across waves were observed for all products except snus. Greater baseline use was predicted by identifying as non-Hispanic (cigarettes, snus); lower parent education (SLT); fewer youth-reported rules (cigarillos); greater externalizing problems (cigarillos); and greater motives (all products except cigarillos). Greater increases in use were predicted by older age (cigarettes); identifying as male (ECIGs, SLT), Black (vs. White; cigarillos), White (vs. Black; ECIGs, SLT), other race (vs. White; ECIGs), and non-Hispanic (ECIGs, SLT); and greater youth-reported rules (cigarillos, SLT). Weaker increases in use were predicted by greater parent-reported rules (snus), externalizing problems (SLT), and motives (ECIGs). **Conclusion:** Youth increased their use of almost all products across this developmental period. Those factors that served to reduce versus exacerbate increases in tobacco use were dependent on the tobacco product. Consequently, prevention and intervention efforts likely need to be tailored to the type of product being used.

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PS5-84

NICOTINE-RELATED CONTENT IN ENDS ADVERTISEMENTS: 2018-2020

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Significance: There is no standard way to communicate to consumers how much nicotine is present in electronic nicotine delivery systems (ENDS). Some ENDS users, including youth, are unsure of the nicotine content in their ENDS. Effective communication of nicotine strength in product advertising could increase public knowledge of ENDS nicotine content, but little is known about how nicotine content is conveyed in advertisements. This study assesses the presence of nicotine-related content in ENDS advertisements (2018-2020). **Methods:** We acquired English-language ENDS ads that appeared in consumer and business-to-business (B2B) outlets between 01/01/2018 and 12/31/2020 from Numerator. Outlets included: TV, radio, newspapers, magazines (consumer and B2B), online platforms, and direct-to-consumer emails. We coded for the presence of any nicotine-related content, including words such as "nicotine", "nic", "salts", and presentation of nicotine strength. We excluded mentions featured in the required nicotine warning statement. **Results:** The sample included 2966 unique advertisements; 33% of ads (n=979) included nicotine-related content. Of these ads, 38% (n=369) included a mention of nicotine in the main ad copy and 13% (n=129) included mentions of "salts" (or similar). Nicotine strength was more often reported in "mg" or "mg/ml" (n=444) compared to strength reported in "%" nicotine, (n=260). The proportion of advertisements with nicotine-related content differed by manufacturer/retailer (e.g., Logic (62%, n=258), Blu (49%, n=114), South Beach Smoke (41%, n=80), Vuse (22%, n=84), Vapor4Life (20%, n=65), and JUUL (13%, n=95)). The proportion of advertisements with nicotine-related content varied by media outlet, including: B2Bmagazines (65%, n=68/105), direct-to-consumer emails (41%, n=529/1289), consumer magazines (30%, n=41/135), online (25%, n=227/899), TV (20%, n=6/30), radio (19%, n=89/465), and outdoor/billboards (0%, n=0/43). **Conclusions:** Nicotine-related content is present in one-third of our sample, and findings suggest substantial variation in nicotine-related content by manufacturer/retailer and by media outlet.

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PS5-85

SWITCHING TO NATURAL AMERICAN SPIRIT CIGARETTES SIGNIFICANTLY INCREASES THE ODDS OF BELIEVING ONE'S OWN BRAND MIGHT BE LESS HARMFUL THAN OTHER BRANDS: RESULTS FROM WAVES 1-4 OF THE PATH STUDY

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SIGNIFICANCE: Natural American Spirit (NAS) smokers are considerably more likely than smokers of other brands to believe that their brand might be less harmful than other cigarette brands; however, the temporal relationship between preferring NAS cigarettes and believing one's own brand is less harmful has not been established. The purpose of this study was to examine the longitudinal relationship between smoking or switching to NAS and belief that one's own brand might be less harmful than other

brands among adult US smokers. **METHODS:** Data were drawn from 4 waves (2013-2018) of the Population Assessment of Tobacco and Health (PATH) Study. The analytic sample is limited to current established smokers with a usual brand who have at least two waves of data. We report unweighted within-person brand switching probabilities by belief that one's own brand might be less harmful overall and by brand and use conditional fixed effects logistic models to report the odds of believing one's own brand might be less harmful when switching from a non-NAS brand to NAS. **RESULTS:** Among NAS smokers, 76.3% who believed that their brand might less harmful than other brands maintained that belief in a subsequent wave, compared to only 41.2% of non-NAS smokers. Among NAS smokers who believed that their own brand might be as or more harmful than other brands, 19.1% shifted to believing that their brand might be less harmful than other brands at the next wave; only 4.3% of non-NAS smokers made the same transition. The odds that a smoker believed their own brand might be less harmful than other brands increased by a factor of 26 when they switched from a non-NAS cigarette brand to NAS (95% CI: 13.7, 53.1). **CONCLUSIONS:** Smokers who switch from a non-NAS brand to an NAS brand demonstrate a dramatically increased odds of believing their own brand might be less harmful than other brands. In combination with a significant body of cross-sectional descriptive and experimental research, our results add further evidence that smokers have and develop inaccurate harm perceptions about NAS.

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PS5-86

2SLGBTQI+ YOUNG ADULT SMOKING CESSATION

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Significance: Research has suggested a number of reasons why smoking rates are high among young adults who identify as 2SLGBTQI+: minority stress and stigma, discrimination, and normative behaviours within the communities. This presentation will outline results from an online survey that highlight the types of cessation services that 2SLGBTQI+ young adults have tried in the past, and services they would be interested in using if they were affirming and tailored to their needs. Methods: Online survey participants across Ontario and Quebec Canada were recruited from November 2020 until April 2021 through social media ads online and shared with partner organizations. A convenience sample of 1511 participants who completed at least 70% of the online survey were included in the final sample. Eligibility for the survey included: being between the ages of 16 and 29, living in Ontario or Quebec, and identifying as 2SLGBTQI2S+. Quantitative survey data were analyzed in SAS 9.4 to identify past and potential cessation services, as well as barriers faced among 2SLGBTQI+ young adults. Results: Overall, very few individuals in the sample had previously tried any cessation services with the most common response being cold-turkey (7%) and use of e-cigarettes to quit (5%). However, many were interested in trying tailored and affirming services that addressed broader issues such as mental health support (75%), stress management (71%), talking to a health professional trained in 2SLGBTQI+ health (70%), and strategies to help with cravings (55%). Conclusions: These survey results are helping us to better understand the best ways to help support 2SLGBTQI+ young adults who are ready to quit smoking. Acknowledging systemic barriers and broader issues such as mental health and stigma are critical for developing cessation services for this population.

FUNDING: Federal

PS5-87

BELIEFS AND ATTITUDES ABOUT COVID-19 AMONG SMOKING AND VAPING ADOLESCENTS IN GUATEMALA CITY

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Background: On March 2020 the first COVID-19 case was diagnosed in Guatemala. Since then the country experienced several containment measures to halt the epidemic, including shifts from in-person to virtual schooling. As smoking-related comorbidities are associated more severe COVID-19 infection and death, we sought to assess risk perceptions about COVID-19 in a sample of adolescents (including smokers and e-cigarette users) in Guatemala. **Methods:** During August and December of 2020, we surveyed 1914 adolescents from private schools in Guatemala City. Those who reported smoking or using an e-cigarette in the past 30 days were classified as current smokers or current e-cigarette users. Students were also asked about how worried they were about getting COVID-19 (extremely, very, some, a little, and not at all), and about the impact of smoking and e-cigarette use on COVID-19 disease severity (much more, a little worse, same, less, or much less). **Results:** A total of 58 (3%) and 285 (15%) respondents were current smokers and e-cigarette users, respectively. When asked how sick they would get if diagnosed with COVID-19, smokers were more likely to believe that they would get at least as or more sick than non-smokers (26% vs. 17%, p=0.09). The percentage of e-cigarettes users who indicated this was not significantly different than for non-users (14% vs. 19%, p=0.1). When asked how sick a smoker would get if diagnosed with COVID-19, most smokers (90%), non-smokers (93%), e-cigarette users (86%), and non-users (94%) believed smokers would get sicker than non-smokers, with no significant difference across groups. Of the smokers, 9 (15%) answered that they had quit to prevent COVID-19. The corresponding percentage for e-cigarette users was 17% (48). **Conclusions:** Guatemalan adolescents recognize that smoking can increase the risk of severe COVID-19 disease but are more likely to recognize this risk in others than among themselves. Regarding e-cigarette users, our findings suggest that adolescents do not consider themselves to be at higher risk for COVID-19 severity. Our findings highlight the need to adequately communicate the risk of COVID-19 among adolescents, particularly those who smoke. 1

FUNDING: Federal

PS5-88

HOW THE OTHER HALF SEES IT: E-CIGARETTE ADVERTISING EXPOSURE AND SUBSEQUENT E-CIGARETTE USE AMONG U.S. YOUNG ADULT ESTABLISHED CIGARETTE SMOKERS

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INTRODUCTION Much is known about the relationship between e-cigarette advertising (ad) exposure and e-cigarette use among tobacco-naïve young adults. Less research, however, has focused on this relationship among young adult cigarette smokers, who may substantially benefit from quitting or reducing cigarette smoking by using e-cigarettes. This study was aimed to examine this relationship. **METHODS** Data were from Waves 4 and 5 of the nationally representative Population Assessment of Tobacco and Health (PATH) Study adult survey. Respondents included in the analysis were young adult established cigarette smokers at Wave 4 (aged 18-34 years; n=3,391) and smokers who tried to quit smoking completely in the past year at Wave 5 (n=1,235). Past-month e-cigarette ad exposure at baseline (Wave 4) as well as past-year e-cigarette use in general and past-year e-cigarette use to quit cigarette smoking at follow-up (Wave 5) were assessed. Weighted multivariable logistic regressions were used to examine the associations between e-cigarette ad exposure and subsequent e-cigarette use behaviors, controlling for covariates including socio-demographics and tobacco use and cessation experience at baseline. **RESULTS** Overall, 42.6% of young adult cigarette smokers were exposed to e-cigarette ads at baseline; 43.4% of all smokers and 14.8% of smokers who tried to quit smoking completely reported past-year e-cigarette use and past-year e-cigarette use to quit smoking at follow-up, respectively. The regressions showed that e-cigarette ad exposure at baseline was positively associated with subsequent past-year e-cigarette use (AOR=1.53, p<0.0001, 95% CI=1.27, 1.86) and past-year e-cigarette use to quit smoking at follow up (AOR=1.65, p<0.01, 95% CI=1.19, 2.29). **DISCUSSION** Exposure to e-cigarette ads among U.S. young adult established cigarette smokers may be associated with subsequent e-cigarette use in general as well as e-cigarette use to quit smoking. More research is needed to understand the features of e-cigarette ads (e.g., price promotions, flavors, smoker-targeted claims) that may shape perception and behavior related to e-cigarette use among young adult cigarette smokers.

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PS5-89

E-CIGARETTE USE AND PERCEPTIONS AMONG PUBLIC HOUSING RESIDENTS

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Significance: In 2018, the U.S. Department of Housing and Urban Development required all public housing authorities to become smokefree. Combustible tobacco products were prohibited in all residences, all common indoor areas, and within 25 feet of buildings. E-cigarettes were not included in the rule. This study examines e-cigarette perceptions and use among adult smokers living in public housing.Methods: Data were collected from 434 self-identified current combustible tobacco product users residing across 15 public housing developments in the District of Columbia Housing Authority (DCHA) between July 2018 and November 2021. Measures included tobacco use, intention to quit combustible cigarettes, e-cigarette use behaviors, perceptions of e-cigarettes as a cessation aid, and socio-demographic characteristics. Descriptive statistics were calculated to examine e-cigarette use and perceptions.Results: The majority of analytic sample identified as African-American/Black (82.9%) and the average age of the participants was 56 years. The vast majority were current cigarette smokers (97.2%), while 22.4% indicated ever using e-cigarettes and 5.3% indicated e-cigarette use in the past 30-days. The average age at which residents first used an e-cigarette was 45 years. Of those who never used an e-cigarette, 28.4% indicated being curious about e-cigarettes. In response to the smoke-free rule, 7.9% said they considered newly using e-cigarettes and 7.6% said they considered switching to e-cigarettes. Among cigarette smokers, 86.2% indicated they were thinking of quitting conventional cigarettes and 9.7% said they thought e-cigarettes would be helpful as a cigarette cessation method. Conclusions: While e-cigarettes are not prohibited by the DCHA's implementation of the HUD smokefree rule, results show that a smaller portion of public housing residents who self-identified as current combustible tobacco users are using e-cigarettes as compared to the U.S. current smokers. Additional research is needed to understand the roles of e-cigarettes in combustible tobacco use in this population.

FUNDING: Federal

PS5-90

STRENGTH OF FLAVORED CIGARILLO PREFERENCE MAY PREDICT PRODUCT CESSATION OR TOBACCO SUBSTITUTION FOLLOWING A FLAVOR BAN

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Significance: Use of flavored cigarillo products is nearly ubiquitous among users but little is known about the strength of flavor preferences. The purpose of this research was to measure the strength of flavor preferences and identify how young adult cigarillo users may respond to a flavor ban. Methods: Current cigarillo users aged 21-28 (n=586) were recruited between October 2020 and April 2021 to participate in an online survey about flavored tobacco preferences and behaviors as well as what they would do if they could no longer access flavored cigarillos. Respondents were asked to select their preferred, usual, and current cigarillo flavors (fruit, sweet and candy, mint, alcohol, menthol, tobacco, and other). Individuals who preferred tobacco flavors were compared to individuals who preferred any other flavors. Strength of preferences was defined when an individual's preferred flavor matched what they use both usually and currently creating a spectrum of individuals with a strong tobacco preference (n=24), weak tobacco preference (n=21), weak flavor preference (n=212), strong flavor preference (n=319). Results: Individuals with a strong tobacco preference had lower nicotine dependence scores compared to individuals with any strength flavor preference. There was a dose-response relationship in the proportion of those who said they would discontinue cigarillos if flavored options were not available based on type and strength of their preference: 11.3% (95% CI: 2.5-20.1) of individuals with a tobacco flavor preference, 28.4% (95% CI: 21.2-35.6) of those with a weak flavor preference, and 38.1% (95% CI: 32.7-43.6) of those with a strong flavor preference. Similarly, 11.3% (95% CI: 2.5-20.1) of those with tobacco flavor preference, 24.3% (95% CI: 17.4-31.2) of those with a weak flavor preference, and 38.4% (95% CI: 32.9-43.8) of those with a strong flavor preference indicated they would switch to another flavored product if they could not get flavored cigarillos. Conclusion: Individuals who display strong flavor preferences are more likely to discontinue use or seek out alternative flavored products following a ban on flavors compared to those who prefer tobacco flavored cigarillos.

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PS5-91

NICOTINE POUCH USE, PERCEPTIONS, AND MARKETING EXPOSURE AND ASSOCIATIONS WITH MOTIVATION TO QUIT TRADITIONAL SMOKELESS TOBACCO

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Significance: Nicotine pouches are increasingly popular, advertised as tobacco-free substitutes for smokeless tobacco (SLT), and available in several brands, nicotine concentrations, and flavors. There is little research about this product and its associations with traditional SLT. We characterized nicotine pouch use, perceptions, and marketing exposure and examined if these factors predict motivation to quit SLT among current SLT and dual cigarette/SLT users. **Methods:** Data were from a cross-sectional survey of tobacco users and nonusers recruited in Ohio. Analyses included 170 current exclusive SLT users (71%) and dual cigarette/SLT users (29%). Measures included sociodemographics, tobacco use, nicotine pouch use, perceptions (e.g., perceived risks and substitutability for SLT), marketing exposure, and motivation to quit SLT use. We analyzed factors associated with current use of nicotine pouches, and conducted predictive multiple linear regression using backward selection to examine sociodemographic characteristics, tobacco use, nicotine pouch use, perceptions, and marketing associated with motivation to quit SLT use. **Results:** Participants averaged 34.9 (SD ±10.14) years of age. The majority were male (96%), white (95%), non-Hispanic (98%), and reported more than $50,000 annual income (71%). Overall, 81% were aware of nicotine pouches and 40% were current users. Current nicotine pouch use was less common among dual ST/cigarette smokers and was associated with younger age, exposure to marketing, higher perceived substitutability for SLT, and lower perceived risks of health harm from nicotine pouches. Motivation to quit SLT was significantly associated with having an income >$75,000 ($\beta$= 1.25, p=0.035) and greater worry about the health risks of nicotine pouches (β= 0.47, p<0.001). **Conclusions:** Nicotine pouch use was most common among exclusive SLT users, and associated with marketing exposure, perceived risks, and perceived substitutability for SLT. Higher income and perceived risks of nicotine pouches predicted motivation to quit SLT. Research is needed to understand the potential risks and benefits of this novel product to clearly communicate risks to consumers.

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PS5-92

SECONDHAND SMOKE EXPOSURE IN MULTIUNIT HOUSING SERVING LOW-INCOME RESIDENTS IN NEW YORK CITY: THIRTY MONTH EVALUATION OF A FEDERAL SMOKING BAN IN PUBLIC HOUSING FINDINGS USING A NATURAL EXPERIMENT DESIGN, 2018-2021

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Significance: In July 2018, the U.S. Department of Housing and Urban Development passed a rule requiring public housing authorities to implement smoke-free housing (SFH) policies. We measured secondhand smoke exposure (SHSe) immediately before, and 30-months after implementation of SFH policy in a purposeful sample of 21 high-rise buildings (>15 floors) in New York City (NYC): 10 NYC Housing Authority (NYCHA) buildings subject to the policy and 11 privately managed buildings with no defined SFH policies (herein 'Section 8'). **Methods:** We invited participants from non-

smoking households (NYCHA n=157, Section 8 n=118) to enroll into a longitudinal air monitoring study to track SHSe, measuring (1) nicotine concentration from passive, bi-sulfate-coated filters, and (2) particulate matter ($PM_{2.5}$) from low-cost particle sensors. We also measured nicotine concentrations in common areas (n=91 stairwells and hallways), and average cigarette butt counts within common areas in our selected buildings. We repeated air monitoring sessions every 6-months, totaling five post-policy sessions: from 6 months (December 2018-March 2019) to 30 months post-policy (December 2020-March 2021). We prematurely stopped data collection in our third post-policy session at 18 months (December 2019-March 2020) due to COVID-19 pandemic restrictions but resumed air monitoring in common areas at 24 months (April-September 2020) and in non-smoking households at 30 months. **Results:** From pre-policy to 30 months' post-policy, we observed larger declines in nicotine concentrations in NYCHA hallways than in Section 8, (difference-in-difference [DID] -1.28 μg/m^3, 95% CI -2.42, -0.14). There was no differential change in nicotine concentration in non-smoking households (DID -0.23 μg/m^3, 95% CI -0.49, 0.02) or stairwells (DID -0.05 μg/m^3, 95% CI -1.28, 1.17). The difference in indoor $PM_{2.5}$ levels in NYCHA non-smoking apartments was larger than in Section 8, from pre-policy to 30 months' post-policy (DID -5.42 μg/m^3, 95% CI -10.39, -0.46). Variability in mean stairwell and hallway cigarette butt counts across buildings was not statistically significant. **Conclusions:** Nicotine concentrations in NYCHA hallways may be decreasing due to the SFH policy.

FUNDING: Unfunded; Federal

PS5-93

WHICH SMOKERS WANT TO SWITCH TO NONCOMBUSTIBLE PRODUCTS AND WHAT ARE THEIR CONCERNS?

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Introduction: Moving smokers down the tobacco product risk continuum is one method for reducing the burden of smoking-caused disease for those who are not willing or able to quit completely. While previous research has shown that a significant proportion of smokers are interested in less harmful products, it's not clear what keeps smokers from switching. Identifying these barriers to switching can inform messaging that can address the concerns of established smokers. Methods: A study on Amazon Mechanical Turk asked established smokers if they would consider switching to a noncombustible product on a scale of 0 (I do not agree at all) to 100 (I completely agree). Participants were asked to explain what lead them to consider switching or what keeps them from considering switching. Demographics and ever use of different tobacco products are presented by considering switching (a score of >=50) or not (a score of <50) and chi square was used to assess the significance of differences in proportions. Qualitative responses were inductively coded using thematic analysis to identify themes in reasons listed for or against considering switching. Results: 57% of participants reported some willingness to consider switching to a noncombustible. No differences were found by demographic characteristics, although those who reported ever using very low nicotine cigarettes were significantly more likely to report considering switching. Concern about not being satisfied, dissatisfaction with previously tried products, lack of product appeal, concerns about health harms, misperceptions about relative risk of noncombustibles, and being content with their smoking emerged as themes for not considering switching. Wanting a less harmful product and a product that could help with cessation was a major theme among those who reported some consideration of quitting, although this group also wanted confirmation that products would be less harmful and still satisfying. Conclusions: Smoker are interested in switching to noncombustibles, but want a less harmful product that can help them quit completely. Clear guidance is needed from trusted authorities to help smokers move down the continuum of risk towards less harmful products.

FUNDING: Academic Institution

PS5-94

CHANGES IN REASONS FOR ELECTRONIC NICOTINE DELIVERY SYSTEMS (ENDS) USE AMONG YOUTH ENDS USERS, RESULTS FROM THE PATH STUDY 2018-19 TO 2020

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Significance: The purpose of this study is to examine the differences between the reasons for ENDS use among youth past 30-day (P30D) ENDS users in Wave 5 (W5) and Wave 5.5 (W5.5) of the Population Assessment of Tobacco and Health (PATH) Study. Methods: The PATH Study collects nationally representative data on youth ENDS use and ten reasons for their ENDS use. Data were collected in-person via Audio Computer-Assisted Self-Interviewing (ACASI) at W5 (December 2018-November 2019) and via telephone in W5.5 (July-December 2020) in adaptation to the COVID-19 pandemic. Analyses were limited to respondents aged 13-17 who self-reported using ENDS in the past 30 days (W5, n=1,070; W5.5, n=337). Cross-sectional analyses evaluated the prevalence of each reason for use by wave, and *t*-tests compared endorsement at W5 and W5.5. Analyses were weighted to produce nationally representative estimates and 95% confidence intervals (CI) were computed using the balanced repeated replication method. Results: Among youth ENDS users in both W5 (65.9% [95% CI: 62.8%, 68.9%]) and W5.5 (68.6% [95% CI: 61.8%, 74.7%]), the most endorsed reason for use was that "e-liquid comes in flavors I like." Between W5 and W5.5, there were significant decreases ($p<0.05$) in youth ENDS users reporting they used ENDS because "They might be less harmful to me than cigarettes" (W5: 58.0% [95% CI: 55.2%, 60.7%], W5.5: 48.9% [95% CI: 43.3%, 54.6%]), "Using an electronic nicotine product feels like smoking a regular cigarette" (W5: 15.3% [95% CI: 12.9%, 18.0%], W5.5: 9.8% [95% CI: 6.9%, 13.7%]) and "Electronic nicotine products don't bother non-tobacco users" (W5: 35.6% [95% CI: 32.4%, 38.9%], W5.5: 27.4% [95% CI: 21.6%, 33.9%]). There were no significant changes in the other seven reasons for ENDS use between W5 and W5.5. Conclusions: These findings should be interpreted with caution given the changes to the PATH Study design in W5.5 due to the COVID-19 pandemic, yet reasons for ENDS use related to lower harm perceptions, feels like smoking cigarettes, and don't bother non-tobacco users decreased between W5 and W5.5 among youth ENDS users.

FUNDING: Federal; FDA CTP

PS5-95

DO VAPING PREVENTION MESSAGES AFFECT ADOLESCENTS AND YOUNG ADULTS?A METAANALYSIS OF EXPERIMENTAL STUDIES

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Background: Vaping prevention messages are widely used to communicate the risks of vaping and discourage vaping among youth and young adults. To examine the efficacy of these messages to inform research, policy, and practice, we conducted a meta-analysis of experimental studies on vaping prevention messages. **Methods:** We conducted comprehensive searches of six databases and reviewed reference lists of included articles. To be included, a study had to 1) be an experimental study, 2) have at least one vaping prevention message condition and one control condition (no message or a control message), 3) focus on vaping prevention, and 4) have adolescents or young adults as the study sample. Our searches generated 4,451 references. After removing 2,295 duplicates, two coders screened all titles and abstracts for relevance, leading to 71 articles for retrieval. A full-text review led to a final set of 15 studies being included, the study characteristics of which were coded. Kappa's intercoder reliability across all categories was .70. **Results:** Fifteen outcome variables were meta-analyzed. Compared to control, vaping prevention messages increased risk perceptions: perceived likelihood of harm (d = 0.17, p = .003), perceived likelihood of addiction (d = 0.21, p < .001), harm perception (d = 0.32, p < .001), addiction perception (d = 0.39, p < .001), perceived relative harm (d = 0.14, p = .036), and perceived relative addiction (d = 0.33, p = .015). They also increased perceived message effectiveness (effect perception; d = 0.55, p < .001; message perception; d = 0.51, p < .001), e-cigarette knowledge (d = 0.37, p < .001), and decreased vaping intentions (d = -0.08, p = .02). Most effects were statistically homogenous (p > .05). **Discussion:** This is the first meta-analysis to examine the efficacy of vaping prevention messages. Findings suggest vaping prevention messages increase risk perceptions and decrease vaping intentions in adolescents and young adults. Future studies should examine the ability of vaping prevention campaigns to reduce vaping behavior in real world settings.

FUNDING: Nonprofit grant funding entity; FDA CTP

PS5-96

CORRELATES OF CONTINUOUS 12 WEEK QUIT SUCCESS IN SOUTH ASIAN SMOKELESS TOBACCO USERS

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INTRODUCTION. Smokeless tobacco (ST) is used globally with the highest consumption in South Asia (SA). A major SA public health threat, it has a substantial disease related burden. Implementing the WHO Framework Convention for Tobacco Control will regulate ST use but evidence-based interventions to help SA ST cessation are few. We report an initial analysis of a randomised trial of ST cessation in a SA sample. It was hypothesised that differences in participant self-reported ST abstinence at 12 weeks would correlate with social-demography, dependency and mood. METHODS.Adult daily sole ST users were recruited from primary care settings in Bangladesh, India and Pakistan. A power calculation required recruiting 264 participants. At study entry participants were consented and social demographic, ST use and dependency, social support and mood data collected before individual randomisation to one of four evidence-based interventions. This preliminary analysis presents self-reported continuous abstinence from tobacco at 12 weeks after quit completion. Descriptive summary statistics, odds ratios and 95% confidence intervals (adjusted for age, employment and marital status) were estimated.RESULTS. Sample retention at 12 weeks was 92% (244/264), with 53% male and mean age of 34.8 (SD 12.09) years. Mean age of first ST use was 21.7 (SD 10.64) years and mean total daily ST intakes was 16.5 (SD 16.69). Mean total Fagerstrom Test for Nicotine Dependency score was 3.3 (SD 1.92) and mean total Mean and Physical Symptoms score was 12.7 (SD 4.34).56.5% reported continuous abstinence. Correlates of abstinence were employment status (homemaker/student/unemployed) (OR 2.15, 95%CI 1.20, 3.88), being somewhat depressed (OR 2.86, 95% CI 1.29, 6.36), slightly (OR 2.59, 95%CI 1.12, 6.01) or somewhat (OR 3.35, 95% CI 1.54, 7.29) irritable, slightly (OR 2.62, 95%CI 1.01, 6.8) or somewhat (OR 2.23, 95% CI 1.03, 4.82) restless, slightly hungry (OR 3.53, 95% CI 1.16, 10.76) and reporting slightly poor concentration (OR 2.77, 95% CI 1.17, 6.54).CONCLUSION.Twelve week self-reported continuous abstinence in a SA sample of ST users correlated with social demography and mood but not dependency.

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PS5-97

MINT, MENTHOL, SWEET, AND TOBACCO ENDS LIQUID FLAVORINGS IN RELATION TO NICOTINE FORMULATION AND CONCENTRATION: RESULTS FROM THE POPULATION-BASED VAPER STUDY

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Significance Sweet and menthol flavors may reduce the harshness of the nicotine present in electronic nicotine delivery systems (ENDS). These flavors may improve the appeal/palatability of ENDS, which could increase self-administration and nicotine exposure. Certain populations (e.g., young adults) report lower harm perceptions for ENDS with non-tobacco flavors. The present study explores the relationship between liquid flavor and nicotine concentration and formulation. **Methods** From May-October 2020, adults aged 21+ (n=1209) using ENDS 5+ days/week completed a survey about and submitted photos of their most used ENDS device and liquid. Coded photo data were prioritized; if unavailable, self-report data were used. Liquid flavors were grouped into four categories based on the primary flavor: mint, menthol, sweet, tobacco. When nicotine concentration and formulation (i.e., freebase vs. salt) data were available and flavor was able to be grouped into the predetermined categories (n=1058), descriptive analyses and Kruskal-Wallis tests were used to examine nicotine concentration (mg/mL) by flavor type; because salt nicotine liquids reduce nicotine harshness and tend to have higher concentrations than freebase liquids, results were stratified by formulation. **Results** Sweet flavors were most common (n=700), followed by menthol (n=156), tobacco (n=147), and mint (n=55). Among freebase liquids, mean nicotine concentration was highest for mint (12.2 mg/mL) and tobacco (11.6 mg/mL), followed by menthol (9.25 mg/mL) and sweet (6.26 mg/mL) flavors (H(3) = 14.1; p = 0.0027). Among salt nicotine liquids, mean nicotine concentration was highest for menthol (49.6 mg/mL), followed by tobacco (45.9 mg/mL), mint (44.6 mg/mL) and sweet (42.6 mg/mL) flavors (H(3) = 54.1; p = 0.0001). **Conclusions** Menthol flavored liquids were used with the highest nicotine concentrations; participants may be using menthol flavoring to mask the harshness of high nicotine concentrations. Future research may examine these relationships using longitudinal data (e.g., changes in concentrations over time by flavor) or stratified by use characteristics (e.g., smoking status, vaping frequency, length of time vaping, demographics, device type/wattage).

FUNDING: Federal

PS5-98

EFFECTS OF FLAVORS, NICOTINE STRENGTH, AND WARNING LABELS ON ADULTS' PERCEPTIONS OF NICOTINE POUCHES

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Significance: Nicotine pouches are novel, oral nicotine products that are gaining in popularity and marketed as alternatives to cigarettes and traditional smokeless tobacco by emphasizing characteristics such as tobacco-free and smoke/spit-free. Although nicotine pouches are available to consumers in a variety of flavors (e.g., "smooth," mint, fruit, coffee) and nicotine strengths (e.g., 3 mg, 6 mg), the potential impact of these features on product perceptions and use behaviors is unknown. **Methods:** Adult (≥ 21 yrs, n=301) cigarette smokers, smokeless tobacco users, dual cigarette/smokeless tobacco users, and nonusers were recruited in Ohio. Participants were randomized to view an image of Zyn nicotine pouches in a 4 (Flavor: Smooth, Dark Frost, Cool Mint, Coffee) by 3 (Nicotine Content: None, 3 mg, 6 mg) by 2 (Addiction Warning Label: Present, Absent) between-subjects experiment. Post-exposure measures assessed perceived substitutability of nicotine pouches for cigarettes and smokeless tobacco, perceived harm and addictiveness, and intentions to use nicotine pouches. Analyses examined main effects and interactions of the experimental factors on outcomes adjusting for tobacco user status. **Results:** There was a significant main effect of nicotine concentration (ps <.05) on measures of perceived harm and addictiveness. Products labeled as 6mg nicotine produced lower perceived harm and addictiveness than those with no nicotine content on the label and/or those labeled as 3 mg nicotine. These effects were not moderated by tobacco user status. There were no significant effects of nicotine concentration on perceived substitutability, no significant effects of flavor or warning label on any outcomes, and no significant interactions between the experimental factors. **Conclusion:** Our findings suggest that including nicotine content on labeling for nicotine pouches affects consumers' perceived harm and addictiveness of these products. Given the diversity of nicotine pouches available and the wide range of nicotine strengths, the effects of nicotine pouch labeling and packaging on consumer perceptions and behavior warrants further study.

FUNDING: Academic Institution

PS5-99

EXPOSURE TO CORRECTIVE STATEMENTS DURING AND AFTER COURT-ORDERED CIGARETTE PACK ONSERTS

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Significance: A federal court ordered major U.S. cigarette companies to disseminate corrective statements via pack onserts in six, two-week installments shipped about four months apart starting no later than November 21, 2018. Each of the companies' cigarette brands was to receive at least one installment of onserts for each of 5 topic areas addressed by the 18 corrective statements. This is the first study to query smokers about their exposure to the onserts. ***Methods:*** Adults enrolling in tobacco cessation treatment (*N*=582) completed a survey on their scheduled quit day. The sample was divided into group 1 (*n*=298) who took the survey between October 2018 and July 2020 (inclusive of when onserts were to appear), and group 2 (*n*=284) who took the survey between August 2020 and September 2021 (post-onserts). Participants read the 18 statements and reported their prior awareness of each. They then reported if they had noticed any of the statements "on a piece of paper attached to or included with a pack of cigarettes" in the last 7 days and, if so, which of the 5 topic areas they had seen. ***Results:*** On average, group 1 participants reported awareness of 13.4 (*SD*=4.6) of the 18 statements, similar to the 13.1 (*SD*=4.4) for group 2 (*p*=0.505). Participants in

group 1 were more likely than those in group 2 to have noticed an onsert in the prior 7 days (39.1% vs. 27.1%, *p*=0.002). Group 1 recalled seeing more of the 5 topic areas than group 2 (0.76 [*SD*=1.26] vs. 0.49 [*SD*=1.04], *p*=0.005). In group 1, the less novel topic area of "the health effects of smoking" was recalled being seen by almost as many participants (34.6%) as the other 4, more novel, topic areas combined (41.6%). ***Conclusions:*** Exposure to the onserts was higher during the time they were to appear, with over one-third of participants during that period reporting they had recently seen one or more. However, over one-quarter of post-onsert period participants also reported recent exposure, suggesting possible confusion between the onserts and the long-standing Surgeon General's warnings printed on all packs. The onserts may have had only limited impact in conveying novel information in the corrective statements.

FUNDING: Federal; State

PS5-100

E-CIGARETTE HARM PERCEPTIONS IN YOUTH E-CIGARETTE USERS, DUAL USERS, AND SMOKERS

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Significance: Youth who perceive e-cigarettes as less harmful than cigarettes are more likely to use e-cigarettes. Previous studies have not investigated differences in e-cigarette harm perceptions among youth never users, ever e-cigarette users, ever smokers, and ever dual users. **Methods:** Using data from the 2016-2018 PATH Wave 4 Youth survey (n=14,389), we divided adolescents into 4 categories: never users, ever e-cigarette users only, ever smokers, and ever dual users. We used the weighted Rao-Scott Chi-Square tests to identify the association between smoking/e-cigarette use status and covariates. Both unadjusted and adjusted odds ratios from weighted logistic and cumulative logistic regression models were used to identify differences in harm perceptions between the four e-cigarette/cigarette use categories. **Results:** When compared to never users, both ever dual users and ever smokers were less likely to believe that nicotine is the main substance that makes people want to use tobacco products, and thought smoking takes a long time to harm their health. Ever dual users and ever vapers felt additive-free and organic tobacco products are less harmful and thought vaping is less harmful than smoking. Ever dual users and ever vapers felt flavored e-cigarettes (other than menthol or mint) were easier to use than tobacco-flavored or unflavored e-cigarettes. Both ever dual users (AOR=1.64; 95% CI: 1.27-2.11) and ever vapers (AOR=1.63; 95% CI: 1.28-2.06) thought menthol or mint-flavored e-cigarettes or flavored e-cigarettes (other than menthol or mint) are less harmful compared to tobacco-flavored or unflavored e-cigarettes. **Conclusion:** These findings suggest that some youth who use tobacco products alone or in combination are susceptible to inaccurate beliefs about nicotine, and that flavored tobacco products are less harmful than other tobacco products. These findings may help tailor health messaging to youth who use a variety of tobacco products either alone or in combination and strengthen the argument to ban flavored tobacco products.

FUNDING: Unfunded

PS5-101

IMPACTS OF EXPOSURE TO CORRECTIVE STATEMENTS AND FEDERAL RICO COURT FINDINGS ON SMOKING CESSATION

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Significance: In an ongoing federal court case, tobacco companies were found to have repeatedly violated civil racketeering (RICO) laws and ordered to disseminate corrective statements. This study examined impacts of the corrective statements and federal RICO court findings on smoking cessation rates. ***Methods:*** Participants (n=582) were adults who enrolled in tobacco cessation treatment. Data were collected from October 2018 through September 2021. Participants were asked to read the 18 corrective statements and 10 court findings and report their prior awareness of each ("yes," "no" or "not sure"). Using a 9-point scale (1="not at all" to 9="extremely"), they rated the extent to which the information evoked emotions and reported their likelihood of quitting smoking. Reported smoking status was verified via a carbon monoxide breath sample at 4, 12, and 26 weeks after the quit day. All regression analyses were adjusted for age, sex, race/ethnicity, years of education, and pre-quit cigarettes smoked per day. ***Results:*** Participants were mostly female (56.4%), White (63.4%) or Black (25.4%), with a mean age of 52.5 (*SD*=12.3) years. Most (54.4%) reported an annual income of <$21,000. Participants had smoked an average of 16.6 (*SD*=10.4) cigarettes per day (pre-quit) for 31.1 (*SD*=14.7) years. On average, participants reported awareness of 13.3 (*SD*=4.6) of the 18 corrective statements, and 4.1 (*SD*=3.8) of the 10 court findings. Participants reported the statements/findings made them feel extremely (rating=9) afraid (28.4%), angry toward tobacco companies (43.8%), and worried about the health risks of smoking (45.9%) and secondhand smoke (47.8%). Many (80.4%) reported that after reading this information they were more likely to quit smoking for good. Greater awareness of the 10 court findings was associated with smoking abstinence at 4 weeks (*p*=0.023) and 12 weeks (*p*=0.001) post-quit, but not at 26 weeks post-quit (*p*=0.124). Awareness of the corrective statements was not associated with abstinence at any follow-up. ***Conclusions:*** Smokers' awareness of court findings from the ongoing RICO case against tobacco companies may evoke strong emotions while aiding smoking cessation.

FUNDING: Federal; State

PS5-102

IMPACT OF VAPING RESTRICTIONS IN PUBLIC PLACES ON SMOKING AND VAPING

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Study Objectives: To investigate how extending indoor smoking restrictions to include electronic cigarettes (ECs) impacts the use of ECs and smoking. Data and Methods: Data on smoking, use of ECs (vaping), and place of residence from the Tobacco Use Supplement of the Current Population Survey (TUS-CPS 2010-2011, 2014-2015, and 2018-2019) were combined with the American for Non-Smokers Rights Foundation (ANRF) database of state and local indoor smoking and vaping laws. A Difference-in-difference analysis was conducted to explore the impact of indoor vaping restrictions (IVR) on smoking and EC use. Results: We found that increasing county-level IVR coverage from 0% to 100% significantly reduced adult EC use by a half of one percentage point from the average, with greater effect found among those aged 18-35 years, male gender, and those with higher educational attainment. IVR coverage was not significantly associated with adult cigarette smoking, although in subgroup analyses there was a significant increase in cigarette smoking found among those with more years of formal education. The overall estimated effects of IVR on vaping and smoking were robust across different model specifications and sample selections. Conclusion: IVRs, which are intended to protect the health of nonsmokers, appear to have the unintended consequence of discouraging vaping and increasing smoking in some adult subgroups.

FUNDING: Federal

PS5-103

EXAMINING TOBACCO PRODUCT USE PROFILES AMONG ADULTS: A LATENT CLASS ANALYSIS OF THE POPULATION ASSESSMENT OF TOBACCO AND HEALTH (PATH) STUDY

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Background: Multiple varieties of tobacco products have become increasingly available. However, tobacco product use (TPU) profiles are not well understood. **Method:** The study population consisted of 85,140 adults who participated all four waves (2013-2018) of the Population Assessment of Tobacco and Health (PATH) study. Current users were defined as individuals who currently (every day or some days) or in the past 30 days reported use of any tobacco products surveyed in PATH, while those who responded "No" to the same questions were defined as non-current users. Tobacco products were grouped into 5 categories: cigarette, e-products, cigar/pipe, hookah, and snus/smokeless. We applied latent class analysis to each survey wave data to identify groups of adults that shared a similar TPU profile based on observed indicators of tobacco product use status. **Results:** We identified 4 clearly defined TPU latent classes that remained relatively

stable over time: *Dominant cigarette users*, *Poly-users, Non-current-users*, and *Dominant snus/smokeless product users*. The proportion of participants within each TPU class varied, changing from 16.82% in Wave 1 to 32.47% in Wave 4 for Dominant cigarette users, from 9.47% to 10.40% for Poly-users, from 56.49% to 2.42% for Dominant snus/smokeless users, and from 17.22% to 54.71% for Non-current-users. The posterior probability of using individual tobacco product category also varied, changing from 20.34% in Wave 1 to 29.2% in Wave 4 for Dominant cigarette users, 11.81% to 14.12% for Poly-users, from 50.62% to 2.39% for Dominant snus/smokeless users, and from 17.23% to 54.2% for Non-current-users. In addition, the prevalence of current users decreased from 62.22% in Wave 1 to 55.42% in Wave 4. **Conclusion:** Four distinct TPU patterns existed among the US adults that were discernable across PATH survey waves between 2013-2018. The variation in the relative proportion of a TPU latent class and the probability of being in a product use category indicates TPU transitions across waves. Future studies are needed to quantify these transitions between TPU profiles and identify the associated factors for their health and policy implications.

PS5-104

IMPACT OF THE COVID-19 RESTRICTIONS ON SUBSTANCE USE AMONG ADOLESCENTS IN GUATEMALA CITY

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Significance: Electronic Nicotine Delivery System products have been used by youngsters over the past decade. In March 2020, the World Health Organization, declared the COVID-19 outbreak a pandemic and before vaccines were available, countries implemented many societal restrictions to curb it. We sought to assess how the COVID-19 restrictions have influenced substance use including tobacco in a sample of adolescents in Guatemala City. **Methods:** Data were analyzed from two surveys of a cohort of high school students in private schools in Guatemala City who were surveyed before and during the COVID-19 period (n=2666). In both survey waves, students were queried about demographics, substance use, and risk factors for tobacco use. We used logistic regression to estimate changes in use of cigarettes, e-cigarettes, marihuana, and alcohol, including binge drinking, while adjusting for sex, scholastic performance, school grade, wave, parental education, substance use and household member tobacco use. **Results:** Self-reported current e-cigarette use declined over time (31% to 14%, p<0.001), as well as current smokers (10% to 3%, p<0.001) and marijuana (4.3% to 1.9%, p<0.001) and alcohol (47% to 38.5%, p<0.001) use. Friend (59% to 47%, p<0.001), and household member (46% to 37%, p<0.001) smoking and friend (24% to 18%, p<0.001) and household member e-cigarette use (46% to 37%, p<0.001) also declined. In separate adjusted models for each substance assessed, wave 2 was associated with lower odds of using e-cigarettes (AOR=0.41, 95%CI=0.4-0.49), cigarettes (AOR=0.47, 95%CI=0.4-0.66) and binge drinking (AOR=0.73, 95%CI=0.60-0.89). Changes in alcohol (AOR=0.92, 95%CI=0.80-1.06) and marijuana (AOR=0.70, 95%CI=0.45-1.09) were not significant. **Conclusion:** COVID-19 restrictions were associated with a significant decrease in smoking, e-cigarette use, and binge drinking among adolescents.

FUNDING: Federal

PS5-105

A BAYESIAN LATENT GROWTH MODELING ANALYSIS OF SOCIAL NORMS AND TOBACCO USE AMONG ADULT SMOKERS IN MAINLAND CHINA

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Significance. Tobacco use kills more than eight million individuals each year, and results in substantial economic and human capital loss across nations. The world's largest consumer and manufacturer of cigarettes is China, where the prevalence of tobacco use is far higher than the global average, and is expected to increase given the affordability of cigarettes in the nation. While effective policy solutions to tobacco control exist, demand-side approaches are also needed to reach hardened smokers, and smokers in countries with weaker tobacco control policy environments. Shifting social norms around tobacco use is one such promising approach. To develop effective social norms change programs in China, there is first a need to determine how change in social norms affects change in tobacco use, if at all. **Methods.** Longitudinal data over nine years comprising adult smokers from four cities in Mainland China were provided by the International Tobacco Control Policy Evaluation Project. Parallel process Bayesian Latent Growth Curve models were used to model linear and non-linear trajectories in latent change processes over time for tobacco use, descriptive norms, and injunctive norms. Time-varying and time invariant covariates known to be associated with tobacco use were included in the models. Missing data were considered Missing at Random and imputed using a Bayesian imputation method in MPlus. Hypothesis testing was conducted on the basis of whether the 95% Credible Interval for each parameter estimate contained zero. **Results.** Linear change in tobacco use was related to linear change in both descriptive and injunctive norms, as well as the initial level of descriptive norms. Quadratic change in tobacco use was related to the initial level of descriptive norms. As hypothesized, average change in tobacco use, injunctive norms, and descriptive norms varied significantly between individuals. Contrary to initial hypotheses, the relationship between the initial level of injunctive norms and tobacco use change did not vary by initial levels of smoking in the household, nor by initial level of exposure to pro-tobacco media. **Conclusions.** Change in descriptive and injunctive norms relates to change in tobacco use over time in urban settings in Mainland China. In particular, the role of descriptive norms and peer influence is highlighted, and future tobacco reduction interventions in China should target influential individuals within smaller peer group networks in order to usher in large-scale change in tobacco use.

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PS5-106

USING THE THEORY OF PLANNED BEHAVIOR AS A FRAMEWORK TO CHARACTERIZE CURRENT E-CIGARETTE USE AMONG U.S. ADULT CIGARETTE SMOKERS

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BackgroundE-cigarette use patterns among cigarette smokers have been found to be quite variable over 1-year follow-up. Identifying the predictors that determine current dual use will help policy makers design interventions for possible prevention or harm reduction.**Objective**To assess factors that determine current dual use among U.S. adult smokers.**Methods**We used the Theory of Planned Behavior (TPB) as a framework to assess factors (including intention, attitude/perceptions, subjective norms and perceived behavioral controls on tobacco products) that determine dual use among U.S. adults. Adult cigarette smokers were included for the present analysis using data from Waves 2 & 3 of the Population Assessment of Tobacco and Health (PATH) Study. Bivariate logistic regression and Generalized Estimating Equation (GEE) models were used to examine TPB factors associated with current dual use. Classification and regression tree (CART) analyses were used to identify the combination of TPB factors that could achieve the most exploratory power to characterize current dual use and create a hierarchical decision tree.**Results**Current established e-cigarette users among smokers were 645 (11.6%) in Wave 2 and 509 (11.3%) in Wave 3. Smokers who have ever considered switching to e-cigarette were about 7 times more likely to be current dual users than those who never considered so (OR [95% CI]: 6.9 [4.1-11.7]). Compared to smokers that perceived "e-cigarette is less harmful" than regular smoking, those who perceived e-cigarette "about the same harmful" (OR [95% CI]: 0.23 [0.20-0.27]) or "more harmful" (OR [95% CI]: 0.09 [0.06-0.13]) were much less likely to be current dual users. Results from CART showed similar results. The most influential factor for current dual use was harm perception of e-cigarettes compared to cigarettes, followed by intention to switch to e-cigarettes, and behavior controls.**Conclusions**Intention to switch to e-cigarette, less harmful perception of e-cigarette, subjective norms, and perceived behavioral control contributed significantly to current dual use among smokers. Thus, the potential risks of e-cigarettes must be well communicated to smokers. Also, social norms could be guided and behavioral control should be strengthened for early prevention of dual use among smokers.

PS5-107

MAGNITUDE AND PREDICTORS OF WATERPIPE SMOKING CESSATION AMONG YOUNG ADULTS IN THE POPULATION ASSESSMENT OF TOBACCO AND HEALTH (PATH) STUDY, WAVES 3-5 (2015-2019)

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Significance: The prevalence of waterpipe tobacco (WPT) smoking among young adults is high in the US. The majority of WPT smokers make unsuccessful quit attempts each

year. This study assessed the magnitude and predictors of WPT smoking cessation among young adults. Adequate understanding of the factors predicting WPT cessation is very essential to tobacco control efforts. **Methods**: The population assessment of tobacco and health (PATH) study data (waves 3-5) was used for the study. A total sample of 292 young adults exclusively using WPT (past 30-days) was used for the analysis. The probability of WPT smoking cessation (no use in the past 12 months) was estimated using the Kaplan-Meier survival method. The Cox proportional hazards regression models were used to examine the predictors of the WPT smoking cessation. **Results**: During the three waves, 32.5% of the young adult WPT smokers quit smoking. Among them, 57.7% were females and the remaining were males. Non-Hispanic Blacks (32.9%) had the highest rate of WPT smoking cessation among ethnic groups. Negative/neutral social norms about tobacco use (adjusted odds ratio (aHR)= 3.62, 95% confidence interval (CI)=1.38-9.45), good/excellent mental health (aHR=2.84, 95% CI=1.37-5.90), and regret smoking WPT (aHR=1.80, 95% CI=1.03-3.15) predicted WPT cessation. **Conclusions**: WPT cessation interventions for example quit smoking campaigns and behavioral support programs should focus on promoting regret among WPT smokers. The mental well-being status of the WPT smokers should be considered in targeting interventions at an individual level. Tobacco-free policies should be implemented adequately to change positive social norms of tobacco use.

PS5-108

REASONS FOR USING AND STOPPING USE OF E-CIGARETTES, A LONGITUDINAL STUDY OF BEHAVIORAL SEQUELAE AMONG MEXICAN SMOKERS

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Background The purpose of this study was to estimate the prevalence of different reasons for using and stopping the use of e-cigarettes and their association with short-term transitions in tobacco product use. **Methods** Open cohort of smokers was surveyed every four months across 8 survey waves from November 2018 to March 2021. Those who were followed up at least once after recruitment were classified as: 1) Dual users, those who smokes and uses e-cigarettes at least once in the month for the last 4 months; 2) Former e-cigarette users, smokers who used e-cigarettes but not in the last 4 months. Among dual users, transitions at 4-month follow-up (time "t+1") included: 1) Cessation of both products; 2) exclusive smoker. Among former e-cig user, transitions (time "t+1") were: 1) actual e-cig user (dual or exclusive); 2) exclusive smoker. By two independent multinomial logistic regression models, we estimated the likelihood of each transition at follow-up (time "t + 1"), based on respondent reasons for using (or stopping e-cigarette use at the prior 4-months (time "t"), assessed one at a time and adjusting for covariates including demographic and tobacco variables. **Results:** Most popular reasons to use e-cigarettes were "less harmful to people around me than cigarettes" (38.2%) and "they are more acceptable" (37.5%), while for stop using e-cigarettes were "are not satisfactory enough" (32.7%) and "e-cigarettes are very expensive" (28.6%). Among dual users, 5.9% stopped using e-cigarettes and combustible cigarettes or change to exclusive e-cigarette users, and 20.1% changed to exclusive smokers by the time "t + 1". Those dual users who reported that they use e-cigs at the time "t" because are "less harmful to others" (ARRR=0.66), "Enjoy using them" (ARRR=0.58), "help to quit smoking" (ARRR=0.67) and "control weight" (ARRR=0.50) were less likely to transition to exclusive smokers at follow-up. Among former users of e-cigarettes, 37.9% transitioned to exclusive e-cigarette users or dual users, while former users who reported that they stop using e-cigarettes because it was not satisfactory (ARRR=0.60) had a lower likelihood to use e-cigarettes again at follow-up. Although did not keep statistical significance in adjusted models. **Conclusions:** Reasons for use and stopping using e-cigarette are associated with changes in smoking status for dual and former users respectively. Future research could determine the associated factors and time that each transition lasts and its variation according to the pattern of consumption.

FUNDING: Nonprofit grant funding entity

PS5-109

WHICH MESSAGES DO SMOKERS WANT TO SEE ON CIGARETTE PACK INSERTS? A QUALITATIVE STUDY TO INFORM DEVELOPMENT OF PACK INSERTS IN ISRAEL

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Significance: Tobacco package inserts [TPI] can be used as an effective channel to transmit smoking cessation messages to smokers if they are perceived by smokers as worthwhile attending to. Israel is the second country (after Canada) to legislate health-related TPIs, as part of amendments to the 2018 law governing advertising and marketing of tobacco products, and includes provisions for messages on the harms of smoking and smoking cessation. However, tobacco package inserts have not yet been implemented. Experience and research in other countries, including Canada, Australia, UK, and Turkey, have shown positive effects of inserts on intentions to quit and increased self-efficacy. In order to develop effective TPIs in Israel, where 300 million cigarette packs are sold annually, qualitative interviews were conducted with smokers to learn from their perspective what messages they might find helpful. **Methods:** Interviews with 25 smokers and ex-smokers were recorded and transcribed and themes analysed. Participants included 14 females and 11 males, 17 current and 8 ex-smokers, aged 18-67. **Results:** Participants expressed interest in receiving information via inserts in particular about harm to others rather than themselves, and proposed messages about secondhand smoke, information about addiction, comparative risks of different tobacco/nicotine products, motivational messages to encourage quitting, use of personal quit stories, information on available cessation services and tips for quitting, for example promoting sport. Some suggested using messages about smoking harms, while others preferred positive messages about quitting. **Conclusion:** Development of TPI aimed to encourage smokers to quit should provide diverse types of information and consider smokers' preferences to learn about what is unknown to them regarding hazards (mainly to others) of tobacco products, cessation approaches, practical tips and getting support.

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PS5-110

DIRECT ANALYSIS OF N'-NITROSONORNICOTINE IN TOBACCO PRODUCTS BY LC-MS-MS USING A MOLECULARLY IMPRINTED POLYMER-PACKED COLUMN

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Significance: N'-Nitrosonornicotine (NNN) is a tobacco specific nitrosamine (TSNA) that is formed during the curing and harvesting process of tobacco products. NNN is highly carcinogenic and is a contributor to cancer risks from the use of tobacco products. As a result, the FDA has proposed limits of NNN that can be present in smokeless tobacco products, about 1 microgram per gram; therefore, sensitive and selective analytical methods are necessary. Molecularly imprinted polymers (MIPs) are synthetic polymers that are designed to selectively capture an analyte based on its chemical and physical properties. MIPs can be incorporated into HPLC columns for the direct analysis of target analytes with minimal sample preparation. The purpose of this project was to develop a method to directly analyze levels of NNN in a variety of tobacco products. **Methods:** Nine tobacco products were analyzed. One smokeless tobacco product and seven oral nicotine pouches that were labelled as "nicotine derived from tobacco", and one oral nicotine pouch labelled as containing nicotine salts. The samples were prepared following the CORESTA method for the analysis of NNN by weighing out 250 milligrams of product and mixing with 10 millimolar ammonium acetate, pH 5.5 for 60 minutes, before filtering the product with a 0.45 micrometer syringe. Samples were analyzed with a HPLC column slurry packed with MIP material specific for TSNAs. A validated method for detecting and quantifying NNN in tobacco products was carried out on a SCIEX ExionLC 2.0 Binary Pump and a SCIEX Q-Trap 6500 Mass Spectrometer. **Results:** The method showed a linear, analytical range from 0.05 to 100 nanograms per milliliter with a correlation factor of 0.9995 and accuracy and precision values within acceptable ranges. Of the nine samples analyzed, only the smokeless tobacco product was positive for NNN, with a concentration of 209.9 ± 3.9 nanogram per gram. **Conclusion:** The validated method allows for the direct analysis of NNN in a variety of tobacco products with a MIP-packed HPLC column via LC-MS-MS.

FUNDING: Federal

PS5-111

METAL CONCENTRATIONS IN E-CIGARETTE AEROSOL SAMPLES: A COMPARISON BY DEVICE TYPE AND FLAVOR

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SignificanceThe rapid evolution of e-cigarette products in recent years warrants constant surveillance of the differences in exposure across device generations - MODs, PODs, disposable PODs (d-PODs)—and flavors of the products available on the market. This study aimed to measure and compare metal aerosol concentrations by device type (MODs, PODs, d-PODs) and popular flavors. **Methods**We sampled 137 MODs, 67 PODs, and 23 d-PODs. We collected aerosol from 4 POD brands (Bo, PHIX, Suorin, JUUL) and 3 d-PODs (Zpod, Bidi, Stig) via droplet deposition in a series of conical pipette tips. Metals (Al, As, Co, Cr, Cu, Fe, Mn, Ni, Pb, Sb, Sn, Zn) were measured using ICP-MS, log-transformed for statistical analysis, and reported in aerosol units (mg/m^3). **Results**Of the 12 metals analyzed, all metal concentrations except for Zn were statistically significantly higher by 62-99% for MOD devices than for both PODs and d-PODs. Of the POD brands analyzed, PHIX had highest median As, Ni, Pb, and Sn aerosol concentrations while BO devices had highest median Cu and Zn concentrations compared to the rest of the POD brands. According to POD flavor, Linear regression of geometric means of Cu, Fe, and Ni were found to be 85-98% higher in tobacco flavored aerosol than in mint flavored aerosol. Of the d-PODs analyzed, linear regression of several metals (Al, Cr, Fe, Ni, Pb, Zn) were found to be 33 to 99% higher in ZPOD brand compared to Bidi Stick and Stig devices. According to d-POD flavor, only As concentrations were found to be statistically significantly higher in tobacco flavored d-PODs than mint-flavored d-PODs. **Conclusion**We observed wide variability in aerosol metal concentrations within and between the different e-cigarette device types, brands and flavors. Overall, MODs generate higher metal concentrations than PODs and d-PODs, and tobacco flavored aerosols contain the highest metal concentrations. Continued research is needed to evaluate the factors that contribute to metal exposure from new and emerging e-cigarette devices.

FUNDING: Federal; FDA CTP

PS5-112

ASSOCIATION OF EXPOSURE TO FLAVORS IN ELECTRONIC CIGARETTES (ECIG) AND DRY COUGH AMONG CURRENT AND FORMER ESTABLISHED ECIG USERS

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SignificanceEarly reports indicate an association between electronic cigarettes (ECIG) use and elevated risk of wheezing and respiratory symptoms. Few studies focus on coughing as a symptom reflecting potential negative effects of ECIG use. Less is known about the health effects of ECIG flavors on the production of cough. This report examined the association between exposure to flavors in ECIG and self-reported dry cough in the past 12 months (P12M) among current and former established ECIG users. **Methods**Cross sectional analyses were conducted of data from the Population Assessment of Tobacco and Health (PATH) Study Wave 2 (October 2014-2015). The study population included new and continuing adults with completed information (n=28,361). Weighted prevalence estimates of self-reported dry cough in the P12M and exposure to ECIG flavors are presented. Multivariable weighted logistic regression models to assess unadjusted and adjusted associations were performed. Models were adjusted for sex, age, race and ethnicity, educational level, household income, body mass index, disease status, and ever-tobacco use. **Results**Compared to non-users (15.4%), the weighted prevalence of self-reported dry cough in the past 12 months was significantly higher among established current and former established ECIG users, 20.2-30.6% and 23.2- 32.5%, respectively, across flavor categories. In the full model, former and current established ECIG users of menthol and mint were 74% (aOR:1.74, 95%CI 1.33, 2.28) and 94% (aOR:1.94, 95%CI 1.34, 2.82) more likely to report dry cough in the P12M, respectively, when compared to non-ECIG users. After excluding participants with medical conditions from the analysis (non-disease model), current established ECIG users of fruit flavors were 64% (aOR:1.64, 95%CI 1.14, 2.35) more likely to report dry cough in the P12M. Among former established ECIG users, only menthol and mint flavor users were more likely to report dry cough, with more than two times the odds of reporting (aOR:2.20, 95%CI 1.41, 3.43).**Conclusion**ECIG users of menthol and mint flavors were consistently more likely to report dry cough in the past 12 months as compared to non-ECIG users.

FUNDING: Federal

PS5-113

COST-EFFECTIVENESS OF A CHRONIC CARE SMOKING TREATMENT PROGRAM IN PRIMARY CARE

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SIGNIFICANCE: Primary care offers a unique opportunity to deliver chronic-illness care management to patients who smoke. This real-world pragmatic trial implemented electronic health record (EHR) prompts and tools to facilitate proactive, repeated outreach and smoking cessation treatment to all adult patients who smoked cigarettes. The program comprised tools for clinicians to offer treatment at routine clinic encounters, and phone outreach and cessation support from certified tobacco treatment specialists. The program increased treatment reach and rates of quitting smoking among patients on a smoking registry in the participating health system. Little research has examined the relative health care costs and benefits of an intervention that involves EHR guided outreach and intervention. METHODS: The study used a stepped-wedge design to implement the program in 3 steps in 6 primary care clinics from January to November 2018. Pre-post analyses compared intervention costs with benefits of increased treatment engagement, quit attempts, and successful smoking cessation, as well as decreased acute health care use, including emergency department visits and inpatient hospitalization. Incremental cost-effectiveness, or cost per patient who quit smoking, was calculated based on staff time and resources used (including medications) in the intervention relative to weighted individual pathways of pre-post smoking rates and health care costs for patients who smoked. RESULTS: A total of 10,683 adults were on the smoking registry for the participating clinics from January 2017 to February 2020. Total cost was $11.28 per patient per month on the smoking registry post-implementation. Acute health care costs decreased from pre- to post-implementation by an average $42.65 per patient per month for individuals on the smoking registry. The incremental cost-effectiveness ratio was $1,853 per person who quit. CONCLUSIONS: Implementation of a comprehensive and proactive EHR-enabled smoking cessation outreach and treatment program for adult primary care patients who smoke is cost-effective in primary care clinics. Reductions in acute health care cost could offset the intervention costs.

FUNDING: Federal

PS5-114

IMPACT OF E-CIGARETTE USE BEHAVIORS AND DEVICE CHARACTERISTICS ON BLOOD METALS

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Introduction: Electronic cigarettes rapidly evolved from “mod” devices mostly used by smokers as a risk reduction strategy to “pod” devices marketed to youth and never smokers. Mod devices allow users to customize flavors, coils, temperature, power, whereas users of pod devices can only choose flavors from prefilled or refillable cartridges. Evaluating e-cigarette use behaviors, device type, and settings is essential to understanding potential heavy metal exposures. Objective: Describe user demographics, use behaviors and preferences by device type, and assess heavy metal concentration in blood of e-cigarette users and controls by use behaviors and device type. Methods: We recruited 95 participants: 17 Mod, 24 Pod, 10 smokers, 14 dual users (cigarette and e-cigarette), and 30 non-e-cigarette/non-smokers. Sociodemographic characteristics, e-cigarette/tobacco use behaviors, and device characteristics were collected by survey. Whole blood samples from 83 participant were analyzed for As, Cd, Cr, Cu, Mn, Ni, Pb, and Zn using ICP-MS. Data was corrected for background and limit of detection and each metal was characterized by primary device used by each participant. Chi-squared tests for categorical variables, ANOVA tests for continuous variables, and linear regressions were used to assess relationships between variables and groups. Results: Mod users reported greater mean number of puffs per day (374 +/- 587) compared to

pod users (93.5 +/-82.5) and dual users (132.6 +/-125.2). Nicotine concentration used was significantly associated with education status (p = 0.012) and former smoking status (p < 0.001). Education was significantly associated with mod power (p = 0.038) and time since last coil change (p = 0.044). Blood Cd was 2.65 times higher in smokers than nonusers. Blood Mn was lower in mod (0.78 times) and pod (0.81 times) users compared to nonusers. Ni in mod users was 1.51 times higher than nonusers. Blood Zn was lower in dual (0.81 times) and mod (0.88 times) users compared to nonusers. Conclusions: Differences in user behaviors, characteristics, and device type determine exposure to certain metals. Blood Cd, Mn, Ni, and Zn were associated with user group.

FUNDING: Federal

PS5-115

STUCK IN THE MIDDLE RATHER THAN SWITCHING: E-CIGARETTE AND CIGARETTE DUAL USERS' BELIEFS ABOUT QUITTING AND PERSPECTIVES ON MASS MEDIA CESSATION ADS

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Significance: More than half (55%) of the 11 million e-cigarette users in the US also smoke cigarettes. Some biomarkers of harm for these "dual users" are as high or higher than those of exclusive cigarette smokers. We sought to understand dual users' motivations and quitting barriers and elicit their reactions to potential mass media ads encouraging cessation. **Methods:** We conducted 7 semi-structured focus groups with adult dual users in North Carolina. Groups were stratified by age (18-25, 26-44, 45+) and education level (low: some college or less, high: associate's degree or higher). The discussions followed a guide addressing motivations for use, barriers to quitting, and responses to existing FDA and CDC ads and mocked-up dual-use-specific ads. We then conducted a thematic content analysis using two independent coders. **Results:** There were 41 participants (25 female, 15 male, 1 nonbinary; median age = 31; 28 White, 9 African American, 4 other race; 4 Hispanic; 20 low education, 21 high education). Motivations for e-cigarette use included a desire for a more convenient nicotine source or wanting to cut down on cigarette use. Barriers to quitting cigarettes included 1) finding e-cigarettes to be an inferior substitute for cigarettes, 2) reverting to cigarettes under stress, 3) the influence of peers who smoke, and 4) believing there is no health benefit to switching to e-cigarettes. When shown FDA, CDC, and mock dual-use-specific ads, participants indicated a desire for ads that spoke directly to dual use, explained the harm of both cigarettes and e-cigarettes, and provided direction and resources in quitting. Participants suggested that either supportive or fear-based testimonial ads could be effective. Opinions were mixed about whether ads should encourage quitting both products simultaneously or prioritize quitting cigarettes. **Conclusion:** Findings suggest ads for dual users should directly address dual use, clearly explain relative product risks, and offer guidance in how to either quit both products or fully switch to e-cigarettes. We will discuss how findings may inform further communication research and FDA and CDC mass media campaign development.

FUNDING: Federal; FDA CTP

PS5-116

HELPING SMOKERS QUIT OR FUELING A NEW ADDICTION? EXAMINING THE INTERSECTION OF CONFLICTING INFORMATION AND RECENT TOBACCO EXPERIENCE ON SUPPORT FOR E-CIGARETTE REGULATIONS

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Significance: Conflicting information about e-cigarettes reflects ongoing research and evolving risk assessments; as such, one may encounter information about both the potential benefits (e.g., harm reduction) and potential risks (e.g., exposure to chemicals). But how might exposure to one-sided vs. two-sided information impact support for e-cigarette regulations, comparing those with and without recent vaping experience? **Methods:** We conducted an online, 2x2 between-subjects factorial experiment with 200 U.S. adults (18+) from December 14-16, 2021. Participants were randomly assigned to one of four conditions, in which they read a research brief about: (1) the benefits of e-cigarettes; (2) the risks of e-cigarettes; (3) the benefits and risks of e-cigarettes (conflict); or (4) a neutral cues control. Next, they indicated their support for four current or proposed e-cigarettes regulations, which we averaged into a regulatory support scale (range=1-7; M=4.50; SD=1.65; Cronbach's alpha=.85). Participants were also asked about their current vaping status. **Results:** There was a main effect of risks (vs. no risks), $F(1,192)=6.97$, $p<.01$; those exposed to information about the risks of e-cigarettes reported higher regulatory support than those who were not. In addition, there was a main effect of current vaping status, $F(1,192)=22.19$, $p<.001$; current vapers expressed lower regulatory support than non-vapers. Finally, there was a marginally significant three-way interaction between benefits, risks, and current vaping status, $F(1,192)=3.75$, $p=.054$. Those in the risks-only condition expressed similar support for e-cigarette regulations, regardless of current vaping status. Conversely, non-vapers in the conflict condition reported higher regulatory support (M=5.29, SE=0.27) than current vapers (M=3.81, SE=0.33). **Conclusion:** Those exposed to a one-sided brief about the risks of e-cigarettes reported similar regulatory support, irrespective of recent vaping experience. However, a gap emerged between vapers and non-vapers in the conflict condition, suggesting that tobacco experience may play a role when weighing the concurrent risks and benefits of e-cigarettes.

FUNDING: Academic Institution

PS5-117

CORRELATES OF SMOKING DURING COVID-19 AMONG LGBTQI+ CANCER SURVIVORS

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Significance: Cancer survivors who smoke are at greater risk for cancer reoccurrence. National data show that the LGBTQI+ population has a higher proportion of smoking compared to those who identify as straight and cisgender because of stressors related to their identities as a result of systemic forms of discrimination. The COVID-19 pandemic may have further exacerbated these stressors. Explore the correlates of cigarette use and other tobacco and nicotine products during the COVID-19 pandemic in LGBTQI+ cancer survivor population.**Methods:** We conducted a secondary analysis of OUT: The National Survey, administered from September 2020-March 2021. Our outcome was ever-use of 100+ cigarettes in their lifetime and current use (do not use, cigarette use, and other included e-cigarettes, snus, cigarillos, and hookah). Our explanatory variables included gender, sexual orientation, race and ethnicity, age, educational level, alcohol use, psychological distress, has health insurance, lost employment during the pandemic, disability status, and neighborhood setting. We implemented logistic regression and multinomial logistic regression analysis.**Results:** About 55% of our sample (N=1,629) used cigarettes in their lifetime, and 87% did not smoke currently. Older age (OR=1.02; 95% CI: 1.01,1.03) and binge drinking (OR=2.47; 95% CI: 1.17,5.20) were associated with an increased likelihood of ever-use, while having a graduate-level education (OR=.40; 95% CI: .23,.71) was associated with a decreased likelihood of ever-use. Compared to individuals who do not currently use, those who identify as Latinx (RRR=2.21; 95% CI: 1.20,4.08), binge drinking (RRR=3.68; 95% CI: 1.75,7.76), and differently abled (RRR=1.02; 95% CI: 1.01,1.03) were more likely to currently use cigarettes, while those who are older (RRR=.98; 95% CI: .97,1.00) and have a graduate-level education (RRR=.25; 95% CI: .11,.56) were less likely to use cigarettes currently. Those who do not have insurance (RRR=3.85; 95% CI: 1.20,12.34) and differently abled (RRR=2.06; 95% CI: 1.15,3.70) were more likely to use other tobacco and nicotine products, while womxn (RRR=.15; 95% CI: .03,.77) are less likely to use other products.**Conclusion:** Because of systemic oppression, LGBTQI+ cancer survivors at greater risk for smoking. Researchers and practitioners that work with this population need to advocate for systemic changes that would make access to resources and services easier for LGBTQI+ cancer survivors without additional barriers because of their intersecting identities.

FUNDING: Federal; Pharmaceutical Industry; Nonprofit grant funding entity

PS5-118

THE TRUTH SANDWICH AND OTHER TECHNIQUES TO CORRECT NICOTINE REDUCTION MISPERCEPTIONS: RCT WITH A NATIONAL PROBABILITY SAMPLE

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Significance: There is a misperception held by half of smokers that very low nicotine content (VLNC) cigarettes would be less toxic to smoke than current cigarettes. This could reduce smokers' motivation to quit under a VLNC policy. We conducted a national RCT to determine the effectiveness of three promising cognitive-science-based message design approaches in reducing this misperception. **Methods:** In a between-subjects design, an online probability sample of US adult smokers (n=1,053) were randomized to view a set of messages that: 1) evoked emotion (Emotion); 2) presented the true information, refuted the myth, then reiterated the truth (Truth Sandwich); 3) reframed the conversation to emphasize the harm of all smoking (Reframe); or 4) contained a control message about littering (Control). There were three messages in each set. We then assessed misperceptions about risk of harm, risk of cancer, and risk death from VLNC cigarettes as compared to current cigarettes. **Results:** All three approaches greatly reduced VLNC misperceptions compared to control (p<.05). Messages following the Truth Sandwich approach were more effective in reducing misperceptions than those using Emotion or Change Frame approaches (p<.05). Compared to control, the Truth Sandwich resulted in lower levels of the misperceptions for risk of harm (42% vs. 8%), risk of cancer (37% vs. 9%) and risk of death (40% vs. 9%) (all p<.05). **Conclusions:** Using cognitive-science-based approaches, especially the Truth Sandwich approach, successfully reduces the misperception that VLNC cigarettes are safer than current cigarettes. These approaches can be used to ensure that the public correctly understands that a nicotine reduction policy does not mean that cigarettes are now safe to smoke. Future research can examine whether these effects are temporary or long-lasting in a real-world setting. In our presentation we will discuss our message refinement process, display example messages, and examine implications for mass media campaigns.

FUNDING: Federal; FDA CTP

PS5-119

THE IMPACT OF PERCEIVED RISK OF COVID-19 FROM SMOKING ON THE CHANGE IN NUMBER OF CIGARETTES SMOKED

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Significance: Smoking is associated with a greater likelihood of both contracting and a more severe illness from COVID-19. Individuals who smoke are less likely to practice COVID-19 precautions. However, the impact of perceived risk of COVID-19 on smoking behavior is not well known. This study investigated whether perceived COVID-19 risk due to smoking (i.e., smoking increases COVID-19 risk) is associated with changes in cigarette consumption. Methods: U.S. adults who smoked at least 30 days over the past year (N = 461) were recruited online using Reddit (Jan-Apr/2021), and completed a one-time online survey that assessed perceived risk of COVID-19 due to smoking and the number of cigarettes smoked per day at T1 (pre-COVID-19 in the U.S., Dec 2019 - Feb 2020), and throughout the pandemic (T2: Mar - May 2020, T3: June - Aug 2020, T4: Nov 2020 - Jan 2021). Results: A linear regression model showed that higher perceived COVID-19 risk at T2 predicted greater reductions in the number of cigarettes from T1 to T2 (p = .04) while perceived COVID-19 risk at T3 was not associated with changes in cigarette consumption from T2 to T3 (p = 0.94). However, higher perceived COVID-19 risk at T4 predicted an increased number of cigarettes from T3 to T4 (p = .01). Follow-up analyses revealed that perceived risk remained stable over time, and using perceived risk at T2 as a predictor in all analyses did not change the findings. While those with the highest (top quartile) perceived risk reported the greatest decrease in the number of cigarettes from T1 to T2, they also reported the greatest increase from T3 to T4, returning to cigarette consumption similar to their pre-COVID levels. Conclusions: Our results showed that those with higher perceived COVID-19 risk reduced smoking at the beginning of the pandemic, yet they have returned to their pre-COVID levels of smoking within less than a year, even though their perceived risk remained unchanged. This suggests that the perception that smoking increases acute health risks may lead to reductions in smoking, yet its impact on smoking behavior may be short-lived, and such changes cannot be sustained without further interventions.

FUNDING: Academic Institution

PS5-120

ASSOCIATION BETWEEN E-CIGARETTE USE AND RESPIRATORY SYMPTOMS AMONG ADULTS: A LONGITUDINAL ANALYSIS OF THE POPULATION ASSESSMENT OF TOBACCO AND HEALTH STUDY

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Background: Little is known about the respiratory effect of e-cigarette use. We examined the association of e-cigarette use with respiratory symptoms among US adults. **Method:** We analyzed data from the Population Assessment of Tobacco and Health Study. Adult participants with complete Waves 3 and 4 data and reported no respiratory diseases (e.g., asthma, COPD, chronic bronchitis, emphysema, other lung/respiratory conditions) in Wave 3 were included (n=17,731). Participants reported e-cigarette (never/former/current) and combustible tobacco use (never/former/current) at Wave 3. Combustible tobacco includes cigarettes, cigars, cigarillos, hookah, and pipe tobacco. A respiratory symptom index (ranging 0-9) was created based on 7 respiratory health questions in Wave 4. An index score of ≥2 was defined as having functionally important respiratory symptoms, and otherwise as no functional impairment. For each of the 3 groups of combustible tobacco smokers, we performed weighted multivariable logistic regression to examine the association of e-cigarette use (Wave 3) with functionally important respiratory symptoms (Wave 4), adjusted for covariates (i.e., gender, race/ethnicity, education, poverty level, secondhand smoke exposure, chronic diseases, body mass index, and respiratory symptom index) at Wave 3. **Results:** Among adults who had never used combustible tobacco products, e-cigarette use is not associated with reporting functionally important respiratory symptoms (e-cigarette former use: OR=0.57; 95% CI: 0.18, 1.79; e-cigarette current use: OR=0.36; 95% CI: 0.03, 4.38; e-cigarette never use as reference). Similarly, among former combustible tobacco smokers, former (OR=1.15; 95% CI: 0.85, 1.55) or current e-cigarette use (OR=1.11; 95% CI: 0.62, 2.01) is not associated with respiratory impairment. For current combustible tobacco smokers, former (OR=1.27; 95% CI: 1.02, 1.58) and current e-cigarette use (OR=1.35; 95% CI: 1.04, 1.76) is associated with higher odds of respiratory symptoms compared to e-cigarette never users. **Conclusions:** Current combustible tobacco users are at elevated risks of functionally important respiratory symptoms when combined with e-cigarette use.

FUNDING: Federal; FDA CTP

PS5-121

MOST YOUNG ADULTS WHO USE TOBACCO OR CANNABIS ARE DUAL USERS IN 2021 US SURVEY

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Significance: There is growing recognition of the high co-occurrence between tobacco and cannabis use. Increased vaping among 19 to 22 year-olds represents the largest increase of any substance in the 45-year history of the Monitoring the Future survey. Young adults also experienced a historic surge in cannabis use. The present study investigates frequency and modalities of tobacco and cannabis use. **Methods:** Young adults aged 18 to 25 years (N=1,039; mean age=20.9 years; 53% annual income≤$34,999; 54% students) were surveyed via Qualtrics panel on their tobacco and cannabis use from February 16 to May 1, 202, in states where marijuana use was fully legal (n=524) or fully illegal (n=515) for at least four years preceding data collection. Sampling was stratified by race/ethnicity (approximately one third of sample Hispanic, non-Hispanic Black, and non-Hispanic white) and gender (approximately half male and half female).**Results:** Dual tobacco and cannabis use was much more common (409/564=73%) than single use of tobacco (109/564=19%) or cannabis (46/564=8%) among current users of either substance (564/1,039=54%). Current e-cigarette use was reported by 41% of the study sample, with most using disposables (28%), rechargeables (19%), or mods/tanks (17%) on about 11 of the past 30 days. Current combustible tobacco use was reported by 30% of the sample, with cigarettes (18%; 13.8 days) and little cigars or cigarillos (11%; 7.7 days) the most common methods. Current cannabis use was reported by 44%. Smoking was the most common method of cannabis consumption, reported by 32% of participants (14.3 days), followed by vaping/dabbing (22%; 9.2 days), and edible (17%; 6.6 days). The most common methods of tobacco and cannabis co-administration were blunts (16%; 9.4 days) and spliffs (15%; 10.6 days).**Conclusion:** Most young adults who used tobacco or cannabis in the past

30 days used both products. The most common mode of tobacco use was vaping, whereas the most common mode of cannabis use was smoking. Findings highlight dual use of tobacco and cannabis as a unique public health issue among young adults warranting targeted interventions.

FUNDING: Academic Institution

PS5-122

PERCEPTIONS OF HARM AND SOCIAL ACCEPTABILITY OF TOBACCO AND CANNABIS BY US STATE-LEVEL CANNABIS LEGALITY

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Significance: Many young adults who use tobacco or cannabis consume both substances, a pattern associated with increased health risk. A key factor in tobacco and cannabis use is the perception of risk and acceptability of each substance. The present study investigates how perceptions of harm and social acceptability for tobacco and cannabis varies by cannabis legality.**Methods:** Young adults aged 18-25 years (N=1,039; mean age=20.9 years; 52.9% annual income< $35,000) were surveyed from February 16 to May 1, 2021 through a Qualtrics panel. Recruitment focused on states where marijuana was fully legal (n=524) or fully illegal (n=515) for at least four years. Sampling was stratified by race/ethnicity (Hispanic, non-Hispanic Black, non-Hispanic white) and gender (male, female). Perceived harm and social acceptability of various products were rated on 5-point scales ranging from not at all to extremely. Scores were averaged for combustible and smokeless tobacco products (tobacco), vaping tobacco products (vaping), and all cannabis use modalities (cannabis). **Results:** Perceived harm of tobacco was 3.9 (SD=1.1) in legal and 3.8 (1.1) in illegal states, *p*=.16. Perceived harm of vaping was 3.6 (1.3) in legal vs. 3.5 (1.3) in illegal states, *p*=.24. Perceived harm of cannabis was 2.97 (1.3) in legal and 3.04 (1.4) in illegal states, *p*=.42. In legal and illegal states, vaping and dabbing ranked higher in perceived harm. Perceived social acceptability of tobacco was 2.4 (1.1) in both legal and illegal states, *p*=.96. Perceived social acceptability of vaping was 2.8 (1.3) in both legal and illegal states. Perceived social acceptability of cannabis was 2.9 (1.3) in legal and 2.6 (1.3) in illegal states, *p*=.003. **Conclusion:** Harm perceptions for tobacco, vaping, and cannabis did not vary by US state-level cannabis legality. Cannabis was perceived as relatively less harmful than tobacco regardless of legal status. Cannabis use was perceived as less socially acceptable in states where it is illegal. Understanding how perceptions of harm vs. acceptability connect with prevalence and associated consequences is a future direction.

FUNDING: Academic Institution

PS5-123

CHARACTERISTICS OF YOUNG ADULTS WHO USE TOBACCO FREE NICOTINE E-CIGARETTES

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Significance: E-cigarettes advertised to contain tobacco free nicotine (TFN), meaning synthetic nicotine rather than tobacco derived, are becoming more available. It is unclear if TFN can be regulated as tobacco products. Little is known about if TFN products are used, specifically in groups at risk for vaping, like young adults. The current study examined e-cigarette use behaviors in young adults who do and do not report TFN e-cigarette use. **Method**: U.S. young adults (aged 18-25) with ever e-cigarette use were recruited via online panels in Fall 2021 (n=927). Following attention checks to confirm knowledge of TFN, participants answered questions about e-cigarette and TFN use. Participants were categorized by ever use of TFN e-cigarettes (yes, n=317 [34.2%]; no, n=610 [65.8%]). Bivariate comparisons by TFN vaping status were used for demographics, e-cigarette devices (e.g. JUUL, disposables), and flavor types (e.g. fruit, mint). Binary logistic regression models were used to examine whether frequency of past 30-day vaping, lifetime vaping (<100 times vs. ≥100 times vaped), and other tobacco product (i.e. combustibles, smokeless, pouches, hookah, all entered separately), cannabis, or alcohol use were associated with TFN vaping. Models included demographics and age of vaping initiation. **Results**: Young adults reporting TFN vaping were younger and more likely to be Non-Hispanic White. A higher proportion of TFN vapers (compared to non-TFN vapers) reported having tried most e-cigarette device and flavor types. In adjusted models, more frequent past-30 day vaping and lifetime vaping (≥100 times) was associated with greater odds of TFN vaping (respectively, aOR: 1.03, 95%CI: 1.01,1.04; aOR: 2.14, 95%CI: 1.56, 2.94, *ps* < .001). Among products, only nicotine pouch use was associated with greater odds of TFN vaping (aOR:1.90, 95%CI:1.14, 3.17, *p*<.01). **Conclusion**: Young adults with more frequent e-cigarette use were more likely to use TFN e-cigarettes. Interestingly, nicotine pouches, which heavily advertise TFN forms, were associated with TFN vaping. Given the increased prevalence of TFN products in the market, it is important to examine use and appeal among young adults.

FUNDING: Federal; Nonprofit grant funding entity; FDA CTP

PS5-124

SOURCES OF EXPOSURE TO "TOBACCO-FREE NICOTINE" ELECTRONIC NICOTINE DELIVERY SYSTEMS (ENDS) AMONG US YOUNG ADULTS AND ASSOCIATIONS WITH LIFETIME USE AND CURIOSITY TO USE

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Background: The FDA has authority to regulate the marketing of tobacco-derived products. The Electronic Nicotine Delivery System (ENDS) industry has responded by introducing "tobacco-free nicotine" (TFN) products containing synthetic nicotine. We examined sources of exposure to TFN ENDS among young adults and whether exposure was related to curiosity to use or use of TFN ENDS. **Methods:** In 2021, young adults ages 18-25 years (N=1239) participated in a Qualtrics panel survey. Participants either did not currently use any tobacco products (never users = 154; lifetime users = 211) or were current users of ENDS only (n=334), non-ENDS tobacco products only (n=206), or ENDS and other tobacco products (n=334). The analytic sample was limited to participants who had heard of TFN ENDS (n=642). Participants indicated how often (never, rarely, sometimes, often) they are exposed to TFN ENDS via retail stores, billboards, social media, non-social-media websites, print media, radio, network TV, streaming platforms, gaming platforms, and other. They also reported on lifetime use of TFN ENDS, and never users reported on curiosity to use. Binary logistic regression analyses were run to examine associations between sources of TFN exposure and TFN use and curiosity, respectively. **Results:** Young adults who had heard of TFN reported (sometimes/often) being exposed to TFN ENDS via retail stores (73.8%), social media (57.3%), TV (36.3%), streaming platforms (35.4%), billboards (31.6%), non-social media websites (37.4%), gaming platforms (26.3%), print media (25.7%), radio (21.3%), and other (16.7%). 61.0% indicated lifetime use of a TFN ENDS, and 45.4% of never users were curious to use. Exposure via non-social media websites (ORadj=1.89) and streaming (ORadj=1.76) was positively associated with TFN use; radio exposure was associated negatively (ORadj=0.55). Curiosity was associated positively with exposure via radio (ORadj=3.92) and negatively with exposure in stores (ORadj=0.42). **Conclusions**: Among young adults with and without ENDS experience, 51.2% had heard of TFN ENDS, with exposure occurring via numerous sources. Given concerns about the applicability of regulations to TFN products and our findings that exposure was associated with curiosity and use, ongoing surveillance of TFN marketing practices is needed.

FUNDING: FDA CTP

PS5-125

EXPLORING THE TRIPARTITE MODEL OF RISK PERCEPTION (TRIRISK) IN A GENERAL POPULATION SAMPLE

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Significance: Risk perceptions are key constructs in theories of health behavior. A tripartite model of risk perception, the TRIRISK model, was developed to assess deliberative, affective, and experiential components of risk perception. The goals of the current project were to replicate the factor structure of the TRIRISK measure for cancer and extend and verify the structure to respiratory illness (for which smoking is a risk factor). **Methods:** Participants were recruited using an address-based sample, were 18 or older, and were residents of New York State. As part of a statewide survey

conducted in NYS to examine the impact of flavored tobacco regulations, the TRIRSK measure was included to characterize perceptions of risk around cancer and respiratory illness. Confirmatory Factor Analyses were conducted in Mplus to test the TRIRISK model in our sample. We used nested chi square tests to evaluate the unmodified TRIRISK model against a single-factor model and two dual-factor models where 1) affective and experiential risk perceptions were consolidated into a single factor, and 2) deliberative and experiential risk perceptions were consolidated into a single factor. **Results:** The distribution of smoking status was as followed: 9.2% current, 24.7% former, and 65.9% never smokers. For cancer and respiratory illness, items loaded on the respective constructs as expected, since all standardized factor loadings were significant ($p<0.0001$) and substantial (>0.50, except for one item). The internal reliability among deliberative, affective, and experiential components suggested acceptable convergent validity (Cronbach's alpha ranging from 0.61 to 0.98, with one exception). For both cancer and respiratory illness, the single factor models and the two dual factor structures led to a significant decrement in model fit when compared to the respective TRIRISK models (chi square=1857.92, DF=132 and chi square=1625.99, DF=132; respectively). **Conclusion:** The TRIRISK model can be used improve risk communication and encourage positive health behaviors with regards to tobacco use (including quitting or switching tobacco products).

FUNDING: Federal; FDA CTP

PS5-126

IMPACT OF THE TIPS FROM FORMER SMOKERS ANTI-SMOKING MEDIA CAMPAIGN ON YOUTH SMOKING BEHAVIORS AND ANTI-TOBACCO ATTITUDES

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Anti-tobacco media campaigns are successful at reducing adult and youth smoking, but there is little research on how campaigns that target adults affect youth. Here, we investigate the potential for the adult-targeted Tips From Former Smokers (Tips) campaign to impact youth smoking behaviors and anti-tobacco attitudes, and if this association varies by sex, race/ethnicity, or socioeconomic status. We used repeated cross-sectional data from the Monitoring the Future (MTF) dataset, a nationally representative survey on 8th, 10th, and 12th graders, from years 2013-2015. Quartiles of gross rating points (GRPs) of Tips were used to estimate exposure. Smoking behavior outcomes included smoking participation, initiation, and intentions. For the two anti-tobacco attitude outcomes, participants were asked to what extent anti-tobacco ads in general made them less favorable towards smoking or less likely to smoke cigarettes. Modified Poisson models were used to estimate average marginal effects; separate additive interactions between Tips GRP exposure and sex, race/ethnicity, parents' highest education, and college plans (12th graders only) were used to test for effect modification. Tips GRPs were not significantly associated with any smoking behavior outcomes among any grade. However, 12th graders in the highest quartile of GRPs had a 7.52 percentage point higher probability (95% CI: 0.022-0.124) and a 6.52 percentage point higher probability (95% CI: 0.018-0.113) of responding that anti-tobacco ads made them less likely to smoke and less favorable towards smoking, respectively, relative to those below the 25th percentile. Among 10th graders, higher Tips GRPs were associated with a lower probability of smoking in the past 30 days among females, but not males (joint p-value: 0.007). No other statistically significant interactions by sex, race/ethnicity, or SES were found. This study revealed some potential for adult-targeted campaigns to affect youth smoking-related outcomes. In particular, exposure to the Tips campaign may increase anti-tobacco attitudes among youth. Future studies are warranted to evaluate the impact of Tips exposure on youth smoking cessation rates.

FUNDING: Federal

PS5-127

DISPARITIES IN TOBACCO USE FOR YOUNG SEXUAL MINORITY PEOPLE PERSIST DURING PREGNANCY

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Significance. Tobacco use disparities among sexual minority (SM) assigned female at birth (AFAB) youth emerge before high school and extend into young adulthood. SM AFAB are also more likely to become pregnant during this period than non-SM AFAB. A recent study found increased cannabis use in pregnant SM AFAB compared to those who did not identify as gay, lesbian, or bisexual. However, there is a gap in the literature on prenatal tobacco use as a function of SM identity. **Methods**. Pregnant individuals less than 22 years old were recruited before or during OB visits for a study of prenatal cannabis and tobacco use. Two hundred and thirty participants (78 percent Black or Biracial, Mean age = 19.7 yrs: range = 14.7-21.9) completed an online survey about substance use before and during pregnancy. In addition, clinical urine samples from 126 participants recruited in person were tested for cotinine using point-of-care immunoassay testing. Self-report data were combined with the results of the urine screens to create a measure of prenatal tobacco use. Participants were also asked to identify their sexual orientation in the survey and those who indicated anything other than heterosexual were coded as SM (n = 75). The indirect effects of SM status on prenatal tobacco use via cigarette use before pregnancy recognition were modeled using Mplus. **Results**. SM participants were more likely to smoke combustible cigarettes (32 vs. 22 percent) and little cigars and cigarillos (27 vs. 10 percent) than non-SM participants prior to pregnancy recognition. There were no differences in the use of JUUL or vape pens. There was a significant indirect effect of SM identity on prenatal tobacco use via cigarette use prior to pregnancy recognition, controlling for race and age. **Conclusion**. These results provide evidence that health disparities in tobacco use among SM AFAB youth persist during pregnancy and can be explained by tobacco use prior to pregnancy. Thus, it is necessary to address conditions that contribute to greater tobacco use among SM AFAB youth, such as discrimination and experiences of violence to achieve health equity in maternal and child health.

FUNDING: Federal

PS5-128

ASSOCIATIONS BETWEEN DAILY TOBACCO USE AND COVID-19 SYMPTOM SEVERITY

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Significance: Preliminary studies have shown associations between tobacco/nicotine product use and COVID-19 symptom severity, however, research in this area is limited. This study examined the relationship between daily use of tobacco products and COVID-19 symptom severity. **Methods:** Participants ages 18-65 (N=2421) completed a survey in Fall 2020 assessing COVID-19 symptom severity (range: 1 (I don't feel bad at all) -10 (worst I have ever felt)), COVID symptoms (e.g., sore throat, cough, chest tightness, fever, chills) and COVID-related medical care (i.e., overnight hospitalization, supplemental oxygen, mechanical ventilation), and tobacco product use (i.e., cigarettes, cigarillos, cigars, smokeless tobacco, e-cigarettes). To examine differences ($p<0.05$) in COVID-19 self-reported characteristics and daily tobacco product use, participants were categorized as daily users (≥25 days of product use within last 30 days) and nondaily users. **Results:** Majority of respondents (N= 2,421, *M*age = 37.65 years, *SD* = 13.38 years) were White (85.6%) and female (62.6%). Eleven percent (11.2%; n = 270) of respondents self-reported having COVID-19. While symptom presentation between groups was similar, there was a statistically significant difference in self-reported COVID-19 symptom severity ratings between daily (*M*=6.7, *SD*=2.7) and nondaily users (*M*=5.8, *SD*=2.6; t(268)=2.51, p=0.013, two-tailed). A higher proportion of daily tobacco users reported mechanical ventilation during their hospitalization (90%; X^2=6.5, p=0.01). An ANOVA was conducted to determine if number of daily tobacco product used was associated with symptom severity, but findings were not statistically significant (F(2,218)=0.56, p=0.80). **Conclusion:** Adult daily tobacco users may be at increased risk for poorer COVID-19-related outcomes compared to nondaily tobacco users. Research is needed to better understand how frequency and number of tobacco product used relates with COVID-19 symptoms and severity. Education campaigns to inform tobacco users of potential risks may be warranted.

FUNDING: State

PS5-129

ASSOCIATIONS BETWEEN SEXUAL AND GENDER MINORITY STATUS, ROMANTIC PARTNERSHIP, AND POLYTOBACCO USE

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Significance: Sexual and gender minoritized (SGM) youth report higher rates of substance use and an increased risk for HIV/STI. However, limited work has examined the links between SGM status and nicotine/tobacco product usage. The current study addresses these gaps by examining the differences in both tobacco/nicotine product usage prior to sexual activity by SGM status among young adults. **Methods:** Young adults ages 18-21 years old (*N*=651) completed an anonymous, self-reported, web-based survey in August 2020. Data collection included sociodemographic characteristics, sexual orientation/attraction, romantic relationship status, and sexual behaviors, as well as nicotine/tobacco product use. Participants were considered SGM if they identified as homosexual (gay, lesbian, queer), bisexual, or undecided and/or questioning. Independent-samples t-tests examined differences in SGM status and the total number of products used (i.e., single, dual, or polytobacco use - three or more products) as well as type of products used by the participant and their romantic partner prior to engaging in sexual activities. **Results**: Majority of participants (M_{age}=19.42, SD=1.11) identified as female (71.6%), heterosexual (64.8%), and White (6.2%), and did not use any tobacco products (57.0%). Majority of SGM (32.4%) young adults identified as bisexual (22.1%). Most tobacco users (31.4%) were either polytobacco users (16.3%) or single product users (15.1%). SGM youth were more likely to use a higher quantity of products prior to sexual activity (t=2.124; p=0.003; M=1.251 products, SD=1.667 products) compared to non-SGM youth (M=0.962, SD=1.503). SGM youth romantic partners were also more likely to use more products (t=2.414; p<0.001; M=0.972; SD=1.508) compared to non-SGM youth romantic partners (M=0.683, SD=1.225). **Conclusions:** Consistent with prior work, SGM youth demonstrate a higher number of total tobacco/nicotine products used and were more likely to use products prior to sexual behavior. Such findings reflect a critical but understudied health disparity among SGM young adults. Targeted, culturally tailored interventions are needed to encourage prevention of tobacco use among SGM young adults.

FUNDING: State

PS5-130

USE OF TOBACCO PRODUCTS AND E-CIGARETTES AND PASSIVE EXPOSURE TO THEM IN EUROPE: THE TACKSHS PROJECT

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Significance: To determine the prevalence of use of cigarettes, heated tobacco products (HTP) and electronic cigarettes (e-cigs), as well as passive exposure to their aerosols in Europe. **Methods**: In 2017-2018, within the TackSHS Project (www.tackshs.eu), we conducted a cross-sectional face-to-face survey in 12 European countries (Bulgaria, England, France, Germany, Greece, Ireland, Italy, Latvia, Poland, Portugal, Romania and Spain). In each country, a representative sample of around 1,000 subjects aged >14 years was interviewed. The survey gathered information on tobacco smoking, use of HTPs and e-cigs, and exposure to secondhand tobacco smoke (SHS) and secondhand aerosols (SHA) of e-cigs in different settings. **Results**: Overall, 25.9% of participants were current smokers (21.2% women, 31.0% men) and 16.5% were former smokers (from 18.9% in Italy to 37.0% in Bulgaria). Smoking prevalence decreased with increasing age and education level. 1.8% were ever HTP users (from 0.6% in Spain to 8.3% in Greece), and 0.1% were current users. HTP use was less frequent in women than men, was inversely related to age and more frequent in ever smokers and ever e-cig users. Prevalence of e-cig use was 2.4% overall (2.3% women, 2.5% men and inversely related to age) ranging from 0.6% in Spain to 7.2% in England. 30.9% of non-smokers (29.0% women, 33.2% men) reported being exposed to SHS in indoor settings (median time 60 min/day). The prevalence of SHS exposure was 13.1% at home, 11.4% at the workplace, 4.7% in private transportation, 4.0% in public transportation, and 14.7% in "other indoor settings" (leisure including bars and restaurants). Overall, 16.0% of e-cig non-users were exposed to SHA in any indoor setting at least weekly (from 4.3% in Spain to 29.6% in England). The median duration of SHA exposure was 43 min/day. "Other indoor settings" was the place where most e-cig non-users were exposed (8.3%), followed by workplace/educational venues (6.4%), home (5.8%), public transportation (3.5%) and private transportation (2.7%). **Conclusions**: Cigarette smoking and SHS exposure continue to be highly prevalent, while the use of HTP and e-cigs and exposure to their aerosols is still limited. Implementation and enforcement of stricter tobacco control legislation at the national and European level to tackle the tobacco epidemic is still needed.

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PS5-131

"COMMIT TO QUIT" PILOT: DEVELOPING A TOBACCO CESSATION AND PREVENTION PROGRAM FOR ARAB AMERICAN WOMEN UNDER COVID-19 CONDITIONS

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Significance: Despite being a large population in the US at risk for tobacco-related harms, Arab Americans are understudied and underserved in tobacco research and programs. There is also a dearth of tobacco programs for women. Arab American tobacco risks include waterpipe/hookah ("shisha") smoking, however very few tobacco programs address shisha use. Arab American women, particularly immigrants and refugees from conservative religious communities, may feel socially isolated and yet be limited from participating in mainstream programs. We launched, to our knowledge, the first tobacco cessation and prevention program specific to Arab American women. Due to COVID-19 pandemic conditions, nearly all program activities were virtual. **Methods:** We recruited 35 adult women in the San Francisco Bay Area to an Arab American Women's Group (AAWG). Over five months, we held biweekly virtual meetings. Staff and guest speakers provided information and support for cessation and reducing secondhand smoke, including shisha. Meetings were private, conducted primarily in Arabic, and documented in written notes. Women could turn off cameras and "chat" and converse in Arabic or English. A social network text group kept participants engaged and connected between meetings. To evaluate the pilot program, we reviewed notes and assessed program impacts qualitatively with participants. **Results:** Web-based meetings made the program accessible and appropriate. Women were able to participate despite challenges of travel, childcare, and modesty. Attendance was high and consistent. Participants reported a sense of belonging and safety in having a space that embraced their Arabic language, culture, and norms. Notably, many women shared about shisha use which they had not previously disclosed in other formats. As a result of participating, participants reported quitting or cutting back on shisha; initiating healthier habits; gaining knowledge and awareness; and having support for these changes. **Conclusion:** Virtual and culturally-specific programming reduced COVID-19 risks and made the program accessible to women who were highly at risk for tobacco-related harms but underreached and underserved. The study indicates the importance of tobacco treatment and prevention programs specific to Arab American women.

FUNDING: State

PS5-132

PATTERNS OF TOBACCO PRODUCT USE AMONG US YOUTH --A COMPARISON STUDY USING NYTS AND UTUS 2020 DATA

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Significance: Multiple tobacco product use is common among youth. We sought to identify and verify subgroups of past-30-day cigarette and alternative tobacco product use among youth and assess measurement invariance using data from two nationally representative samples. **Methods:** Using the 2020 data from the National Youth Tobacco Use (NYTS, collected by CDC) study and Underage Tobacco Use Survey (UTUS, collected by Altria), respectively, we conducted latent class analyses to identify subgroups of tobacco use patterns based on self-reported use of 8 tobacco products (i.e., smoking cigarette, cigar/cigarillo/little cigar, chewing tobacco, electronic cigarettes,

hookah, pipe, snus, and dissolvable) in the past 30 days. We also assessed measure invariance to establish whether the tobacco use subgroups are identical across two data sets. **Results:** LCA indicated two classes of P30D tobacco/nicotine product users, comprising Primarily Abstainer Users (93.6% n = 13603 for NYTS; 96.4% n = 4994, in UTUS) and E-cigarette Poly-Users (6.4% n = 923 for NYTS; 3.6% n = 189 in UTUS). Test of measurement invariance suggested that the item response probabilities and latent class prevalence are different across two studies. The difference in latent class profile may be attributable to time of data collection, the population under presentation, sampling and data collection methods. **Conclusions:** There is a sizable group of multiple tobacco product users among US youth. Making direct comparisons between groups across studies requires considerable caution.

PS5-133

NICOTINE, MENTHOL AND HUMECTANTS IN HEATED TOBACCO PRODUCT IQOS FROM DIFFERENT COUNTRIES

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Significance: IQOS, a popular brand of contemporary heated tobacco product (HTP), is available globally in a variety of flavors, including light- and dark- labeled menthol. The aim of this study was to compare nicotine, menthol, and humectant concentrations in IQOS HeatSticks (HEETS) purchased across nine countries. **Methods**: A convenient sample of menthol flavored (n=10) and tobacco (n=11) HEETS were purchased in US, Canada, UK, Italy, Poland, Israel, South Africa, South Korea, and Japan. Menthol flavored and tobacco cigarettes from a popular US brand were purchased as controls. HEETS/Cigarette tobacco filler was separated from the non-tobacco material (NTM), consisting of the cellulose acetate filter and paper, and each were individually extracted using methanol and a platform shaker. Analysis for nicotine, menthol, propylene glycol (PG) and glycerin (VG) was performed using GC-MS methods. Statistical comparisons were performed with Mann-Whitney t-tests for significance at $p<0.05$. **Results**: Average nicotine content in HEETS was 4.7±0.5 mg/HEET and did not differ statistically across countries. Across countries, menthol was more concentrated in the NTM (0.2±0.3 mg/HEET) rather than the tobacco filler (0.1±0.1 mg/HEET), while PG and VG were more greatly detected in the filler (0.3±0.2 and >32 mg/HEET, respectively) compared to the NTM (0.2±0.1 and 1.9±0.5 mg/HEET, respectively); all $p<0.05$. Among menthol flavored HEETS, the highest menthol concentration was detected in HEETS from Japan (1.9 mg/HEET), while Italian HEETS contained the lowest concentration (0.1 mg/HEET). Finally, average menthol concentration in mentholated HEETS was lower when compared to mentholated conventional cigarettes (2.5 mg/cigarette). **Conclusions**: This across-country comparative study of nicotine, menthol, and humectant concentrations in HEETS showed that IQOS inserts from different countries do not vary in nicotine concentration but vary significantly in menthol content. Glycerin is a primary humectant in tobacco filler while significant amounts of menthol appear to be present in non-tobacco material.

FUNDING: Federal

PS5-134

AMBULATORY PUFF AND RESPIRATION TOPOGRAPHY FOR JUUL

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Significance: This is the first study to provide ambulatory puffing and respiration topography for the Juul electronic cigarette in the natural environment (NE). Few NE studies have been done to date, and no NE studies have been done for the Juul. No studies have been done on respiration topography for electronic cigarettes. Both puffing and respiration topography are needed to assess exposure to harmful constituents from inhaled tobacco products. **Methods:** Current pod-style users were assigned Virginia Tobacco Juul pods with nicotine strength approximating their current product. Puffing topography was captured by the wPUM™ Juul monitor and respiration topography was captured by the hexoskin smart garment for a 29 hour period in the users' own environment. Data were analyzed by RIT's TAP™ analysis program. **Results:** Thirteen participants completed the 3-day study, including 12 current everyday users and 1 current someday user. The majority of participants (54% moderate) reported moderate ecig dependence. Mean (STD) current withdrawal symptoms were 1.64 (0.59) and mean craving for ecigs was 3.86 (1.53). Mean (STD) puff flow rate, puff duration, puff volume and interpuff interval were 30.8 (8.7) ml/s, 3.3 (0.9) s, 97.4 (44.0) ml, and 456 (283) s, respectively. New consumption parameters were found, namely; mean aerosol consumption rate was 1088 (879) ml/hr. and mean percent of hours inhaling eliquid was 1.1% (1.0%). Simultaneous evaluation of puff and respiration topography traces indicate that both direct to lung and mouth to lung puffing were occurring, though participants tended to be primarily one or the other. Respiration volumes were significantly larger than the puff volumes, indicating aerosol dilution by nose breathing during inhalation. **Conclusions:** Current puff topography standards, including FTC/ISO, Health Canada, Massachusetts Department of Health and the electronic cigarette CORESTA standard, are insufficient to describe the range of real-world puff topography for the Juul. Consumption rate varied widely for the Juul, as much as 10x across the cohort. New techniques for simultaneously measuring respiration and puff topography in the natural environment will elucidate complex behavior patterns and improve accuracy of exposure modeling.

FUNDING: Federal; FDA CTP

PS5-135

AWARENESS, CURIOSITY, USE, AND PERCEPTIONS OF TOBACCO-FREE NICOTINE IN E-CIGARETTES AMONG A NATIONAL SAMPLE OF YOUNG ADULTS IN THE UNITED STATES

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Significance: "Tobacco-free nicotine" (TFN) e-cigarettes are marketed as those that contain synthetic, rather than tobacco-derived nicotine (TN). This study examined perceptions of TFN vs. TN, as well as awareness, curiosity to try, and use of TFN e-cigarettes among a U.S. national sample of young adults. **Methods:** Young adults aged 18-25 years (N =1,239; 53.9% female, 58.1% White, 34.7% Hispanic, 27% Black,) were recruited via an online Qualtrics panel in October 2021 using stratified convenience sampling. Overall, 53.9% (n=668), 20.9% (n=259), and 25.2% (n=312) of the sample reported current, lifetime, and never e-cigarette use, respectively. Survey questions assessed if respondents "ever heard" of TFN (i.e., awareness), curiosity to try, and use of TFN in e-cigarettes/vapes. Items also assessed perceptions of how flavor, taste, ease of access, cost, and harms compared between TFN and TN. Among the sample who had "ever heard" of TFN (n=642), binary logistic regression examined associations between perceptions and lifetime use of TFN. Among non-TFN users (n=922), binary logistic regression models examined associations between TFN perceptions and curiosity to try TFN. All models controlled for total number of tobacco products ever used and demographics. **Results:** Overall, 51.8% of participants had ever heard of TFN (n=642) and 25.6% had tried TFN (n=317). Among those who had heard of TFN (n=642), many young adults strongly agreed/agreed that, compared to TN, TFN had more available flavors (61.8 %) and had flavors that tasted better (54.4%). Relatively fewer agreed that TFN was easier to purchase (41.6%), tasted cleaner (42.1%), tasted less like tobacco (39.1%), or was less expensive (24.6%), harmful, (21.5%), or addictive (15%) than TN. Lifetime TFN use was associated with increased odds of perceiving that TFN had flavors that tasted better than TN (aOR=1.30; 95% CI=1.01-1.67) and decreased odds that it tasted less like tobacco than TN (aOR=0.70; 95% CI 0.57-0.85). Among those who had not tried TFN (n=922), 56.5% were curious to try it and curiosity was associated with perceiving that TFN was less harmful (aOR=1.79; 95% CI=1.17-2.75), less addictive (aOR=2.68; 95% CI =1.62-4.44), and tasted cleaner (aOR=1.97; 95% CI =1.36-2.84) than TN. **Conclusions:** Perceptions of flavors and taste were associated with TFN use, whereas perceptions of reduced harm from TFN vs. TN were associated with curiosity to try TFN. As it is currently unclear whether TFN carries the same health risks as TN, ongoing surveillance of TFN uptake is warranted.

FUNDING: Federal; Nonprofit grant funding entity; FDA CTP

PS5-136

DEVELOPMENT OF A DECISIONAL BALANCE SCALE FOR YOUNG ADULT E-CIGARETTE USE

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E-cigarette use has become prevalent among young people. Understanding motives for e-cigarette use can inform prevention and intervention efforts. Decisional balance is a framework for understanding motivations underlying drug taking and other behaviors. Decisional balance measures contain items that reflect beliefs about the pros and cons of a behavior and respondents are asked to rate the importance of such beliefs in their decisions to engage in the behavior or not. Such measures have been developed across various recreational drugs, but to our knowledge, no such measure exists for

e-cigarettes. The aim of this investigation was to develop and test a novel decisional balance scale for e-cigarettes in a sample of young adults. In Phase 1, 180 participants (*M* age = 25; 57% male) were queried about the pros and cons of e-cigarette use and disuse using an open-ended response format. Based on these qualitative responses and an extensive literature review, an initial measure was generated with 87-items rated on a 5-point scale. In Phase 2, 616 respondents (*M* age = 23; 61% female) completed the decisional balance scale along with demographic and e-cigarette use questions. Exploratory factor analysis (EFA) identified a three-factor solution that can be characterized as Pros, Cons, and Social Pros. The factors had high levels of internal consistency (Cronbach's alphas > .90) and were significantly associated with e-cigarette related variables. As predicted, e-cigarette users (n = 327) scored significantly higher on Pros and Social Pros and lower on Cons than non-users (n = 289; all *p*'s < .001). Among users, greater e-cigarette consumption was associated with greater scores on Pros and lower scores on Cons (*p's* < .001). Furthermore, greater scores on the Cons factor (*r* = .390, *p* < .001), but not the Pros factor predicted greater reported desire to quit. The present investigation provides initial evidence that e-cigarette use can be understood using a decisional balance framework, which can aid efforts to curtail e-cigarette use among young adults. Future research will confirm the factor structure and predictive and discriminant validity among diverse samples.

FUNDING: Academic Institution

PS5-137

DIFFERENCES IN SUBSTANCES VAPED BETWEEN HETEROSEXUAL AND LGBT INDIVIDUALS

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Background: Although it is known that lesbian, gay, bisexual, and transgender (LGBT) individuals are more likely to vape and to have substance abuse disorders than heterosexual individuals likely due to discrimination and stress, little research has been done to compare the differences in substances vaped between the two groups. **Methods:** As part of a larger study, individuals aged 18 years and older (N=497) took part in an online survey via the crowdsourcing platform, Prolific. Participant ages ranged from 18-70 years old[SEM1] . Participants were asked about their sexual orientation: heterosexual (N=270) or lesbian/gay, bisexual, or other non-heterosexual identity (N=227). Participants were also asked about whether they vaped any products and which products they vaped (e.g., nicotine, THC, and/or CBD). **Results:** In the sample, 148 [SEM2] LGBT individuals vaped at least one substance and 182 [SEM3] heterosexual individuals vaped at least one substance. There were no significant differences between heterosexuals (44.1%) and LGBT individuals (51.1%) in vaping nicotine (p>.05). However, LGBT individuals were more likely (49.8%) to be ever or current users of THC-containing vape products than heterosexuals (33.7%; p<.001). In addition, LGBT individuals were almost twice as likely (28.2%) to be ever or current users of CBD-containing vape products than heterosexuals (14.4%; p<.001). **Conclusion:** LGBT individuals in this study were found to be more likely to use both THC- and CBD-containing vape products than their heterosexual counterparts. However, there were no significant differences in vaping nicotine between the two groups. This supports prior evidence that LGBT individuals are more likely than heterosexual individuals to use THC products.

FUNDING: Federal

PS5-138

SUCCESSFUL QUITTING AMONG U.S. ADULT CIGARETTE SMOKERS: POPULATION ASSESSMENT OF TOBACCO AND HEALTH (PATH) WAVE 5 (2018-2019)

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Objective: Cigarette smoking continues to be the most prevalent form of tobacco use in the USA. Quitting is hard due to dependence producing nicotine. Yet, successful quitting can achieved. The study aimed to estimate cross-sectional prevalence of and factors associated with successful quitting (smoking abstinence ≥3 months) in US adult (18+ years). Design: Data were from Wave 5 (2019) of the Population Assessment of Tobacco and Health (PATH) Study national longitudinal cohort study of US adults. Current smokers were those who now smoke "every day" or "somedays" irrespective of smoking threshold of 100 cigarette in lifetime. Former smokers responded "not at all" to now smoke question. Duration since last smoked was used to define successful quitting. Sample included (N=12,647) adults based on smoker type: current, recent former (<3 m), and successful (quitting) former (≥3 m). Results: Overall, 69.0% were current smokers, 9.1% were recent former, and 21.8% achieved successful cessation. There were significant differences in smoker type by age, race, education, income, and perceived mental health status. Successful quitting did not vary by sex. Higher rates of successful quitting were in younger adults (33.1%), Hispanic (26.2%), with bachelor education (30.7%), and with 100,000+ annual household income (34.1%). Higher rates of success were in adults who rate their mental health 'excellent' (22.7%) than in those who rate their mental health 'poor' (16.4%). Conclusion: In this national sample of adult smokers, results highlight the role of perceived mental health status in successful smoking cessation. Efforts to improve successful cessation, at the population level, may be accelerated via standard treatment of medication and counseling, but also by special emphasis on positive beliefs and affirmation. Further longitudinal assessment using multiple waves of PATH study will provide better understanding of the relationship between perceived mental health and successful quitting.

FUNDING: Federal; FDA CTP

PS5-139

POTENTIAL EFFECTS OF STUDY DESIGN ON MASS MEDIA TOBACCO PREVENTION CAMPAIGNS EVALUATIONS: A SYSTEMATIC REVIEW

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SIGNIFICANCE Data from tobacco prevention mass campaign evaluations have been essential to guiding population-level tobacco control strategies; however, evidence from recent campaigns with null-to-modest effects raise questions about the impacts of dose, delivery, and design in these evaluations. The goal of this study was to assess the impact of evaluation design on effects reported from tobacco prevention mass media campaigns. METHODS Electronic searches were conducted in 5 databases in March 2021. Two independent reviewers coded the articles. Included studies were outcome evaluations of mass media prevention interventions targeting adolescents/young adults' (aged 12-29) beliefs about tobacco—publication year ranged (1991-2021). Data on outcomes and study design were extracted from tobacco campaign evaluations and synthesized qualitatively. RESULTS Electronic searches produced 11,346 publications for title and abstract review. Coders reviewed 595 articles on full-text resulting in 44 campaign evaluations of tobacco-related media campaigns. Outcome evaluations varied in study design: single (n=12), repeated (n=12), and pre-post (n=2) cross-sectional designs, longitudinal cohort studies (n=12), cluster randomized (n=5) and non-randomized community control trials (n=1). Cross-sectional and longitudinal cohort designs largely demonstrated positive effects on tobacco-related beliefs and behavior. Evaluations with cluster randomized designs showed little to no effect of the prevention intervention on tobacco beliefs and behavior. Several campaigns were evaluated using multiple study designs—two were examined through cross-sectional and longitudinal cohort designs, one campaign was evaluated through cross-sectional studies and a non-randomized community control trial, and one was assessed via cross-sectional, longitudinal cohort, and quasi-experimental longitudinal cohort designs. Prevention interventions evaluated through varied methods showed similar effectiveness across study designs. CONCLUSION Study design may impact findings from mass media campaigns. Future studies assessing tobacco-related outcomes using multiple approaches are needed to better understand the role of study design in positive or null mass media campaign findings.

FUNDING: Federal

PS5-140

UNDERSTANDING ADOLESCENT RISK PERCEPTIONS OF TOBACCO, ALCOHOL, AND MARIJUANA

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Significance. Today's adolescents are using a myriad of substances such as cigarettes, vapes, alcohol and marijuana. Use of these substances by adolescents is concerning due to associated physiological risks, poor educational outcomes and associated risk behaviors later in life. Understanding risk perceptions of these substances is thus important given that use and risk perceptions are correlated and risk perceptions can be protective factors in limiting use. This study explores risk perceptions of occasional and everyday use of cigarettes, vapes with nicotine, alcohol, and marijuana among adolescents from middle and high schools across California. *Methods.* Participants were 162,675 adolescents from the California Student Tobacco Survey 2019-20, which collected data from 358 middle school and high schools randomly sampled across California. Participants were asked to rate the risk of each substance "if used every day.." or if "used some days.." using a scale of 1-5. The mean ratings for each substance are calculated, and the results are weighted by population parameters. *Results.* Of the four substances rated, adolescents considered everyday use of cigarettes at highest risk (M=4.70), followed by vapes with nicotine (M=4.42, p<.001), alcohol (M=4.24, p<.001), with marijuana rated lowest in risk (M=3.83, p<.001). The same order was found for occasional use of the substances with occasional cigarette rated at highest risk (M=4.18), followed by vapes with nicotine (M=3.84, p<.001), alcohol (M=3.39, p <.001), with occasional marijuana use rated lowest in risk (M=3.24, p <.001). *Conclusion.* Years of anti-smoking messaging seems to have succeeded in persuading the youth of the risk of tobacco use. On the other hand, relative low risk perception for marijuana use is concerning and it may contribute to possible increase in its use among adolescents. The differences in risk perceptions of various substances by adolescents thus underscores the need for future research into understanding these differences and explore targeted public health messaging for various substances.

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PS5-141

INVESTIGATING THE ASSOCIATION BETWEEN COVID WARINESS AND PROTECTIVE BEHAVIORS, CHANGES IN SMOKING, AND CIGARETTE PURCHASING PATTERNS

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Significance: Smoking increased among many smokers during the COVID-19 pandemic. Little research has focused on whether smokers have adopted COVID-related protective behaviors (e.g., mask wearing). Some smokers report changing their cigarette purchasing patterns to reduce infection risk during the pandemic. We examined associations between COVID wariness and adoption of COVID-related protective behaviors, changes in smoking, and changes in cigarette purchasing patterns among vulnerable smokers. **Methods:** Web-based surveys were distributed to 709 adults who had participated in a previous trial investigating the effects of very low nicotine content cigarettes in daily smokers with socioeconomic disadvantage, comorbid affective disorders or opioid use disorder. Respondents indicated their COVID wariness on three scales: perceived probability of being infected by COVID (probability), likely disease severity upon infection (severity), and perceived personal susceptibility to COVID (susceptibility). Associations between COVID wariness scales and self-reported adoption of COVID-related protective behaviors, changes in smoking, and changes in cigarette purchasing patterns were examined using Chi-square tests of independence and Fisher's Exact tests. **Results:** Among respondents (N=440, 55.2% female), adoption of protective health behaviors was high (all behaviors endorsed by >85% of respondents). There was a significant positive association between the severity scale of COVID-wariness and avoiding touching one's face, using hand sanitizer, and staying home except for essential reasons (p's<.05). Susceptibility was positively associated with avoiding touching one's face while smoking (p=.03). Smoking rate and cigarette purchasing patterns were generally unrelated to COVID wariness scales, though there was a positive association between severity and buying more packs of cigarettes per store visit (p=.03). **Conclusion:** Among vulnerable smokers, COVID wariness was associated with adoption of protective behaviors but was generally unrelated to changes in smoking or cigarette purchasing behavior. Vulnerable smokers may be unable to reduce smoking even during public health crises.

FUNDING: Federal; FDA CTP

PS5-142

'NO ONE'S NOTICING IT ON ZOOM CLASS WITH OFF CAMERAS. I HIT IT THROUGHOUT THE DAY NOW': POLY-TOBACCO USE CHANGE AMONG YOUNG ADULTS DURING THE COVID-19 GLOBAL PANDEMIC

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Significance: The COVID-19 pandemic has profoundly altered the social and physical spaces of young adults (YA), who even absent these disruptions experience significant development during this important life stage. This study aimed to identify how social and environmental disruptions of the pandemic influenced poly-tobacco use and perceptions among YA in Iowa (US), which can reveal important, potentially manipulatable drivers of product use change for subsequent intervention. **Methods:** We conducted 11 in-depth semi-structured telephone interviews with Iowa YA aged 18-29 who reported past 30-day use of multiple tobacco products (July-August 2021). Eight participants were female, two male, and one participant was genderqueer. In the interview, we asked participants to walk us through their tobacco product use routines, life circumstances, and emotional states between February 2020 and the interview date. We audio recorded, transcribed (via external service), de-identified, and cleaned transcripts. We developed a codebook of a priori and emergent codes using iterative tandem transcript reading and coded the transcripts to conduct thematic analysis. **Results:** YA reported pandemic-related changes including changes in living condition, employment status, mode of attending job/school, and social opportunities. The changing, uncertain, and unengaging lifestyle of the early pandemic led to stress, boredom, and anxiety and a related increase in nicotine use. Changes in living situation also affected the types of products YA used. E.g., increasing cigarette smoking/reducing vaping when a sudden move from a college dorm to an apartment made concealment less important, since these products were the 'real deal' in comparison. For some, unexpectedly living with parents increased access to other products (e.g., cigarettes, pipe). For YA with unaffected jobs and living situations, tobacco product use largely remained the same. **Discussion**: This study captured the nuanced short-term changes in social and physical space leading to changed perceptions and use of tobacco products for YA across the pandemic. Documenting changes during this key developmental period can help anticipate, interpret, and address tobacco use across this unique cohort's life course.

FUNDING: Nonprofit grant funding entity

PS5-143

OXIDATIVE POTENTIAL AND PHYSICO-CHEMICAL PROPERTIES OF WATERPIPE TOBACCO SMOKE GENERATED FROM DIFFERENT FLAVORS OF SHISHA

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Significance: Continued popularity of waterpipe tobacco smoking, especially among younger demographic groups, supports investigating the relative safety of this lifestyle choice. Flavors are a known enticement for smoking initiation and a concern regarding smoke toxicity. Our study evaluates the physico-chemical characteristics and relative oxidative potential of Waterpipe Tobacco Smoke (WTS) generated from different flavors using acellular methods. **Methods:** WTS gas phase and particulate components were collected using impingers and filters, respectively. Physical properties were analyzed using a TSI Engine Exhaust Particle SIzer (EEPS). The chemical composition of impinger solutions were analyzed using gas chromatography/mass spectrometry. Filters were extracted for differences in chemical composition using liquid chromatography/mass spectrometry. Filters were extracted into impinger solutions and analyzed for oxidative potential (OP) using using the acellular dithiothreitol (DTT) and dichlorofluorescin (DCFH) assays. Results: WTS generated from different shisha flavors show varying levels of OP between the two acellular assays. Particle profiles indicate significant differences in number concentration and size profile over time for different shisha flavors. LCMS and GCMS analyses found significant differences in the number of compounds unique to different flavors as well as those present in shisha syrup versus those present in WTS. Conclusions: Our data indicate whole shisha smoke generated from shisha flavors have differential effects on smoke oxidative potential with flavors that are the most popular with new smokers.

FUNDING: Academic Institution

PS5-144

CORRELATES OF WILLINGNESS TO QUIT WATERPIPE TOBACCO SMOKING AMONG YOUTH IN LAGOS, NIGERIA

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Significance: Waterpipe (WP) tobacco use which has been recently reported to be on the increase among Nigerian youth. This method of tobacco consumption through pipes appears to be more fashionable among young persons those in the higher socio-economic category who frequent bars in Lagos, Nigeria. This study sought to determine the willingness of WP smokers in these venues to quit the habit. **Methods:** Interviewer-administered questionnaires were used to elicit responses from youth above eighteen years of age who were found smoking WP tobacco in the open and closed air bars visited. Version 17 of SPSS data editor was used to analyze the data and Odds Ratios and 95% Confidence Intervals (95 % CI) were used to determine the correlates of willingness to quit (WTQ). **Results:** A total of sixty-four (64) male respondents were interviewed in seven (7) bars with their ages ranging from 18 to 23 years. Thirty-eight respondents (60%) indicated that they had smoked WP tobacco at least once within the past week. Twenty-five persons (39%) indicating a willingness to quit the habit. Increased WTQ was associated with perception of possibility of 'enemies' spiking the tobacco (OR = 1.25, 95% CI: 1.04-1.72), higher education (OR = 1.32, 95% CI: 1.21-1.63) and present employment (OR = 1.55, 95% CI: 1.21-1.70). Decreased WTQ was associated with perception that WP smoking was safer than smoking regular or roll-your-own cigarettes (OR = 0.31, 95% CI: 0.21-0.71), possibility of choosing preferred flavors (OR = 0.43, 95% CI:0.34-0.83) and acceptability of the habit among female peers (OR = 0.45, 95% CI: 0.12-0.61). **Conclusion**: The low level of willingness to quit WP smoking is alarming especially as it relates to poor perception about the dangers of WP smoking and the possibility of flavoring of these products which seems to have an appeal among these young persons. These factors should be considered in designing health interventions to arrest this emerging trend among Nigerian youth.

FUNDING: Unfunded

PS5-145

YOUNG ADULTS' INTEREST IN USING TOBACCO-FREE NONMEDICINAL ORAL NICOTINE PRODUCTS TO QUIT VAPING

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Significance: Flavored tobacco-free oral nicotine products, including nonmedicinal nicotine gums, lozenges, gummies, or pouches, may be attractive means to quit vaping among young adult e-cigarette users who otherwise struggle to quit using e-cigarettes. **Methods:** Using data from a cohort originally recruited as teens in Los Angeles, cross-sectional web-based survey responses collected in 2021 were analyzed among young adult past 30-day e-cigarette users [n = 148; mean age (SD) = 21.8 (0.4); 54.7% female] who reported having seriously considered quitting vaping within the next 6 months. Participants self-reported e-cigarette use history and interest in using tobacco-free oral nonmedicinal nicotine products (yes/no) and several FDA-approved tobacco use cessation medications to quit vaping (yes/no). **Results:** Respondents' interest in using flavored tobacco-free oral nonmedicinal nicotine products (46.6%) to quit vaping was higher than interest using either medicinal nicotine gum/lozenges (25.8%), nicotine transdermal patch (19.0%), or prescription medications (17.0%) to quit vaping. Interest in using flavored tobacco-free oral nicotine products to quit vaping was associated with vaping ≥20 vs. <10 days in the past month (OR = 3.20, 95% CI = 1.37 - 7.77), vaping ≥10 vs. <10 times per day during vaping days (OR = 2.46, 95% CI = 1.13 - 5.51), and low vs. high self efficacy in ability to quit vaping (OR = 3.53, 95% CI = 1.55 - 8.41). **Conclusion:** In young adult e-cigarette users, using flavored tobacco-free nonmedicinal oral nicotine products may be attractive means to quit vaping among those motivated to quit vaping, particularly for frequent vapers with low quit self-efficacy. Further studies are needed to determine whether young adults who take up tobacco-free oral nicotine products successfully stop vaping.

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PS5-146

RELATIONSHIP BETWEEN THE "ORGANIC" DESCRIPTOR, PERCEIVED HARM, AND RELATIVE INTENTION TO TRY AMONG YOUNG ADULTS: RESULTS FROM A RANDOMIZED ONLINE EXPERIMENT OF NATURAL AMERICAN CIGARETTES

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SIGNIFICANCE: Natural American Spirit (NAS) smokers are considerably more likely than smokers of other brands to believe that their brand might be less harmful than other cigarette brands. The purpose of this study was to describe the effect of removing "organic" on harm perceptions and relative intention to try NAS among young adults ages 18-34 overall and by smoking status. **METHODS:** Data are drawn from an experiment embedded in the Truth Initiative Young Adult Cohort. Participants were randomized to 1 of 3 conditions (n=2,470): 1) unmodified NAS pack; 2) NAS pack with "organic" removed; and 3) NAS pack with "additive-free" removed. Given FDA-mandated removal of "additive-free" in 2018, these results are not presented. Participants answered questions about the relative harm of the pictured product and relative interest in trying NAS. **RESULTS:** The sample was majority female (60.6%), ages 25-35 (69.2%), non-Hispanic White (63.9); few identified as a smoker (6.8%) or "social smoker" (9.0%). Overall, removing the "organic" descriptor marginally reduced odds of believing NAS was less harmful by 25% (aOR 0.75; 95% CI: 0.54, 1.03). Stratifying by smoking status, removing "organic" reduced the odds of believing NAS is less harmful for non-/ex-smokers only (aOR 0.66; 95% CI: 0.45, 0.96). Regardless of condition, the odds of believing that NAS is less harmful than other cigarette brands were over two times higher (aOR 2.1; 95% CI: 1.59, 2.87) for social/current smokers than non-/ex-smokers. Nearly all (96.2%) non-/ex-smokers were uninterested in trying a cigarette, regardless of brand or study condition. Among smokers, 13.7% (n=35) were less likely to try NAS than another type of cigarette; 18% (n=46) were more likely. Given these sample sizes, it is unsurprising that there was no relationship between relative intention to try and condition. **CONCLUSIONS:** Removing "organic" reduced odds of misunderstanding the harm of NAS cigarettes among non-/ex-smokers. Young adult social/current smokers are more likely to misunderstand the relative harm of NAS cigarettes than non-/ex-smokers, regardless of condition. Results were limited by the low number of smokers in the sample.

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PS5-147

A PILOT EVALUATION OF THE EFFICACY OF TOBACCO EDUCATION AND CESSATION TREATMENT AMONG MINORITY AND UNDERSERVED CANCER PATIENTS

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Significance: Current smoking among cancer patients has been shown to increase metastases and toxicity of treatment; increase the risk of infection, and reduce survival. Smoking cessation provides a valuable opportunity for cancer patients to reduce their risks of disease progression, improve treatment outcomes, and increase their quality of life and survival. Evidence-based interventions are essential to mitigating the economic and health burden of smoking-related diseases among US adults, particularly among vulnerable subpopulations with elevated prevalence of tobacco use, such as cancer patients. The overall goals of this study were to 1) increase health literacy in cancer patients on tobacco use and its effects on health and cancer treatments, and 2) reduce the prevalence of current smoking among cancer patients. **Methods:** Using a pre- post-test design with an educational intervention and evidence-based 12-week tobacco cessation program (including medication and counseling), 18 participants completed the study measures at baseline, 2 weeks, and 12 weeks. We examined change over time in knowledge of smoking on cancer treatment and motivation to quit, readiness to quit, exhaled Carbon Monoxide (CO) (as a validation of smoking cessation or progress), and the 20-item Center for Epidemiologic Studies Depression Scale. **Results:** The average age was 59.9 yrs. (SD 7.71), 56% were Black and 61% identified as male. 100% (N=7) of female participants reported a family history of cancer. There were significant increases in knowledge of smoking on cancer treatment. Study participants were more confident that they could quit smoking from baseline to 12-weeks visit (p-value = 0.021) and were more knowledgeable on how quitting smoking reduces their risk of complications from cancer treatment (p-value = 0.040). There was no significant difference in exhaled CO, depression, or nicotine dependence over time, respectively. **Conclusion:** Increasing health literacy and knowledge on the effects of tobacco on cancer treatment outcomes

and providing tailored cessation to cancer patients may help improve cessation rates, subsequently improving cancer treatment outcomes for vulnerable cancer patients.

FUNDING: Academic Institution

PS5-148

THE INFLUENCE OF NICOTINE HARM PERCEPTIONS AND BELIEFS ON USE OF E-CIGARETTES AND NICOTINE REPLACEMENT THERAPY AMONG BLACK AND WHITE CIGARETTE SMOKERS

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Black cigarette smokers are more likely than White smokers to have had a past year quit attempt but are less likely to successfully quit smoking. Compared to Whites, Black smokers are also less likely to use evidence-based quit aids like nicotine replacement therapy (NRT) and non evidence-based quit aids like nicotine e-cigarettes and limited research suggests that Blacks are more likely to perceive nicotine as harmful and as a carcinogen. This study examined the association between nicotine harm perceptions and beliefs and use of NRT and e-cigarettes among non-Hispanic Black and White adult cigarette smokers. Data from wave 4 of the Population Assessment on Tobacco and Health (PATH) study were analyzed in multivariable logistic regression models overall and stratified by race that controlled for sociodemographic and smoker characteristics. Outcomes included past 30 day e-cigarette and past 12 month NRT use and our predictors were perceived harmfulness of nicotine in e-cigarettes and NRT and belief that nicotine is the main addictive substance and main carcinogen in tobacco. Those who perceived nicotine in e-cigarettes as very or extremely harmful (AORs: 0.25-Whites to 0.29-Blacks) or somewhat harmful (AORs: 0.43-Whites to 0.48-Blacks) had lower odds of past 30 day e-cigarette use compared to those who perceived nicotine as slightly or not at all harmful. Those who perceived nicotine in NRT as very or extremely harmful (AORs: 0.36-Blacks to 0.74-Whites) and somewhat harmful (AORs: 0.55-Blacks to 0.66-Whites) compared to those who perceived nicotine as slightly or not at all harmful. Similarly, those who believed nicotine is the main carcinogen in tobacco had lower odds of past 30 day e-cigarette use (AORs: 0.65-Blacks to 0.78-Whites) but belief that nicotine was the main addictive substance was only associated with e-cigarette use among Whites (AOR: 0.80). No associations were found between nicotine beliefs and NRT use. Cessation interventions that aim to increase NRT and e-cigarette use may benefit by addressing misperceptions regarding the harmfulness of nicotine, but more research is needed to explain racial differences in rates of NRT and e-cigarette use.

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PS5-149

USE OF GOOGLE TRENDS IN DETECTION OF PUBLIC'S INTEREST IN HEATED TOBACCO PRODUCTS IN THE U.S.

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Significance: Heated tobacco products (HTPs) are popular all over the world. However, it wasn't until 2019 when IQOS became the first and only heated tobacco product (HTP) allowed to be sold in the U.S. In November of 2021, the sale of IQOS was temporarily banned due to a patent lawsuit. Despite its ban, people's continued interest in this product begs for deeper investigation. **Methods:** Google Trends was used in the analysis of the public's interest in heated tobacco products in the U.S. **Results:** In the past year, U.S. searches for "heat-not-burn tobacco products" were more popular than queries for "IQOS" or "heated tobacco products". Geographically, these searches were popular over most of the U.S., including the far West and the Midwestern states. Queries about IQOS increased since August of 2021 and decreased after the ban. While the public's interest in electronic cigarettes outweighed searches for IQOS in the first three quarters of 2021, the patent lawsuit caused IQOS searches to approach those of electronic cigarettes. IQOS-related searches dominated in queries asking where to buy it, about its nearby stores, its prices, and its relation to COVID-19. These searches were mainly requested from states that have IQOS stores and their neighbors. Meanwhile, a limited number of people looked up its health effects, safety, risks, and alternatives to smoking - leaving insufficient data for detection. **Conclusion:** IQOS attracts limited interest in the U.S. However, those who are interested come from geographically diverse areas. The public is more familiar with the marketed "heat-not-burn" term, rather than the "IQOS" or "heated tobacco products". While people's curiosity in IQOS was prevalent all of the U.S., searches indicating an intention for purchase were more prevalent in areas where this product was available. Most of the people searching for this product are not interested in its health effects - indicating a possibility that they are convinced of its safety.

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PS5-150

ASSOCIATION OF CANCER MISCONCEPTIONS AND TOBACCO USE PATTERNS

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Significance: Limited data is available regarding the impact of cancer risk perception on current tobacco use patterns, including E-cigarettes. To address this, we assessed the relationship between Cancer Risk misconceptions, and tobacco use patterns among US Adults.**Methods**: Data from the fifth wave for the Population Assessment of Tobacco and Health (PATH) Study was used (2018-2019). Misconceptions of smoking and cancer were assessed by ascertaining whether respondents believe that different types of cancers are caused by smoking as well as if nicotine in cigarettes causes cancer. Respondents were classified as tobacco users and non-users. Tobacco users were further classified by their tobacco use pattern. Multivariable logistic regression was performed to examine the associations between cancer- and nicotine-related misconceptions and tobacco use.**Results**: Study included 32,855 participants. Approximately 24% of tobacco users, mainly exclusive cigarette users (45%) and other dual and poly tobacco users (25%) had misconceptions that nicotine in cigarettes causes cancer. Tobacco users had higher odds of having misconceptions about smoking and lung cancer (aOR=5.06, 95% CI=3.85, 6.67) followed by mouth cancer (aOR=3.12, 95% CI=2.66, 3.67), liver cancer (aOR=1.98, 95% CI=1.82, 2.14) and bladder cancer (aOR=1.72, 95% CI=1.61, 1.85) compared to never users. Compared to exclusive cigarette users, the odds for having nicotine-related misconceptions were significantly lower among exclusive ENDS users (aOR=0.76, 95%CI=0.64, 0.91); and dual cigarette and e-cigarette users (aOR=0.76, 95%CI=0.63, 0.92); however, other exclusive tobacco users had significantly higher odds of having nicotine-related misconceptions (aOR=1.36, 95%CI=1.09, 1.70) than exclusive cigarette users respectively. For cancer-related misconceptions, exclusive e-cigarette users had lower odds of having at least one misconception about cancer and smoking (aOR=0.87, 95% CI=0.73, 1.03) compared to exclusive cigarette users.**Conclusion:** Several misconceptions about association of smoking and cancer still exist including the misconception about association of nicotine use and cancer. Tobacco use patterns were associated with cancer misperception about nicotine use. Increasing awareness among the US public about the correct link between smoking, nicotine and different types of cancers is still warranted, especially within the context of harm reduction among current smokers.

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PS5-151

ASSOCIATION OF POLYTOBACCO USE WITH ERECTILE DYSFUNCTION: FINDINGS FROM THE POPULATION ASSESSMENT OF TOBACCO OR HEALTH (PATH) STUDY

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Significance: Tobacco use landscape has shifted overtime to include two or more tobacco products (i.e. polytobacco use). Tobacco smoking remains independently associated with erectile dysfunction (ED); however data on the patterns of multiple tobacco products use on men's sexual health including ED are limited. We sought to systematically evaluate polytobacco use effect on ED using nationally representative data. Methods: Data from Population Assessment of Tobacco and Health (PATH) survey wave 4 (December 2016- January 2018) was examined. Those who responded, "sometimes or never" to the question "Ability to get and keep an erection adequate for satisfactory intercourse?" were classified as having ED. Tobacco users were classified as mono-, poly- and non- users

based on the past 30-day tobacco products use. Multivariate logistic regression models were used to identify association of tobacco use with ED among a restricted sample that included only men aged 20-65 who did not report any prior CVD diagnosis. We adjusted for several covariates including sociodemographic characteristics, diabetes, BMI, mental health status, and physical exercise.Results: Between December 2016 to January 2018 of which adult males, aged 20-65 years or older who responded to the question assessing ED were included in the study (N=8,651). Among the study population, 19.5% participants were mono-tobacco users and 16.1% were poly tobacco users. The proportion of ED for the sample population was 8.2%;prevalence among mono-tobacco users was 1.7% and poly-tobacco users was 1.4%. Compared to non-users, current poly-tobacco users were more likely (adjusted OR (aOR)= 1.43; 95% CI=0.99, 2.07;p<0.05) to report having ED. Conclusions: With the shift in the landscape of tobacco products that is associated with increasing prevalence of polytobacco products use, adult men and clinicians should be aware its potential impact. Future studies should evaluate the longitudinal impact of use multiple tobacco and tobacco use trajectories on the development of ED among adult men.

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PS5-152

ASSOCIATION BETWEEN ELECTRONIC CIGARETTE USE BEHAVIORS INSIDE OF VEHICLES, AGE, AND HARM PERCEPTIONS OF SECONDHAND ELECTRONIC CIGARETTE EXPOSURE

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Significance: With the rise of electronic cigarette (ECIG) there has also been an increase of ECIG use in indoor spaces, including vehicles, where others can get secondhand exposures from ECIGs. Research has not examined how harm perceptions and ECIG use behaviors inside of vehicles vary by age. This study examined ECIG use inside of vehicles behaviors and harm perceptions and the association with age. **Methods:** A US sample of adult current (past 30-day) ECIG users (n=1002; mean age=32.8) recruited through Qualtrics Panels completed an online survey in 2020. Participants were asked about demographics, tobacco product use, and harm perceptions of secondhand ECIG use exposure. Age was coded into 4 bins (18-24, 25-44, 45-64, 65+). To assess ECIG use inside of vehicles, participants were asked '... how often do you vape *inside of [your] vehicle'*. Harm perceptions of secondhand ECIG aerosol exposure were assessed by asking 'do you think breathing the vapor from others' vapes/e-cigarettes causes...'. Descriptive statistics and chi-square tests were conducted to examine associations. **Results:** Of those who owned a vehicle (n=919), 92.1% reported vaping inside their vehicle. Age was associated with frequency of ECIG use inside of vehicles (p=0.011) and harm perceptions of secondhand ECIG exposure (p<0.001). A greater percentage of 25-44 YOs (48.9%) reported 'almost always' vaping inside of their vehicles compared to 41.2% of 18-24 YOs. Conversely, less 18-24 YOs (10.7%) reported never vaping inside their vehicles compared to 25-44 YOs (5.6%). Among 18-24 YOs, 10.4% reported 'a lot of harm' from secondhand ECIG exposure, while only 5.3% of 65+ YOs did. Additionally, percentage of participants who reported 'little to no harm' from secondhand ECIG exposure increased with age group, with 44.5%, 59.5%, 61.8%, and 78.9% reporting little to no harm among 18-24 YOs, 25-44 YOs, 45-64 YOs, and 65+ YOs, respectively. **Conclusion:** While ECIG use is most prevalent among youth and young adults, this study suggests that middle-aged and older adults may have lower harm perceptions of secondhand ECIG exposure than younger adults and are more likely to vape inside of vehicles.

FUNDING: Federal

PS5-153

HARM PERCEPTIONS OF SECONDHAND ELECTRONIC CIGARETTE EXPOSURE AND ASSOCIATION WITH PERCEIVED ACCEPTABILITY OF ELECTRONIC CIGARETTE USE IN VEHICLES WHEN ADULTS AND CHILDREN ARE PRESENT

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Significance: Limited research has examined electronic cigarette (ECIG) secondhand aerosol (SHA) exposure. Initial research shows ECIG SHA exposure may be associated with negative health effects, but many ECIG users associate little harm with SHA exposure and may be more likely to engage in ECIG use in indoor settings, such as inside of vehicles. This study's purpose was to examine the association between harm perceptions of ECIG SHA and ECIG use inside of vehicles behaviors and perceptions. **Methods:** Current (past 30-day) adult ECIG users in the US (n=1002; mean age=32.8; 50.4% women) completed an online survey examining harm perceptions of ECIG SHA ("no harm", "little harm", "some harm", "a lot of harm"), opinions about acceptability of ECIG use inside of vehicles in the presence of others("always allowed" or "be allowed under some conditions", "never be allowed"), and ECIG use behaviors inside of vehicles ("always", "sometimes", "rarely", "never"). Descriptive statistics and chi-square tests were conducted to examine associations between variables. **Results:** Most participants (78.3%) who owned a vehicle reported ECIG use inside their vehicle "almost always" or "sometimes." Participants perceived ECIG SHA exposure was associated with "little harm" (34.6%) or "some harm" (36.5%), and few (8.6%) associated "a lot of harm." Over three-quarters (79.2%) reported ECIG use inside vehicles when adults were present and 36.6% reported ECIG use when children were present. Most (89.5%) stated that ECIG use should be allowed in the presence of other adults and 39.9% reported ECIG use should be allowed with children present. ECIG users who associated no or little harm with ECIG SHA exposure were more likely to report ECIG use inside of vehicles, ECIG use inside of vehicles when adults or children were present, and to perceive ECIG use inside of vehicles when adults or children were present was acceptable (ps<0.05). **Conclusion:** In this study, lower harm perception of ECIG SHA exposure was associated with increased ECIG use inside of vehicles. Future research should assess the impact of increasing harm perceptions of SHA on indoor ECIG use behaviors.

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PS5-154

CLINICAL BLIND-SPOTS IN THE TREATMENT OF NICOTINE MISUSE: WHAT YOU DON'T KNOW CAN KILL!

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Currently, there are no treatment guideline to assist patients in quitting Electronic Nicotine Delivery Systems (ENDS) or vaping products. Despite the evidences shown the public health danger of vaping among the youth and high concentration use of ENDS, there is still lack of research, standardization, and regulation. In addition, there is no adequate evidence showing commercial ENDS product as a successful long-term smoking cessation tool. The danger of nicotine addiction and public health hazard has risen concerns among the public health arena. During the COVID-19 pandemic, it has shown dual users vaping and smokers had the worst outcome in morbidity and mortality. Evidences have strongly shown the effect of nicotine use irrespective of its delivery system can pose addiction and health issues. The presentation will be discussing areas that urgently need research to guide evidence-based treatment on electronic cigarette dependence.

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PS5-155

A REMOTE PILOT STUDY TO EXAMINE THE INTERACTIVE EFFECTS OF E-CIGARETTE FLAVOR AND NICOTINE DOSE ON ADDICTION POTENTIAL

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Introduction: Prior research suggests that flavors can influence the pharmacological effects of nicotine. We conducted a conceptual replication of earlier work to examine whether e-cigarette flavors increased the addictive potential of nicotine per se. We hypothesized that the effect of nicotine dose on addiction potential would be greater with use of a preferred versus non-preferred e-cigarette flavor. **Methods**: This pilot study recruited 15 regular JUUL e-cigarette users to complete a 2 x 2 factorial crossover trial using an entirely remote video format. Participants completed a sampling baseline session to identify preferred JUUL flavor (menthol vs tobacco) followed by four counterbalanced experimental sessions separated by ≥48 hours: 1)low nicotine dose (3% JUUL)/non-preferred flavor; 2)low dose/preferred flavor; 3)high nicotine dose (5% JUUL)/non-preferred flavor; and 4)high dose/preferred flavor. In each experimental session, participants completed a puffing procedure followed by subjective ratings of e-cigarette liking/wanting (ELW), urges, and reinforcement using a JUUL pod purchase task. **Results**: The mean age of the sample was 27.3 (SD=7.2) years; 53% were female. All reported use of 5% JUUL pods while 33% also reported 3% JUUL pod use. 80% selected menthol over tobacco as their preferred flavor. There was a significant dose x

flavor interaction for average ELW, (F= 4.58, p=0.04). Pairwise comparisons indicated ELW was greater for the preferred than the non-preferred flavor at the *low* nicotine dose; there was no effect of flavor preference at the *high* nicotine dose. There were also significant dose x flavor interactions for pre-post puffing change in overall urge to vape (F= 5.97, p=0.02) and urge strength (F= 4.96, p=0.049), with greater reductions in overall urge/strength for the preferred compared to the non-preferred flavor at the low dose and no effects of preference at the high dose. We found no significant interaction effects for purchase task outcomes. **Conclusion:** Contrary to our hypothesis, the effect of flavor preference on ELW and urges was observed at the low but not high nicotine dose. Additional research is needed to confirm these findings.

FUNDING: Federal; FDA CTP

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