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**RAPID RESPONSE  
ABSTRACTS**

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**POSTER SESSION 5**

**POS5-1**

**FACTORS RELATING TO ABSTINENCE SELF-EFFICACY AND MOTIVATION TO QUIT AMONG SMOKERS WITH SUBSTANCE USE DISORDERS**

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Cigarette smoking rates among individuals with substance use disorders (SUDs) remains substantially higher than the general population. Understanding the factors associated with readiness to quit and abstinence self-efficacy may help to shape interventions that increase quit attempts and cessation amongst this at-risk population. This study examined whether readiness to quit and abstinence self-efficacy in three different contexts (i.e., negative affect, social/positive, habit/craving) were related to perceived stress, negative consequences related to substance use, and belief that quitting smoking will harm one's recovery among smokers with SUDs. Baseline data from a clinical trial examining an intervention designed to engage smokers in quitline use with 60 adult smokers in a SUD day treatment program, recruited irrespective of motivation to quit smoking, were used. A total of 19 (32%) participants reported that they were ready to quit smoking in the next 30 days. Analyses, controlling for age, gender, and nicotine dependence, showed that neither perceived stress nor problems related to substance use were related to readiness to quit within the next 30 days or abstinence self-efficacy in any of the three situations. The belief that quitting smoking will hurt one's sobriety was negatively associated with readiness to quit on both binary (yes/no) ( $OR = 0.28$ ,  $95\%CI: 0.12-0.64$ ,  $p = .003$ ) and continuous measures (1-10 scale) ( $\beta = -0.58$ ,  $SE = 0.11$ ,  $p < .001$ ). Those more likely to endorse this belief also reported reduced abstinence self-efficacy, but only in situations relating to habit/craving ( $\beta = -0.80$ ,  $SE = 0.32$ ,  $p = .015$ ). In sum, one third of smokers currently receiving substance use treatment were ready to quit smoking regardless of perceived stress or severity of substance use problems. On the other hand, belief that smoking cessation would interfere with their recovery effort may interfere with readiness to quit and confidence in their ability to stay quit in certain contexts. Development and evaluation of interventions that address the perception that quitting will harm one's sobriety may be needed.

FUNDING: Federal

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**POS5-2**

**PUBLIC SUPPORT FOR TOBACCO CONTROL IN GERMANY: RESULTS FROM THE GERMAN STUDY ON TOBACCO USE (DEBRA STUDY)**

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SIGNIFICANCE: Germany has ratified the World Health Organization Framework Convention on Tobacco Control with the aim of decreasing prevalence of tobacco smoking. In Germany, smoking prevalence is still high (27%), and implementation of tobacco control needs to be improved. Whether the German population would support stricter tobacco legislation is not yet fully known. This presentation reports findings on public support for such measures from a representative survey on tobacco use in Germany. METHODS: We analyzed data on public support generated as part of the German Study on Tobacco Use (DEBRA study). Data from 2,062 participants aged 14 years and older were collected through a face-to-face household survey in September 2016. To be representative of the German population all data were weighted. Public support for tobacco control was measured with five questions: whether participants would agree to a total ban on sale of tobacco, taxation of tobacco industry sales, research on e-cigarettes as smoking cessation aid, raising the legal age for tobacco sales, and legislation to ban smoking in car while minors are present. Associations between sample characteristics and support of policy measures were assessed with multivariate logistic regression analyses using unweighted data. RESULTS: The majority of the study population

(71.5%;  $95\%CI=69.5\%-73.5\%$ ), would support a smoking ban in cars when minors are present, even among current smokers (67.0%,  $95\%CI=63.0\%-70.9\%$ ). Over 50% of the population would support taxation of tobacco industry sales (57.3%,  $95\%CI=55.1\%-59.4\%$ ) and extended research on e-cigarettes (55.5%,  $95\%CI=53.3\%-57.7\%$ ). Over 40 % of the population expressed agreement with raising the legal age for tobacco sales from 18 to 21 (43.1%,  $95\%CI=41.0\%-45.3\%$ ), and 22.9% would support a total ban on tobacco sales ( $95\%CI=21.1\%-24.8\%$ ). Non-smokers and ex-smokers agreed significantly more often with the proposed policy changes than current smokers. CONCLUSIONS: Stricter tobacco control policy is likely to be supported by the German population, with implementation of a total ban of smoking in cars when minors are present being the most accepted measure even among smokers.

FUNDING: Federal

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**POS5-3**

**ATTITUDES, BARRIERS AND FACILITATORS TO SMOKING CESSATION AMONG CENTRAL AND EASTERN EUROPEAN NURSES: A FOCUS GROUP STUDY**

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SIGNIFICANCE: Smoking among nurses is a barrier to providing smoking cessation interventions to patients. In Central and Eastern Europe—where tobacco use is the leading cause of preventable death and disease—there is limited knowledge about nurses' attitudes toward cessation interventions. Our aim was to explore the attitudes of nurses who are former and current smokers toward providing cessation interventions to patients as well as barriers and facilitators to their own quit efforts. METHODS: Nine focus groups with 81 nurses (94% females) in five Central and Eastern European countries. Content analysis was used to identify major themes. RESULTS: Nurses agreed that they should set a good example by not smoking; should be involved in helping patients stop smoking; and needed additional training in tobacco control. Five common themes were identified as barriers to quitting: smoking cues in the environment; presence of smokers in the environment; relapse postpartum; stress and nicotine addiction; and misperceptions about the dangers of smoking. Former smokers reported facilitators to quitting including: seeing the health consequences of smoking among their patients; personal and family health concerns; receiving support from family; and pregnancy. CONCLUSIONS: There is a need to build upon nurses' positive attitudes about engaging in smoking cessation interventions with patients to ensure that cessation interventions are standard nursing practice. Future studies should focus on programs that support nurses' quit efforts by addressing barriers to smoking cessation, which will improve their health and patient care.

FUNDING: Academic Institution; Federal

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**POS5-4**

**INITIAL DEVELOPMENT AND VALIDATION OF A CONTEXTUAL BEHAVIORAL DISTRESS INTOLERANCE TASK IN SMOKERS**

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SIGNIFICANCE: Distress intolerance (DI) reflects an individual's perceived or actual inability to withstand negative emotional or physical states. DI plays an important role in the maintenance and relapse of smoking. However, there is limited understanding of contextual factors that impact DI. The current study aimed to develop and test a novel computerized behavioral persistence task (Contextual-Frustration Intolerance Typing Task [C-FITT]), based on theoretical principles of self-regulation. The C-FITT was designed to model contextual factors that influence the task persistence, an index of DI, in addition to negative affect and smoking urges. METHODS: Participants (n=550) were daily smokers in the US recruited through Qualtrics Online Sample. Participated smoked an average of

17.2±8.5 cigarettes/day. Using a 2x2+1 experimental design, participants were randomized to one of four C-FITT conditions that crossed task difficulty (low or high difficulty) with passage content (neutral or withdrawal text), plus a neural control group. RESULTS: There was a main effect of task difficulty, such that the high-difficulty C-FITT, compared to low-difficulty, produced small but significant sized effect on shorter behavioral persistence, greater likelihood of self-terminating the task, and increased negative affect and smoking urges. The withdrawal content C-FITT, compared to neutral, produced significantly greater likelihood of task self-termination. The combination of high-difficulty and withdrawal content C-FITT, compared to other conditions, produced significant medium effects on shorter task persistence, 100% self-termination rate, and small effect on increased negative affect and smoking urges. CONCLUSIONS: Findings provide initial evidence of the validity of the C-FITT, a new theoretically-informed, computerized behavioral DI task, in smokers within the context of tobacco withdrawal at low and high levels of intensity. The C-FITT content can be modified and the task is easily accessible through an online website-based platform, which can enhance scientific inquiry on DI.

FUNDING: Federal; Qualtrics Behavioral Research Grant

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## POS5-5 INDOOR AIR QUALITY IN ELECTRONIC CIGARETTE VAPE SHOPS

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BACKGROUND: Electronic nicotine delivery systems (ENDS) have become increasingly popular as a tobacco product, but ENDS are not emission free, and the knowledge of air toxicants in exhaled E-vapor is lacking. Vape shops often have "tasting bars," allowing patrons to sample E-liquid flavors, and therefore provides an extreme real-world environment to study E-vapors and secondhand vaping. METHODS: Air toxicants in five vape shops in New Jersey were measured in 2016 and 2017. Each vape shop was measured for 24 hours, for real-time particle counts from 10 nm to 5 mm, PM<sub>2.5</sub>, nicotine, and aldehydes (e.g., formaldehyde). In addition, key determinants of indoor air quality (indoor CO<sub>2</sub>, temperature, humidity, customer volume, and vape shop sizes) were also measured. RESULTS: The customer volumes ranged from 11 to 20 people per day, and the size of the vape shops were 44.6 to 63.2 m<sup>2</sup>. The average particle counts were 2.14×10<sup>9</sup>/cc during business hours and 6.26×10<sup>7</sup>/cc when the shops were closed. During business hours, the concentrations ranged from 512 to 1506 ppm for CO<sub>2</sub>, from 20 to 11200 mg/m<sup>3</sup> for PM<sub>2.5</sub>, and from 46 to 52 µg/m<sup>3</sup> for formaldehyde. DISCUSSION AND CONCLUSION: Indoor air in vape shops contained large amount of air toxicants. PM<sub>2.5</sub> levels in vape shops often exceeded air quality standards (25 µg/m<sup>3</sup> by WHO), and aldehyde levels were also high. The findings of this study filled a critical knowledge gap in ENDS research, and also provided scientific evidence for ENDS regulations: 1) The FDA may include warning about secondhand vaping risks in E-cigarette warning labels; and 2) The study can inform state/local governments on how to implement/revise clean indoor air laws to regulate ENDS product use in public indoor environments.

FUNDING: Academic Institution

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## POS5-6 DOES THE DUAL USE OF ELECTRONIC CIGARETTES AND CONVENTIONAL CIGARETTES CONFER A PULMONARY HEALTH ADVANTAGE: A BASELINE COHORT ANALYSIS

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SIGNIFICANCE: Electronic cigarettes have become increasingly popular and are believed to be safer than conventional cigarettes (CC). There have been no large, long-term studies on e-cigarette health effects. This study examines whether the dual use (DU) of e-cigarettes and CCs is associated with better pulmonary health, compared with CCs alone. METHODS: Participants (255 dual users and 164 CC users) in Madison and Milwaukee, WI participated in a prospective cohort study. Participants completed demographic, social and smoking histories, tobacco de-

pendence, the St. George Respiratory Questionnaire (SGRQ), and pulmonary function tests (PFTs). PFT outcomes included FEV1 and presence of obstructive PFTs (FEV1/FVC<70%). Regression analyses examined whether PFT and SGRQ outcomes were associated with DU vs CC use only, and whether age, gender, smoking histories or study site moderated those associations. RESULTS: Compared to CC users, DUs were younger (39 vs. 43 years,  $t(417) = 2.54, p = 0.01$ ), smoked fewer CCs per day (12 vs 16,  $t(414) = 3.7, p < 0.001$ ), had fewer pack years (15 vs. 21,  $t(409) = 3.63, p < 0.001$ ) and had lower nicotine dependence (FTND; 4.2 vs. 4.8,  $t(416) = 2.82, p = 0.005$ ). FEV1 was better in DU compared to CC (72.9% vs. 67.8%,  $t(355) = 2.00, p = 0.046$ ). However, regression analyses demonstrated that this association was no longer significant when adjusted for age, gender, pack years and site in the multivariate analysis. Obstructive PFTs were not associated with DU versus CC (41.2% obstructed in DU, 46.1% in CC;  $X^2(1, N = 350) = 0.84, p = 0.36$ ), nor were SGRQ scores ( $m = 25.3$  in DU, 26.5 in CC;  $b = -1.18, t(363) = 0.56, p = 0.58$ ). CONCLUSIONS: Dual use of e-cigarettes and CCs, in this sample, does appear to be associated with fewer cigarettes smoked per day and fewer pack years accumulated, as well as modestly lower nicotine dependence scores. However, dual use does not appear to be associated with significant objective or subjective pulmonary health benefits. Larger and long-term data are needed, but this cross-sectional analysis is an initial step into understanding the risks of e-cigarettes to better inform clinical decisions for smokers.

FUNDING: Non-profit

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## POS5-7 PREPARING MENTHOL CIGARETTES FOR CLINICAL RESEARCH

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BACKGROUND: The Family Smoking Prevention and Tobacco Control Act bans characterizing flavors in cigarettes, except tobacco and menthol. However, the Food and Drug Administration does have the authority to implement tobacco product standards to protect public health. Research on cigarettes and other tobacco products indicates that flavors like menthol may have an important role in subjective preference and sensation. The impact of changes in cigarette menthol content on smoking topography, nicotine pharmacokinetics, toxicant exposure, and consumer appeal is not well understood. As part of a clinical study to evaluate this impact, a method was developed to amend SPECTRUM Research Cigarettes to have low, medium, and high menthol contents that bracket the commercially available range. METHODS: SPECTRUM Research Cigarettes, NRC 600 (0.8 mg nicotine; 10 mg tar) were modified to contain menthol at 3, 6, and 12 mg/cigarette by injecting 25 µL ethanol/triacetin/menthol solutions of varying concentrations (120 mg menthol/mL, 240 mg/mL, and 480 mg/mL) into either 1) the filter or 2) the filter and the tobacco rod. Menthol levels were tested in triplicate in the whole cigarette and in the tobacco rod and paper at 1, 24, 48, and 72 hours (hr) for each concentration using an extraction solution of quinoline in MTBE, and measured using gas chromatography with flame ionization detection. RESULTS: Injections into the cigarette filter revealed a slow migration of menthol into the tobacco filler/rod that approached 25% at 72 hr across concentrations. Injections into the filter and tobacco rod (12.5 µL each) yielded equal menthol distribution up to 72 hr. However, the total menthol decreased from an average of 90.7% at 1 hr; 86.4% at 24 hr; 83.2% at 48 hr, and 80.9% at 72 hr in cigarettes stored individually in glass tubes at room temperature. CONCLUSIONS: This novel method can be used to modify cigarettes with a range of reliable menthol levels in both filter and tobacco rod for clinical research. This research was funded by a contract with the FDA (HHS-F2232013100301/HHSF22301005T). The authors declare no conflict of interest.

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## POS5-8

### OUTCOMES FROM PROJECT ACTION: A RANDOMIZED CONTROL TRIAL TO ASSESS THE EFFICACY OF AN INTERACTIVE MOBILE MESSAGING INTERVENTION FOR UNDERSERVED SMOKERS

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**SIGNIFICANCE:** Despite the significant decrease over the past ten years, smoking still remains a major public health concern, especially among low-income, underserved individuals. These groups tend to be confronted with significant barriers to utilizing more traditional smoking cessation intervention approaches. The purpose of this study was to utilize a mobile clinic model, a network of community sites and an interactive telehealth system to reach and deliver smoking cessation treatment to underserved, low-income communities. **METHODS:** We used a group-randomized design with the community as the sampling unit to compare the efficacy of three smoking cessation interventions: Standard Care (SC) - brief advice to quit smoking, nicotine replacement therapy, and self-help materials; Enhanced Care (EC) - SC plus a cell phone-delivered text/graphical messaging component and Intensive Care (IC) - EC plus cell phone-delivered proactive counseling sessions. **RESULTS:** A total of 624 participants were recruited and 73.5% (mean age 45 years) completed the 6-month assessment. We used 7-day self-report to compare abstinence rates between groups. To estimate the effect of treatment group on abstinence, log binomial mixed models were used adjusting for significant covariates. The primary intent-to-treat analysis revealed that abstinence rates were 46% in IC, 40% in EC group and 35% in SC. Hence the relative risk of quitting in the IC group compared to the SC group was 1.30 (0.96, 1.75), a 30% higher rate of quitting. The relative risk of quitting in the EC group compared to the SC group was 1.15 (0.85, 1.56), a 15% higher rate of quitting. **CONCLUSIONS:** This was an unusually responsive population. All intervention conditions showed numerically high abstinence rates. Unexpectedly high abstinence even in the low-intensity SC group indicates that this population is in urgent need of smoking cessation programs. Although statistical significance was not achieved between conditions, the program demonstrated a considerable impact overall in low-SES communities.

**FUNDING:** Federal

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## POS5-9

### OUTDOOR TOBACCO POLICIES AT FOUR-YEAR, PUBLIC UNIVERSITIES IN THE UNITED STATES

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**SIGNIFICANCE:** Campus tobacco policies are integral to protecting the health of over 20 million US college students. Currently, two US organizations maintain lists of 100% smoke or tobacco-free campuses; however, surveillance for institutions with less stringent policies could inform strategic tobacco control efforts. Two-thirds of US students attend 4-year institutions, of which 25% are public. The purpose of this study was to examine the scope of outdoor tobacco policies for 4-year, public universities in the US. **METHODS:** A list of 4-year, public universities was obtained from the US National Center for Education Statistics' College Navigator website. Campus tobacco policies, along with enrollment data, were identified by searching university websites. Tobacco policies were analyzed for restrictions by product (e.g., combustible, smokeless, electronic) and location (e.g., building entrances/perimeters, designated areas, all grounds). **RESULTS:** Of 653 institutions, representing 8.1 million students, 622 had policies on their website that prohibited outdoor use. Fifty percent (n=312) of policies included all products; 65% (n=407) included electronic products; 57% (n=356) included smokeless products, and 27% (n=171) included only combustible products. One-third of institutions prohibited use around buildings [entrances (n=137); perimeters (n=43)] and 16% (n=100) restricted use to designated areas. Roughly 3.4 million students (42%) attended schools without a campus-wide policy. Additionally, there were 4 times more institutions with a building entrance/perimeter policy than campus-wide policy when the policy prohibited only combustible products. Institutions prohibiting all products were more likely to have a campus-wide policy than building entrance/perimeter policy. **CONCLUSIONS:** Policy lists can inform efforts to expand protections on campuses with less stringent policies. Variability in protection at 4-year, public in-

stitutions reinforces the need for tailored efforts to eliminate secondhand smoke and tobacco exposure. Moreover, further research should explore if a hierarchy of harm perceptions explains which products and locations are included in policies.

**FUNDING:** Unfunded

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## POS5-10

### THE ACUTE EFFECTS OF EXERCISE AND NICOTINE ON COGNITION IN SMOKERS

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**SIGNIFICANCE:** Cognitive deficits arise when an individual stops smoking (al'Absi, Amunrud, & Wittmers, 2002). These cognitive deficits contribute to unsuccessful quit attempts (Stolz, Seiffert, Kuster, Fagerström, & Tamm, 2014). In a non-smoking population moderate intensity exercise and nicotine have been shown to increase cognition to the same extent (Prapavessis, Guirguis, Sui & Mancuso, 2017). In non-deprived nicotine smokers it is unknown if the moderate intensity exercise will provide the same benefit seen in non-smokers. **METHODS:** A randomized counterbalanced crossover study design was utilized. Specifically, non-deprived nicotine smokers (n=26; mean age = 34.85 (12.19)) served as their own controls and received either moderate intensity or nicotine inhalation first, followed by the treatment they did not receive second. The primary outcome was working memory accuracy and reaction time (RT) measured by a battery of n-back assessments with the 3-back being the primary outcome (Braver, Cohen, Nystrom, Jonides, Smith & Noll, 1997). Smoking was validated using a CO Smokerlyzer, heart rate and blood pressure readings, whereas exercise was validated using heart rate and a blood pressure readings. **RESULTS:** A repeated measure ANOVA revealed a significant treatment effect for accuracy on the 3-back [ $f(2,4) = 8.118, p = .002, \eta^2 = .404$ ]. Post-hoc paired sample t-tests uncovered a significant improvement in accuracy from baseline and the exercise condition [ $t(25) = 2.605, p = .015, \eta^2 = .511$ ] as well as a significant improvement in accuracy from baseline and the nicotine inhalation condition [ $t(25) = 3.447, p = .002, \eta^2 = .676$ ]. Non-significant differences were observed between the two treatments groups [ $t(25) = .892, p = .381, \eta^2 = .175$ ]. A repeated measures ANOVA revealed a non-significant treatment effect for RT on the 3-back [ $f(2,4) = .388, p = .682, \eta^2 = 0.34$ ]. **CONCLUSION:** Moderate intensity exercise pragmatically increased accuracy on the n-back from baseline in comparison to nicotine inhalation, without a compromise in reaction time. Implications for future work are discussed.

**FUNDING:** State

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## POS5-11

### THE RELATIONSHIPS AMONG SELF-EFFICACY, QUALITY OF LIFE, PERCEIVED VULNERABILITY, AND READINESS TO QUIT SMOKING IN PEOPLE LIVING WITH HIV

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People living with HIV (PLWH) smoke cigarettes at a higher rate than the general population, and smoking is a leading cause of morbidity and mortality among PLWH receiving treatment. While many PLWH who smoke report a desire to quit, a majority have low readiness to quit, resulting in lower rates of quit attempts. Identifying factors that impact readiness to quit among PLWH may help in developing interventions that facilitate quit attempts in this vulnerable population. This study examined the relations among readiness to quit, self-efficacy (SE), quality of life (QoL), and perceived vulnerability (PV) from a baseline assessment among 100 PLWH smokers who participated in a randomized clinical trial designed to increase their engagement in a tobacco quitline and increase their smoking abstinence. Regression analyses showed no significant main effects (SE, QoL, PV) or interaction effects (SExQoL, SExPV) on a continuous measure of readiness to quit. However, logistic regressions showed that greater SE, but not QoL or PV, significantly increased the likelihood of reporting readiness to quit in the next 30 days (yes/no). Furthermore, significant SE x QoL and SE x PV interaction effects were found,

indicating that SE predicted readiness to quit in the next 30 days only among those who reported low QoL or high PV. For PLWH smokers, increasing self-efficacy may increase readiness to quit especially among those with lower quality of life. Psychoeducation tailored to PLWH designed to reduce unrealistic invulnerability to smoking-related diseases along with interventions that target self-efficacy may help improve rates of quit attempts.

FUNDING: Federal

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## POS5-12

### AN EVALUATION OF THE EFFECTS OF INVITATION TO LUNG CANCER SCREENING ON SMOKING BEHAVIORS AMONG VETERANS

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**SIGNIFICANCE:** Lung cancer screening (LCS) with low dose CT has been widely endorsed. There remain concerns about potential unintended consequences, particularly regarding effects on smoking cessation and relapse. However, while screening has been suggested as an effective “teachable moment” to address tobacco use and increase abstinence, the limited available data suggest LCS has little effect on smoking behaviors. **OBJECTIVES:** To examine the smoking cessation and relapse behaviors in a cohort of Veterans randomized 2:1 to either direct mailed invitation to an LCS program, which included smoking cessation information, or to referral to LCS at provider discretion (usual care). **METHODS:** Longitudinal surveys administered by mail to assess long-term tobacco use outcomes (over 1 year after randomization). We compared the following tobacco outcomes between the two study arms: abstinence (7-day, 30-day), frequency of use (every day, some days, not at all), and quit attempts during the past year. Within the direct invitation group, we compared outcomes between those who did and did not undergo screening. **RESULTS:** 979 Veterans returned the survey (n=660 direct LCS invitation, n=319 usual care). Among those smoking at baseline (n=488, 49.8%), follow-up smoking abstinence rates and quit attempts did not differ between usual care and direct invitation groups. A higher proportion of baseline smokers in usual care smoked every day at follow up (84.4%) compared to the direct invitation group (74.4%; p=0.03). Approximately 15% of former smokers at baseline had relapsed to smoking at follow-up; this did not differ between arms. Among those directly invited to LCS, tobacco outcomes did not significantly differ between those screened and those not screened. **CONCLUSIONS:** In this real world, randomized program evaluation of tobacco use behaviors in the context of LCS, we observed an overall neutral effect of LCS on smoking behaviors among both patients overall and those who completed screening. As LCS spreads nationally, programs should capitalize on the teachable moment that screening offers, with efforts to diminish the observed relapse rate and increase tobacco abstinence.

FUNDING: Federal

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## POS5-13

### SEXUAL MINORITY WOMEN'S PERCEPTIONS OF LGBT-TARGETED VERSUS NON-TARGETED ADVERTISING IMAGES: IMPLICATIONS FOR DESIGNING ANTI-TOBACCO MESSAGES TO ADDRESS TOBACCO DISPARITIES

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**SIGNIFICANCE:** Sexual minority women (SMW) report more exposure to tobacco industry marketing and are more receptive to marketing compared with heterosexual women. Presently, there are significant knowledge gaps in identifying effective intervention approaches to reduce smoking among SMW. To test the effectiveness of including LGBT-targeted images in interventions, we examined how young adult SMW respond to LGBT-targeted advertisement images compared to non-targeted images. This research is significant because it provides formative evidence of

the impact of targeted images on cognitions and emotions among SMW smokers and non-smokers. **METHODS:** We analyzed data on SMW from a larger study that also included heterosexual women (the data including heterosexual women were analyzed in a separate analysis). SMW (ages 18-30; N=313) from the Survey Sampling International panel were invited to participate in a web survey. They were first shown four randomly chosen non-targeted images from a pool of 15 non-targeted images (e.g., a group of friends, swimmers) followed by eight randomly chosen LGBT-targeted images (e.g., rainbow flag, same-sex couples) from a pool of 35 LGBT-targeted images. These images were from advertisements and health campaign messages, and edited to exclude any product or brand cues. Participants then answered a series of questions for each image. Outcomes of interest were group identity activation, attitudes, felt targetness, positive (happy, hopeful, inspired) and negative (annoyed, angry, embarrassed) emotions. Outcomes were analyzed using multi-level mixed regression analyses controlling for image-relevant covariates (e.g., presence of women). **RESULTS:** SMW brought to mind more LGBT groups; had more favorable attitudes; felt they were targeted to a greater extent; and felt more positive emotions (happy, hopeful, inspired), and less negative emotions (annoyed) in response to LGBT-targeted images than non-targeted images (all Ps<0.05). **CONCLUSION:** Results suggest that LGBT-targeted images could be more effective for targeting SMW than non-targeted images and could inform campaign designers of messages to reduce tobacco use among SMW.

FUNDING: Unfunded

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## POS5-14

### USING A SMOKING CESSATION QUITLINE TO PROMOTE LUNG CANCER SCREENING

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Lung cancer screening (LCS) is recommended by the United States Preventive Services Task Force (USPSTF) for a high risk group of current and former smokers. To promote awareness of LCS through a Quitline, a randomized trial was conducted among New York State Smokers' Quitline (NYSSQL) participants to assess the impact of a brochure, containing information on risks, benefits, and costs associated with LCS (control group) versus the brochure supplemented with phone-based in-depth messaging, containing information on awareness, perceived benefits, barriers, and cues to action (treatment group). Eligible participants had to reside in NYS (outside of Erie and Niagara County) and meet the USPSTF eligibility criteria for LCS. A total of 1000 participants were recruited and randomized into the control and treatment arm. After a 4 month telephone survey (n = 431), the association between the control and treatment group was examined for two primary outcomes: 1) speaking with a physician regarding LCS and 2) speaking with an insurance company about coverage of the LCS exam. Multivariate logistic regression models adjusted for demographics, insurance status, emphysema/COPD, and past 30 day cigarette use for the two main outcomes, but found no significant differences. However, there were significant differences between the two arms with regards to past 30 day tobacco use (p = .04), and receiving the study brochure for screening (p = .01). The sample, when restricted to just the control group and examined for differences between individuals who reported receiving the study brochure compared to those who reported not receiving it, showed significant differences with regards to knowledge of LCS (p = .001), thinking about my risk of lung cancer (p < .001), information made me feel more comfortable about getting LCS (p < .001), and speaking to my physician regarding LCS (p = .02). While the in-depth intervention did not have significant impacts on the two primary endpoints, it had a significant association with past 30 day cigarette use. The study brochure by itself may be a relatively low cost way to for Quitlines to deliver information about LCS.

FUNDING: Unfunded

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## POS5-15

### EXAMINING PREVALENCE AND PREDICTORS OF CO-OCCURRING MARIJUANA AND CIGARETTE USE AMONG YOUNG ADULTS USING NHANES, 2005-2014

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**SIGNIFICANCE:** Prior research has found significant rates of co-use of marijuana and cigarettes among young people. As the outcomes of co-use are worse than those from a single substance, it is pertinent to provide insight into the patterns and risk factors for marijuana and cigarette co-use among young adults, as this knowledge is absent from the literature. **METHODS:** Pooled, cross-sectional National Health and Nutrition Examination Survey (NHANES) data were used to assess prevalence and predictors of co-occurring marijuana and cigarette use among young adults (ages 21-30) and how these patterns have changed over a 10-year period (2005-2014). Respondents were classified into four mutually exclusive categories based on past-month behavior: neither marijuana nor cigarette use (64.5%), cigarette-only use (17.1%), marijuana-only use (7.7%) and co-occurring use (10.7%). Multinomial logistic regression models were computed with covariates to predict these categories. All analyses were conducted using Stata 15.1. **RESULTS:** Prevalence of past-month cigarette use decreased from 30.9% in 2005-2006 to 23.7% in 2013-2014 ( $p=0.024$ ) while both past-month marijuana use (average across all waves, 18.0%) and past-month co-occurring use (average across all waves, 9.8%) remained stable between 2005 and 2014. There was no statistically significant difference in past-month co-occurring use by age; however, there was a statistically significant difference by gender ( $p<0.001$ ); 12.9% of men reported past-month co-occurring use compared with 6.8% of women. There were also significant differences by racial and ethnic group ( $p<0.001$ ) with the highest prevalence among Non-Hispanic Black respondents (12.7%) and the lowest among those endorsing Mexican ethnicity (4.8%). In terms of predictors, marital status, race and ethnicity, alcohol use, depressive symptoms, and other drug use were found to differentiate co-use from marijuana-only or cigarette-only use in multivariate models. **CONCLUSIONS:** Co-occurring cigarette and marijuana users have unique characteristics compared to cigarette-only and marijuana-only users. These findings can contribute to more effective, tailored prevention strategies.

FUNDING: Academic Institution

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## POS5-16

### TOBACCO USE ECHO CHAMBERS IN SOCIAL MEDIA: THE REINFORCEMENT OF INEQUALITIES IN SMOKING NORMS

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**SIGNIFICANCE:** Inequalities in smoking norms make it more likely for those in low socioeconomic or minority populations to use tobacco. These unequal social norms may be further reinforced in social media echo chambers, where smokers and those who have many smokers in their networks are likely exposed to more photos/videos of friends smoking. This study qualitatively explores how young adults are processing social media posts featuring combustible tobacco use and how what they see and how they interpret it may be different based on their – and their network's – smoking status. **METHODS:** In-depth interviews were conducted with eight smokers and ten nonsmokers, ages 18 to 24, from the DC metro area. Interviews were audio-recorded, transcribed, and statements coded using NVivo and sorted to identify themes. **RESULTS:** Smokers and those with many smokers in their network regularly see posts featuring combustible tobacco use. Most said these posts did not influence their intention to smoke but did influence how prevalent and acceptable they think smoking is among peers. Smokers and nonsmokers alike said smokers in their networks fell into two categories – those that "owned" their identity as a smoker and posted smoking pictures/videos often; and those that actively avoided such posts, not wanting smoking to be part of their image. Although smoking posts were often viewed negatively ("attention-seeking" or "pointless"), participants did not share these reactions on social media – because they did not want to embarrass the poster, felt they could not change the poster's mind, or feared backlash from the poster or others in the network. **CONCLUSIONS:** Social media echo chambers – where smokers and those who know many smokers see more smoking, and nobody speaks up against it – may reinforce inequalities in norms around prevalence and accept-

ability of smoking. Innovative social media interventions could be developed to mitigate or counter this influence.

FUNDING: Academic Institution

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## POS5-17

### POOR TASTE RATINGS OF SPECTRUM RESEARCH CIGARETTES NEGATIVELY INFLUENCE HYPOTHETICAL AND REAL SMOKING BEHAVIORS

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**SIGNIFICANCE:** The 2009 Family Smoking Prevention and Tobacco Control Act provided the FDA with authority over cigarette nicotine content. Recent assessments of reduced-nicotine cigarettes have used SPECTRUM investigational research cigarettes, provided under a federal contract with NIDA. Few studies have systematically evaluated the taste of these cigarettes nor its influence on smoking behavior. This study assessed numerous taste dimensions for both full- and reduced-nicotine SPECTRUM cigarettes and relate them to real and hypothetical smoking behaviors. **METHODS:** Cigarette-deprived, dependent smokers ( $n=9$ ) visited the laboratory for two double-blind experimental sessions. Participants worked for SPECTRUM cigarette puffs (Lindsley plunger pulls; FR-3 for 3 puffs), with full-nicotine (15.8 mg/g) cigarettes in one session and reduced-nicotine (5.2, 2.4, or 1.3 mg/g across participants) cigarettes in the other. At each session completion, participants rated various dimensions of cigarette taste and completed a hypothetical cigarette purchasing task for the sampled SPECTRUM cigarettes as well as their usual cigarette brand. **RESULTS:** Taste measures, purchasing task demand metrics, and total puffs did not significantly differ between full- and reduced-nicotine cigarettes, so data were collapsed across all doses. Overall, ratings were higher for the negative dimensions of taste relative to the positive dimensions. Positive taste ratings were positively correlated with total puffs taken, whereas negative taste ratings were negatively correlated with puffs. On the cigarette purchasing task, demand for SPECTRUM cigarettes was more elastic (price sensitive) than the usual brand; however, there was no significant difference in demand intensity (consumption at lowest price). **CONCLUSIONS:** Data indicate that smokers generally consider the taste of SPECTRUM cigarettes unpleasant, regardless of nicotine content, and that taste preferences can modulate smoking behavior. Future studies utilizing SPECTRUM cigarettes would benefit from including analyses of taste measures to evaluate nonpharmacological factors of reduced-nicotine cigarettes on smoking behavior. Funding: R01DA042527-02

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## POS5-18

### ARE MENTHOL SMOKERS USING STATE QUITLINES? FINDINGS FROM MINNESOTA

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**SIGNIFICANCE:** Increasing the reach of evidence-based cessation services is a long-standing public health priority. Reach ratios gauge whether quitline services are reaching subgroups of smokers who may be at higher risk and are a relative comparison of the proportion of a subgroup in a quitline to the proportion of the same subgroup in the larger population of tobacco users. Little research has examined whether quitline services are reaching menthol smokers, who may have increased difficulty quitting relative to non-menthol smokers. The purpose of this study was to understand whether quitline services are reaching menthol smokers. **METHODS:** Data were analyzed from Minnesota's cessation program, QUIT-PLAN<sup>®</sup> Services. Cigarette smokers who enrolled between May and October 2017 ( $n=5235$ ) were asked about usual cigarette type (menthol vs. non-menthol). Reach ratios were calculated by dividing the percent of program enrollees who are menthol smokers by the percent of all Minnesota smokers who are menthol smokers. The Katz log method was used to estimate 95% confidence intervals. Chi-square tests and t-tests were used to assess differences in demographic, smoking-related, and utilization characteristics between menthol and non-menthol smokers.

**RESULTS:** Among QUITPLAN Services enrollees, 31% of smokers reported using menthol cigarettes. The reach ratio for menthol smokers was 1.23 (95% CI: 1.11, 1.36). Menthol smokers were more likely to be younger, female, African-American, and live in an urban area than non-menthol smokers. Menthol smokers were also more likely to smoke fewer cigarettes per day. No differences in service utilization were found between menthol and non-menthol smokers. **CONCLUSIONS:** We found a reach ratio for menthol smokers greater than 1, indicating that menthol smokers are over-represented among Minnesota's quitline enrollees. State quitlines should consider assessing menthol use at intake in order to calculate reach ratios and monitor reach of services and promotional strategies directed at menthol smokers. Future studies combining reach ratios and quit outcomes can help states adapt services to best help menthol smokers quit.

FUNDING: Non-profit

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## POS5-19

### SELF-EFFICACY MEDIATES LONG-TERM EFFECTS OF A MULTI-LEVEL PEDIATRIC OFFICE-BASED INTERVENTION ON SMOKING CESSATION AMONG LOW-INCOME PARENTS

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**SIGNIFICANCE:** Child tobacco smoke exposure (CTSE) has adverse effects on child health, yet effective interventions to reduce CTSE have been difficult to implement in pediatrics. We addressed this problem using a multilevel intervention combining pediatrician advice with telebased behavioral counseling. **METHODS:** The intervention, Kids Safe & Smokefree (KiSS), was tested in a randomized controlled trial (N = 327) with two-groups and three measurement periods: pre-intervention, end-of-treatment (EOT) and 12-month follow-up. All parents attending participating clinics received brief intervention from pediatricians. Specifically, messages in electronic health record systems prompted pediatricians to "Ask" parents about CTSE, "Advise" about CTSE harms, and "Refer" them to cessation resources (AAR). After baseline assessment, parents were randomized to a tele-based intervention condition that used support, education and cognitive-behavioral skill building to help parents quit smoking (COUNSELING) or to an attention control condition (CONTROL). Pediatricians and assessors were blind to condition. Analyses of self-reported outcomes at EOT suggested that counseling increased quit rates relative to the control arm (Collins et al., 2018). The present paper examines heretofore unreported findings on mediators of the intervention on 12-month 7-day point prevalence abstinence from smoking, verified by salivary cotinine levels. **RESULTS:** Participants were mostly unmarried (59%), African American (84%), female (84%), and living below poverty (79%). Intention-to-treat analyses showed a significant effect of intervention on 12-month quit rates: the COUNSELING group was 2.46 times more likely to have quit than CONTROLS (p < .05). Further, relative to CONTROLS, the COUNSELING group reported higher levels of efficacy to quit smoking at EOT which, in turn, was associated with a higher probability of quitting at 12-month follow-up. **CONCLUSIONS:** These findings suggest that relative to clinic intervention alone, the multilevel KiSS intervention effectively helps low-income parents to quit smoking for the long-term, potentially by improving their self-efficacy.

FUNDING: Federal; NIH grant CA158361

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## POS5-20

### FINANCIAL INCENTIVES AND PROACTIVE CALLING FOR PROMOTING TOBACCO TREATMENT ENGAGEMENT IN A LOW-INCOME POPULATION: A FACTORIAL RANDOMIZED TRIAL

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The tobacco epidemic disproportionately affects low-income populations. Improved strategies to engage low-income smokers in tobacco treatment are needed, particularly scalable interventions. We tested a tobacco treatment engagement

intervention for low-income smokers. The intervention was implemented through Minnesota's National Breast and Cervical Cancer Early Detection Program (Sage), which provides cancer services to low-income individuals. Participants were smokers identified using Sage data from 2013 to 2016 with confirmed addresses (N=3,365). Using a factorial design, participants were randomized to six intervention groups consisting of different levels of financial incentives (\$0 vs \$10 vs \$20) and proactive calls (no call vs call). All individuals received direct mail and could opt for cessation support through QUITPLAN<sup>®</sup> Services, Minnesota's population-based cessation services. The primary outcome was treatment engagement, operationalized as confirmed connection to QUITPLAN Services through Sage's call center. Logistic regression was used to examine the effect of financial incentives, proactive calls, and interaction effects. Groups that received \$10 or \$20 incentives had higher odds of treatment engagement compared to groups that received no incentive [respectively, OR=1.97; 95% CI (1.21–3.23); OR=2.06; 95% CI (1.26–3.35)]; the difference between \$10 and \$20 was non-significant. Groups that received a proactive call had higher odds of treatment engagement compared to groups not called [OR=1.50; 95% CI (1.04–2.17)]. The interactions between incentives and a proactive call were not significant; however, the proactive call plus \$10 and \$20 incentive groups had the highest engagement rates. Cost-effectiveness analyses revealed that the \$10 incentive, no call group was most cost effective compared to the no incentive, no call group. Direct mail with small incentives or proactive calling can successfully encourage low-income smokers to engage in tobacco treatment through population-based cessation programs. The intervention could be disseminated across population-based programs that serve low-income populations (e.g., Medicaid).

FUNDING: State

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## POS5-21

### SELF-BLAMING THINKING ABOUT NICOTINE CRAVING AS A MEDIATOR BETWEEN DEPRESSIVE SYMPTOMS AND SMOKING OUTCOMES

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**SIGNIFICANCE:** Depression and nicotine craving are often proposed predictors of enduring nicotine dependence, but mechanisms underlying the relations are unclear. Further, depression and craving do not consistently predict use. The current study tested a novel mechanism, negative thinking styles about craving, as a mediator between depressive symptoms and several smoking outcomes. **METHODS:** People who smoke (N=162, 44.4% male, 65.4% white,  $M_{age}=35.1$ ) completed web measures of depressive symptoms, thinking styles about cravings, affect, confidence about not smoking, and readiness and plans to quit. Moderated mediation analyses tested 1) self-blaming about craving as a mediator between depressive symptoms and each outcome; and 2) whether the degree of mediation varied according to depressive symptoms. **RESULTS:** As expected, greater self-blaming about craving partly accounted for the relation between higher depressive symptoms and greater negative affect (indirect effect=.006, 95% CI [.0009, .02]), with the pattern increasing among individuals with more depressive symptoms (moderated mediation index=.004, 95% CI [.00002, .01]). There was no effect for positive affect. For confidence, moderated mediation (index=.02, 95% CI [.0001, .07]) occurred in an unexpected direction: greater self-blaming about craving accounted for greater confidence that one would not smoke tomorrow, with the pattern increasing among individuals with higher depressive symptoms. Similarly, greater self-blaming about craving accounted for greater readiness to quit, plans to quit in the next 30 days, and the next 6 months. Checks of alternative models indicated that neither craving itself nor two comparison thinking styles about craving revealed similar patterns. **CONCLUSION:** These results connect depressive symptoms to critical smoking and mood outcomes, and may inform previous inconsistencies. While depression usually hinders motivation, depression-related increases in self-blaming about craving may be accompanied by increased negative affect, but also greater readiness and confidence to quit. Future research can expand these results with longitudinal designs among clinical samples.

FUNDING: Federal

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## POS5-22

### AGE-VARYING ASSOCIATIONS BETWEEN NICOTINE DEPENDENCE AND SLEEP

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**SIGNIFICANCE:** Nicotine dependence (ND) is harmful to sleep continuity and duration. Recent work using time to first cigarette (TTFC) as a proxy for ND revealed a positive association between ND and daytime sleepiness, mediated via waking too early. In this model, the association between ND and sleep outcomes varied by age. Here, time-varying effect modeling (TVEM) is used to further unpack the age-varying relations between TTFC, daytime sleepiness, and waking too early. TVEM is an innovative approach that enables the investigation of ND and sleep outcomes as a continuous function of age using cross-sectional data. **METHODS:** Nationally representative data are from the 2005-06 and 2007-08 National Health and Nutrition Examination Study. The sample included smokers between the ages of 20-69 (N = 2,159; 41.96% female). Participants reported on TTFC, frequency of feeling overly sleepy during the day, and frequency of waking too early. To estimate the age-varying association between ND and sleep outcomes, TTFC was included as a predictor of waking too early and daytime sleepiness. In the final model, waking too early predicted daytime sleepiness by age. **RESULTS:** The relation between TTFC and daytime sleepiness was not significant at any age subgroup. However, there was a significant, positive association between TTFC and waking too early for ages 22-45. The association between waking too early and daytime sleepiness was significant for ages 20-64, strongest at age 20 and again at ages 50-54. **CONCLUSIONS:** Greater ND, as indicated by earlier TTFC, is associated with an increased frequency of waking too early for adults ages 22-45, showing that individuals with a higher ND are more likely to report waking too early for these ages only. Young- and middle-aged nicotine-dependent adults' sleep may be shortened by increased urge to smoke in the morning. Older adults' sleep may be impaired by other comorbidities (e.g. sleep disordered breathing). These findings highlight the importance of considering the impact of ND on sleep quality among younger adults, particularly during the time surrounding a quit attempt, as sleep has shown to be predictive of cessation success.

FUNDING: Unfunded

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## POS5-23

### CIGARETTE USE VS. DUAL ECIG/CIGARETTE USE AMONG PREGNANT WOMEN IN THEIR FIRST TRIMESTER: CIGARETTES PER DAY AND BIOMARKERS OF USE

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**SIGNIFICANCE:** The U.S. has the fastest growing market for electronic cigarettes (ECIGs), and usage among women of childbearing age, including pregnant women, is alarming. Little data is available on ECIG use among pregnant women and how ECIG use affects outcomes such as number of conventional cigarettes per day (CPD), and biomarkers of toxicant exposure (urine cotinine, expired air carbon monoxide [CO] and the carcinogen metabolite NNAL). The purpose of this study is to compare cigarette use rates and biomarkers among pregnant cigarette smokers, dual cigarette/ECIG users, and ECIG-only users in their first trimester. **METHODS:** Preliminary analysis of an ongoing, multi-site prospective study using quota sampling was conducted. Pregnant women in their first trimester, ages 18-44, who used ECIGs in the past 30 days, cigarettes, or both, were included. Data on the aforementioned outcomes were collected. **RESULTS:** To date, 177 pregnant women have been enrolled in this study (127 cigarette smokers, 43 dual ECIG/cigarette users, and 7 ECIG-only users). Due to few ECIG-only users, statistical comparisons were conducted for cigarette smokers and dual ECIG/cigarette users only. Cigarette smokers reported smoking an average of 12.9 CPD (SD=11.6), and dual users an average of 13.0 CPD (SD=9.7), and had used ECIGs on 17 out of the past 30 days. Cigarette smokers had an average CO level of 7.2 ppm (SD=4.8), and dual users 8.4 ppm (SD=7.0). No significant differences in the number of CPD, CO levels, cotinine, or NNAL were observed between the two groups. Of note, ECIG-only users had lower CO and NNAL levels than cigarette smokers and dual cigarette/ECIG users, but not cotinine (not included in statistical analysis). **CONCLUSIONS:** Findings indicate pregnant women engaged in dual ECIG/cigarette use may smoke no fewer CPD, and have no lower CO, cotinine, or NNAL levels

compared to pregnant women who use cigarettes only, suggesting similar fetal exposure. Notably, in this sample, few women reported using only ECIGs during their 1<sup>st</sup> trimester. Until more data about the effects of ECIGs on cigarette use, biomarkers, and other effects is available, ECIGs should not be used in pregnancy.

FUNDING: Federal

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## POS5-24

### ASSESSING THE IMPACT OF SUPPORTIVE HEALTH MESSAGES ON CIGARETTE PACKAGE INSERTS: A PILOT STUDY USING ECOLOGICAL MOMENTARY ASSESSMENT

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**SIGNIFICANCE:** Observational studies in Canada suggest that cigarette package inserts with supportive health messages (i.e. efficacy messages) can increase smokers' self-efficacy to quit and promote cessation. This study used ecological momentary assessment to assess smokers' real-time responses to inserts with efficacy messages. **METHODS:** A randomized case-crossover design was used, whereby 15 US smokers were provided with one week supply of their preferred brand of cigarettes with inserts and one week supply without inserts; participants were randomized to the insert condition on either the first or second week of the study. For 14 consecutive days, participants used a smartphone to answer a brief survey each time they opened a new pack and at approximately three additional, randomly selected smoking occasions each day. Surveys assessed attitude towards smoking, self-efficacy to quit smoking, and self-efficacy to reduce smoking. Random-effects linear regression models were used to analyze responses to variables in the surveys. **RESULTS:** Participants generally adhered to the protocol and reported no meaningful issues with completing it. Observations from the period with insert exposure were associated with more negative attitudes toward smoking (b= -0.22, SE=0.60, p<0.000). Other results did not reach statistical significance but exhibited the expected pattern associated with insert exposure versus not, such as higher self-efficacy to quit (b=0.06, SE=0.06, p=0.30) and greater self-efficacy to cut down on smoking (b=0.15, SE=0.08, p=0.07) when exposed to inserts. **CONCLUSIONS:** The EMA protocol we developed appears acceptable and feasible, with results indicating that studies with larger sample sizes may find meaningful effects of inserts on key variables that explain how efficacy messages can influence cessation.

FUNDING: Federal

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## POS5-25

### DIFFERENCES BETWEEN CURRENT, FORMER, AND NEVER SMOKERS IN PAIN INTENSITY AND USE OF ANALGESICS, AND MARIJUANA

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**SIGNIFICANCE:** Use of marijuana, tobacco, and oral opioid analgesics has been associated with psychological distress. Psychological distress and marijuana use are also co-morbid conditions among individuals with severe chronic pain. The aim of this study was to determine the effects of smoking status, psychological distress and alcohol/marijuana use on pain intensity and use of analgesics. **METHODS:** We used adult, cross-sectional data from Wave 1 of the nationally-representative United States Population Assessment of Tobacco and Health (PATH) Study, an ongoing, longitudinal cohort study of tobacco use and related health outcomes. Recruitment employed a stratified address-based, area-probability sampling design with oversampling of tobacco product users. We examined self-reported current cigarette, marijuana, alcohol, and painkiller use; perception of mental and physical health; pain intensity; and psychological distress. Bivariate analyses were used to examine the effects of smoking status on substance and analgesic use, pain ratings and psychological distress. A multivariate logistic regression model concurrently examined use of painkillers as a function of smoking status, pain in-

tensity, alcohol and marijuana use, psychological distress and select socio-demographic characteristics. RESULTS: Compared to former smokers (n=4,919) and never smokers (n=7,115), current cigarette smokers (n=11,402) were more likely to have severe pain, currently use marijuana, alcohol, and painkillers frequently, have used painkillers weekly or more often, and be psychologically distressed,  $p < 0.05$ . The risk of being a current (past 30 day) painkiller user was highest for current smokers, individuals with severe pain intensity, recreational marijuana users, and African Americans (all  $p$ 's  $< 0.05$ ). CONCLUSIONS: The results indicate that current cigarette smoking, marijuana use, and oral analgesic use are associated with high levels of pain intensity and use of painkillers. The relationship between smoking, marijuana use, and opioid use to manage pain is important to consider in the treatment and in efforts to help smokers who have pain to stop smoking.

FUNDING: Unfunded

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## POS5-26

### CHARACTERIZING ADULT HARDCORE SMOKERS IN NEW JERSEY: RESULTS FROM THE 2015 TOBACCO USE SUPPLEMENT TO THE CURRENT POPULATION SURVEY

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SIGNIFICANCE: For several decades, smoking prevalence has been on the decline in the United States. The rate of decline has been slower in recent years and prior research attributes this to "hardcore smokers". Past research primarily characterized hardcore smokers on the nation-level, and state assessments have been limited to California and Missouri. Characterizing hardcore smokers on a more local level may be crucial to promoting successful cessation and advancing smoking prevalence decline. The purpose of this study is to estimate and describe commonalities of adult hardcore smokers in New Jersey. METHODS: We analyzed data from the May 2015 Tobacco Use Supplement to the Current Population Survey, restricted to New Jersey adult smokers 26 years or older (N=460) and weighted to yield representative estimates. We defined hardcore smokers as current smokers who: are 26 years or older, smoke at least 15 cigarettes per day, have no quit attempt in the past year, and have no plan to quit smoking in the next 6 months. We estimated hardcore smoker prevalence and identified sociodemographic correlates. RESULTS: 3.9% of adult smokers 26 years or older in New Jersey were classified as hardcore smokers. Odds of hardcore smoking were significantly greater for: males compared to females (OR=2.07, 95% CI: 2.03-2.10), whites compared to non-whites (OR=2.84, 95% CI: 2.75-2.92), and those with income less than \$30,000 USD compared to those with a higher income (OR=1.29, 95% CI: 1.26-1.32). CONCLUSIONS: Compared to studies in other states which used the same definitions, New Jersey had the lowest prevalence of hardcore smoking. Our results are consistent with literature showing hardcore smokers are more likely to be low-income, white males. The low prevalence of hardcore smokers in New Jersey compared to California (5.2%) and Missouri (7.8%) may reflect differences in tobacco control policies or anti-smoking climate. Hardcore smokers may be resistant to certain tobacco control measures and need more targeted intervention. Further research is needed in other states to determine which components of a tobacco control program reduce the proportion of hardcore smokers in a population.

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## POS5-27

### ARE NICOTINIC ACETYLCHOLINE RECEPTORS POSSIBLE TARGETS FOR THE TREATMENT OF CHEMOTHERAPY-INDUCED PERIPHERAL NEUROPATHY?

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SIGNIFICANCE: Exposure to cancer chemotherapy drugs can often result in chemotherapy-induced peripheral neuropathy (CIPN), a consequence of peripheral nerve fiber dysfunction or degeneration, which is characterized by sensory symptoms such as numbness, burning, and allodynia. Paclitaxel, a microtubule poison

that is commonly used to treat breast, lung, and ovarian cancers, has been found to cause CIPN in 59-78% of cancer patients, and there is currently no effective treatment for this side effect. Our laboratories have previously shown that nicotine, a nicotinic acetylcholine receptor (nAChR) agonist, can prevent and reverse paclitaxel-induced peripheral neuropathy without increasing lung tumor growth in mice. Our current studies have demonstrated that the  $\alpha 7$  nAChR silent agonist R-47 may be a promising preventative and therapeutic treatment for CIPN as well. METHODS AND RESULTS: R-47 was administered orally to male C57BL/6J mice treated with paclitaxel (8 mg/kg, i.p.). Von Frey filament testing revealed that R-47 can both prevent and reverse paclitaxel-induced mechanical hypersensitivity; the latter effect can be inhibited by the  $\alpha 7$  nAChR antagonist methyllycaconitine. In support of these findings, R-47 also prevents the reduction of intra-epidermal nerve fibers in the hind paws of paclitaxel-treated mice. Similarly,  $\alpha 7$  nAChR knockout mice exhibit a greater and sustained increase in mechanical hypersensitivity after paclitaxel treatment when compared to wild-type mice. Due to its potential use as a CIPN therapy in cancer patients, we ensured that R-47 fails to increase A549 and H460 non-small cell lung cancer (NSCLC) colony formation and proliferation, and that it does not interfere with paclitaxel-induced growth arrest or apoptosis. In accordance with the *in vitro* findings, R-47 did not increase the growth of A549 NSCLC tumors or interfere with the antitumor activity of paclitaxel in NSG mice after systemic administration. CONCLUSION: These data suggest that nAChRs, specifically the  $\alpha 7$  subtype, do not play a significant role in the response to cancer chemotherapy and may be efficacious drug targets for the prevention and treatment of CIPN.

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## POS5-28

### FROM A TOBACCO MICROBIOTA STANDPOINT, ARE LITTLE CIGARS JUST CIGARETTES?

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SIGNIFICANCE: Bacterial constituents of combustible tobacco products (cigarettes and little cigars) have been thus far largely ignored, despite their critical importance in infectious and chronic diseases, and potential role in the production of tobacco-specific N-nitrosamines (TSNAs). Bacterial constituents in cigarette tobacco have been the recent focus of several studies, but there has been no comprehensive characterization to date on the bacterial species associated with little cigars. In this study, we performed comparative microbiota analyses of the bacterial constituents in little cigars compared to cigarettes. METHODS: Bacterial communities were characterized in time-series experiments in several tobacco products: Swisher Sweets Original, Swisher Sweets Sweet Cherry, Cheyenne Cigars Full Flavor 100's, Cheyenne Menthol Box, Camel Crush, Camel Kings and Newport Menthol Box. For each product, three different storage conditions of temperature and relative humidity were tested: room (20°C 50% RH), fridge (5°C 18% RH) and pocket (25°C 30% RH). On days 0, 5, 9 and 14, subsamples were collected and total DNA was extracted. For little cigars, wrapper and tobacco were separated and DNA-extracted separately. Microbiota profiling was then performed by sequencing of the V3/V4 region of the 16S rRNA gene, followed by analysis using QIIME and the Phyloseq R package. RESULTS: Cigarette tobacco and little cigar tobacco have significantly distinct bacterial microbiotas. Little cigars tobacco is dominated by bacteria from the genus *Staphylococcus*, while bacteria from the genus *Pseudomonas* and the family *Enterobacteriaceae* dominate in cigarette tobacco. In addition, the microbiota in little cigars wrapper is dominated by bacteria from the genera *Bacillus* and *Lactobacillus*. CONCLUSIONS: Microbiota analyses comparing the bacterial communities of little cigars and cigarette showed that these two products have very distinct bacterial constituents. Our study highlights different bacterial exposures to potential human pathogens tobacco users get exposed to, depending on the combustible tobacco product used.

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## POS5-29

### FACETS OF EMOTION DYSREGULATION AND E-CIGARETTE USE IN A COLLEGE SAMPLE

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**SIGNIFICANCE:** Maladaptive emotional states are associated with cigarette use, but little is known regarding e-cigarette use. Although e-cigarette use may be an effective harm reduction strategy for smokers, their health impact among non-smokers is controversial. The current study investigates whether deficits in emotion regulation strategies are associated with e-cigarette susceptibility and use. **METHODS:** Survey data were collected from a local community college and a historically African-American University in the Southeast (N = 1547, M age = 20.2, 68.3% African-American). Respondents answered questions related to emotion dysregulation (Difficulties in Regulating Emotion Scale; DERS), e-cigarette susceptibility (modified version of Susceptibility to Smoke Index), and use. The DERS contains six subscales (Awareness, Clarity, Impulse, Nonacceptance, Strategies, and Goals). **RESULTS:** ANCOVAs were conducted to examine differences in emotion regulation between susceptible and non-susceptible non-users (n=641). After controlling for school of origin, school type, and student status, susceptible non-users reported worse scores on Goals (F = 5.70, p = .017, partial η<sup>2</sup> = .009) and Clarity (F = 5.74, p = .017, partial η<sup>2</sup> = .009) subscales. No significant differences were detected for overall emotion dysregulation and the Strategies, Impulse, Awareness, and Nonacceptance subscales. Further, one-way ANCOVAs revealed that e-cigarette ever-users reported worse overall emotion regulation (F = 4.60, p = .03, partial η<sup>2</sup> = .004), as well as poorer scores on Strategies (F = 4.87, p = .03, partial η<sup>2</sup> = .004), Goals (F = 7.68, p = .006, partial η<sup>2</sup> = .007), and Impulse (F = 7.93, p = .005, partial η<sup>2</sup> = .007) subscales. No significant differences were detected for the Awareness, Clarity, and Nonacceptance subscales. **CONCLUSIONS:** Emotion regulation difficulties correlate with e-cigarette susceptibility and initiation. Deficits in planning (Goals) appear to be particularly important. Further research should investigate emotion regulation training, particularly related to goal setting, as a potential tool for reducing tobacco product usage.

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## POS5-30

### THE JUUL OF E-CIGARETTES: PREVALENCE AND TERMINOLOGY ASSOCIATED WITH JUUL E-CIGARETTE USE

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**SIGNIFICANCE:** The tobacco product landscape has evolved rapidly in recent years, with an increasing number of electronic nicotine delivery systems (ENDS) available on the market. In June 2015, PAX Labs released Juul, an ENDS product that uses nicotine salts and comes in a variety of flavors. Recent media reports suggest this product is rapidly becoming popular among young people, and Nielsen sales data indicate Juul sales account for 40% of ENDS sales. The objective of the current study was to assess the prevalence of Juul use among youth and young adults and investigate the terminology used by these populations to describe the product and the use of the product. **METHODS:** The study sample included 1,018 15-24 year olds who are members of the Qualtrics online panel. **RESULTS:** The sample included 50% males and 50% females; 50% ages 15-17 and 50% ages 18-24; 56% white, 15% African American, 18% Hispanic, and 11% other race; and 40% resided in the South, 22% in the Midwest, 22% in the West, and 16% in the Northeast U.S. More than one third of the sample (36%) reported they lived comfortably when asked about their perceived financial situation. Among all participants, 25% reported recognizing Juul, and 10% reported ever using the product. Among those who reported ever using the product, 80% had used it in the past 30 days. Males and those who reported they lived financially comfortably were more likely to report ever or past 30-day use of Juul compared with females and those who reported their income just meets their needs or doesn't meet their needs. One third of the sample (33%) referred to the product correctly as a "Juul", and 23% referred to the use of the product as "Juuling". Among those who recognized Juul, only 21% were aware that the product always contains nicotine. Ever users of Juul are significantly more likely to be aware that the product always contains nicotine compared with those

who had never used it. **CONCLUSIONS:** We will discuss implications for youth awareness and access to nicotine products and countermarketing messaging for emerging ENDS products.

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## POS5-31

### TOBACCO SMOKING AND ALL-CAUSE MORTALITY AMONG 1,464 INDIGENOUS ADULTS IN AN AUSTRALIAN COHORT STUDY

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**SIGNIFICANCE:** Tobacco smoking is the leading contributor to the burden of disease among Indigenous Australians. Despite recent substantial reductions, daily smoking prevalence remains high, at 41.4% of adults. Smoking's harms are strong and well-established, but the magnitude of the association between smoking and mortality varies between population groups and over time. Our objective was to quantify directly – for the first time – the association between smoking and mortality among Indigenous Australian adults. **METHODS:** Prospective study of 1,464 CVD- and cancer-free Indigenous adults aged ≥45 years, part of 267,153 participants who joined the 45 and Up Study between 2006 and 2009, randomly sampled from the general population of NSW, Australia. Questionnaire data were linked (through CheReL) to data on fact of death (NSW Registry of Births, Deaths and Marriages) to mid-2014. We estimated hazard ratios (HRs) for all-cause mortality among current and ex-, versus never, smokers adjusted for age, sex, education, and remoteness. **RESULTS:** Over 9,025 person-years of follow-up, 77 deaths accrued. 22.0% of participants were current and 36.3% ex-smokers. Compared to never-smokers, HRs (95%CI) for all-cause mortality were 3.87 (2.05,7.29) for current and 1.77 (1.00,3.16) for ex-smokers, and HRs for mortality were 4.09 (1.47,11.36) and 5.78 (2.64,12.69) for those smoking 1-14 and ≥15 cigarettes/day, respectively. Earlier smoking cessation was associated with decreasing mortality risk (p-trend<0.01), with HRs for mortality of 0.72 (0.26,1.98) and 1.93 (1.02,3.64) for those ceasing smoking at age <45 and ≥45 years, compared to never-smokers. **CONCLUSIONS:** Mortality risk was >3-fold for current smokers versus those who had never smoked, in this cohort of Indigenous adults. Smoking cessation – particularly at younger ages – reduces mortality compared to smoking continuation. Previous estimates may have underestimated the impacts of smoking on mortality for Indigenous Australians, and also the benefits of smoking cessation. Given the high prevalence of smoking and the magnitude of associated harm, promoting non-smoking among Indigenous Australians is a public health priority.

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## POS5-32

### EXPLORING BLACK AMERICANS' AWARENESS AND TRUST IN THE US FOOD AND DRUG ADMINISTRATION'S ROLE AS A TOBACCO REGULATOR: A QUALITATIVE STUDY WITH BLACK AMERICAN STAKEHOLDERS IN LOS ANGELES, CALIFORNIA

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**SIGNIFICANCE:** The 2009 Family Smoking Prevention and Tobacco Control Act gave the U.S. Food and Drug Administration (FDA) the authority to regulate tobacco products. Notably, Black Americans have a historical legacy of targeted marketing by the tobacco industry and experiences of exclusion and neglect at the hands of the U.S. government, which may influence their perceptions of the trustworthiness of a government agency regulating tobacco products. The objective of this study was to explore Black Americans' awareness and trust in FDA's role as a tobacco regulator. **METHODS:** Thematic analysis methodology was adopted. Data were from two focus group discussions conducted with a purposive sample of 23 Black stakeholders in Los Angeles. An open-ended discussion guide was used,

and discussions were audio-recorded and transcribed verbatim for analysis. NVivo 10.0 was used to manage the data, and initial open coding captured the concepts of awareness, trust, and determinants of trust from the data, followed by selective coding to saturate the core category. RESULTS: Although most participants were aware of FDA's role as a tobacco regulator, they noted that the Black community overall is not aware. Recurrent across the focus groups were discussions about distrust in FDA and contributing factors include perceptions that FDA is: (1) a bureaucracy exercising monopoly power; (2) influenced by the tobacco, agricultural, and pharmaceutical industries; (3) influenced by money and politics; and (4) lacks technical capacity and competence. Participants' descriptions of how FDA can improve trust ranged from the need for greater product ingredient transparency, a stronger presence in the Black community, and greater representation of people of color at the decision-making level. CONCLUSION: Distrust in FDA's role as a tobacco regulator may have implications for the smoking and relatively poor cessation outcomes of Black Americans. To fulfill its mission in protecting the public health, study findings highlight opportunities for FDA to increase awareness and trust in their role through communication campaigns and community engagement with Black Americans.

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## POS5-33

### DIFFERENCES IN CIGARETTE CRAVING REDUCTIONS BETWEEN AFRICAN AMERICAN AND WHITE SMOKERS UNDERGOING SMOKING CESSATION TREATMENT

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Despite smoking fewer cigarettes per day (CPD) and reporting high levels of motivation to quit smoking, African American (AA) smokers are less likely to achieve abstinence relative to White smokers. Emerging research suggests that AAs experience higher levels of cigarette craving compared to Whites, which may contribute to differences in cessation rates. This study examined racial differences in craving during the course of a cessation program to elucidate contributors to this tobacco-related disparity. Data used in the current analysis were collected as part of a larger investigation. The present study randomized 52 AA and 60 White smokers to 8 sessions of cognitive-behavioral therapy (CBT) or general health education (GHE; control condition) smoking cessation group therapy. We hypothesized that: 1) AAs would report higher initial craving to smoke, and 2) AAs and Whites would both show significant craving reduction during treatment. We also explored whether smokers in the CBT and GHE conditions would differ in craving reduction during treatment. At baseline, AAs reported smoking fewer CPD ( $p < .001$ ), and there were differences in household income, marital status, and education. Contrary to previous literature and our hypothesis, AAs reported lower craving at treatment onset ( $p = .039$ ), compared to Whites. However, this difference was not significant when controlling for baseline CPD. Results of 2 (Race) X 2 (Condition) ANOVA revealed a significant main effect of race on craving reduction from the first to last treatment session ( $p = .048$ ), such that Whites reported a greater reduction in craving compared to AAs across both treatment conditions when controlling for CPD, income, marital status, and education. However, race differences in craving reduction disappeared when craving at treatment onset was added as an additional covariate, indicating that the initial difference in craving was a driver of the differential reduction during treatment. These findings highlight the complexity of craving and craving-reduction as a potential mechanism contributing to tobacco-related health disparities.

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## POS5-34

### ASSOCIATION BETWEEN ELECTRONIC CIGARETTE USE AND MYOCARDIAL INFARCTION: RESULTS FROM THE 2014 AND 2016 NATIONAL HEALTH INTERVIEW SURVEYS

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SIGNIFICANCE: Electronic cigarettes (e-cigarettes) are promoted as a less risky alternative to conventional cigarettes and have grown in popularity. Experimental and clinical evidence suggests that they could be increasing risk of myocardial infarction. METHODS: The National Health Interview Surveys of 2014 ( $n = 36,697$ ) and 2016 ( $n = 33,028$ ) were used to examine the cross-sectional association between e-cigarette use and myocardial infarction controlling for conventional cigarette use and demographic (age, gender, body mass index) and health characteristics (hypertension, diabetes, and hypercholesterolemia) using logistic regression. Data were collected in 2014 and 2016 and analyzed in 2017. RESULTS: Daily e-cigarette use was associated with increased odds of having had a myocardial infarction (OR 1.79, 95% CI 1.20-2.66;  $P = 0.004$ ) as was daily conventional cigarette smoking (OR 2.72, 95% CI 2.29-3.24;  $P < 0.001$ ). Former and some day e-cigarette use were not associated with significant changes in the odds of having had a myocardial infarction ( $P = 0.608$  and  $P = 0.392$ ) while former and some day cigarette smoking were (OR 1.70;  $p < 0.001$ ) and (OR 2.36;  $p < 0.001$ ). Odds of a myocardial infarction were also increased with history of hypertension (OR, 2.32;  $p < 0.001$ ), high cholesterol (OR, 2.36;  $p < 0.001$ ), and diabetes (OR, 1.77;  $p < 0.001$ ) and age (OR 1.65 per 10 years;  $p < 0.001$ ). Women (OR, 0.47;  $p < 0.001$ ) had lower odds of myocardial infarction. CONCLUSIONS: Daily electronic cigarette use, adjusted for other risk factors including smoking conventional cigarettes, is associated with increased risk of myocardial infarction.

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## POS5-35

### EQUITY IN TREATMENT: PRIORITIZING NICOTINE DEPENDENCE FOR BEHAVIORAL HEALTH TREATMENT PROVIDERS IN OKLAHOMA

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SIGNIFICANCE: Individuals with behavioral health disorders use tobacco at rates 2 to 3 times higher than the general population. In Oklahoma, the impact of tobacco use coupled with other co-existing chronic conditions within the behavioral health population results in an average life expectancy that is 26 years shorter than the state's general population. Oklahoma offers robust nicotine cessation programming to all Oklahoman's through the Oklahoma Tobacco Helpline (OTH). Services include free quit coaching and nicotine replacement therapy METHODS: The Oklahoma Department of Mental Health and Substance Abuse Services (ODMHSAS) is charged to provide administrative oversight to behavioral health treatment facilities. The ODMHSAS prioritized the treatment of consumers' nicotine dependence using the following policy changes

- Education and training regarding the scope of the problem, the need to address tobacco use as an addiction, and best practices for tobacco cessation
- Technical support to assist facilities to incorporate 5A's intervention and OTH referrals into existing workflows
- Require a Tobacco Free Workplace Policy for all treatment facilities, promoting the OTH
- Include a minimum referral (5%) expectation of those reporting tobacco use to the OTH

RESULTS: Information examined from the OTH registration and acceptance data revealed a significant increase in the number of referrals to the OTH. Specifically, the number of referring behavioral health treatment facilities increased to 138 and referrals increased to 9,450 in FY17. The service acceptance rate also increased by 2% CONCLUSION: Other states contemplating a public policy change for behavioral health treatment facilities should consider the following:



- Offering broadly targeted educational opportunities alongside direct technical assistance was critical to maintaining engagement and momentum
- Identify a champion within each facility to serve as an internal advocate for change. The combination of internal advocacy with external pressure through public policy change from ODMHSAS proved effective
- Embed the referral process into each facility's existing workflow to promote uniform adoption and sustainability of the practice

FUNDING: State

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### POS5-36 IMPLEMENTATION AND EVALUATION OF A ROLLING GROUP COURAGE TO QUIT® SMOKING INTERVENTION

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Group-based smoking cessation interventions often are conducted in a closed format with manualized materials to prepare for a quit date and undergo relapse prevention. However, closed groups require weekly attendance, cannot enroll new patients mid-treatment, and have high attrition. This format may be notably challenging for low-income, medically compromised patients who need immediate intervention and for underserved minorities who may incur barriers to weekly attendance. In this pilot study, we developed a cutting-edge, rolling-admission Courage to Quit (CTQ) tobacco cessation program and tested its effects in its first year of adoption. CTQ content was modified to provide four topic-based groups and psychoeducation on a revolving schedule that facilitated ongoing enrollment. Items assessing knowledge on common misconceptions or confidence in quitting smoking were given before and after each group. Participants included N=157 current smokers at a large urban medical center referred by their medical provider during the first 12 months of the program. The average age was 57.2 (±11.6 standard deviation), 83% were African American, 67% identified as female, and 72% were not working (i.e., unemployed, retired, or disabled). For smoking, 85% smoked daily and 43% smoked more than ½ pack per day. Most participants had a major medical diagnosis (cancer, pulmonary disease, etc.). Participant retention was good, as approximately 50% of participants attended more than one session and 23% attended 3 or more sessions. Of the 12 knowledge-based items, improvement was noted in 11 items, including learning that nicotine does not cause cancer and confidence in using coping techniques for smoking urges (all  $p < .05$ ). Assessment of smoking behavior showed that mean cigarettes smoked per day decreased over 30% ( $9.1 \pm 7.3$  vs.  $6.1 \pm 4.5$ ,  $p = .05$ ) from the first to last attended group. This study showed that adoption of a rolling-admission tobacco cessation program is feasible, and can improve smoking-cessation related knowledge and reduce cigarette-smoking behavior. Future studies will need to further investigate rolling-group tobacco cessation groups as a means to treat underserved patients.

FUNDING: Academic Institution

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### POS5-37 FACILITATORS AND BARRIERS FOR PROVIDING SMOKING PREVENTION TO VULNERABLE MOTHERS

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SIGNIFICANCE: Over 25% of vulnerable, European women smoke during their pregnancy causing adverse health effects for both mother and child. Healthcare professionals play a key role in providing smoking prevention and cessation support (SPCS). This research aims to identify facilitators and barriers of specialised nurses providing SPCS to vulnerable (expectant) mothers as part of a nurse-family partnership program in the Netherlands. METHODS: Semi-structured, qualitative interviews were conducted with 16 nurses. Main themes were experiences with the current practice and perceived facilitators and barriers. Interviews were

recorded and transcribed, data were analysed using a predefined yet adaptable code tree. RESULTS: Nurses reported having sufficient time and having a trusting relationship with clients as facilitators of providing SPCS. Furthermore, nurses considered it as their responsibility to provide SPCS. Although nurses regularly provided SPCS during their home visits, they experienced it as unsustainable and ineffective. Nurses used their own expertise rather than (strictly) using prescribed materials, as those did not fit with clients' motivational stage to quit smoking. Other reported barriers were having other priorities during a home visit and the negative influence of the social environment of clients. CONCLUSION: Despite the promising context of nurse-family partnerships, nurses' provision of SPCS is complicated. Nurses need tools to prioritise provision of SPCS, that fit the clients' needs and context, and that are effective in sustainable SPCS.

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### POS5-38 A SECONDARY AUDIENCE'S REACTIONS TO THE REAL COST CAMPAIGN: RESULTS FROM A STUDY OF US YOUNG ADULTS

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SIGNIFICANCE: Exposure to *The Real Cost* campaign has prevented smoking initiation among its target audience (US youth ages 12-17). This study examines reactions to the campaign among a potential secondary audience: US young adults. METHODS: In 2017, we recruited an online convenience sample of young adult (ages 18-29) smokers ( $n=225$ ) and susceptible non-smokers ( $n=339$ ). In a within-subjects experiment, participants viewed three television ads from *The Real Cost* campaign and reported their past exposure to, conversations about, and reactions to the ads. We examined message-level and person-level predictors of perceived message effectiveness (PME) using multilevel modeling. RESULTS: About half of smokers (47%) and susceptible non-smokers (51%) had seen at least one of the three ads in the past 3 months. About 1 in 4 smokers (23%) and susceptible non-smokers (24%) had at least one conversation about the ads in the past 3 months. Susceptible non-smokers rated the ads *higher* on PME than smokers ( $p < .01$ ), but *lower* on message relevance and negative affective reactions to the ads (both  $p < .05$ ). In both samples, ads that elicited *higher* negative affective reactions and message relevance and *lower* message reactance (i.e., resistance) received higher PME ratings (all  $p < .05$ ). CONCLUSIONS: *The Real Cost* campaign has reached, generated conversations among, and elicited largely favorable reactions from young adult smokers and susceptible non-smokers. This indicates that the campaign may have beneficial spillover effects on non-targeted audiences.

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### POS5-39 AVOIDANCE OF CIGARETTE PACK RISK MESSAGES: RESULTS FROM TWO RANDOMIZED CLINICAL TRIALS WITH SMOKERS

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SIGNIFICANCE: Previous studies have found that cigarette pack warnings increase avoidance. Fear appeal theory posits that message avoidance is maladaptive (a sign that a message is being rejected). In contrast, some empirical studies have shown that avoidance is associated with more cigarette quit attempts, suggesting that message avoidance may instead be adaptive (a sign that a message is having a beneficial impact). We investigated these competing hypotheses in two randomized trials, examining whether message avoidance was due to fear (an adaptive response) or reactance (a maladaptive response). METHODS: Trial 1 randomly assigned 2,149 adult US smokers to receive either pictorial warnings (intervention) or text-only warnings (control) on their cigarette packs for four weeks in 2014 and 2015. Trial 2 randomly assigned 719 adult US smokers to receive either messages about toxic chemicals in cigarette smoke and their health harms (intervention) or messages about not littering cigarette butts (control) for three weeks in 2016 and 2017. Multiple mediation analyses used structural equation



modeling with standardized path coefficients. RESULTS: Intervention messages led to greater message avoidance in both trials (both  $p < .001$ ). Negative affect, including fear, explained most of the greater message avoidance in Trial 1 (mediated effect = .20,  $p < .001$ ). In contrast, reactance explained only a small part of the effect in Trial 1 (mediated effect = .03,  $p < .001$ ). Similarly, in Trial 2, negative affect explained the effect of intervention messages on message avoidance (mediated effect = .12,  $p < .001$ ). Reactance explained none of the effect. CONCLUSIONS: In two large trials, smokers avoided messages due to negative affect (an adaptive response), but reactance (a maladaptive response) had little impact. This may explain why message avoidance is positively associated with smoking quit attempts in prior research about cigarette pack warnings.

FUNDING: Federal

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## POS5-40

### WATERPIPE TOBACCO SMOKE: CHARACTERIZATION OF TOXICANTS AND BIOMARKERS IN A CROSS-SECTIONAL STUDY IN RUSSIA AND TURKEY

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BACKGROUND: The popularity of waterpipe (WP) smoking has surged dramatically in recent years particularly among youth. The aim of this study was to investigate metals, volatile organic compounds (VOC), polycyclic aromatic hydrocarbons (PAH), and heterocyclic aromatic amines (HCAA) concentrations in urine samples of WP venue employees and compare the concentrations of those chemicals by active and secondhand WP use. METHODS: In this cross-sectional study, we collected urine specimens from workers in WP venues from Turkey and Russia. A total of 51 chemicals were measured in the urine samples, including 13 metals, 25 VOCs, 7 PAHs and 6 HCAA. The biospecimens were analyzed by the U.S. Centers for Disease Control and Prevention Tobacco Product Laboratory. RESULTS: The final sample included 110 employees, with 61 in Istanbul and 49 in Moscow. Employees who reported only using WP had higher urinary manganese (geometric mean ratio (GMR): 2.42, 95% CI: 1.16, 5.07) than never/former smoker after adjustment for age, sex, work hours per week and country. GMRs of PAHs were generally higher among dual cigarette and WP users than cigarette only users. Employees who reported SHS from WP over 21 hour per week had higher urine cobalt (GMR: 1.38, 95% CI: 1.10, 1.73) and urine cesium 1.14 (GMR: 1.14, 95% CI: 1.00, 1.35) than employees who reported SHS from WP below 21 hours per week. Employees involved in lighting WPs had higher urine cobalt (GMR: 1.42, 95% CI: 1.10, 1.83), urine molybdenum (GMR: 1.43, 95% CI: 1.08, 1.90), urine 1-Hydroxypyrene (PAH) (GMR: 1.36, 95% CI: 1.01, 1.83), and urine 1-3-Butadiene (VOC) (GMR: 1.42, 95% CI: 1.06, 1.88) compared to those not involved in lighting WP. CONCLUSIONS: This is the first study of metals, VOCs, PAHs and HCAA, many of which are toxic and carcinogenic, in WP secondhand smoke exposure and WP active smoking. Waterpipe use and exposure were associated with higher levels of certain metals (Mn, Co and Cs). Occupational involvement in lighting WP was also related to excess exposure of Mn as well as some PAHs and VOCs. These findings should be considered when regulating WP smoking products and use in the US and other countries.

FUNDING: Non-profit; Federal

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## POS5-41

### SEQUENCE OF SUBSTANCE INITIATION IN YOUTH: A LONGITUDINAL EXAMINATION OF ELECTRONIC NICOTINE DELIVERY SYSTEMS, CIGARETTES, AND CANNABIS

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SIGNIFICANCE: There is emerging evidence linking youth use of Electronic Nicotine Delivery Systems (ENDS; e-cigarettes) to subsequent cannabis use and to

subsequent cigarette use. The growing popularity of ENDS in the context of increased normalization of cannabis use raises new health concerns and presents new challenges to tobacco control. METHODS: A longitudinal adolescent sample from seven Oregon school districts (n = 1165; 52% female; 37% Hispanic) was followed from 8<sup>th</sup> to 11<sup>th</sup> grade (eight total surveys). Data collection was completed in November of 2017. Students reported lifetime (ever use) and current (last 30 days) use of ENDS, cigarettes, and cannabis, and, if applicable, the delivery method of their current cannabis use. The order in which initiation of each substance occurred is examined. RESULTS: Lifetime substance prevalence rates by the fall of 11<sup>th</sup> grade were high: 48% for ENDS, 46% for cannabis, and 40% for cigarettes. Of those reporting ENDS use onset, 26% began by the spring of 8<sup>th</sup> grade and 8% initiated use between the spring of 8<sup>th</sup> grade and the fall of 9<sup>th</sup> grade. Over 30% of ENDS users initiated ENDS prior to onset of cigarettes or cannabis, 5% initiated cannabis use prior to ENDS onset, and 5% initiated cigarette use prior to ENDS onset. Of adolescents who initiated ENDS first, 34% had not initiated the other substances, 29% subsequently initiated use of both cannabis and cigarettes, 28% subsequently initiated use of cannabis only, and 9% subsequently initiated use of cigarettes only by the fall of 11<sup>th</sup> grade. Of the 18% of participants who reported current cannabis use in 11<sup>th</sup> grade, the 8% who were also current users of ENDS had an increased likelihood of vaping cannabis (20% vs. 50%,  $p < .001$ ). CONCLUSIONS: ENDS was the first substance used for about one-third of youth in this sample, and more of these youth subsequently initiated cannabis compared to cigarettes. Over half of adolescents who had initiated ENDS later initiated cannabis use. The use of vaporizers for cannabis delivery may be contributing to this progression of substances for youth.

FUNDING: Federal

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## POS5-42

### CANNABIDIOL PREVENTS COGNITIVE DEFICITS OF NICOTINE ABSTINENCE THROUGH MODULATION OF INFLAMMATION AND NEUROGENESIS

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Cognitive deficits observed during initial tobacco abstinence can represent a target for smoking cessation. Many studies associate cognitive impairment with inflammatory processes and smoking with inflammation. However, the use of anti-inflammatory agents as a smoking cessation aid has not been explored. We evaluate the role of Cannabidiol (CBD), a non-psychoactive cannabinoid with anti-inflammatory properties, in the nicotine withdrawal-cognitive deficit. To induce nicotine dependence, we used Alzet osmotic pumps (25 mg/kg/day/14 days) and withdrawal was induced by the nicotinic receptor antagonist, mecamylamine (2 mg/kg). Using the object recognition task, we observed a deficit in memory consolidation that was still present 4 days after precipitation of withdrawal. Immunofluorescence (IF) studies revealed a significant increase of microglial reactivity in the hippocampus and prefrontal cortex of nicotine abstinent mice at the 4<sup>th</sup> day of withdrawal. Moreover, qPCR analysis showed an increase of the proinflammatory markers IL1B and TNF $\alpha$ , associated with microglial reactivity, in the hippocampus of nicotine withdrawn mice. Proinflammatory cytokines were also altered in the periphery. Flow cytometric analysis revealed a significant increase of plasmatic levels of TNF $\alpha$  and IFN $\gamma$  during nicotine abstinence. We next studied hippocampal neurogenesis by using Ki67, a cell proliferation marker, and doublecortin (DCX), a neuronal maturation marker since neurogenesis can be affected by neuroinflammation. Interestingly, IF revealed a significant reduction of DCX and Ki67 in nicotine abstinent mice. Subchronic treatment with CBD (10 mg/kg/day during 4 days) was able to block the memory deficits and the increase of microglial reactivity observed 4 days after the precipitation of withdrawal. In addition, the same CBD treatment normalized the increased levels of IL1B and TNF $\alpha$  observed in hippocampus of nicotine abstinent mice. Interestingly, subchronic CBD treatment also prevented the reduction of the cell proliferation marker Ki67 revealed during nicotine abstinence. Our data indicate that CBD could be useful to improve cognitive performance during early nicotine withdrawal.

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**POS5-43**  
**COMPARING SEXUAL MINORITY WOMEN'S AND HETEROSEXUAL WOMEN'S PERCEPTIONS OF LGBT-TARGETED ADVERTISING IMAGES**

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**SIGNIFICANCE:** Sexual minority women (SMW) use tobacco at higher rates than heterosexual women. Efforts are needed to increase the effectiveness of anti-tobacco messages among SMW. However, the effect of utilizing LGBT identity cues (e.g., same-sex couples as models, rainbow flag, and terms including "Pride" and "Out") to target SMW is not well understood. This analysis aimed to compare how SMW respond to LGBT-targeted images versus heterosexual women. **METHODS:** Young adult SMW and heterosexual women smokers and non-smokers (ages 18-30; N=623) were invited to participate in a web-based survey from an online panel (Survey Sampling International). Participants were first shown four out of 15 images not targeted for LGBT populations followed by eight out of 35 LGBT-targeted images at random. All images were edited from a variety of advertising and health campaign messages to remove product branding. After viewing each image, participants were asked questions on group identity activation, attitudes, felt targetness, positive emotions (happy, hopeful, inspired) and negative emotions (annoyed, angry, embarrassed) toward the image. We conducted multilevel mixed regression analyses to compare outcomes towards LGBT-targeted images between SMW and heterosexual women, controlling for demographics and smoking status (Outcomes related to non-targeted images were analyzed in a separate analysis). **RESULTS:** Compared with heterosexual women, SMW identified more LGBT groups; had more favorable attitudes; felt they were targeted to a greater extent; reported more positive emotions (happy, hopeful, inspired); and reported less negative emotions (annoyed) in response to LGBT-targeted images (all  $P$ s<0.05). In addition, daily smokers had more favorable attitudes; felt they were targeted to a greater extent; and felt more positive emotions (happy, hopeful, inspired), and less negative emotions (annoyed) in response to LGBT-targeted images than non-smokers. **CONCLUSION:** The study findings suggest that SMW have more favorable responses toward LGBT-targeted images compared with heterosexual women. We discuss implications for designing anti-tobacco messages for targeting SMW audiences.

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**POS5-44**  
**MATERNAL SMOKING DURING PREGNANCY, OFFSPRING SMOKING, AND DEVELOPMENT OF MAJOR DEPRESSION: A FAMILY DESIGN STUDY**

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**SIGNIFICANCE:** Prior studies investigating the association between maternal smoking during pregnancy (MSP) and risk of major depressive disorders (MDD) among adult offspring have produced conflicting results. These studies have differed in their control for potential familial confounding factors and have not accounted for the possibility of confounding by offspring's history of regular smoking. We report findings from a longitudinal study of MSP, MDD, and regular smoking utilizing a family design. **METHODS:** Study participants were adult offspring of members of the Providence and Boston cohorts of the Collaborative Perinatal Project (1959-1966). Approximately 10% of these adult offspring were enrolled in the New England Family Study ( $n = 1,783$ ), a follow-up study that oversampled families with multiple siblings. Logistic regression models were fit using models that allowed between-mother effects ( $OR_b$ ) of MSP to differ from within-mother effects ( $OR_w$ ). **RESULTS:** In models including gender and gravida MSP predicted risk of MDD among the offspring ( $OR_w=2.35$ ,  $CI=1.05, 5.26$  and  $OR_b=1.15$ ,  $CI=0.96, 1.37$ ). Inclusion of smoking history yielded a slightly larger within-mother effect ( $OR_w=2.48$ ,  $CI=1.11, 5.52$ ) and had no practical effect on between-mother effect ( $OR_b=1.13$ ,  $CI=0.95, 1.35$ ). Current regular smoking was an independent risk factor for lifetime MDD ( $OR=1.80$ ,  $CI=1.37, 2.35$ ). **CONCLUSIONS:** Findings from our study, which was designed to discount the role of familial genetic and social vulnerabilities

to MDD, support existence of an independent link between MSP and MDD among adult offspring. The observed MSP-MDD link is unlikely to be explained by offspring's smoking history.

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**POS5-45**  
**GLOBAL APPROACHES TO REGULATING NICOTINE CONTENT IN E-CIGARETTES**

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**SIGNIFICANCE:** E-liquid commonly contains nicotine, an addictive agent delivered to the user via the inhaled aerosol. The concentration of nicotine in e-cigarette cartridges typically ranges from 6-24mg/mL, however it can be much higher. Moreover, e-cigarette packaging have been shown to misrepresent nicotine content. The current study sought to assess strategies that countries across the globe are taking to regulate nicotine in e-cigarettes and e-liquids. **METHODS:** National policies regulating e-cigarettes were identified primarily through direct contact with representatives of Ministries of Health or tobacco control experts in approximately 130 countries. Media monitoring was also used to identify emerging or new e-cigarette product regulation or legislation. Copies of written policies were reviewed and policies related to nicotine concentration were summarized. Finally, data were verified by in-country experts. **RESULTS:** The policy search identified 82 countries that had a policy that is being applied to regulate e-cigarettes. Twenty-seven countries, as well as Northern Ireland, regulate the amount of nicotine in e-liquids and single use e-cigarettes including the concentration and volume of nicotine. All of these countries were in the European Union (EU), applying the European Tobacco Products Directive. For each country, the limit set for nicotine concentration is 20 mg/mL, while the maximum volume of single use e-cigarettes is 2mL. Refill bottles of e-liquid are capped at a maximum volume of 10mL. **CONCLUSIONS:** There are currently no countries outside of the EU regulating e-cigarette nicotine concentration at the national level. Understanding approaches to product regulation including limiting nicotine is a necessary first step to assessing the impact of policies on public health.

FUNDING: Non-profit

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**POS5-46**  
**RECENT FINDINGS ON CIGARETTE USE AND CESSATION BEHAVIORS AMONG ASIAN RESIDENTS OF NEW YORK CITY**

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**BACKGROUND:** Cigarette smoking has declined among New York City (NYC) adults since 2002 but is stagnant among NYC Asian adults. This is due to very high smoking rates among Chinese, the largest Asian subgroup in NYC. In order to understand how to best target this subgroup, we explored predictors of smoking and cessation among Chinese-speaking Asian smokers compared with English-speaking Asian smokers and all other smokers. **METHODS:** We used combined 2015-16 and 2016 data from the NYC Community Health Survey (CHS), an annual dual landline/cellphone survey of about 10,000 adults to analyze demographics, and quit attempts, advice, and aids used among Asian smokers who took the survey in Chinese, Asian smokers who took the survey in English and all other smokers. Prevalence among smokers was compared by race/language using t-tests. We used multivariate logistic regression for odds of current smoking, receiving past year quit advice from a medical provider, and using nicotine replacement therapy (NRT) by race/language, adjusting for demographics. **RESULTS:** In 2015-16, English-speaking Asians (11.2%,  $p=.004$ ) and all other adults (13.6%,  $p=.029$ ) were less likely to be current smokers compared with Chinese-speaking Asians (16.9%). Chinese-speaking Asian smokers were nearly twice as likely to be male (32.6%) compared with English-speaking Asian smokers (17.1%,  $p<.001$ ) and all other smokers (16.3%,  $p<.001$ ). In 2016, Chinese-speaking Asian smokers were two times less likely to use NRT (10.6%) compared with all other adults (21.0%,  $p=.049$ ). Odds of smoking among English-speaking Asians and all other

respondents were 51% and 42% lower, respectively, than among Chinese-speaking Asians. Odds of using NRT among all other smokers were 2.63 times higher than those of Chinese-speaking Asian smokers. Odds of receiving quit advice from a medical provider in the past year between race/language categories did not differ. **CONCLUSIONS:** Results indicate the need for tailored smoking cessation programs towards Chinese-speaking Asian smokers to encourage NRT use and reduce cigarette consumption to achieve declines seen in other groups.

FUNDING: City

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## POS5-47

### RELATIVE AND ABSOLUTE HARM PERCEPTIONS OF TOBACCO PRODUCTS AND NEWLY INCIDENT USE IN YOUTH: RESULTS FROM WAVE 1 AND 2 OF THE POPULATION ASSESSMENT OF TOBACCO AND HEALTH (PATH) STUDY

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**SIGNIFICANCE:** Several studies have examined correlations between harm perceptions and tobacco use in youth, but few have addressed whether tobacco harm perceptions influence tobacco initiation. **METHODS:** Product-specific absolute and relative (compared to cigarettes) harm perceptions were collected at Wave 1 in a nationally representative sample of youth never tobacco users in the Population Assessment of Tobacco and Health (PATH) Study (12-17 years; n=11,996). At Wave 2, product-specific incidence was calculated for cigarettes, e-cigarettes, cigars, pipes, hookah, and smokeless tobacco. Adjusted rate ratios estimated whether harm perceptions at Wave 1 predicted incident tobacco product use at Wave 2, adjusting for age, sex, race, region, and ever tobacco use. **RESULTS:** Absolute harm perceptions were highest for cigarettes (82.3%) and lowest for e-cigarettes (24.1%); relative harm perceptions were highest for pipes (32.1%) and lowest for e-cigarettes (4.8%). Product-specific incident use ranged from 10.3% for e-cigarettes to 0.8% for pipes. For absolute harm, youth who believed that e-cigarettes, cigars, pipes, hookah, and smokeless posed little harm at Wave 1 were more likely to have tried those products at Wave 2 (p's<0.05). Youth who viewed e-cigarettes, cigars, hookah, and smokeless tobacco as less harmful than cigarettes at Wave 1 were more likely to try those tobacco products at Wave 2 compared to youth who thought cigarettes were equally harmful or more harmful (p's<0.05). **CONCLUSIONS:** Low absolute or relative harm perceptions of e-cigarettes, cigars, and hookah was positively associated with trial of these products by youth between study waves. Findings suggest the need to target product-specific harm perceptions to prevent use of tobacco among youth.

FUNDING: Federal

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## POS5-48

### "IT FELT LIKE I WAS SMOKING NOTHING": WHY DO YOUNG ADULTS DISCONTINUE USING E-CIGARETTES?

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**SIGNIFICANCE:** The potential public health impact of e-cigarettes is currently under debate, with the potential for e-cigarettes as cessation devices contrasted against possible negative health effects such as irritation, an increased risk of certain cancers and nicotine dependence. Initial research has primarily focused on why young adults use e-cigarettes, identifying motivations such as curiosity, convenience, and appealing flavors. We know much less about why young adults discontinue using e-cigarettes, which is important to inform policy and intervention. **METHODS:** We recruited 97 tobacco users between the ages of 18 and 26 from Baltimore County, Maryland to participate in 17 focus group discussions. Qualitative data were analyzed using framework analysis. **RESULTS:** Sixty-four (66%) had ever used an e-cigarette and 47 (48%) had used e-cigarettes in the past 30 days. The primary reason reported for discontinuing use of e-cigarettes is that they were less satisfying than combustible tobacco. For instance, one participant reported, "... there are different flavors, and it is healthy because it is water vapor, but at the same time, no it doesn't fill the need that tobacco did." Because of this,

several participants reported switching back to combustible tobacco after trying e-cigarettes. Many participants also reported discontinuing use due to the perceived accumulating costs. One participant noted, "I ain't saying I didn't like it, it is just not something that I would keep going, it is too expensive." Finally, negative physical effects were also mentioned: "It is too strong for me because it gives me a headache... like immediately, I don't like it." **CONCLUSIONS:** The net public health implications of e-cigarettes are still inconclusive. As they are becoming increasingly popular, understanding why young adults not only initiate, but also discontinue e-cigarette use is critical to inform e-cigarette regulatory efforts. If e-cigarettes are to be used as cessation devices, regulation should ensure they are affordable, equally satisfying to combustible tobacco and formulated to minimize negative physical effects.

FUNDING: Academic Institution

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## POS5-49

### MENTAL HEALTH AMONG CURRENT TOBACCO AND ALCOHOL DUAL USERS

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**SIGNIFICANCE:** Individuals affected with mental health disorders have greater rates of tobacco use and nicotine dependence, measured as unique outcomes. However, associations between concurrent alcohol and tobacco use and mental health disorders (internalizing and externalizing disorders) are unknown. The purpose of this cross-sectional study was to understand the association of mental health behaviors in current alcohol and tobacco (cigarettes or e-cigarettes) dual users. **METHODS:** Data from 32,320 adults age 18 years and older participating in the first wave (2013-2014) of the Population Assessment of Tobacco and Health (PATH) study were used. Weighted logistic regression analyses were used to determine the associations of current dual use on the outcomes of high internalizing and externalizing factor score while adjusting for sex, age, race, education, income, and beliefs on tobacco. The factor scores are summed and representative of the core constructs of mental health disorders. The Global Appraisal of Individual Needs—Short Screener was applied to identify internalizing and externalizing problem symptoms in the PATH dataset, using a continuous measure of severity to account for observed comorbidity patterns. **RESULTS:** Women had higher internalizing factor scores (58.1%) while men had higher externalizing factor scores (53.9%). In multivariate logistic regression analyses, dual use had strong and consistent associations with high internalizing and externalizing factor scores. Odds for a high internalizing factor score were greater for alcohol and e-cigarette dual users (AOR= 2.59, 95% CI= 1.89, 3.55) while odds for a high externalizing factor score were greater for alcohol and cigarette dual users (AOR= 2.41, 95% CI= 2.16, 2.68). There were greater odds of high internalizing and externalizing factor scores when two products were used compared to one single product (alcohol, cigarette, or e-cigarette). **CONCLUSIONS:** Dual use of alcohol and tobacco is strongly associated with mental health outcomes. These findings suggest that screening people with mental health disorders for concurrent substance use must, at a minimum, consider the dual use of alcohol and tobacco.

FUNDING: Academic Institution

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## POS5-50

### AWARENESS, PERCEIVED RISK, AND POLICY PERCEPTIONS OF HEAT-NOT-BURN PRODUCTS

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**SIGNIFICANCE:** In Ontario, Canada, heat-not-burn (HNB) products were introduced in April, 2017 under the brand IQOS (Phillip Morris International). These products heat tobacco to a lower temperature than cigarettes to produce aerosol with nicotine and are marketed by the tobacco industry as reduced-risk products. From a regulatory perspective, these are considered tobacco products, which in Canada, are subjected to marketing bans and powerwall restrictions. In this environment, the level of awareness of this product and perceptions of risk are large-



ly unknown. METHODS: In November 2017, we surveyed 727 recent smokers from an ongoing panel of Ontario smokers. Respondents were asked about their awareness, use, and risk and policy perceptions of HNB products. Descriptive statistics were conducted. RESULTS: The majority (83%) of respondents were current smokers, and the average age was 48 years; 42% were men, and almost 60% had completed post-secondary education. While 10% of respondents were aware of HNB, less than 3% ever used it. Those who were aware of these products reported the main ways they heard about them was through friends (30%), social media (27%), and at convenience stores (23%). Almost one quarter of all respondents perceived HNB to be less harmful than regular cigarettes. Over one third of all respondents believed HNB products can help people quit smoking regular cigarettes. Current vapers were more likely to have these positive perceptions of these products. Almost half (46%) of respondents felt that HNB products should be sold in a number of different places, similar to regular cigarettes. CONCLUSIONS: The positive perceptions about HNB products, and support for product sales in various locations, were much higher among all respondents compared to the small proportion of respondents that were aware or ever used these products. In Ontario, these products are just emerging, and it is likely that more positive perceptions will develop. Public health education campaigns are necessary to inform users about the health risks of HNB products. Rigorous research on the effectiveness of these products for smoking cessation is also needed.

FUNDING: State

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## POS5-51

### EVALUATION OF THE HUD SMOKE-FREE POLICY IN FEDERALLY SUBSIDIZED PUBLIC HOUSING IN NEW YORK STATE: BASELINE FINDINGS

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BACKGROUND: The November 2016 U.S. Department of Housing and Urban Development (HUD) smoke-free policy requires that all U.S. public housing authorities (PHAs) have entirely smoke-free apartment buildings (including individual units) by July 31, 2018. As of May 2017, most New York State (NYS) PHAs (62%, 51 of 82) had not yet complied. In July-October 2017, we conducted a baseline nested survey of residents, Development Managers (DMs), and Executive Directors (EDs) in a sample of NYS PHAs prior to HUD policy implementation. METHODS: We sampled PHAs that did not at the time prohibit smoking within apartment units. As more than 80% of NYS public housing units are in New York City (NYC), we randomly selected 16 developments administered by the NYC Housing Authority. We also selected one PHA in each of four other regions: Metro (non-NYC), Capital, Central, and Western. We measured policy implementation, knowledge, attitudes, and self-reported resident health using a cross-sectional mail survey of PHA residents (n= 761) and DMs (n=9) and a phone survey of EDs (n=5). RESULTS: Among all PHAs, 44% of residents reported tobacco smoke entering their apartment from outside at least a few times a week. Most residents (78%) supported an in-unit smoke-free policy; non-smokers (85%) were more supportive than smokers (39%). Two EDs did not support in-unit smoke-free policies, and three felt that decisions about smoke-free policies should be controlled by the PHA. Four of five PHAs limited smoking in at least one area for at least some buildings. Concordance between what EDs told us were the PHA smoking rules and what residents believed to be their building smoking rules was low. All EDs and DMs felt that HUD policy enforcement will be challenging. Two EDs reported that they had provided tenants with quit smoking resources, conducted resident meetings, and partnered with resident councils as part of implementation. DISCUSSION: These data provide baseline measures for future analyses of changes in policy implementation, knowledge, attitudes, and resident health, and have implications for communication and policy enforcement by PHA staff working to comply with the HUD rule.

FUNDING: State

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## POS5-52

### BIOMARKERS OF EXPOSURE IN EXCLUSIVE MENTHOL VS. NON-MENTHOL CIGARETTE SMOKERS: WAVE 1 OF THE POPULATION ASSESSMENT OF TOBACCO AND HEALTH (PATH) STUDY

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BACKGROUND: Under the Family Smoking Prevention and Tobacco Control Act, all cigarette flavorings are banned except menthol. The associations between use of menthol-flavored cigarettes and biomarkers of tobacco exposure, specifically polycyclic aromatic hydrocarbons (PAHs) and volatile organic compounds (VOCs), are not well documented. The purpose of this study was to compare a wide array of biomarkers of tobacco exposure among US adult menthol and non-menthol cigarette smokers. METHODS: Our analysis utilized the Wave 1 Biomarker Restricted Use Files from the PATH Study. We conducted weighted analyses to compare the effect of menthol status on exposure to over 50 urinary biomarkers including nicotine metabolites, metals, tobacco specific nitrosamines (TSNAs), PAHs, and VOCs among current exclusive every day cigarette smokers (non-menthol= 1194; menthol= 768). We calculated geometric means for each biomarker, and ran multivariable linear regression models to calculate geometric mean ratios (GMRs) adjusted for relevant demographic and smoking characteristics. RESULTS: Menthol smokers were significantly younger ( $M_{age} = 42.7$  vs. 46.7 years), heavier ( $M_{BMI} = 28.5$  vs. 27.6 kg/m<sup>2</sup>), and smoked fewer cigarettes per day ( $M_{CPD} = 15.3$  vs 17.6) than non-menthol smokers. They were also comprised of a higher proportion of African Americans (34.2%) compared to non-menthol smokers (4.3%). After controlling for age, sex, race/ethnicity, education, body mass index, and CPD, menthol smokers did not have differences in exposure to nicotine, metals, TSNAs, or PAHs. However, menthol smokers exhibited greater exposure to the VOCs, N-Acetyl-S-(3-hydroxypropyl)-L-cysteine (GMR= 1.13, CI= 1.00-1.23), and Acroline (GMR= 1.23, CI= 1.05-1.43) compared to non-menthol smokers. CONCLUSIONS: After controlling for relevant sociodemographic characteristics, our analysis revealed greater exposure to some VOCs in menthol smokers compared to non-menthol cigarette smokers. These findings suggest that menthol smokers may have greater exposure to potentially harmful toxicants. Future research is needed to better understand if greater exposure is due to the flavoring itself or different patterns of use.

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## POS5-53

### SAME DOG NEW TRICKS: A CLOSER LOOK AT OPPOSITION TACTICS TO LOCAL MENTHOL RESTRICTIONS IN MINNESOTA

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SIGNIFICANCE: In 2017, the Minneapolis and Saint Paul City Councils voted to restrict the sale of menthol tobacco to adult-only tobacco and liquor stores. Given menthol reflects one-quarter of cigarette sales in Minnesota, there was unprecedented national attention from the tobacco industry in opposing these local policies. In addition to contracting with local lobbyists, grassroots organizers and PR firms, tobacco companies such as Reynolds American Incorporated, engaged national and local African American community leaders to leverage racial tension and spread misinformation to communities that would be most impacted by a menthol restriction. Advocates successfully responded to these tactics. METHODS: Campaign materials generated and distributed by the tobacco industry and their funded allies were collected and filed. This includes direct mail, paid ads, earned media, radio show recordings, testimony, event flyers and social media posts. RESULTS: Through our analysis, the opposition focused their messages in three areas: 1. Generating concern about the livelihood of neighborhood retailers; 2. Proposing alternative, unrealistic policy options such as a statewide law to raise the tobacco sales age to 21; 3. Claiming that restricting menthol would increase interaction between law enforcement and communities of color. There was a coordinated campaign consisting of local, state and national convenience and tobacco retail groups as well as the tobacco industry. The use of new and old tactics resulted in delayed public hearings, later implementation dates, and increased calls for action and organizing from tobacco prevention advocates. CONCLUSION: The opposition tactics seen in Minneapolis and Saint Paul exemplify the stake the tobacco industry has placed in protecting the menthol tobacco market. Tobacco companies

have a history of funding African American leaders and organizations as a way to gain influence, and it is clear they are using that strategy again to protect future profits. Tracking and understanding new and old tobacco industry opposition tactics is key to preventing their success in blocking effective tobacco control policies at all levels of government.

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## POS5-54 PRACTICES OF POLY-TOBACCO USE AMONG YOUNG ADULTS

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**SIGNIFICANCE:** Poly-tobacco use is increasing among young adults throughout the country. A diverse array of tobacco products, including e-cigarettes and smokeless tobacco are used in addition to cigarettes. Research has described new product initiation trends, but little is known about how and why some people regularly use multiple tobacco products. This study takes a social practice theory approach to describe poly-tobacco use, focusing on the integration of different product use practices into young adults' daily routines. **METHODS:** Young adults who use two or more tobacco products ( $n=60$  ages 18-29) described their typical weekday/end routines during in-depth interviews. Analysis identified distinguishing characteristics of each tobacco product (e.g., byproducts of use) and ways in which they are incorporated into participants' routines. **RESULTS:** Smoking, "vaping" and chewing emerged as distinct practices exhibiting differences across three practice elements: the materials, competences, and meanings associated with product use. These disparate elements allow each practice to integrate in different ways within daily routines. Product use can structure or 'bookend' activities, provide protected time or a break, and help transition from one part of a routine to the next. Cigarettes function well in these contexts, due to the discrete time it takes to smoke them. Each tobacco product confers perceived benefits: ease social interaction, cope with crisis, self-soothe, augment physical/mental function, and provide sensation/pleasure. Use of e-cigarettes or smokeless tobacco can serve as a space-time opener, creating opportunities for nicotine consumption where cigarette use is constrained. Rotating between products can provide a sense of health harm mitigation. **DISCUSSION:** Poly-tobacco product use provides diverse opportunities to integrate nicotine consumption into daily routines and a range of perceived functions and benefits to the user. This analysis elucidates mechanisms by which tobacco products may complement rather than displace one another in young adults' routines. Implications for product substitution as a smoking cessation strategy are discussed.

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## POS5-55 FEASIBILITY AND PRELIMINARY EFFICACY OF SMARTPHONE-DELIVERED AUTOMATED VIDEO-ASSISTED SMOKING CESSATION TREATMENT

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**BACKGROUND:** To determine the feasibility and preliminary efficacy of an automated video-assisted smoking cessation intervention delivered via smartphones to underserved smokers. **METHODS:** Participants ( $n=40$ ) were recruited from two sites (a safety net HIV clinic and a food bank distribution center) located in the greater Oklahoma City area. Participant inclusion criteria included: age 18 or older; willing to make a quit attempt within one week, smoking history of  $\geq 100$  cigarettes; and smoking at least 5 cigarettes per day. Individuals with a contraindication for nicotine replacement therapy (NRT) were excluded. Participants were randomized to standard treatment (ST) or automated treatment (AT). ST participants received proactive phone counseling + NRT. AT participants received an automated smartphone-delivered intervention + NRT. The smartphone intervention consisted of brief weekly assessments, followed by individually tailored (based on smoking status, stress, motivation, and self-efficacy) video clips and

daily text messaging. Data were collected through week 12 post-enrollment. **RESULTS:** Participants had a mean age of 45 years and were 49% female, 35% African American, 10% Latino, and 13% American Indian. Almost 80% reporting an annual household income of  $< \$20,000$ . Dependence levels were moderately high with 63% reporting smoking within 30 minutes of waking. AT participants completed 64% of proactive sessions, while ST participants completed 50% of sessions. With access to on-demand treatment included, participants in AT completed an average of 9 video sessions vs. 2.5 human-delivered sessions in the ST group. As hypothesized, 7-day abstinence rates (as assessed by self-report and portable CO monitors - iCO) were similar in the groups. At week 12, abstinence in both groups was 25%. Finally, 100% of AT participants endorsed "yes - got the service they wanted"; 92% stated the program met most or all smoking cessation needs. **CONCLUSIONS:** Results from this pilot RCT suggest that the automated smartphone intervention is a feasible treatment approach for underserved smokers, and may produce abstinence rates comparable to more costly human-delivered counseling.

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## POS5-56 EFFECTS OF NICOTINE ON COGNITIVE REMEDIATION TRAINING IN SCHIZOPHRENIA

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Cognitive remediation training can alleviate cognitive deficits associated with schizophrenia, but its impact is limited by small effect sizes. We aimed at pharmacological enhancement of cognitive remediation training, seeking to enhance the beneficial effects of the training challenges by administering nicotine prior to some of the training sessions. Nicotine-induced facilitation of sensory processing, alertness, attention, learning and memory was expected to promote training benefits. Twenty-five people with schizophrenia were enrolled into a 10-week, 5 days/week, computerized auditory and visual cognitive training regimen. Participants were randomized into one of two treatment groups. Every Monday and Thursday, participants in the nicotine group received a nicotine polacrilex lozenge (2 or 4 mg, depending on smoking status) prior to the training, and participants in the placebo group a placebo lozenge. Outcome measures were taken on a no-lozenge day in weeks 0 (baseline), 4, 7, and 10, and 4 weeks after the intervention ended. The MATRICS Consensus Cognitive Battery (MCCB) composite score improved over time, but not beyond expected practice effects with repeated test administration. There were no group differences in this effect. When exploring the seven MCCB sub-domains, only the Reasoning/Problem Solving domain displayed a Group x Time interaction ( $P=0.003$ ); the placebo group improved over time, but not the nicotine group, suggesting that intermittent nicotine exposure negatively impacted training effects on higher-order cognitive control processes. There were no effects on the UCSD Performance-Based Skills Assessment. Psychiatric symptoms did not improve from pre- to post-training intervention in either treatment group. However, significant improvements from pre- to post-intervention were seen on the Quality of Life Scale ( $P<0.05$ ) and the Cognitive Assessment Interview ( $P<0.001$ ), both measuring real-life functional outcome. These effects did not differ between the nicotine and the placebo group. In conclusion, there was no evidence that nicotine exposure during cognitive remediation training may potentiate training benefits. Funded by R21MH095824 (Hahn).

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## POS5-57 MESSAGING TO MEN: A QUALITATIVE INVESTIGATION OF MALE SMOKERS, AGES 25-44

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**SIGNIFICANCE:** Since New York City (NYC) implemented comprehensive tobacco control in 2002, smoking rates have declined overall and in most subpopulations. However, disparities by sex have widened. Men, ages 25-44, now smoke



at rates nearly twice that of females ages 25-44 (22% vs 12%). To better understand the context of smoking among these men, we conducted five focus groups in summer 2017. **METHODS:** We recruited male smokers from the following populations, based on high smoking prevalence and/or known behavioral correlates of smoking: Chinese speakers; uninsured or Medicaid-insured (1 English group, 1 Spanish); and English speakers stratified by alcohol use (2 groups). Moderators used a semi-structured interview guide to cover perceptions of health risks, smoking behaviors, and cessation attitudes. Participants were encouraged to engage in discussion and elaborate on statements. Translated transcripts were reviewed and coded for key themes in QDA Miner Lite, version 2.0.2. **RESULTS:** Six themes emerged: 1) Friends who smoke are a primary factor in continuing to smoke; however, friends are also considered the most credible source of cessation support and advice; 2) While the health impact of smoking is understood, many participants still had a sense of fatalism about their own likelihood of health effects; 3) NYC's tobacco control intentions are recognized, but participants have developed strategies to facilitate continued smoking despite these measures, including seeking lower-taxed cigarettes and denying the credibility or personal relevance of hard-hitting media campaigns; 4) Promoted and evidence-based cessation methods are not considered effective; utilizing them instead of quitting unaided may indicate a lack of willpower; 5) Quitting smoking is seen as compatible with fitness and exercise goals; 6) Use of marijuana and/or alcohol often undermines quit attempts. **CONCLUSIONS:** This research is an important contribution to understanding male smokers in the context of a mature, successful comprehensive tobacco control environment. Findings will be used to develop communications and cessation strategies to motivate male smokers to continue making quit attempts.

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## POS5-58

### THE EFFECT OF HOUSEHOLD RESTRICTIONS ON TIME TO FIRST CIGARETTE

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**SIGNIFICANCE:** Time to first cigarette (TTFC) is an indicator of dependence; earlier TTFC is associated with higher dependence, increased nicotine uptake, and more difficulty quitting. However, a potential confound in the measurement of TTFC are household restrictions / rules imposed regarding where and when smokers can smoke in their homes. These restrictions may have the effect of delaying or preventing a smoker's ability to smoke soon after waking, regardless of the smoker's preferences. It is not known if these restrictions significantly alter TTFC, dependence, or smoking behaviors in a population of daily smokers. **METHODS:** Participants were 438 daily smokers who were provided with an in-home mobile topography device for a 3-day period to record real-time smoking behaviors. Participants completed questionnaires regarding smoking history, demographics, household rules on smoking, TTFC, and nicotine dependence. **RESULTS:** ANOVA analyses compared the effect of household restrictions group on TTFC in three levels: 1) smoking is not allowed in the home, 2) smoking is allowed in some places / times, and 3) smoking is allowed anywhere/ there are no rules. There were statistically significant differences between the individuals where smoking is allowed inside and where smoking is *not* allowed inside. Those who were not allowed to smoke inside the home smoked an average of 26 minutes later than those who were allowed to smoke anywhere,  $F(2, 339) = 5.43; p = 0.0048$ . **CONCLUSIONS:** Results indicated that TTFC is longer in households that impose indoor smoking bans, while partial bans have no significant effect on TTFC. Therefore, the construct of TTFC may be confounded by household restrictions, as it delays or prevents one's ability to smoke immediately upon waking, regardless of the smoker's preferred first cigarette time. Results regarding other smoking behaviors and topography measures, as well as implications for research will be discussed.

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## POS5-59

### ASSOCIATIONS BETWEEN PAST-MONTH PAIN AND CIGARETTE SMOKING ABSTINENCE SELF-EFFICACY

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**SIGNIFICANCE:** An evolving reciprocal model suggests that pain and smoking behavior interact in the manner of a positive feedback loop, resulting in greater pain and the maintenance of tobacco dependence. Consistent with this perspective, recurring pain has been linked to greater difficulty quitting, and initial evidence indicates that smokers with co-occurring pain (vs. no pain) are less confident in their ability to abstain from smoking. Abstinence self-efficacy (ASE) is a consistent predictor of smoking cessation outcomes, and relapse prevention theory posits that ASE varies across situations and contexts. No previous work has examined context-specific ASE as a function of past-month pain status. **METHODS:** Participants included 192 daily tobacco smokers (59.7% male;  $M_{CPD} = 20$ ) who were recruited from the local community to participate in a smoking cessation intervention. The current analyses utilized data collected at the baseline session, prior to randomization. Past-month pain severity was assessed using a five-point scale ranging from 0 (no pain) to 5 (very severe pain), and the Relapse Situation Efficacy Questionnaire assessed both total and context-specific ASE (i.e., negative affect, positive affect, restrictive situation, idle time, social-food, low arousal, craving). **RESULTS:** Hierarchical linear regression indicated that greater past-month pain severity was associated with lower total ASE ( $b = -3.42, t = -2.05, p < .05$ ), and ASE in the contexts of low arousal (e.g., feeling tired or hungry;  $b = -.56, t = -2.12, p < .05$ ) and cigarette craving ( $b = -.24, t = -2.48, p < .05$ ). **CONCLUSIONS:** These results are consistent with previous work demonstrating a negative relation between co-occurring pain and self-efficacy for smoking cessation. These findings further suggest that treatment-seeking smokers who endorse past-month pain may benefit from tailored interventions that specifically address ASE in the contexts of low arousal and cigarette craving.

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## POS5-60

### A STANDARDIZED APPROACH TO DETERMINE NICOTINE CONTENT IN MULTIPLE FLAVORED ELECTRONIC CIGARETTE LIQUIDS USING HIGH PERFORMANCE LIQUID CHROMATOGRAPHY

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Concentrations of nicotine in electronic cigarette (ECIG) liquids vary from 1 to >50 mg/mL. Additionally, ECIG liquids are available in >7700 flavoring combinations and with varying ratios of propylene glycol and vegetable glycerin. Developing a selective and robust HPLC method for ECIG liquid nicotine quantification is critical to ensure quality control of these products. In order to quantitatively analyze nicotine in ECIG liquids, we developed a rapid, precise, and specific HPLC method for direct analysis of nicotine. A Waters Alliance 2695 with Waters 996 Photodiode Array Detector was used for method development and validation. Column chemistry and mobile phase ratio played critical role in separation and resolution of nicotine peak from flavoring agents peaks. Selectivity of the method for nicotine was confirmed by performing peak purity evaluation of the nicotine peak. Robustness and applicability of the HPLC method was tested by varying organic phase composition by +10% to separate the nicotine peak from possible interfering flavoring agent peaks. Further, using the recommendations set forth by the United States Pharmacopeia (USP) and ICH guidelines for drug products, the HPLC method was validated for various parameters such as limit of detection (LoD), limit of quantitation (LoQ), linearity, accuracy, precision and specificity. LoD was 0.07 µg/mL and LoQ was 0.45 µg/mL. Linearity of the method was established over the range of 0.45-500 µg/mL with  $R^2 = 0.99997$ . Accuracy of the method was within 98 to 102% and precision within 2%. An HPLC method successfully separated nicotine from flavoring agents in ECIG liquids in 12 minutes. Based on quantitative assay performed on various ECIG liquids, the HPLC method was found to be selective and quantitatively accurate for nicotine. The method was linear, accurate, precise and robust in the specified range of prepared samples. Nicotine can exist in three (free-base and two protonated) forms, depending on pH of the

matrix. Therefore, the method is being tested for its ability to measure free base nicotine and protonated form(s) of nicotine from ECIG liquids using a liquid-liquid extraction technique.

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## POS5-61

### CHILDREN OF WAR: PTSD AND TOBACCO USE AMONG SYRIAN REFUGEE YOUTH LIVING IN REFUGEE CAMPS IN NORTHERN JORDAN

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**INTRODUCTION:** Refugees cumulate numerous vulnerability factors and have a higher prevalence of mental disorders than the general population. A positive relationship between Post Traumatic Stress Disorder (PTSD) and cigarette smoking has been reported. Little, however, is known about such relationship among Syrian refugee youth. The current study assessed the relationship between PTSD and tobacco use, namely cigarette smoking and waterpipe use, among a sample of Syrian refugee youth (12 – 16 years) living in refugee camps in Northern Jordan. **METHODS:** Multi-stage sampling technique was used to select a sample of refugee youth living within camp settings and attending schools in Northern Jordan. Data was collected between August and November 2017 using a structured computer-assisted questionnaire. Arabic version of the Civilian PTSD Check List (PCL-C) and the Patient Health Questionnaire (PHQ-9) for depression, as well as a cluster of questions assessing religiousness and self-reported current tobacco use. Logistic regression analyses assessed the adjusted effect of PTSD scores on cigarette smoking and on waterpipe use. **RESULTS:** A total of 420 refugee youth participated in the study. Mean age was 14.9 years old, 55% were girls, mean years of displacement was 3.8 (0.8) years, 34% and 29.6% witnessed injury and loss of a family member, respectively, 32.5% reported having depression symptoms, 92.8% attributed what happened to them as God's will, and 61.1% were questioning "why God does that to me". About 5% and 7% of participants were cigarette smokers and waterpipe users, respectively. Mean PTSD score was 52.5 (12.5) (range: 23.7 to 76.3). Cigarette smokers had significantly higher mean PTSD scores (60.2 (14.2)) than non-smokers (52.1 (12.4)) ( $P=0.045$ ). Mean PTSD was not significantly different by waterpipe use ( $P=0.149$ ). PTSD significantly predicted cigarette smoking (Adjusted Odds Ratio, 95% C.I.= 1.5, 1.2 – 1.72), but not waterpipe use (1.08, 0.95 – 1.07). **CONCLUSION:** Health promotion programs designed for Syrian refugee youth need to incorporate culturally appropriate tobacco prevention components that consider mental health status.

FUNDING: Academic Institution

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## POS5-62

### TOBACCO USE AND CESSATION BEHAVIORS IN YOUNG ADULTS: 2016 NATIONAL HEALTH INTERVIEW SURVEY

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**SIGNIFICANCE:** Recent national studies have documented higher current tobacco use in young adults (aged 18-24) compared to adults aged 25+. However, studies of smoking cessation by age are dated, relying on 2003 data. The current study provides updated estimates and sociodemographic correlates of tobacco use and cessation in young compared to older adults. **METHODS:** Data from the 2016 National Health Interview Survey (n=33,028) identified 13,494 current and former cigarette smokers (562 aged 18-24, 12,932 aged 25+). Analyses examined correlations between age group and cigarette smoking and cessation status in the full sample and other tobacco and nicotine use in current and former smokers. Past-year quit attempts, having a health professional talk to you about smoking, and cigarettes per day were examined in current smokers (408 aged 18-24, 4,932 aged 25+). All analyses accounted for survey weighting and multivariable analyses

controlled for sex, education, race/ethnicity, region, and subjective financial situation. **RESULTS:** In the full sample, current daily smoking was 8.9% in those aged 18-24 and 12.5% in those 25+; current some day smoking was 4.0% in 18-24-year olds and 3.8% in those aged 25+. Former smokers comprised 25.4% of adults aged 25+ and 4.9% of those aged 18-24. Former smokers who quit for  $\leq 1$  year constituted 2.8% of 18-24-year olds (57% of former smokers aged 18-24) vs. 2.4% of adults aged 25+ (9% of former smokers aged 25+). Compared to never use, current some day use and ever trial of e-cigarettes, cigars, pipes, and smokeless tobacco were correlated with being 18-24 vs. 25+ in adjusted models of current and former smokers. Among current smokers, young adults smoked fewer cigarettes per day than those aged 25+ (mean 9.4 vs. 13.3), had higher odds of making a past-year quit attempt (AOR 1.42), and lower odds of having a health professional talk to them about smoking (AOR 0.44). **CONCLUSIONS:** Greater experimentation with non-cigarette products, lower cigarette consumption, and greater interest in quitting smoking signal novel opportunities for tobacco reduction, cessation, and relapse prevention interventions in young adults.

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## POS5-63

### CHARACTERISTICS OF MOBILE WEBSITES FOR LEADING CIGARETTE, CIGAR, SMOKELESS TOBACCO, HOOKAH, AND ENDS BRANDS

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**SIGNIFICANCE:** Tobacco companies invest in reaching consumers through the internet. Most US adults have smart phones, and tobacco-susceptible groups (e.g., younger adults; people with low income; and gender, sexual, racial, and ethnic minorities) rely more on smart phones for internet access. This study describes features of smart phone-optimized tobacco industry websites used to market 5 product classes: cigarettes, cigars, smokeless, ENDS, and hookah. **METHODS:** We identified 131 leading tobacco companies using Nielsen sales and Kantar spending data. Using smart phones, we searched and identified 62 consumer-oriented sites. We dual-coded site characteristics including: age and access requirements, sales strategies (e.g., reviews, coupons), brand engagement strategies (e.g., games, social features), and warnings. **RESULTS:** All cigarette and 89% of smokeless sites required age verified accounts to enter, while 76% of ENDS sites required this only for purchases. Some sites did not require age verification. All cigarette, 89% of smokeless, and no hookah sites offered coupons. Cigarette (40%) and smokeless (22%) sites advertised time-sensitive coupons activated by geolocation once in a store. Brand engagement strategies included games, sweepstakes, points systems, and videos. All hookah, 67% of ENDS, 47% of cigar, and no cigarette or smokeless sites were linked to Facebook. Many cigarette and smokeless sites had internal social media components for users to create and share content. All cigarette and smokeless sites showed warnings, while 43% of ENDS, 24% of cigar, and 100% of hookah sites did not. Many websites required the user to scroll up to see warnings. **CONCLUSIONS:** About half of leading tobacco companies have mobile-optimized sites. ENDS, hookah, and cigar sites prevent youth access less strictly than cigarette and smokeless sites. Many cigarette and smokeless sites have their own internal social media and use geolocation when offering coupons. Warnings could be made more visible on many sites. This study describes the current landscape of tobacco mobile websites, which susceptible populations may be more likely to access.

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## POS5-64

### NICOTINE REPLACEMENT THERAPY USE AND BELIEFS IN AN URBAN LOW-INCOME MINORITY POPULATION OF SMOKERS

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**SIGNIFICANCE:** Combination nicotine replacement therapy (NRT) and counseling remains the recommended strategy for quitting smoking. Despite this recommendation, smokers in low-income communities are less likely to use NRT. Secondary



analysis of data from the Kids Safe & Smokefree trial allowed us to investigate reasons for low NRT uptake among smoking parents. Participants (N=327) were mostly black (84%), women (84%), living below poverty (79%), and smoked an average of 11.4 cigs per day pre-intervention. At baseline, only 17% had ever tried NRT. METHODS: In addition to the primary intervention, Control (CTL) and Intervention (INT) groups both received written NRT information and INT group also received verbal encouragement and navigation on how to obtain NRT. Data were collected using structured telephone interviews. Key NRT variables were self-reported NRT use, helpfulness in quitting, perceived harmfulness, and confidence NRT would prevent relapse. RESULTS: At 12-month follow-up, among the entire sample, 48% had tried NRT (M=35 days, SD = 59), 63% perceived NRT to be "very" or "somewhat" helpful for quitting, 68% were "very" or "somewhat" confident it would prevent relapse, and 41% saw it as "somewhat" or "very" harmful. Perceived helpfulness of NRT in quitting was significantly positively correlated with using NRT ( $p=.001$ ) and with number of days used ( $p=.003$ ). Perceived harmfulness of NRT was significantly negatively related to NRT use ( $p=.003$ ). Confidence NRT would prevent relapse was significantly positively correlated with days used ( $p=.036$ ). Compared to CTL, the INT group was more likely to take NRT ( $p=.004$ ) despite no between group differences in beliefs about helpfulness and harmfulness of NRT. The INT group did, however, have more confidence that NRT would prevent relapse ( $p=.052$ ). CONCLUSIONS: Attitudes about NRT are significantly related to NRT use and duration of use. The INT group improved NRT use, potentially due to confidence that NRT will help avoid relapse, as opposed to mitigating perceptions of harm or boosting perceptions of benefits. Additional descriptive NRT use patterns and beliefs, as well as potential implications, will be discussed.

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## POS5-65

### TELEVISION ADVERTISING AND CALLS TO QUITLINES DURING FIVE NATIONAL TOBACCO EDUCATION CAMPAIGNS

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BACKGROUND: In 2012, the Centers for Disease Control and Prevention launched the first federally funded national tobacco education campaign, *Tips From Former Smokers*® (*Tips*®). We assessed the impact of *Tips* campaign advertisements on call volume to the national quitline portal 1-800-QUIT-NOW for annual implementations from 2012 through 2016. METHODS: We estimated calls to 1-800-QUIT-NOW using multivariable linear regression models as a function of market-level weekly gross rating points (GRPs) for *Tips* television advertisements. GRPs are a measure of exposure to media, calculated as the reach of the media times the frequency of the media. Models controlled for media market characteristics including population size, smoking prevalence, race/ethnicity, educational attainment, and median household income. Models included state and calendar quarter fixed effects as well as a linear time trend. We also performed post-estimation predictions under a "no campaign" assumption to estimate the total additional calls to 1-800-QUIT-NOW associated with *Tips*. RESULTS: From 2012 through 2016, *Tips* ads aired at an average of 100 GRPs per week in 210 U.S. Designated Market Areas (DMAs) during on-air weeks. Separate annual models, as well as the cumulative model, show a statistically significant association between *Tips* GRPs and quitline calls to 1-800-QUIT-NOW. The cumulative model for 2012-2016 indicates that an increase of 100 *Tips* television GRPs per week in a given media market was associated with an average of about 38 additional calls per week per area code ( $p < 0.001$ ), or 8,100 additional calls nationally per week overall. Over the five-year period of 2012-2016, *Tips* was associated with approximately 784,000 additional calls (95% CI: 774,000-793,000) to 1-800-QUIT-NOW. CONCLUSIONS: CDC's *Tips* campaign has been effective for promoting and increasing the use of telephone quitlines among U.S. adult cigarette smokers for a half decade. Anti-tobacco mass media campaigns, such as *Tips*, are an important component of comprehensive efforts to reduce cigarette smoking in the United States.

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## POS5-66

### "NO, THE GOVERNMENT DOESN'T NEED TO, IT'S ALREADY SELF-REGULATED": A QUALITATIVE STUDY AMONG VAPE SHOP OPERATORS ON PERCEPTIONS OF ELECTRONIC VAPOR PRODUCT REGULATION

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INTRODUCTION: While the market share of Electronic Vapor Products (EVPs), sold primarily through vape shops and other outlets, has increased rapidly, these products remained largely unregulated until 2016. This study, conducted prior to announcement of the deeming regulations provides insights into vape shop operators' attitudes toward potential government regulations of EVPs, and how they might affect policy implementation. METHODS: In 2015, we conducted 37 in-person interviews of vape shop operators across nine US cities. Shops were identified through extensive web-searches. We used NVIVO software to analyze the transcripts. RESULTS: Many vape shop operators found regulations requiring safe production of e-liquids, child-resistant bottles, and listing e-juice ingredients acceptable. They disagreed with the elimination of free samples and bans on flavored e-liquid sales, which generated significant revenue for their stores. They also did not fully welcome pre-market review of new product lines and negatively perceived EVP-specific taxes. All agreed that EVPs should not be sold to minors, but most felt that owners should not be fined if minors visited vape shops. CONCLUSIONS: The findings from our study suggest that vape shop operators, similar to many small business owners and entrepreneurs in the U.S., are more likely to reject regulations that may negatively affect their profits. The public health community needs to identify and to instigate communication lines with the vape shop community and position itself as the primary and supportive messenger of ongoing scientific findings about the safety of EVPs.

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## POS5-67

### ASSESSING SUPPORT FOR A POTENTIAL MENTHOL CIGARETTE BAN AMONG SMOKERS ENROLLED IN A CLINICAL TRIAL OF REDUCED-NICOTINE CIGARETTES

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SIGNIFICANCE: Cigarettes with menthol as a characterizing flavor constitute approximately one-third of all cigarettes sold in the U.S. and are disproportionately used by vulnerable populations such as adolescents and racial minorities. The Food and Drug Administration (FDA) has regulatory authority to ban menthol as a characterizing flavor in cigarettes but to date has not enacted such a policy. A recent trial of reduced nicotine content cigarettes asked questions assessing smokers' opinions regarding potential tobacco regulatory policies. For this secondary analysis, we examined participants' support for banning menthol as a characterizing flavor in cigarettes. METHODS: At baseline, participants (N=839, 43% female, 57% preferred menthol cigarettes, 15.6 cigarettes per day, not currently trying to quit) were asked if they would "support or oppose a law that banned menthol cigarettes." Logistic regression analyses assessed whether support was affected by gender, race, educational attainment, menthol status, age, nicotine dependence, cigarette satisfaction and perceived health risk ratings, and intention to quit smoking in the next 6 months. RESULTS: 127 participants (15.1%) supported and 543 (64.7%) opposed the policy, with 169 (20.1%) responding "Don't know." Support was lowest among menthol smokers (OR=0.06; 95% CI=0.03-0.11), participants identifying as white (OR=0.54; 95% CI=0.31-0.95), and those with higher cigarette satisfaction ratings (OR=0.78, 95% CI=0.65-0.94). There was a trend ( $p=0.057$ ) for increased support of the policy among female participants (OR=1.57; 95% CI=0.99-2.5). All other covariates were not significantly associated with support. CONCLUSION: Overall, participants, especially menthol cigarette smokers, were not receptive to a menthol cigarette ban. If the FDA implements such a ban, then special care should be taken to determine how best to frame the policy for the public. Highlighting the potential public health benefits of removing menthol cigarettes from

the marketplace, such as potential decreases in adolescent use, could possibly increase support, especially since 20% of the sample did not have an opinion for or against the ban.

FUNDING: Federal; Academic Institution

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## POS5-68

### CLINICAL LABORATORY EVALUATION OF BLACK & MILD CIGAR FLAVORS: PUFF TOPOGRAPHY AND PHYSIOLOGICAL EFFECTS

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**SIGNIFICANCE:** Unlike combustible tobacco cigarettes (CTCs), cigar products are available in many flavors that have been linked to recent increases in use, particularly among vulnerable groups. Flavorings may mask the taste of tobacco and enhance smoke inhalation, increasing toxicant exposure. This study compares puff topography and physiological effects of four cigar products from a popular brand and own brand (OB) CTCs in young adults. **METHODS:** Young adult (18-25 years old) CTC smokers naïve to cigar use (N=9) completed five Latin-square ordered sessions differing by product: OB CTC or Black & Mild cigar (B&M; original, apple, cream, or wine-flavored). Sessions consisted of two directed 10-puff bouts separated by one hour. Outcomes included puff topography (average flow rate, puff volume, puff duration, and total puff volume), heart rate (HR) and blood pressure (systolic and diastolic BP; monitored continuously), and expired air carbon monoxide (CO; pre- and post-bout). Linear mixed models were used to examine condition by time effects ( $p < 0.05$ ). **RESULTS:** Of puff topography measures, only puff duration differed across bouts by condition with significantly shorter puffs measured ( $M=1.87$  s,  $SE=0.22$ ) during OB CTC relative to cream ( $M=2.38$  s,  $SE=0.22$ ) and original B&M ( $M=2.43$  s,  $SE=0.22$ ). Collapsed across time, HR was significantly higher during OB CTC relative to apple, cream, and original B&M, and systolic BP was higher during OB CTC relative to cream and original B&M. Following bout 1, CO was significantly higher for cream ( $M=16.11$  ppm,  $SE=1.87$ ) and original B&M ( $M=16.00$  ppm,  $SE=1.87$ ) relative to OB CTC ( $M=8.78$  ppm,  $SE=1.87$ ); following bout 2, all B&M conditions were higher in CO than OB CTC. **CONCLUSIONS:** These findings indicate participants took longer puffs and had increased CO exposure when smoking cream and original B&Ms relative to OB CTC. Cardiovascular effects varied but findings suggest less nicotine exposure during B&M use relative to OB CTC. Results represent the first clinical lab data to suggest cigar flavors may differentially influence smoking behavior and associated physiological effects.

FUNDING: Federal; State

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## POS5-69

### EXPOSURE TO TOBACCO MAGAZINE ADVERTISEMENTS AND TOBACCO USERS' PSYCHOGRAPHICS

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**OBJECTIVE:** Tobacco companies have used psychographic (i.e., beliefs and attitudes) research to tailor and target their advertising activities. However, little is known about how psychographics relate to exposure to tobacco advertising. We aim to examine if the frequency of exposure to tobacco advertisements is associated with certain psychographics among current tobacco users. **METHODS:** Current tobacco users who participated in the Experian's Winter 2015 Simmons National Consumer Study indicated a list of magazines that they read in the past six months. Kantar Media magazine advertising schedule of 2014 was used to enumerate the number of tobacco advertisements per each magazine. We then merged the two datasets to calculate the number of tobacco magazine advertisements each tobacco user was exposed to, categorized into: 1-50, 51-100, and over 100. Several psychographics were assessed, and we applied logistic regression models to examine the association between individual psychographics and exposure to all tobacco, cigarette, and e-cigarette advertisements while adjusting for demographics. **RESULTS:** Higher exposure to tobacco magazine advertising

was found among tobacco users with novelty-seeking, stress, and artistic psychographics. For example, compared to tobacco users who were not exposed to tobacco magazine advertising, those who were exposed to 1-50 tobacco ads (AOR=1.35), 51-100 tobacco ads (AOR=1.58), >100 tobacco ads (AOR=1.64) were more likely to agree with the statement "I enjoy taking risks." Higher exposure to tobacco magazine advertising was also associated with agreeing that "I want to get to the very top of my career" (0 ads: reference, 1-50 tobacco ads: AOR=1.17, 50-100 tobacco ads: AOR=1.30, >100 tobacco ads: AOR=1.50), and agreeing that "I consider myself interested in the arts" (0 ads: reference, 1-50 tobacco ads: AOR=1.45, 50-100 tobacco ads: AOR=1.84, >100 tobacco ads: AOR=2.29). Similar findings were observed for exposure to cigarette and e-cigarette magazine advertising. **CONCLUSIONS:** Our findings suggest that tobacco companies may be using magazine advertising to target people with psychographics that are risk factors for tobacco use.

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## POS5-70

### PREVALENCE OF QUITLINE SERVICE ENROLLMENT FOLLOWING INPATIENT HOSPITAL E-REFERRAL

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Quitlines are low-cost, evidence-based support systems that are readily available to most tobacco users. Hospitalization is an opportunity to connect smokers to post-discharge quitline services. However, limited data exist regarding quitline service enrollment following referrals of hospitalized patients. Moreover, few evaluations examine effective quitline implementation. This project examines the post-discharge quitline enrollment rates of 878 smokers referred from an academic medical center over a 1-year period. Patients smoked on average 15.48 cigarettes per day. Most were white (67%), female (51%), and 77% smoked within 5 minutes of waking. All smokers were treated in-hospital by tobacco cessation counselors, and all smokers consented to post-discharge secure electronic quitline referral. Counselors provided patients brief advice regarding how to recognize when the quitline was calling and the importance of taking quitline calls. The quitline service provided fax-back reports on referred patients; these reports were data entered by counselors. The referring treatment service received reports on 657 out of 878 smokers (74%). Of the reports received, 134 (20%) smokers received quitline services. Of the 134 smokers who received services, 34 (25%) smokers only accepted mailed materials or asked general questions, 63 (47%) smokers accepted one call, and 37 smokers (27%) accepted multiple calls. Of the 523 smokers who did not receive quitline services, 410 (78%) smokers were unreachable, 100 smokers (19%) declined services, and 13 smokers (2%) were already enrolled. In this hospital, the quitline failed to reach most referred patients; among patients who were reached, few received the multiple calls associated with successful outcomes. In an intent-to-treat calculation, 37/878 (4%) received evidence-based quitline intervention (multiple call program). To improve reach, quitlines could provide a "heads-up" text to patients prior to calling, use a single identifier for caller-ID, or switch to text-based services, among other innovations. To ensure service delivery quality, contractors could mandate reporting of the proportion of fax-referred tobacco users served.

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## POS5-71

### PLAYING AROUND WITH QUITTING SMOKING: A RANDOMIZED PILOT TRIAL OF MOBILE GAMES AS AN URGE RESPONSE STRATEGY

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**SIGNIFICANCE:** Attempts to quit smoking often fail due to at least in part to craving. Unfortunately, medication and counseling only modestly quell craving. This research examined whether mobile games can help smokers trying to quit decrease their cravings and increase their chances of quitting. We hypothesized that smokers quitting with versus without instructions to use study-selected mo-

bile games would smoke fewer cigarettes post-target quit day (TQD) and have higher quit rates. **METHODS:** Participants (N = 30) in a pilot cessation trial were offered 4 weeks of nicotine patch plus 5 brief counseling sessions through Week 4 post-TQD. Participants were randomized to game access versus no access. The games were 11 commercial mobile games on a study smartphone available from the TQD through Week 4 post-TQD. Every fifth time participants randomized to games tried to play a game, however, the smartphone required them to wait 2 minutes to play the game. **RESULTS:** Of participants randomized to games (n = 16), 25% did not play at all; 38% played on >1/3 of days; and one participant played on >80% of days. Due to the small N, no effects discussed below were significant (p's >.05). Participants who played games showed modest pre- to post-game decreases in urges to smoke; when these participants tried to play a game but were blocked from playing for 2 minutes, they showed modest increases in urges to smoke. A mixed effects ANOVA was conducted on mean cigarettes smoked per day each week with repeated measures across Weeks 1-4 and controlling for baseline cigarettes per day. There was a non-significant Group x Time interaction (F = 2.32, p = .13,  $\eta_p^2 = .08$ ); those randomized to games decreased their cigarettes per day through Week 3, while the control group increased each week through Week 4. Those randomized to games versus no games had a slightly higher carbon monoxide-confirmed 7-day point-prevalence abstinence rate at Week 4 (25 vs 21%, ns), and a modestly higher self-reported continuous abstinence rate to Day 28 (31 vs. 21%, ns). **CONCLUSIONS:** Mobile games may help some smokers respond to urges to smoke. The results encourage more research on this intervention strategy.

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## POS5-72

### COMPARING ELECTRONIC CIGARETTE DEVICE AND LIQUID CHARACTERISTICS AS WELL AS BIOMARKERS OF EXPOSURE AMONG USERS WHO ARE AND ARE NOT FORMER SMOKERS

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**SIGNIFICANCE:** Although most US electronic cigarette (ECIG) users are current or former cigarette smokers, 16% have never smoked cigarettes. The purpose of this study was to compare ECIG users who are or are not former smokers on various outcomes. **METHODS:** Experienced ECIG users provided information regarding ECIG device/liquid characteristics, dependence level (Penn State Dependence questionnaire) and a urine sample pre and post 12 hours of ECIG abstinence. **RESULTS:** Of 38 ECIG users, 26 were former/current smokers ( $\leq 3$  cigarettes/week) and 12 were never smokers (<5 cigarettes, lifetime). Groups did not differ significantly in self-reported device/liquid characteristics, urine cotinine, or propylene glycol (PG) concentration [t(35)<0.4, p>.05]. Mean (SD) reported device power was 47.1 W (32.2) for former smokers and 77.8 W (63.4) for never smokers and mean liquid nicotine concentration was 7.6 mg/ml (4.4) for former smokers and 7.3 mg/ml (3.2) for never smokers; mean urine cotinine concentration was 578.2 ng/ml (399.1) for former smokers and 473.3 ng/ml (324.8) for never smokers. However, mean (SD) dependence scores were 9.3 (5.0) for former smokers and 6.0 (4.2) for never smokers [t(35)= -2.2, p<.05] and mean age was 29 years (7.7) for former smokers and 21 years (2.2) for never smokers [t(35)= -5.4, p<.01]. Notably, although groups did not differ in urine PG concentration, significant decreases in urine PG concentration were observed for both groups after 12 hours ECIG abstinence [t(35)= 3.1, p<.05]; mean (SD) urine PG was 12.2 mcg/ml (23.3) pre-abstinence and 3.6 mcg/ml (7.7) after 12 hours ECIG abstinence. **CONCLUSIONS:** In this sample, 32% of experienced ECIG users were never smokers, and they were younger and less dependent than former smokers, though no differences were observed in product characteristics or urine cotinine or PG concentration. The public health and regulatory implications of ECIGs that support regular use in non-smokers are uncertain. Clarification likely requires monitoring and assessing of experienced ECIG users current/former smoking status, verifying product characteristics, and measuring dependence as well as biomarkers of exposure.

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## POS5-73

### COMPARISON OF MEASUREMENT METHODS FOR CIGARETTE AND SMOKELESS TOBACCO USE

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**SIGNIFICANCE:** Gaining a better understanding of tobacco dependence requires the use of measures that are reliable and valid. Few comprehensive comparisons of measurement methods are available for cigarette smoking, and virtually none are available for smokeless tobacco (SLT) use. **Purpose:** This secondary data analysis was performed to compare methods of global self-report, ecological momentary assessments via electronic diary, and returned cigarette butts among a sample of dual cigarette-SLT users. **METHODS:** Participants (N=52) self-reported their cigarette and SLT use via a global questionnaire during an in-person screening interview. For 14 consecutive study days, they also recorded their natural patterns of product use in real-time via electronic diary and returned butts from all cigarettes smoked. **RESULTS:** High rates of digit bias (values rounded to 0 or 5) were observed for global self-reported CPD (>86%) but not DPD (<12%). Participants were consistent with their recording of cigarettes and SLT via electronic diary across days [ICC's (95% CI's) = .57 (.45-.69) and .33 (.20-.52), respectively], and with their returned cigarette butts (.59 (.49-.71)). Still, CPD as measured by diary records and returned butts varied on one or more days by at least 5 cigarettes for 94% of participants. Additionally, global self-reported CPD differed from diary records and returned butts on one or more days by at least 5 cigarettes for 64% and 65% of participants, respectively. Indeed, mean global self-reported CPD (Mean $\pm$ SD = 19.7 $\pm$ 9.0) was significantly higher than diary records (from 9.3 $\pm$ 5.7 to 13.9 $\pm$ 8.4) and returned butts (from 8.6 $\pm$ 5.8 to 13.5 $\pm$ 8.2) across days (p's<.01), while the latter two methods were not different from one another (most p's>.05). As for DPD, self-reports (4.4 $\pm$ 2.3) were also significantly higher than diary records (from 1.3 $\pm$ 1.4 to 2.5 $\pm$ 2.0) across days (most p's<.05). **CONCLUSIONS:** Daily product use as measured by global self-reports was significantly different from that measured by other methods. This finding may be due to increased burden on participants, which has been reported in previous work for cigarette smoking.

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## POS5-74

### EFFECT OF SWITCHING FROM MENTHOL TO NON-MENTHOL CIGARETTES ON NICOTINE METABOLITE RATIO (NMR)

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**SIGNIFICANCE:** Nicotine and cotinine metabolism is primarily mediated by the cytochrome P450 2A6 isoenzyme (CYP2A6), the activity of which can be estimated using the nicotine metabolite ratio (NMR) which is the ratio of 3-hydroxycotinine (3HC) to cotinine (COT). The NMR has been reported to predict cessation success and has been suggested as a measure that can guide smoking cessation therapy among smokers wishing to quit. The effect of menthol on NMR is therefore of importance however data has been inconsistent regarding how it is affected by menthol. **METHODS:** African American smokers of menthol cigarettes were randomized to either continue smoking menthol cigarettes for an approximately 4 week period or to switch to non-menthol cigarettes during this period. Urine was collected at baseline and at the end of the 4 week period from which concentrations of COT and 3HC were measured. NMR was calculated as 3HC / COT. **RESULTS:** Data from both time-points is available for 95 subjects of whom 48 were randomized to continue smoking menthol cigarettes and 47 to switch to non-menthol cigarettes. 37% of subjects were female; age (mean (SD)) of subjects was 46 (11) years. No significant difference in NMR at week 4 (after adjusting for baseline NMR) was found between groups. Among those randomized to continue smoking menthol cigarettes, baseline NMR was 2.45 and week 4 NMR was 2.99; among those randomized to non-menthol cigarettes the NMR was 2.82 at baseline at week 4 was 3.11. Separately evaluating male and female subjects found no significant differences in either sex. **CONCLUSIONS:** Switching from menthol to non-menthol cigarettes did not result in changes to urinary NMR in African American menthol cigarette smokers. This suggests that differences in cessation success between menthol and non-menthol smokers

are likely not due to menthol's effects on nicotine metabolism. Further research is needed to determine reasons for inconsistencies among studies on the effect of menthol on NMR.

FUNDING: Federal; Non-profit

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## POS5-75

### TOBACCO USE, QUIT ATTEMPTS, AND CARDIOVASCULAR DISEASE RISK AMONG PATIENTS LIVING WITH HIV IN GUATEMALA, A LOW/MIDDLE INCOME COUNTRY

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**SIGNIFICANCE:** Antiretroviral therapy (ART) has dramatically reduced HIV morbidity and mortality. However, it is also associated with increased cardiovascular disease (CVD) risk. Tobacco use is the number one preventable cause of CVD and is particularly high among people living with HIV (PLWHIV). Guatemala is a low/middle income country with weak FCTC implementation, particularly among vulnerable populations. Therefore, we sought to assess CVD risk, tobacco use, and quit attempts among PLWHIV in Guatemala. **METHODS:** We surveyed PLWHIV from the Roosevelt Hospital HIV Clinic between August and October 2017. After obtaining informed consent, patients were interviewed to estimate the 5-year CVD risk using the Data collection on Adverse Effects of Anti-HIV Drugs Study (DAD) equation. Age, sex, systolic blood pressure, smoking status, and family history of CVD and diabetes were collected. Cholesterol levels and ART use were gathered from patients' charts. Smokers also answered a survey adapted from the International Tobacco Control Policy Evaluation Project to assess quit attempts, and perceptions and knowledge of tobacco health effects and constituents. **RESULTS:** A total of 816 PLWHIV were surveyed, most were male (503, 61.6%), mean age 41.0 (SD 12.1) years. Mean total and HDL cholesterol levels were 4.64 and 1.11 mmol/l, respectively. Overall, 95 (11.6%) of PLWHIV were considered to be at high and 77 (9.4%) at very high risk for developing CVD. One hundred and one (12.4%) were current and 222 (27.2%) former smokers. On average, smokers have made 2.8 ± 1.9 quit attempts, most (78, 77.2%) know of the harmful effects of tobacco and 45 (44.5%) were aware of the constituents. **CONCLUSIONS:** PLWHIV have a high risk of CVD. Smoking prevalence is high and a contributing factor to CVD. Our data should support FCTC implementation to provide cessation treatment to PLWHIV.

FUNDING: Academic Institution

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## POS5-76

### HOW PSYCHOLOGICAL DISTRESS IS RELATED TO SMOKERS' RESPONSES TO MESSAGES COMMUNICATING COMPARATIVE HARMS OF ELECTRONIC CIGARETTES AND COMBUSTIBLE CIGARETTES

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**OBJECTIVE:** Smoking is related to poorer mental health. While many smokers with mental illness want to quit, they find quitting more difficult due to nicotine addiction. Communicating to these smokers that electronic cigarettes (e-cigarettes) might be a less harmful alternative to regular cigarettes might be helpful. However, such messages might cause unintended consequences (e.g., dual use). Our study examined the relationship of smokers' psychological distress with their responses to messages communicating reduced harm of e-cigarettes. **METHOD:** In an online experiment, 1,202 U.S. adult smokers or recent quitters viewed 1 of 6 messages about reduced harm of e-cigarettes compared to cigarettes. Then participants reported their reactions to the message, perceived harm and behavioral intentions. Psychological distress was measured before message exposure. **RESULTS:** Regression analyses found that greater psychological distress was related to higher negative emotions (beta=.09), perceived harm of e-cigarettes (.03) and cigarettes (.02), self-efficacy (.01), support for tobacco control (.03), switch intentions (.03) and among current smokers: more intentions to quit (.04), seek help to quit (.02), and use nicotine replacement therapy (.02). Psychological distress was not re-

lated to positive emotions, perceived message effectiveness, comparative harm of e-cigarettes and cigarettes, perceived benefits of e-cigarettes or cigarettes, and did not predict greater intentions of dual use vs. exclusive e-cigarettes use or smoking cessation. **CONCLUSION:** Although people with more vs. less psychological distress reported greater perceived harm of e-cigarettes following exposure to reduced harm messages, they reported stronger intentions to switch to e-cigarettes or quit smoking. Smokers with greater psychological distress did not demonstrate more unintended consequences after seeing reduced harm messages. While more studies specifically focusing on smokers with psychological distress need to be done, our study provides early evidence that psychological distress is not related to undesired responses to comparative harm messages.

FUNDING: Federal

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## POS5-77

### THE NEUROCOGNITIVE IMPLICATIONS OF CHEWING TOBACCO AMONG PEOPLE LIVING WITH HIV IN INDIA

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**SIGNIFICANCE:** Two out of three (68.3%) people living with HIV (PLWH) in India use tobacco products. Despite this high prevalence, the neurocognitive implications of HIV and tobacco use remain unknown. Tobacco use among HIV- controls is known to induce apoptosis via oxidative stress and vascular degradation. It is unknown if the adverse effects of tobacco will exacerbate HIV-associated premature vascular aging, or if the possible positive immunomodulatory effects of nicotine will engender neuroprotective processes. This cross-sectional analysis sought to examine these possibilities. **METHODS:** An Indian sample of 339 HIV+/- participants completed a gold standard neuropsychological (NP) battery, comprehensive neuromedical assessment, and an HIV-related biomarker panel. HIV+ participants (n = 204) were antiretroviral naive. Separate three-way interaction Least Squares (LS) models of age, HIV status, and tobacco use (naive vs. chewing within the past 30 days) were constructed to predict global and domain-based NP deficit scores (which adjust for demographic characteristics). A backwards stepwise logistic regression model identified biomarkers most predictive of cognitive impairment. **RESULTS:** The cohort was primarily male (52.2%), had a mean age of 33.0 (±7.5) years, and had never used tobacco (52.2%). Global NP deficit scores were predicted by a two-way interaction between HIV status and tobacco use (beta = -.5348, p = .0347), such that the adverse NP effects of HIV were reduced among chewers. Global level interactions were primarily driven by the motor domain. Worse motor performance was predicted by HIV+ status, recent tobacco use, and older age (beta = .0939, p = .0038). Among HIV+ chewers, IP-10 (an indicator of T-cell migration across the blood brain barrier) was the primary predictor of motor impairment (X<sup>2</sup> = 4.53, p = .0343, df = 1). **CONCLUSION:** Chewing tobacco adversely impacts motor cognition and this effect strengthens with age. However, nicotine may modulate the neuroinflammatory state of PLWH resulting in global neuroprotection. Future studies should investigate these outcomes in a longitudinal fashion while examining biomarkers of chewing tobacco.

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## POS5-78

### RESPONSES TO MESSAGES COMMUNICATING COMPARATIVE HARMS OF ELECTRONIC CIGARETTES AND COMBUSTIBLE CIGARETTES: SMOKING IDENTITY, THREAT, AND EFFICACY

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**OBJECTIVE:** Stronger smoking identity (centrality of smoking to one's self-concept) is related to more defensive responses to antismoking messages (e.g., message avoidance). Yet, it is not clear how smoking identity is related to smokers' responses to messages communicating e-cigarettes as a less harmful option than regular cigarettes, particularly when the messages also emphasize smoking risks. This study examined the relationship between smoking identity and smokers' re-



sponses to comparative risk messages in terms of two threat and two efficacy variables theorized to predict protective actions: perceived severity, susceptibility, response and self-efficacy. **METHOD:** In an online experiment, 1,089 U.S. adult current smokers were randomized to view a message about reduced risk of e-cigarettes with or without information about smoking risks. Then participants reported their perceived smoking threat (severity and susceptibility) and efficacy (response efficacy and self-efficacy for quitting smoking) and intentions to quit smoking. Smoking identity was assessed before message exposure. **RESULTS:** Regression analyses showed that smoking identity predicted greater perceived smoking severity (beta=.26) and less self-efficacy (-.25). Smoking identity interacted with message type. For messages with both reduced risk of e-cigarettes and smoking risks, stronger smoking identity predicted greater perceived severity (.29), susceptibility (.39), and response efficacy (.23). For reduced risk only messages, stronger smoking identity predicted lower self-efficacy (-.42). Greater perceived threat and efficacy in turn predicted more intentions to quit smoking, seek help to quit and obtain nicotine replacement therapy. **DISCUSSION:** Overall, comparative risk messages did not lead to more negative outcomes among people with a high vs. low smoking identity, particularly when the messages also emphasized smoking risks. However, smokers with high smoking identity reported low self-efficacy for reduced risk only messages. As self-efficacy is related to smoking cessation, it is important for reduced risk messages to enhance high smoking identifiers' self-efficacy in quitting.

FUNDING: Federal

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## POS5-79

### DESCRIPTION OF SINGLE NUCLEOTIDE POLYMORPHISM IN ASSOCIATION WITH SMOKING CESSATION AMONG MEXICAN SMOKERS

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**SIGNIFICANCE:** Nicotine addiction is a complex brain disorder which affects the mesolimbic, dopaminergic and serotonergic pathways, as well as neuronal communication. Multiple studies in the Caucasian population have identified variants in genes that encode proteins of the mentioned pathways associated with the degree of addiction, smoking initiation or smoking cessation. **Aim:** To describe 20 single nucleotide polymorphisms (SNPs) in 6 candidate genes' (*CHRNA3*, *CHRNA5*, *NRXN1*, *DRD4*, *HTR2A* and *CYP2A6*) association with quitting smoking in a sample of Mexican smokers. **METHODS:** A total of 40 Mexican smokers were recruited via multimedia to participate in *e-Decide!* a 12-week smoking cessation text message program including nicotine replacement therapy at no cost. For daily smokers, a baseline peripheral blood sample was obtained to evaluate the genetic profile. Smoking cessation was biochemically verified at 12-weeks. 20 SNPs were genotyped in the 6 genes by real-time PCR using TaqMan probes. The analysis of alleles and genotypes was carried out using the EpilInfo v7 program. A follow-up assessment was conducted at 12-weeks. Participants who quit smoking were used as controls, while participants who relapsed were used as cases. **RESULTS:** At 12 weeks, a total of 33 daily smokers completed the follow-up assessment. Out of the 33, 16 (48%) participants relapsed (cases) and 17 (52%) quit smoking (controls). The rs985919 in *NRXN1* gene was associated to risk of relapse ( $p = 0.0366$ , OR = 5.50, CI 95% = 1.21 - 24.81) when the TT genotype was found. The same tendency was observed in the analysis by alleles: T, 87.5% vs. 58.8% (OR = 4.90, 95% CI = 1.40-17.11). No other genes/SNPs were found associated. **CONCLUSIONS:** The rs985919 (TT genotype and T allele) in *NRXN1* gene might be associated to relapse in smoking abstinence among Mexican population. Further research needs to be conducted using a bigger sample size to prove this variant allele is associated with the risk of smoking relapse.

FUNDING: Academic Institution; Federal

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## POS5-80

### RETENTION IN A RANDOMIZED CONTROLLED TRIAL OF ELECTRONIC CIGARETTES AMONG SMOKERS INTERESTED IN REDUCTION

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**SIGNIFICANCE:** Mitigating attrition is a key component in longitudinal randomized controlled trials (RCTs) to reduce bias. Few studies of electronic cigarettes (ECIGs) allow for the examination of long-term retention patterns. This analysis will help characterize the relationship between retention, a variety of baseline measures, and primary study product assigned, ECIG vs. cigarette substitute (CIG SUB), in a 9-month RCT. **METHODS:** Participants (N=520) were current smokers ( $\geq 10$  cigarettes per day [CPD] for  $\geq 1$  year) interested in reducing and were randomized to 1 of 4 conditions: 75% to an ECIG differing in nicotine level, 0, 8, or 36 mg/ml (double-blind); 25% to a cigarette-shaped plastic tube (CIG SUB). Currently, 39% have completed the study, 38% have withdrawn (voluntary/PI decision), and 23% are still enrolled. Study site, condition group randomized, and baseline measures (age, gender, race/ethnicity, baseline CPD, years smoking, baseline expired air CO, nicotine dependence) were included. Bivariate tests and logistic regression were performed across the sample and stratified by condition (ECIG vs. CIG SUB) to examine the relationship between selected covariates and retention status (completed vs. withdrawn). **RESULTS:** On average (SD), participants were aged 46 years old (12), 41% male, 68% White, 32% Black/Other, and smoked 20 CPD (8). Across the sample, bivariate results revealed significant or marginal ( $p < 0.10$ ) differences between completers and withdrawals for age, education, baseline CPD, and nicotine dependence. Within conditions, fewer bivariate baseline differences were observed for CIG SUB relative to ECIG. Overall regression results indicated younger age, less education, and higher baseline CPD were positively associated with withdrawal ( $ps < 0.001$ ). For regressions stratified by condition, baseline CPD was not associated with withdrawal for CIG SUB. **CONCLUSIONS:** Across and within conditions, younger age and less education predicted withdrawal. Effects of baseline CPD were only noted for the overall sample and for ECIG participants. ECIG characteristics and/or participant expectancies may be affecting retention differentially between conditions.

FUNDING: Federal; State

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## POS5-81

### AGE OF SMOKING ONSET AMONG MAJOR RACE/ETHNIC GROUPS: COMPARING CALIFORNIA WITH THE REST OF THE US

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**SIGNIFICANCE:** California has been at the forefront of reducing tobacco use in the United States for the past few decades. This study aimed to examine the differences in age of onset of regular cigarette smoking among racial/ethnic groups in California compared to the rest of the U.S. **METHODS:** Cross-sectional data from the 2001-2015 Tobacco Use Supplements to the Current Population Survey were weighted to estimate the mean of age of onset of regular smoking onset for California and the rest of the U.S. Data were stratified by race/ethnicity (i.e., non-Hispanic Whites, African Americans, Hispanic/Latinos, American Indian/Alaska Natives, and Asian/Pacific Islanders). **RESULTS:** Age of onset for cigarette smoking among non-Hispanic whites in California was significantly higher (mean age=17.5 years, 95% CI: +/-0.05) than the US (mean age=17.1 years, 95% CI: +/-0.01). Results also showed that age of onset for Hispanics/Latinos (mean age= 17.9 years, 95% CI: +/-0.06) and American Indian/Alaskan Natives (mean age=17.7 years, 95% CI: +/-0.29)) in California also initiated at significantly older ages than their US counterparts (mean age=17.6 years, 95% CI: +/-0.03 and 16.7 years, 95%CI: +/-0.07, respectively). For African Americans and Asian/Pacific Islanders, the differences in age of onset between California and the U.S. was not significant, however both groups had significantly older age of onset than all other race/ethnic groups (mean age >18.3 years). **CONCLUSIONS:** Some California racial/ethnic groups have older age of onset of regular smoking compared the rest of the U.S., but significant disparities still exist, prompting the need for more prevention and treatment interventions.

FUNDING: State

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## POS5-82

### PERCEPTIONS OF THE RELATIVE HARM OF SEVEN TOBACCO PRODUCTS

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**SIGNIFICANCE:** As more and diverse tobacco products are increasingly available in the US tobacco market, it is important to understand how people perceive the relative harm of the variety of products available to them. Many studies use either absolute measures of harm or measure harm relative to cigarettes. Because of changes in the tobacco product market, it may be necessary to develop an approach to the assessment of harm that encompasses all the products, and their associated risks, that consumers have available to them at any given time. **METHODS:** This study explored how people assessed relative harm among seven tobacco products: cigarettes, cigars, pipes, hookah, smokeless tobacco, dissolvable tobacco, and electronic nicotine products. A total of 79 adults and youth (ages 12-17) were given cards with unbranded images and descriptions of the products. Respondents were asked to sort the cards in a row from least harmful to most harmful. If products were perceived as equally harmful, respondents placed them side by side. Respondents were then asked to explain the reasoning behind the sort order. **RESULTS:** Factors considered by respondents when assessing relative harm among the tobacco products included product toxicity, delivery mechanism, frequency of use, quantity of tobacco, impact on others, personal experience, advertising claims, conventional wisdom, appearance (e.g., what "looked harmful"), and purpose of use. **CONCLUSIONS:** Based on the card sort activity, respondents seem to be considering a variety of factors when assessing the relative harm of tobacco products. This suggests a need for tobacco researchers to consider relative measures of harm, rather than absolute harm or harm relative to cigarettes, in future research efforts.

**FUNDING:** Federal; Westat

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## POS5-83

### TO HOOKAH OR NOT TO HOOKAH? A THEMATIC CONTENT ANALYSIS OF CONSUMER-DRIVEN SOCIAL MEDIA CONVERSATIONS ABOUT HOOKAH

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**SIGNIFICANCE:** About 100 million people worldwide use hookah (i.e., waterpipe tobacco), and the use of this product has become more prevalent among US youth and young adults in recent years. This may be due, in part, to increased interpersonal discussions about hookah among online social networks, which can promote favorable attitudes and lower perceptions of health risk. **METHODS:** Using Tracc, a buzz monitoring platform, data from a one year time period (2016-2017) were extracted using the keywords "hookah OR shisha OR sheesha OR nargile OR narghile OR waterpipe OR hubblebubble OR arghila OR Argilah OR Argileh". Data were cleaned to ensure that mentions were only from social media sites (e.g. Twitter) and consumer-driven (e.g. did not contain sales content). A final sample of 2,500 mentions was analyzed on nine content themes (Secondhand Smoke, Costs, Negative Sensory, Difficulty in Preparation, Addictiveness, Social Pressure, Negative Social Perception, Health Consequences, Not Rewarding) and valence (positive/negative/neutral). **RESULTS:** Out of the 2500 mentions analyzed, 80% were on Twitter (N = 2,011), 19% on Instagram (N = 472), and 1% on Facebook (N = 17). Overall, only 14% of posts were negatively valenced towards hookah (N = 353) while 24% were positively valenced (N = 597). The remainder were neutral, with such examples as "Hookah bar tomorrow with Drew, Mercedes and Alex." Valence differed by platform with positive sentiment equally distributed across Instagram and Twitter and negative sentiment mostly showing up on Twitter. Common themes that emerged included the socialization of hookah (N=263) and use of hookah to compliment other enjoyable activities (N = 95); while themes such as health consequences (N = 56) were less common. **CONCLUSIONS:** Discussions of hookah on social media are supportive of its use, promote its benefits, and highlight the social aspects of using hookah. Findings suggest that social media may be an important communication platform for future behavior change interventions.

**FUNDING:** Unfunded

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## POS5-84

### EFFECT OF ELECTRONIC CIGARETTE ADVERTISING THEMES ON ABUSE LIABILITY AMONG ADOLESCENTS

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**SIGNIFICANCE:** Given increases in youth electronic cigarette (ECIG) use and limited restrictions on advertising, an understanding of how ECIG advertising affects ECIG abuse liability among adolescent cigarette smokers and nonsmokers is needed to inform ECIG advertising policies. **METHODS:** Cigarette smokers (n=584) and tobacco-susceptible nonsmokers (n=501) aged 13-18 were randomized to 1 of 4 advertising themes derived from a previous content analysis: control (ads for water), General ECIG ads, Flavor and Taste ECIG ads, and People and Youth ECIG ads. Abuse liability was measured by a modified purchase task that asked participants to report their likelihood of buying an ECIG (Likert-type scale from 0, Definitely NOT buy, to 10, Definitely WOULD buy) at a variety of increasing prices, \$0.00 - \$140 USD. Breakpoint, the price at which participants definitely would not buy any ECIGs, was the main outcome; inflection point, the price at which participants switched from probably buying an ECIG (responses >4) to probably not buying an ECIG (responses 4 or lower), was also assessed. Because nearly 1 in 3 youth reported no ECIG demand at any price, logistic regressions tested differences by condition in willingness to purchase ECIGs at any price, while linear regressions tested differences by condition in log-breakpoint or log-inflection point for those with positive demand values. Smokers and nonsmokers were analyzed separately. **RESULTS:** Median ECIG breakpoint for smokers was \$6 (interquartile range [IQR] \$34.5) and for nonsmokers was \$0.25 (IQR \$6); median inflection points were lower (smokers: \$3, IQR \$6; nonsmokers: \$0, IQR \$2). No differences were found by condition in willingness to purchase ECIGs at any price for smokers or nonsmokers (ps>0.05). However, among smokers with positive demand values, exposure to the People and Youth-themed ECIG ads was associated with higher log-breakpoints (beta=0.66, p<0.05) and log-inflection points (beta=0.75, p<0.05). **CONCLUSIONS:** Results provide preliminary evidence that ECIG ads highlighting people and youth may increase demand for ECIGs among cigarette-smoking youth, suggesting a potential focus for ECIG advertising regulations.

**FUNDING:** State

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## POS5-85

### RECOMMENDATIONS FOR EXPANDING PEER CROWD TARGETING IN TOBACCO PREVENTION CAMPAIGNS: NEW DATA FROM A NATIONAL SURVEY

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**BACKGROUND:** Audience segmentation and targeting is a simple way to improve the effectiveness of tobacco education. FDA's FRESH EMPIRE, Real Cost Smokeless and This Free Life campaigns target young people based on peer crowd (identification with a subculture, e.g., hip hop, country and LGBT respectively). While prior research has found peer crowd is associated with cigarette use, there is no recent national data examining its association with other tobacco products. The current study identifies peer crowds with high rates of tobacco use and susceptibility to use. **METHODS:** We conducted a national online survey with 2,619 adolescents age 13-17 assessing susceptibility to use, ever use and established use of cigarettes, e-cigarettes, smokeless tobacco, and little cigars and cigarillos. Participants indicated how much (0-10) they identified with each crowd on a list of crowds identified in prior research. Data were analyzed using logistic regression analyses in Stata 15. Bonferroni corrections accounted for multiple significance tests. Analyses controlled for age, gender, ethnicity, sensation seeking, reactance, and knowledge about the harmfulness and addictiveness of tobacco products. **RESULTS:** Peer crowd identification significantly predicted tobacco use. Those identifying as burnouts and hip hop had significantly higher odds of ever using all types of tobacco products. For example, burnouts were 28% more likely to have ever used cigarettes and those in the hip hop crowd were 13% more likely to use little cigars and cigarillos. Those who identified as country had the highest odds of ever using smokeless products (OR=1.24). Hippie, metal, partier, popular, punk, rebel, and skater crowds had higher odds of susceptibility to or use of tobacco products. Academics had the lowest odds of use of cigarettes and e-cigarettes. **Implications:** Hip hop and country crowds had higher odds of tobacco use; but there are other crowds not currently targeted that are also susceptible to tobacco



use. Targeting these crowds or finding commonalities across crowds (e.g., interest in certain types of media or events) might increase the reach and effectiveness of tobacco prevention campaigns.

FUNDING: Federal

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## POS5-86 RETAILING E-CIGARETTES IN A QUASI-REGULATED ENVIRONMENT

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**SIGNIFICANCE:** In Canada, it is illegal to sell e-cigarettes and e-liquids with nicotine. Although tobacco companies have not yet entered the e-cigarette market, nicotine and non-nicotine e-cigarettes are openly sold in various retail environments, with annual sales up by 41%, totaling CAN\$88 million in 2015. Product placement in retail outlets may be the most prominent form of marketing. Understanding the availability of products in various retail environments under these circumstances is crucial to informing development of regulatory policies. **METHODS:** In September 2017, we audited the availability of e-cigarettes and related products in 52 retail stores in five cities in Ontario, Canada. We also interviewed sales representatives to assess support for product regulations. Data were analyzed by four store types: convenience stores, head shops, tobacconists, and vape shops. **RESULTS:** Nicotine-containing e-liquid was available in all vape stores and tobacconists, with some vape shops offering to mix personalized flavours and nicotine concentrations in-store. One third of convenience stores sold nicotine-containing e-products. Disposable e-cigarettes were visible in most convenience stores (63%) and tobacconists (60%), whereas rechargeable or refillable e-cigarettes were prevalent in all vape shops and most tobacconists (80%). Although head shops carried various devices, only 1 in 3 carried any e-liquid. Convenience stores and tobacconists had limited flavours of e-liquid, whereas vape shops had a considerable selection. Vape shops and tobacconists agreed with sales restrictions to minors, however, they indicated concerns about further regulations, especially in relation to e-liquid flavours. **CONCLUSIONS:** A range of e-cigarette products and nicotine concentrations are widely available in Ontario, with variation by store type. Through placement in a variety of retail environments, the e-cigarette industry has had considerable success in marketing despite the absence of big tobacco and very limited advertising in mass media channels. Continued monitoring of product availability and marketing in both retail and online stores is needed to inform future e-cigarette policy.

FUNDING: State

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## POS5-87 NEGATIVE EMOTIONAL RESPONSES TO PICTORIAL WARNINGS MAY ENHANCE CESSATION BY PROMOTING ATTENTION TO EFFICACY MESSAGES ON PACKAGE INSERTS: EVALUATING CANADA'S INNOVATIVE LABELING POLICY

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**SIGNIFICANCE:** Canada is the only country whose labeling policy requires both pictorial warnings that graphically illustrate health consequences of smoking, as well as package inserts, which feature efficacy messages about the benefits of quitting and cessation tips. This study examined whether negative emotional responses to pictorial warnings promote cessation by increasing Canadian smokers' attention to inserts. **METHODS:** An online cohort of Canadian adult smokers participated in seven waves of surveys from September 2012 to 2014 (n=1,432 smokers, 4,903 observations). Smokers rated warnings on packs at the time of the survey for negative emotional responses (i.e., fear, disgust, worry; range: 1-9) and reported the frequency of reading inserts in the prior month (range: 1-3). Generalized estimating equation models assessed the relationship between negative emotions and subsequent reading of inserts and quit attempts. A path analysis was conducted using a bootstrap procedure to assess the indirect effect of negative emotions on subsequent quit attempts via reading inserts and other established

mediators (e.g., forgoing cigarettes). All models were adjusted for socio-demographic and smoking-related variables, including reading warnings. **RESULTS:** Stronger negative emotional responses to warnings predicted more frequent reading of inserts at follow-up (Adjusted OR [AOR]=1.04, p<0.001), adjusted for baseline frequency of reading inserts. Stronger negative emotions (AOR=1.06, p<0.05) and more frequent reading of inserts (AOR=1.32, p<0.001) predicted greater likelihood of quit attempts at follow-up, with no statistically significant interactions between negative emotions and reading inserts. The indirect effect of negative emotions on subsequent quit attempts via reading inserts was statistically significant (b=0.03, p<0.01). **CONCLUSIONS:** Negative emotional responses to pictorial warnings promotes quit attempts, which in Canada, appears at least partly explained by increased attention to package inserts with efficacy messages. To maximize labeling policy effectiveness, countries should consider using inserts with messages that complement fear arousing warnings.

FUNDING: Federal

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## POS5-88 WEBSITES FOUND ON CIGARETTE PACKS IN 13 LOW-AND MIDDLE-INCOME COUNTRIES: A CONTENT ANALYSIS

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**BACKGROUND:** The promotional space accessible to tobacco companies has declined as countries increase the size of warning labels on cigarette packs. URLs are often included on cigarette packaging, but little is known about the websites' content. This study examines the content of the corporate web addresses found on cigarette packs. **DESIGN/METHODS:** Tobacco packs collected from 13 countries in 2013 (N=3307) for the Tobacco Pack Surveillance System were coded for presence of a URL. A codebook quantitatively assessed websites' promotional tactics, marketing appeals, regulatory controls and warnings, harm reduction terminology, responsible marketing claims, environmental claims, and other corporate social responsibility (CSR) claims. A content analysis was conducted of each main tab of the websites, 80% of websites were double-coded, and discrepancies were resolved via in-person discussion between coders. Cross tabulations were used to assess the proportion of websites in each code. As China has been slow to implement tobacco control policies, and state-owned corporations might impose their own restrictions, it was suspected that Chinese state-owned companies' marketing might differ from the marketing of multinationals. Fisher's Exact test assessed this difference. **RESULTS:** About a quarter of packs had a web address and 24 of 89 websites identified were corporate websites. CSR claims (100%), and quality (88%), popularity (54%), and global appeals (79%) were frequently observed. Multinational websites (n=8) were more likely to discuss consumer education (p=.007), company transparency (p=.041), responsible marketing (p=.026), and environmental sustainability (p=.010). Chinese websites were more likely to discuss support for academics (p=.026) and were more likely to use taste appeals (p=.026). **CONCLUSIONS:** Tobacco companies may be putting URLs on their cigarette packs to increase consumer exposure to CSR and marketing appeals, although it remains unclear who uses them. The potential of these websites to advertise and promote tobacco products should be considered when discussing regulation of tobacco marketing.

FUNDING: Non-profit

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## POS5-89 COMMUNICATION, RECOMMENDATION, AND BELIEFS OF ELECTRONIC CIGARETTES AMONG US PHYSICIANS

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**SIGNIFICANCE:** With the scientific evidence on e-cigarettes continuing to evolve and the prominent role that e-cigarettes may play in FDA's comprehensive nicotine policy in the coming years, it is critical to continue to gauge the perceptions and practices of physicians regarding e-cigarettes. The aim of this study was to

add to the growing body of knowledge about provider-patient communications and recommendations of e-cigarettes. **METHODS:** Using the AMA's Masterfile, we conducted a mail survey of board certified physicians stratified by six specialties including family medicine, internal medicine, obstetrics & gynecology, cardiology, pulmonary/critical care, and hematology/oncology. Physicians received a survey instrument with a \$25 Starbucks® gift card as well as follow-up postcards and mailings, including an option to complete the survey online. **RESULTS:** In all, 324 surveys were completed, yielding a response rate of 37.2%. Overall, 72.9% of physicians reported that patients have ever asked about e-cigarettes and 19.1% had advised a cigarette smoker to switch to e-cigarettes. In clinical scenarios, physicians were more likely to recommend e-cigarettes to an older patient with a history of heavy smoking and several failed quit attempts but more likely to advise FDA-approved medications to a younger, lighter smoker who had never tried pharmacotherapy. Two-thirds of physicians felt that all forms of tobacco were equally harmful and cessation from all tobacco was best while one-third believed quitting cigarettes should be the goal, even if it meant switching to less harmful forms of tobacco. **CONCLUSIONS:** Some physicians believe e-cigarettes could help patients quit smoking in certain circumstances. Also, physicians' understanding of harm reduction and relative risk of nicotine delivery products should be better aligned with the current scientific evidence.

**FUNDING:** Federal

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## POS5-90 IMPLEMENTATION AND EVALUATION OF ASPIRE (A SMOKING PREVENTION INTERACTIVE EXPERIENCE) IN HISD SCHOOLS

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**BACKGROUND:** The UT MD Anderson Cancer Center provides outreach to improve school-based tobacco control education. "A Smoking Prevention Interactive Experience" (ASPIRE) is an online curriculum that informs adolescents about the risks of tobacco products and reinforces tobacco-free norms. It is available in English and Spanish. Hundreds of schools use ASPIRE nation- and worldwide. Houston Independent School District (HISD) has 77 schools with 80,187 students eligible to participate. **OBJECTIVES:** We examined ASPIRE users at HISD with respect to socio-demographic characteristics, prevalence of tobacco and nicotine product use, cognitive susceptibility and knowledge about their health consequences. **RESULTS:** To date, 3,078 students have enrolled in the ASPIRE study and 1,178 (38%) completed the post-exposure survey. The majority of participants (59%) were Hispanic and 23% were African Americans. Approximately 41% reported ever using a tobacco or nicotine product and 13% in the past 30 days. E-cigarettes and hookah were the most frequently used products followed by combustible cigarettes. The following risk factors were identified: Hispanic ethnicity, peer pressure, household smoking, and poor awareness of health effects. The post-ASPIRE survey evaluated its motivational appeal, educational value, and behavior modification. Over 75% of ASPIRE participants reported an increased knowledge of tobacco hazards, an intention to adopt a tobacco-free lifestyle, and a willingness to share ASPIRE with others. There was a significant reduction in cognitive susceptibility to tobacco use after exposure to ASPIRE. Approximately 55% of the susceptible participants at baseline became not susceptible at post-exposure ( $p < .05$ ). **CONCLUSION:** Majority of participants were positively influenced by ASPIRE (motivational appeal and educational value). Participants were more knowledgeable and willing to share the program with others. ASPIRE resulted in significant reduction in cognitive susceptibility to using nicotine and tobacco products. The program holds a considerable potential in informing youth about nicotine and tobacco products available on today's market.

**FUNDING:** State; Academic Institution

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## POS5-91 DIFFERENCES IN PUFF BEHAVIOR AND NICOTINE DELIVERY BETWEEN TWO E-CIGARETTE BRANDS

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**SIGNIFICANCE:** The evolution of the ECIG product class has sparked interest in how product characteristics interact with use behaviors and ultimately affect nicotine delivery. The purpose of this study is to compare adult smokers' puff topography and blood nicotine concentration when smoking their own brand of cigarettes (OB) compared to two common styles of entry-level ECIGs: a MarkTen XL (MT; ~24 mg/mL nicotine liquid) and a pen-style device (e-Go; 3.3 v, with 1.5 Ohm dual coil cartomizer, 25 mg/mL nicotine liquid). Smokers were allowed a 1-week period to familiarize themselves with the devices. **METHODS:** Cigarette smokers (N=18; 14 male, mean cigs/day=17.9) participated in an ongoing study that includes 6 lab visits (LV). Data for these analyses come from LV 2, LV 4, and LV 6. In LV 2, participants smoked their own brand (OB) of cigarettes. The e-Go and MT were used during LV 4 and 6 after participants had completed the product familiarization take home period. During all visits, participants completed directed and ad lib bouts while puff duration and puff volume were measured. Participants' blood was sampled before and after the directed bout to examine blood nicotine concentration. **RESULTS:** There were no statistically significant differences in puff volume or duration comparing the MarkTen, e-Go, and OB cigarettes in the directed or the ad lib bouts. Plasma nicotine concentration was significantly higher after the directed bout for OB cigarettes (mean =13.10 ng/mL; SD = 14.44) compared to the MT (mean = 2.68 ng/mL; SD = 4.4) and the e-Go (mean = 0.83 ng/mL; SD = 4.0;  $p$ 's < 0.05). **CONCLUSIONS:** After a week of familiarization, were no significant differences in puff duration and puff volume between either ECIG devices or between the ECIG devices and participants' OB cigarettes in this ongoing study. OB cigarettes delivered significantly more nicotine to participants than either ECIG device.

**FUNDING:** Federal

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## POS5-92 TOBACCO 21 IN HAWAII: ASSOCIATION WITH MENTHOL CIGARETTE SALES AT MILITARY INSTALLATIONS

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**SIGNIFICANCE:** In January 2016, Hawaii implemented the first statewide law in the U.S. to raise the minimum legal age for purchasing, possessing, selling, and using tobacco products from 18 to 21 years (T21). Military personnel younger than 21 years are covered by T21 in Hawaii. Given U.S. young adults' preference for menthol cigarettes, we assessed the association between T21 and patterns of menthol cigarette sales in Hawaii commissaries. **METHODS:** To account for secular trends, we compared sales patterns at 4 on-base military commissaries in Oahu, Hawaii (HI region) covered by T21 with patterns at 33 on-base military commissaries in the southwest (SW) region of the U.S. mainland, which were not covered by on-base T21 laws. We acquired Universal Product Code-level sales data from The Nielsen Company in 4-week aggregates from June 2012 to June 2017, yielding 45 pre- and 20 post-implementation periods for analysis. The data were centered at the time of Hawaii's law implementation, and segmented regression analyses were used to model sales of menthol cigarettes for the periods pre- and post-implementation. We estimated the average period-to-period change in menthol cigarette pack sales, and the proportion of menthol cigarette pack sales (menthol share) across all pre-post implementation periods within each region. Additionally, we tested the interaction between pre-post sales patterns and region. **RESULTS:** In both regions, average monthly pack sales of menthol cigarettes significantly ( $p < .01$ ) decreased from pre- to post-implementation (HI: -55%; SW: -38%). Pre-post changes in menthol pack sales were not significantly different between regions. However, menthol share decreased significantly more in HI (-18.6%) than in SW (-5.3%) ( $p < .01$ ). **CONCLUSIONS:** After accounting for secular trends, implementation of Hawaii's T21 law was associated with a significant decrease in



the proportion of menthol cigarette packs sold at Hawaii military commissaries. Given that many active-duty servicemen and women are aged 18-20 years, T21 laws that cover military bases, as part of a comprehensive tobacco control strategy, could help reduce tobacco product use among this population.

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## POS5-93

### 3H-NICOTINE SPECIFIC BINDING IN HUMAN WHITE BLOOD CELLS

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**BACKGROUND:** Recent data have suggested a possibility that the extent of nicotinic acetylcholine receptor (nAChR) upregulation in human white blood cells may be used as a biomarker of nicotine exposure. We sought to evaluate the feasibility of using 5-[125I]-A-85380 (selective beta2 subunit-containing or beta2\* nAChRs) to assess nAChR upregulation in white blood cells using minimal volumes of blood. **METHODS:** Polymorphonuclear leukocytes (PMN cells) and lymphocytes were separated from blood samples of 41 adults (24 females; mean age 40.4), including 27 smokers (average 15 cigarettes/day) and 14 non-smokers using Polymorphprep or Percoll. 5-[125I]-A-85380, 125I-labeled epibatidine (IPH) and 3H-nicotine were used to assess nAChR binding sites after ultrasonic disintegration of these cells. Nonspecific binding was assessed with 300 μM nicotine. **RESULTS:** Bmax values (mean ± SE) of 5-[125I]-A-85380 binding to PMN cells from a group of three smokers and a group of three non-smokers were 0.37 ± 0.21 and 0.31 ± 0.31 fmol/mg protein, respectively. These values are at least 80 times smaller than those previously found in PMN cells using 3H-nicotine (Lebargy et al. 1996; Benhammou et al. 2000). Similarly, specific binding (SB) of IPH at 300 pM to PMN cells were ca. 500 times lower than the values reported for SB of 3H-nicotine. The respective SB values of IPH for smokers (n = 24) and non-smokers (n = 11) were 0.01 ± 0.01 and 0.04 ± 0.02 fmol/mg protein. The SB of IPH to lymphocyte cells was virtually undetectable for both smokers (n = 9) and non-smokers (n = 6). In contrast, the SB of 10 nM 3H-nicotine to PMN cells from 3 smokers averaged 35 ± 8 fmol/mg protein, which is consistent with a previous report. However, this SB was not suppressed by 3.4 nM of 5-I-A-85380 or 26 μM of SR 16584 (selective for alpha3beta4\* nAChRs); the former blocked both IPH and 3H-nicotine binding to rat brain membranes, and the latter blocked IPH binding to the rat adrenal membranes. **CONCLUSION:** 3H-nicotine binding sites in smokers' PMN cells are unlikely to be typical beta2\* or alpha3 beta4\* nAChRs found in the nervous system. Future investigations of their nature and function are warranted.

FUNDING: Federal

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## POS5-94

### WILLINGNESS TO ACCEPT TOBACCO QUITLINE REFERRAL IN AN LGBT MEDICAL CLINIC

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**SIGNIFICANCE:** Sexual and gender minority individuals (LGBT) have higher smoking prevalence but use fewer cessation supports (LGBT: 15%; non-LGBT: 32%). While previous estimates for quitline use are low but comparable for both LGBT and non-LGBT smokers (~3%), increasing access to quitlines through provider referrals from clinics delivering LGBT-tailored care could help address this tobacco treatment disparity. However, factors associated with accepting quitline referrals among LGBT smokers in these settings is unknown. **METHOD:** Adults in an LGBT-tailored clinic without an existing quitline referral system completed an anonymous survey from 8/2017-12/2017 (N=139). Current smokers provided information on demographics, tobacco use and cessation history, interest in using cessation aids including a quitline referral (5-point Likert scale) during a future quit attempt, and acceptance of a hypothetical provider-initiated quitline referral (yes/no) during the current visit. Multivariable logistic regression identified factors independently associated with accepting a quitline referral. **RESULTS:** Almost 2/3rds (64%) of respondents reported current smoking. Smokers were on average age 33

(SD=11) years, male (72%), White (67%), gay or lesbian (65%), and 39% were reportedly aware of quitlines. About ¾ (73%) reported making a prior quit attempt, but only 3% had accessed a quitline. For their next quit attempt, 43% reported a plan to use medication, and 8% planned to call the quitline. Over 1/3 (38%) said they would accept a provider referral if offered. In adjusted models, plan to use cessation medication (odds ratio (OR)= 3.54 95% confidence interval (CI)=1.01-12.35), history of prior quit attempt (OR=5.34, 95% CI=1.24-22.96), and higher interest in quitline referral (OR=2.70, 95% CI=1.73-4.23) were independently associated with willingness to accept a quitline referral during their visit. **CONCLUSIONS:** LGBT smokers in care at an LGBT-tailored medical clinic expressed willingness to accept a hypothetical offer of a quitline, suggesting that provider-initiated quitline referrals could reduce disparities in use of evidence-based treatments by LGBT smokers.

FUNDING: Unfunded

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## POS5-95

### THE POLITICS OF TOBACCO CONTROL POLICY ADOPTION: LESSONS FROM INDIA AND TURKEY

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**SIGNIFICANCE:** Tobacco use is a major cause of global mortality, accounting for more than 7 million deaths annually. Addressing this epidemic requires the adoption of evidence-based tobacco control policies consistent with the Framework Convention for Tobacco Control. Unfortunately, few studies have explored the political dynamics of tobacco control policy adoption to help us better understand why these policies are successfully adopted in some low-and middle-income countries but not others. In light of this gap, the primary aim of this study was to understand the process and determinants that led to the issuance of the 85% health warning labels law in India in 2014 and the passage of the smoke-free law in Turkey in 2008. **METHODS:** Under the guidance of the *Multiple Streams Theory*, a case study approach was used for each country whereby data were gathered from two different sources: key informant interviews (N= 41) and document review (N=284). Subsequently, cross-case analysis was conducted to identify cross-cutting themes. **RESULTS:** Results are consistent with the *Multiple Streams Theory*. In India and Turkey, elections brought forth new leaders who were personally committed to tobacco control, and political parties that were eager to elevate the global status of their countries. Understanding this context, international and national advocates worked collaboratively to seize opportunities; policy entrepreneurs gained direct access to new leaders and framed the policies as measures that are not only evidence-based but ones that can help their respective countries gain global leadership. To ensure that tobacco use continued to be regarded as a problem of concern, media advocacy was also employed to shed light on the severity of the epidemic. **CONCLUSIONS:** This comparison suggests the need for advocates to 1) develop a rigorous understanding of their countries' political context in order to formulate appropriate advocacy strategies, 2) be well-versed in the scientific evidence surrounding the harms of tobacco use and the effectiveness of the policy option, 3) work collaboratively, and 4) be prepared to seize windows of opportunities.

FUNDING: Non-profit

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## POS5-96

### AN EXAMINATION OF CANDIDATE MEDIATORS OF MAINTENANCE COUNSELING AND ADHERENCE-FOCUSED INTERVENTIONS EFFECTS ON ABSTINENCE IN ADULT DAILY SMOKERS

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**SIGNIFICANCE:** Relapse remains the most common outcome of smoking cessation attempts, even among those who establish initial abstinence. Although relapse prevention interventions have been developed and tested, the action models by which these interventions work are not well understood. This study extends knowl-

edge about the effects of adherence- and maintenance-focused interventions on affective (e.g., urges to smoke), cognitive (e.g., self-efficacy), and behavioral (e.g., medication use) targets, and relations between these targets and later abstinence. **METHODS:** Adult daily smokers motivated to quit smoking (N=544) were randomized in a 2x2x2x2 experiment testing the effects of 2-level (on vs. off) intervention components on abstinence: 1) counseling addressing medication beliefs (vs. none), 2) automated adherence reminders (vs. none), 3) feedback about nicotine gum use monitored electronically (vs. monitoring without feedback), 4) extended (26-week) nicotine gum and patch therapy (vs. 8-week), and 5) maintenance counseling (vs. none). Candidate mediators were assessed during the first 4 weeks of quitting. Path analysis examined the extent to which interventions affected their targets, and the degree to which these candidate mediators were associated with later medication adherence and abstinence. **RESULTS:** The only component with a main effect on a candidate mediator was feedback about electronically monitored gum use, which significantly increased the number of days of gum adherence. Other components interacted to reduce medication fear, increase gum and patch adherence, and increase cessation fatigue (if getting medication beliefs counseling and another adherence-focused component). None of the mediators was significantly related to 8-week abstinence after controlling for smoking during mediator assessment. **CONCLUSIONS:** Adherence- and maintenance-focused intervention components interact in their impact on target constructs, sometimes in adverse ways, such as increasing cessation fatigue. Results suggest that interventions may not have robust effects on their targets, intervention action plans may need revision, and more treatment may not be better.

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## POS5-97

### A NOVEL DIGITAL PROGRAM TO ENGAGE SMOKERS COMBINING BREATH SENSOR, SMARTPHONE APP, AND IN-APP HUMAN COACHING

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**SIGNIFICANCE:** Pivot is a comprehensive digital solution that combines an FDA-cleared carbon monoxide breath sensor system (COBSS); a six-phase, app-delivered smoking program based on the US Clinical Practice Guidelines for Treating Tobacco Use and Dependence; and dedicated human coaching delivered via in-app chat. **METHOD:** This was a feasibility study assessing program engagement, changes in attitudes toward smoking, and self-reported changes in smoking behavior in the initial 9-day phase of Pivot. Of the 48 participants who enrolled, 41 completed the study. About half the participants (54%) were men, and the mean age was 43 years. Most (85%) were daily smokers and smoked an average of 12 cigarettes per day. **RESULTS:** COBSS usage declined over the course of the study from a mean of 8.4 daily breath samples at the beginning to 6.9 on the last full day of the study. Cigarette logging within the app declined over this same period. Engagement with app lessons was quite high, with all nine lessons having completion rates at or above 80%. Response to coach-initiated outreach was also high with all four contacts receiving >70% response. In matched pair analyses, significant, positive changes in attitudes toward quitting were evident across three metrics from baseline (T1) to end-of-study (T2) including lower perceived difficulty staying smoke-free (T1 M= 3.6, T2 M= 5.4, p<.01), greater expectations of success (T1 M= 4.5, T2 M= 6.5, p<.0001), and increased readiness to quit (T1 M= 6.2, T2 M= 7.4, p<.01). Finally, at study exit, 78% of participants reported decreasing cigarettes smoked per day. **CONCLUSIONS:** Taken together, these preliminary results support the feasibility of the initial phase of the Pivot program. These findings are particularly exciting given that the initial phase of Pivot focuses exclusively on self-monitoring and self-reflection and does not directly address quitting at all. Further research is needed to examine how best to optimize the self-monitoring features of the program (COBSS, in-app cigarette logging), to study how users progress through later phases of the program, and to determine the program's effectiveness for achieving sustained cessation.

**FUNDING:** Khosla Ventures

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## POS5-98

### SMOKE-FREE LAWS AND DISPARITIES IN SMOKING CESSATION IN THE UNITED STATES, 2001-2015

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**SIGNIFICANCE:** Smoke-free laws can reduce the burden of tobacco-related diseases, but few studies have examined the relationship between smoke-free laws and disparities in smoking cessation. This study develops measures of smoke-free law coverage within U.S. core-based statistical areas (CBSAs) to examine whether smoke-free laws are differentially associated with cessation by education level, age, and gender. **METHODS:** Data from the U.S. Census Bureau and the American Nonsmokers' Rights Foundation were used to calculate the percent of the population within CBSAs covered by state, county, and city-level smoke-free laws in the workplace and in the hospitality sector (restaurants and bars). The outcome variable was smoking cessation, derived from data on adult self-respondents 25 years and older from the 2001-2002, 2003, 2006-2007, 2010-2011, and 2014-2015 waves of the Tobacco Use Supplement to the Current Population Survey. Separate logistic regression models for workplace laws and hospitality laws were used to calculate associations between smoke-free laws and smoking cessation. Education, gender, and age were explored as potential effect modifiers by assessing the statistical significance of interaction terms. All models included state and year fixed effects and controlled for tobacco price and the respondent's race/ethnicity. **RESULTS:** Workplace laws were not associated with cessation among any age group, and there was no variation by education level. For hospitality laws, smoke-free law coverage was associated with increased cessation only within the oldest age group (ages 55+), and there was evidence of effect modification by education. Among individuals aged 55+, the association between smoke-free hospitality laws and cessation was significantly more positive for those with higher levels of education (high school graduate and above), compared to individuals with less than a high school education. Gender did not modify any relationships examined. **CONCLUSIONS:** Age and education modify the association between hospitality smoke-free law coverage and smoking cessation. This study points to the importance of examining population heterogeneity in response to smoke-free laws.

**FUNDING:** Federal

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## POS5-99

### SEX HORMONES AND POSTPARTUM DEPRESSION

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Research has shown that more than 50% of women who quit smoking during pregnancy relapse within the first six months postpartum and almost 90% relapse within one year. Women with postpartum depression (PPD) are nearly twice as likely to relapse compared to those without. Since childbirth is associated with erratic hormonal changes, the precipitous drop in sex hormones (i.e., progesterone and estradiol) may play a role. The aim of this study was to determine if the magnitude of relative change in progesterone and estradiol from late pregnancy (week 36 gestation) to early postpartum (four days postpartum) is associated with increased scores on the Edinburgh Postnatal Depression Scale (EPDS). Twenty-nine women aged 18-35, in stable health with a low-risk pregnancy, tobacco-free for at least four weeks prior to study enrollment and motivated to remain abstinent were included in this secondary analysis. Serum progesterone and estradiol samples were collected at Baseline (36 weeks gestation) and at four days postpartum. The EPDS was completed at four days postpartum only. To capture the relative change in hormone level, we used the ratio of the Baseline to postpartum hormone levels. To estimate the association between change in progesterone and EPDS, we fitted a linear regression model with the outcome of EPDS score and the predictor of the log progesterone ratio. An analogous model was fitted for estradiol. Results indicated that for progesterone, a doubling of the progesterone ratio of Baseline to postpartum levels was associated with a 3.0-point increase in EPDS score (95% CI: 0.3, 5.7; p=0.031). For estradiol, a doubling of the estradiol ratio of Baseline to postpartum levels was associated with a 1.4-point increase in EPDS score, however, this association was not statistically significant (95% CI: -2.3, 5.0; p=0.38). Our findings suggest that a larger relative drop in progesterone from late pregnancy to early postpartum may be associated with increased EPDS



scores. Since PPD is a known risk factor for smoking relapse, further research is needed to determine whether interventions that reduce PPD may also reduce risk of smoking relapse.

FUNDING: Federal

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## POS5-100

### ASSOCIATION BETWEEN SMOKERS' PERCEIVED RISK OF INJURY FROM EXPLODING ELECTRONIC NICOTINE DELIVERY SYSTEMS (ENDS) AND THEIR DECISION TO USE ENDS

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**SIGNIFICANCE:** Recent publicity of incidents of ENDS exploding or catching fire may prevent some smokers from using ENDS for quitting smoking, despite general consensus that ENDS use is less risky than cigarette smoking. This study examined the association between smokers' risk perceptions of the possibility of injury from exploding ENDS and their decision to use ENDS. **METHODS:** Data are from 1,185 adult cigarette smokers who completed the 2016 Tobacco Products and Risk Perceptions Survey administered to a national probability sample of U.S. adults, September-October, 2016. Study participants reported their perceptions of risk of ENDS use, including injury from ENDS exploding or catching fire; perceived relative risk of ENDS compared to smoking cigarettes; their belief whether potential benefits of using ENDS exceed costs; and their use of ENDS. Weighted multinomial logistic regression models were estimated. **RESULTS:** Belief in the possibility of injury from exploding ENDS is associated with perceiving ENDS to be at least as harmful as cigarettes (AOR=2.27, 95% CI=1.42, 3.64), feeling that the negatives of ENDS use outweigh the positives (AOR=2.13, 95% CI=1.14, 3.99), and lower odds of being a current ENDS user (AOR=0.47, 95% CI=0.25, 0.86), after adjusting for other perceptions of risk of ENDS use (e.g., lung cancer) and socio-demographic differences (sex, age, race/ethnicity, education, income). **CONCLUSIONS:** Cigarette smokers may be deterred from using ENDS for fear of injury from ENDS exploding or catching fire, actual incidents of which, while relatively infrequent, have been highly publicized. Product standards, such as firing button locks, vent holds, and protections against overcharging; improved product labeling; and education about proper use, charging, and storage of ENDS can help protect consumers from injury. These steps and efforts to better communicate the risks of ENDS use, particularly relative to smoking cigarettes, will facilitate more informed decision-making by smokers considering ENDS as a replacement for cigarettes.

FUNDING: Federal

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## POS5-101

### EXAMINING THE MODERATING EFFECT OF PERCEIVED SOCIAL SUPPORT ON HEAVINESS OF SMOKING AND QUIT ATTEMPTS AMONG ADULT HOMELESS SMOKERS

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**SIGNIFICANCE:** The prevalence of cigarette smoking among homeless adults is high (>70%) and studies indicate that individuals in this group make 2-3 intentional but unaided quit attempts per year. Identification of factors associated with quit attempts may provide new direction for cessation interventions. Recent research indicated that perceived social support was inversely associated with within-day cigarette consumption during a quit attempt, at least for a subset of domiciled smokers, suggesting links between these variables. **METHODS:** We examined the association of the heaviness of smoking index and intentional past-year quit attempts among a sample of homeless smokers (N=445, age = 43.2±11.8, 65% male, 57.5% white) from 6 homeless-serving agencies in Oklahoma in a cross-sectional study, and investigated the potential moderating role of interpersonal support as measured by the ISEL and its 3 subscales: appraisal, belonging, & tangible support. **RESULTS:** Heaviness of smoking was negatively correlated with quit attempts ( $r = -.283, p < .01$ ), and in a multivariate regression model controlling for race, sex, and age, this relationship was significantly moderated by the appraisal subscale, measuring per-

ceived social support ( $p < .05$ ). Although simple slope analysis indicated that heaviness of smoking was significantly related to number of quit attempts across low, medium, and high levels of perceived social support (mean, + 1 SD), the relationship was stronger for those who reported lower levels of social support: low ( $\beta = -.657, p < .001$ ), medium ( $\beta = -.457, p < .001$ ), and high ( $\beta = -.258, p < .05$ ). The ISEL total score and two other subscales were not significant moderators. **CONCLUSIONS:** The perceived availability of someone to talk to about one's problems appeared to attenuate the strength of the inverse relationship between heaviness of smoking and quit attempts. Although more research is needed, results suggest that fostering social support among homeless smokers may reduce the impact that cigarette dependence has on making quit attempts. Coupled with the availability of empirically-supported cessation aids, dismal quit rates among this group may be improved.

FUNDING: State; Non-profit

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## POS5-102

### ELECTRONIC CIGARETTE USE AMONG AMERICAN INDIAN DUAL SMOKERS AND VAPERS

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**SIGNIFICANCE:** American Indians (AI) have the highest prevalence of smoking and of electronic cigarette (EC) use in the US but patterns of EC use (vaping) by AI who smoke are unknown. We describe baseline behaviors and attitudes regarding dual use of EC and cigarettes in the Cherokee Nation Cohort Study. **METHODS:** In 2016, we surveyed 375 AI ages 18 or older who smoke at a Cherokee Nation Health Services facility in northeastern Oklahoma. We report on the 12% (n = 44) who were dual users, defined as using EC in the past 30 days and now using some days or every day. **RESULTS:** Mean age of dual users was 39 years and women comprise 64%. Most (60%) enjoy smoking more than vaping. Only 12% use a cigalike product, with the rest using newer generation devices. Most (76%) smoke before using ECs on days they vape. Median EC dependence scores (6 [interquartile range (IQR): 2-9]) were lower than smoking dependence scores (11 [IQR: 7-16]). About 54% vape five or more times per day, 55% within 30 minutes of waking, and 27% wake at night to vape. While 33% report strong cravings ever to vape, only 22% had such urges in the past week. About one-third report difficulty, feeling irritable or feeling nervous when unable to vape. About 44% use EC due to difficulty quitting them, but the most frequent reason for EC use was to reduce smoking (79%), and liking EC flavors was cited nearly as often (78%). Being able to vape when smoking is prohibited was cited by 73%, followed by using EC to reduce harm from smoking to others (69%) or to themselves (65%). Nearly half use EC to reduce stress (46%), to save money (43%), or because people important to them vape (40%). Some (11%) use ECs without nicotine and another 9% do not know if their EC has nicotine. **CONCLUSIONS:** Among these AI adults, dual EC and cigarette users are highly dependent on smoking and most use ECs to reduce smoking. Nearly 20% use ECs without nicotine or do not know if their EC has nicotine. Enjoyment of flavors, avoiding smoking prohibitions and reducing harm were other reasons for regular EC use. These findings may inform public health policies and clinical interventions to reduce the burden of smoking in AI communities.

FUNDING: Federal

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## POS5-103

### CURRENT AND PAST ELECTRONIC CIGARETTE USE AMONG ADULT AMERICAN INDIANS WHO SMOKE: A CHEROKEE NATION COHORT STUDY

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**SIGNIFICANCE:** Use of electronic cigarettes (EC) has evolved rapidly among adults who smoke combustible cigarettes. American Indians (AI) have a high prev-

absence of EC use, but past and current EC use among AI who smoke are unknown. We describe baseline characteristics and behaviors regarding EC use among past and current EC users in a cohort of AI who smoke. **METHODS:** In 2016, we surveyed a cohort of 375 AI aged 18 or older who smoke in rural Oklahoma regarding their awareness and use of EC. Wilcoxon rank-sum or Student's t-test was used to test differences between past and current EC groups for continuous data. Chi-square or Fisher's exact test was used for differences in categorical data. **RESULTS:** Mean age was 42 years and 61% were women. Current (past 30 day) EC users comprised 16% of the cohort, past EC users 48%, and never users 36%. Overall, 93% were aware of ECs. Current and past users did not differ for most measures of demographics (age, sex, education, income, and marital status), health (general health, history of smoking related cancer, heart disease, pulmonary disease, or depression), or smoking (lifetime quit attempt, median cigarettes/day, pack/day, Hooked on Nicotine Checklist score, Heaviness of Smoking Index, and Penn State Dependence Index). Non-significant differences were found for first EC product used, with a tank system being first for 60% of current and 55% of past users. First EC flavor was tobacco for 41% of current and 48% of past users ( $p = 0.63$ ). Most current (76%) and past (71%) users would have tried ECs even if the only flavor was tobacco ( $p = 0.40$ ). However, current EC users had significantly higher mean confidence to quit smoking scores (3.4 vs 2.5;  $p = 0.02$ ; scale 0-10), more often knew if their first EC product had nicotine (91% vs 78%;  $p = 0.02$ ), and more inclined to use ECs in the next year (81% vs 37%;  $p < 0.01$ ). **CONCLUSIONS:** At baseline, current EC users had more confidence to quit smoking than past EC users, more knowledge of nicotine content in their EC, and more inclination to use ECs in the future. Whether these factors will influence conventional cigarette consumption over time among AI remains to be determined.

**FUNDING:** Federal

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## POS5-104

### THE EFFECTS OF SMOKING AVAILABILITY AND ENVIRONMENTAL STIMULI ON SMOKING MOTIVATION AND SMOKING CHOICE

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**SIGNIFICANCE:** This study investigated the effects of smoking availability and smoking stimuli on motivation to smoke and smoking choice. Prior studies have found that smokers report greater urges and positive affect when they expect to smoke sooner (e.g., 20 mins) than later (e.g., 3 hrs). However, prior research has not adequately investigated how expected extended delays before smoking (e.g., 24 hrs) influence smoking motivation. Using a 3 x 2 between-subjects factorial design, smoking availability (20 mins vs. 3 hrs vs. 24 hrs) was crossed with environmental stimuli (smoking-related vs. neutral). **METHODS:** Smokers (N=180, 34% female) were told that they would attend two lab visits separated by 24 hrs. After completing baseline measures (i.e., urge, mood, and simple reaction time), participants were randomly assigned to one of six conditions. Participants were told that their next opportunity to smoke would be in 20 mins, 3 hrs, or 24 hrs while being exposed to smoking-related (e.g., cigarettes) or neutral stimuli (e.g., a stapler). Participants completed measures and then *all* were told that smoking was imminent. Participants were then given a choice to smoke or earn \$0.50 for every 5 mins they delayed smoking for 50 mins. **RESULTS:** Individuals told they would smoke in 24 hrs reported greater mood disturbances than those told 3 hrs and 20 mins (all  $p$ 's  $< .05$ ). Those told 24 hrs had slower reaction times than those told 3 hrs ( $p = .037$ ). Environmental stimuli had no meaningful effects on subjective measures, but did influence smoking choice. Participants exposed to neutral stimuli chose to smoke sooner than those exposed to smoking stimuli (mean of 18.0 vs. 25.94 minutes,  $p = .010$ ). Participants delayed smoking for 18.75, 21.33, and 25.83 minutes on average in the 20 min, 3 hr, and 24 hr conditions respectively, with some differences among the conditions. **CONCLUSIONS:** Smoking availability influences subjective, objective, and behavioral indices of smoking motivation. The implications of these findings and directions for future research are discussed.

**FUNDING:** Academic Institution

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## POS5-105

### RESULTS OF A SINGLE-ARM PILOT STUDY OF HARM REDUCTION TREATMENT FOR SMOKERS EXPERIENCING CHRONIC HOMELESSNESS

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**SIGNIFICANCE:** Smoking prevalence and smoking-related mortality rates are 5 times higher for chronically homeless people than the general population. Unfortunately, traditional smoking cessation treatment does not optimally reach or engage this population. There have thus been calls for more flexible and client-centered approaches tailored to their needs. **METHODS:** Using a community-based participatory research approach, we codeveloped and piloted harm-reduction treatment for smoking (HaRT-S) together with people with lived experience of chronic homelessness and smoking and a community-based agency that serves them. In HaRT-S, interventionists, all of whom have lived experience of smoking, embody a compassionate, advocacy-oriented "heart-set" and deliver manualized components, including a) participant-led tracking of smoking-related outcomes, b) elicitation of harm-reduction goals and progress made toward them, c) discussion of relative risks of nicotine delivery systems, and d) distribution and instructions on use of nicotine replacement therapy and electronic nicotine delivery systems (ENDS). We conducted a single-arm, 3-month pilot of HaRT-S with 44 smokers experiencing chronic homelessness. **RESULTS:** Participants rated HaRT-S as "totally acceptable/effective," which was reflected in 70% retention at the 3-month follow-up. For each week in the study, participants experienced an 18% increase in odds of reporting 7-day, biochemically validated, point-prevalence abstinence. All participants who achieved abstinence reported using ENDS. Participants also evinced reductions in smoking dependence (-45%), frequency (-29%), and intensity (-78%; all  $ps < .05$ ). Participants who used ENDS during the study experienced an additional 44% reduction in smoking intensity and a 1.2-point reduction in FTND compared to participants who did not use ENDS. **CONCLUSIONS:** This study provided important lessons-learned and has informed a future RCT to establish the efficacy of a harm-reduction behavioral treatment paired with safer nicotine delivery systems to decrease smoking-related harm and improve health-related quality of life for a marginalized and disproportionately affected population.

**FUNDING:** Academic Institution

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## POS5-106

### STUDY ON INTRADAY FLUCTUATION PROFILE OF SALIVARY COTININE AND EXHALED CARBON MONOXIDE LEVELS AMONG CURRENT MALE SMOKERS IN CHINA

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**SIGNIFICANCE:** Salivary cotinine is a non-invasive biomarker to measure tobacco smoke and nicotine exposure, with the advantages of the convenience compared to the blood cotinine. It has been reported that smoker blood cotinine level fluctuates in a day with the highest peak appears in the late afternoon. However, the research on the salivary cotinine intraday changing profile is lack, it will affect the sampling time in salivary diagnostics and nicotine metabolism studies, e.g., nicotine addiction assessment on tobacco use or passive exposure to smoke, etc. **METHODS:** This study recruited 33 healthy male smokers in China. The volunteers' samples were collected at least 2 mL without stimulating in every hour from 9:00 am to 18:00 pm, resulting in ten points in the same day. Nearly 330 saliva samples were stored in the dry ice. And exhaled CO was tested with saliva sampling by piCO Smokerlyzer®. The volunteers were asked to smoke as usual with time recording. 100 µL of thawing saliva sample was spiked with 20 µL of internal standard (d<sub>3</sub>-cotinine), and 280µL methanol to protein precipitation. The samples were vortexed for 30 s at ambient temperature and centrifuged at 15,000 x g for 15 min (4 °C). The HPLC-MS/MS (EVOQ-LC-TQ, Bruker, USA) was used, and chromatographic separation was performed on a Thermo Acclaim™ Polar Advantage II LC column. The mobile phases are 1% formic acid water (A) and 1% formic acid methanol (B), and the HPLC separation is a gradient elution up to 30% B from zero



in 6 min. RESULTS: The results shown that intraday fluctuation of saliva cotinine level was very small in smokers who smoked few cigarettes, and showed an observably increasing trend in smokers who smoked many cigarettes (about more than 8-10 cigarettes) and be highest in the late afternoon. The average level of exhaled CO showed an increasing trend in a day as well appearing peak in the late afternoon. CONCLUSIONS: The steady-state concentration of salivary cotinine is related to the cigarettes consumption, and the saliva cotinine levels and exhaled CO of smokers were higher in the afternoon, especially in the heavy smokers, so the sampling time may be better in the late afternoon.

FUNDING: Unfunded

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### POS5-107 THE ASSOCIATION OF NICOTINE DEPENDENCE AND GENE POLYMORPHISM IN CHINESE POPULATION

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SIGNIFICANCE: It has been widely reported that nicotine dependence is affected by genetic factors. However, the polymorphism of nicotine dependence related genes in Chinese and the gene polymorphism differences between Chinese and Westerners have not been systematically analyzed. Thus, our results will provide important scientific data for regulated agencies to make global policy on tobacco addictiveness reduction. METHODS: 1500 smoking volunteers were recruited from 10 representative cities in China. The nicotine dependence degree was assessed based on DSM-5, and their genome DNA was extracted. All the reported nicotine dependence related genes were analyzed in this study, including nicotinic metabolism genes, nAChRs, dopamine receptors, etc.. 57 SNP loci were selected according to their penetrance and MAF. Genotyping was performed by SNPscan and SNaPshot. Finally, SNP association study was completed based on genotyping results and nicotine dependence degree. RESULTS: (1)Genotyping results of nicotinic metabolism gene CYP2A6 and CYP2B6 showed that the MAF of fast metabolic subtypes (CYP2A6\*1 and CYP2B6\*1) in Chinese smokers was lower than Westerners, while that of slow metabolic subtype (CYP2A6\*4, CYP2A6\*9,-CYP2B6\*6 and CYP2B6\*9) was higher than Westerners.(2) 11 loci were filtered by MAF or HWp-value, 46 loci were analyzed in association study. The results showed that these loci had vastly different risk coefficients, 3 loci had no significant effect, 24 loci had potentially protective effect, and 19 loci had potentially addictive effect. And the general frequency of loci with protective effect was much higher than that with addictive effect. In addition, the linkage disequilibrium of 11 locus pairs with similar effect widened individual differences. (3)The most closely related genes with nicotine dependence in Chinese were CHRNA4, DRD2, CACNA1B, MAOB and BDNF. CONCLUSIONS: There are significant differences in nicotine metabolism gene polymorphism between Chinese and Westerners. Besides, many other genes with different MAF and risk coefficient are associated with nicotine dependence. These indicate great racial and individual differences in nicotine dependence.

FUNDING: Unfunded

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### POS5-108 THE RELATION BETWEEN DISTRESS TOLERANCE AND WITHDRAWAL, CRAVING, AND LAPSE OUTCOMES DURING EARLY NICOTINE ABSTINENCE

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SIGNIFICANCE: Low distress tolerance (DT), one's perceived or demonstrated ability to tolerate or withstand discomfort, is associated with a lower likelihood of successful nicotine cessation. Little work has prospectively examined the relation between DT and acute smoking deprivation outcomes (e.g., craving, withdrawal) during the first 24-48 hours of a cessation attempt. METHOD: The current investigation examined this relation among a sample of daily cigarette smokers (N=64; Mage=33.5; 41.6% female; 54.2% Caucasian 5+ cigarettes/day (CPD)) who were motivated to quit within the next 30 days to 6 months, but had not yet made a

cessation attempt, or significantly decreased their CPD. During their first visit, satiated daily smokers completed self-report (e.g., Distress Tolerance Scale (DTS), Distress Intolerance Index (DII)) and behavioral (e.g., Mirror Tracing Task, Cold Pressor Task) indices of DT, as well as measures nicotine craving, withdrawal, and affect. Participants were then asked to select a date within two weeks to make an abstinence attempt; exactly 24-hours following the attempt, participants completed a second in-person session, reporting abstinence as well as past 24-hour craving, withdrawal, and affect. RESULTS: Multiple linear regression was utilized to predict nicotine craving, withdrawal, and abstinence from DT indices. Less ability to withstand frustration predicted greater craving after abstinence  $b=.21, t(62)=1.794, p=.011$ , above and beyond baseline craving. Moreover, greater perceived DT was associated with lower quit-date negative affect (DTS -  $b=-.30, t(62)=-2.536, p=.014$ ; DII -  $b=.34, t(62)=-3.054, p=.003$ ). DT indices were significantly associated with subjective withdrawal or likelihood of 24-hour abstinence success. CONCLUSION: Results suggest that perceived and behavioral DT are differentially related to subjective experiences during abstinence, but are not predictive of early abstinence success, per se. Findings suggest that cessation interventions that target DT may be effective in ameliorating subjective discomfort during early abstinence, thereby making it more likely that smokers will achieve initial sustained abstinence.

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### POS5-109 CLINICAL CHARACTERISTICS OF VETERANS WITH PTSD WITH AND WITHOUT TOBACCO USE DISORDER IN THE VETERANS HEALTH ADMINISTRATION

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SIGNIFICANCE: Veterans with posttraumatic stress disorder (PTSD) have high lifetime rates of tobacco use and lower rates of tobacco cessation compared to the general population. Tobacco use is typically associated with more psychiatric symptoms and poorer functioning for individuals with mental health disorders compared to individuals without mental health disorders. However, little is known about how the clinical characteristics and health service use of Veterans with PTSD differ for those who use or do not use tobacco across the Veterans Health Administration. METHODS: The present study is an analysis of national VHA administrative data (N=5,531,379) from Fiscal year 2012 that was used to compare the clinical characteristics and health service use of Veterans with PTSD with a diagnosed tobacco use disorder (TUD) and those without a TUD diagnosis. RESULTS: Veterans with PTSD and TUD were more likely to be homeless, have a VA pension, and have peripheral vascular disease, chronic obstructive pulmonary disease, hepatic disease, and diabetes than Veterans with PTSD without TUD. In addition, Veterans with PTSD and TUD were more likely to have alcohol use disorder, drug use disorder, schizophrenia, and bipolar disorder than Veterans with PTSD without TUD. Veterans with PTSD and TUD were also significantly more likely to be psychiatrically hospitalized in the past year than Veterans with PTSD without TUD. CONCLUSIONS: Overall, these results show that tobacco use among Veterans with PTSD is associated with more medical and psychiatric comorbidity, more use of mental health inpatient services, and greater risk of being homeless. Future studies should evaluate tobacco use as a multi-morbidity issue for Veterans with PTSD, with a focus on developing innovative interventions that target the complex co-morbidities associated with tobacco use among Veterans with PTSD.

FUNDING: Federal

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## POS5-110

### ASSOCIATION BETWEEN THE TIPS FROM FORMER SMOKERS® CAMPAIGN AND QUIT ATTEMPTS AMONG SMOKERS WITH AND WITHOUT MENTAL HEALTH CONDITIONS, 2012-2016

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**OBJECTIVE:** Smokers with mental health conditions (MH+) face tobacco-related health disparities and are a priority population for intervention. Since 2012, CDC has implemented *Tips From Former Smokers® (Tips®)*, a paid, national tobacco education campaign. Evaluations have demonstrated *Tips®* impact on increasing smokers' quit intentions, quit attempts, and sustained quits among the general population. However, there have been no studies of *Tips®* specific impact on MH+ smokers. This study examined associations between *Tips®* exposure on smokers' quit attempts by MH status to determine whether the *Tips®* campaign effect on quit attempts differs between MH+ and MH- smokers. **METHODS:** The study analyzes data from online, nationally representative surveys of cigarette smokers conducted in nine waves during 2012-2016. The analysis was stratified by current smokers and recent quitters for both MH- (n = 21,311) and MH+ (n = 8,956). Lifetime MH+ was defined as self-reporting depression, anxiety, ADHD, or a general MH condition. Logistic regression was used to examine the association between past-quarter *Tips®* gross rating points (GRPs), a measure of campaign exposure, and self-reported past 3-month quit attempts. To test whether MH diagnosis modifies the effect of *Tips®*, we estimated an additional model that included the interaction between *Tips®* GRPs and MH status. **RESULTS:** A majority of respondents reported seeing *Tips®* ads during the campaign period, with no significant difference by MH status: 70.4% of MH+ smokers and 67.4% of MH- smokers. MH+ smokers had higher overall quit attempt rates than MH- smokers (e.g., 39.1% vs. 36.2% at 1000 GRPs), and there was a significant relationship between *Tips®* GRPs and quit attempts for both MH- (OR=1.12; p=0.017) and MH+ smokers (OR=1.22; p=0.004). The interaction term between GRP and MH status was not significant (OR=1.09, p=0.332). **CONCLUSION:** The *Tips®* campaign reached the majority of smokers, and campaign exposure promoted quit attempts comparably among smokers with and without mental health conditions. These findings demonstrate the reach and efficacy of a national tobacco media campaign, irrespective of mental health status.

FUNDING: Federal

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## POS5-111

### CONTENT ANALYSIS OF FDA COMPLIANCE CHECK INSPECTIONS OF TOBACCO SALES TO MINORS IN NEW JERSEY: AFTER FDA'S DEEMING RULE

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**SIGNIFICANCE:** In May 2016, FDA issued a final rule extending its tobacco product authority to all tobacco products. Effective August 8, 2016, retailers selling the newly covered tobacco products were required to comply with regulations to prevent youth access to tobacco, including only selling to customers over the legal age of tobacco sale. This study aimed to examine FDA's compliance check inspections of tobacco product retailers in New Jersey after FDA's new deeming rule was effective. **METHODS:** Results from FDA's compliance check inspections of tobacco retailers are available on FDA's website. In October 2017, we downloaded all decisions involving sales to minors by New Jersey tobacco retailers between August 8, 2016 and August 7, 2017. The records were coded for: a minor sale violation (Y/N), tobacco product purchased by minor (cigarettes, cigars, ENDS, smokeless tobacco, unknown) and store type (gas station, liquor store/bar, non-chain convenience, chain convenience, supermarket, other). **RESULTS:** During the 12 month time period, 3726 FDA compliance checks of minor tobacco purchases were conducted in New Jersey. Of these, 671 (18%) resulted in a violation of a tobacco sale to a minor. Violation rates significantly differed by store type (p<.0001). The highest violation rates occurred in gas stations (23.9%) and non-chain convenience stores (21.3%) followed by chain convenience (17.3%), liquor/bar (14.4%), other (14%) and supermarkets (10.9%). Cigarettes (42.2%) were the most common product purchased by minors followed by cigars (36.8%), ENDS (14.3%), unknown (5.2%) and smokeless tobacco (1.5%). **CONCLUSIONS:** Analyses of FDA compliance check inspections showed minors in New Jersey were able to purchase a variety of tobacco products during the year

after new deeming regulations. Although over half of all minor purchases were for non-cigarette products, the extent of minors' ability to purchase these products is unknown given that the number of attempted purchases by product type is not available from the FDA's website. Further research is needed to corroborate available FDA compliance data for products sold to minors.

FUNDING: Unfunded

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## POS5-112

### HELPING WOMEN VETERANS QUIT SMOKING: BACK TO BASICS

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**SIGNIFICANCE:** Tobacco use is the number one cause of death and disability of women in the United States, and our women Veteran population is disproportionately affected. Women Veterans continue to smoke at equal or higher rates than men, are prescribed cessation medications less frequently, and are less likely to successfully quit. In this qualitative study, individual interviews with women Veterans revealed their requirements for successful quit smoking attempts. **METHODS:** Semi-structured interviews were conducted with 15 women Veterans who were current or former smokers. Participants gave a narrative account of quit smoking attempts including pre-quit, the quit attempt, and how relapse occurred. Inductive thematic analysis explored underlying themes. **RESULTS:** Four main themes emerged: health and well-being, smoking as an addiction, optimism, and negative stigmatization. Health and well-being encompassed a triad of physical health, mental health, and financial stability, forming the basis of a quit attempt. Participants who had that stability were more likely to acknowledge that smoking was just as difficult to quit as other addictions, and were more open to quitting. Openness to quitting was demonstrated by seeking medications or counseling, or advanced planning by the participant including recognition of their smoking triggers and ways to cope. Women with more stable life circumstances, who understood triggers and were open to change, were more likely to be optimistic about quitting. That optimism was associated with a resilience to the negative stigmatization of smoking and resilience to the fear of failing, allowing for a quick recovery from slips. **CONCLUSIONS:** Baseline well-being, recognition of the need for treatment, a positive mindset and resiliency best enabled women to quit smoking. By understanding the factors that promote and sustain their quit smoking attempts, care processes can be designed to provide optimal, Veteran-specific care. These results, if replicated, indicate that a multidisciplinary and individualized approach, to address the broader issues that underlie quit attempts, may be best suited in the care of women Veteran smokers.

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## POS5-113

### TRENDS IN SMOKING AMONG MEXICAN ADULTS BETWEEN 2002 AND 2016

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**SIGNIFICANCE:** Since it ratified the Framework Convention on Tobacco Control in 2005, Mexico has increased tobacco taxes, implemented pictorial health warnings, adopted smoke-free policies, and banned tobacco advertising through most channels except point of sale. Monitoring tobacco consumption trends will help evaluate these tobacco control policies. The current study aimed to describe the changes in current, daily, and non-daily smoking among Mexican adults by sex, between 2002 and 2016. **METHODS:** Data come from comparable and nationally-representative surveys of adults aged 15 to 65: the National Survey on Addictions (2002, 2011, 2016) and the Global Adult Tobacco Survey (2009, 2015). Prevalence of current, daily, and nondaily smoking was estimated for each year by sex, after adjusting



for the sampling design. Statistical analyses, were performed using STATA 15. RESULTS: Between 2002 and 2016, the prevalence of current smoking decreased from 33.9% to 29.4% in men, and from 11.5% to 9.3% in women. A similar, but more marked pattern of declining prevalence was observed for daily smokers over this period (i.e., 21.6% to 11.0% among men; 7.1% to 3.3% among women). The decrease in prevalence of current smoking and daily smoking was registered in the period between 2002 to 2009, with no significant changes afterwards. However, the prevalence of non-daily smoking increased from 12.4% in 2002 to 18.4% in 2016 among men, and from 4.3% to 6.0% among women. In 2016, 66% of current smokers were occasional smokers, down from 37% in 2002. CONCLUSIONS: To continue decreasing the prevalence of tobacco consumption, it appears necessary to enhance compliance with current tobacco control policies in Mexico. Additional policies, such as offering cessation therapies and bans tobacco advertising and promotion in points of sale may also be important but include additional challenges when considering the prominence of occasional smokers in Mexico.

FUNDING: Non-profit

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### POS5-114 PERCEPTION OF TOBACCO USE AND CESSATION TREATMENT NEEDS AMONG SURVIVORS UTILIZING DOMESTIC VIOLENCE ADVOCACY SERVICES IN OHIO

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BACKGROUND: Domestic violence (DV) survivors experience health disparities, including higher morbidity impacting premature disability and death. Cigarette use, the leading cause of preventable disease, is prevalent among DV survivors—with survivors reporting 2.1 times the odds of smoking compared to those with no exposure histories. The aim of this study was to characterize the perception of tobacco use and cessation treatment needs among DV survivors using Ohio's advocacy services. METHODS: In November 2017, DV survivors utilizing 5 Ohio agencies providing advocacy services were approached by research staff, during specific times, for recruitment into a cross-sectional, interview administered survey (n=49). Respondents were asked about their perceptions of tobacco use among the population: "We are interested in knowing about your perception of how many people using the services of this agency are using the following substances. Please tell me if you think it is most people, more than half of people, less than half of people, a few people, or no one." Respondents were asked about cigarettes, e-cigarettes, and some other form of tobacco. In addition, respondents were asked about the need for treatment services. RESULTS: The proportion of respondents using various types of DV survivor advocacy services included: 63% emergency, 61% counseling, 57% case management, 55% support groups, 22% legal advocacy, 14% transitional housing and 14% other. Eighty-one percent of respondents reported that most or more than half of survivors using services smoked cigarettes, whereas only 16% perceived most or more than half of survivors used e-cigarettes and 18% some other form of tobacco. Of the 82% of respondents who agreed with the statement that there was a need for "alcohol or other drug treatment services for people who use the services here," 54% identified the need for cigarette cessation and 22% cited the need for other tobacco treatment services. CONCLUSION: DV survivors using advocacy services in Ohio perceive a widespread use of cigarettes, in particular, and have cited a need for cessation services to be offered through DV advocacy organizations.

FUNDING: Federal

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### POS5-115 NICOTINE BELIEFS IN US YOUNG ADULTS, 2016

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SIGNIFICANCE: Nicotine is not a human carcinogen and combustion compounds in tobacco smoke, rather than nicotine, cause tobacco-related cardiovascular disease. Few studies have examined consumer beliefs about nicotine in relation to

smoking. METHODS: Participants aged 18-40 (n = 4,091) in Wave 10 (Fall 2016) of the Truth Initiative Young Adult Cohort Study responded to items, including "Nicotine is a cause of cancer" (true, false, and don't know) and two others: "According to you, how large a part of the health risks of cigarette smoking comes from the nicotine itself?" and "According to you, how large a part of the cancer caused by cigarette smoking comes from the nicotine itself?" with response options: "None or a very small part," "A relatively small part," "A relatively large part," and "A very large part or all." Analyses accounted for survey weights and multivariable models controlled for age (18-24 vs. 25+), gender, race/ethnicity, education, income and any past 30-day tobacco or nicotine use. RESULTS: The majority of young adults endorsed that nicotine was responsible for a relatively or very large part of the health risks of smoking (66%) and cancer caused by smoking (60%). More than half of young adults (55%) believed that nicotine is a cause of cancer, while 24% didn't know. In adjusted analyses, females (vs. males), Blacks and Hispanics (vs. Whites), and those with less than a Bachelor's (BA) degree (vs. BA or more) were more likely to endorse "nicotine is a cause of cancer" as true or "don't know" vs. false. Past 30-day tobacco or nicotine users were less likely to report "nicotine is a cause of cancer" as true or "don't know" vs. false. The same subgroups (female, Black or Hispanic, less than a BA degree) had higher odds of believing that nicotine was responsible for a relatively or very large part of the health risks of smoking and cancer caused by smoking. Past 30-day tobacco or nicotine users had lower odds of endorsing these beliefs.

FUNDING: Federal

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### POS5-116 UNDERCOUNTED EXPOSURES TO HARMFUL CONSTITUENTS IN COMBUSTED TOBACCO: BLUNT USERS WHO DO NOT IDENTIFY AS CIGAR USERS

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SIGNIFICANCE: The modification of cigar products to incorporate marijuana is a common practice. When smoked, the modified product, often referred to as a blunt, exposes the smoker to combusted tobacco and its harms. The amount of exposure varies, depending on whether the smoker has mixed tobacco into the marijuana (and if mixed, how much). However, even blunt smokers who only retain the cigar wrapper and replace the filling entirely with marijuana are exposed to combusted tobacco constituents when the wrapper burns. Furthermore, some blunt smokers do not consider themselves cigar smokers. Most nationally representative surveys of tobacco assess use of cigar products, but without also assessing blunt use, such surveys undercount the proportion of the population that is exposed to combusted tobacco. This poster examines the extent to which omitting blunt smokers from estimates of cigar use, and by extension combusted tobacco use, undercounts the proportion of the population exposed to the harmful effects of combusted tobacco use. METHODS: Data were drawn from the Population Assessment of Tobacco and Health (PATH) Study Wave 2 public use file (Wave 1 did not include sufficient data about blunt use for this analysis). Cigar users (n=7568) and blunt users who do not identify as cigar users (n=497) are included. Differences between those who identify as cigar users and those who do not are examined. RESULTS: We find that 42.2% of adults identify as ever cigar users, while 2.2% identify as ever blunt users but not cigar users, resulting in 44.4% of the American adult population, or 49,590,205 people, exposed to combusted tobacco through ever use of cigars and/or blunts. Of those exposed, 95.1% identify themselves as cigar users, while 4.9% do not. There are statistically significant differences among those who identify as cigar users, and blunt users who do not, including but not limited to sex, age, and race/ethnicity. CONCLUSION: Findings suggest that failure to account for blunt users who do not identify as cigar users results in estimates that undercount the true exposure to combusted tobacco and it is likely that the undercount is more pronounced for some groups.

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**POS5-117**  
**ROLE OF SELF-AFFIRMATION IN AFRICAN AMERICAN SMOKERS' RESPONSES TO GRAPHIC CIGARETTE WARNING LABELS**

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**SIGNIFICANCE:** Concerns have been raised regarding the potential of graphic cigarette warning labels to induce defensive processing leading to counterproductive behavioral responses among smokers. The current research examines the role of self-affirmation, a cognitive process of reflecting on one's positive attributes or cherished values, in overcoming defensive processing and improving the effectiveness of graphic cigarette warning labels. We focus on African American smokers, who suffer disproportionately from smoking-related diseases, and therefore address a significant tobacco-related health disparity. **METHODS:** 158 African American smokers recruited through newspaper ads, community leaders, and word-of-mouth participated in our community-based study. An online survey was administered on iPads. Participants first completed a short demographic questionnaire. They were then randomly assigned to engage in either a self-affirmation task or a control task, and viewed two graphic cigarette warning labels subsequently. After that, participants responded to a questionnaire about their perceived susceptibility to smoking-related diseases, perceived self-efficacy of quitting smoking, attitudes toward smoking, intentions to quit smoking, and desire to stop smoking altogether. **RESULTS:** We found that engaging in self-affirmation prior to viewing the labels increased perceived susceptibility to smoking-related illnesses, but decreased perceived self-efficacy of quit smoking. Self-affirmation did not have a significant direct effect on participants' attitudes toward smoking, intentions to quit smoking, or desire to stop smoking altogether. Nonetheless, self-affirmation indirectly led to more negative attitudes toward smoking, higher intentions to quit smoking sooner, and stronger desire to stop smoking altogether through perceived susceptibility. Self-affirmation also had an unexpected negative indirect effect on intentions to quit smoking and desire to stop smoking altogether through decreased self-efficacy. **CONCLUSIONS:** Our findings suggest the effects of self-affirmation on responses to smoking risk messages are complex, involving both positive and negative impact.

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**POS5-118**  
**IS IQOS DESIGNED TO CONVERT COMBUSTIBLE CIGARETTE USERS? INVESTIGATION OF FREE-BASE AND TOTAL NICOTINE, AND REACTIVE OXYGEN SPECIES IN IQOS**

Soha Talih, Rola Salman, Rachel El-Hage, Nareg Karaoghlanian, Ahmad El-Hellani, Najat Saliba, Alan Shihadeh\*, American University of Beirut, Lebanon

**SIGNIFICANCE:** IQOS (I-Quit-Ordinary-Smoking) is a new heat-not-burn product manufactured and advertised by Philip Morris International (PMI). IQOS uses an electric blade to heat tobacco up to 330°C. Because the tobacco is heated and not combusted into smoke, PMI claims that it generates significantly lower toxicants levels when compared to combustible cigarettes. To date, limited independent studies have addressed the levels of toxicants generated from the IQOS. In this study, we measured reactive oxygen species (ROS), known contributors to oxidative stress which are associated to many smoking-related diseases. Additionally, we measured nicotine yield and its partitioning between its free-base and protonated forms. Free-base nicotine is widely thought to increase the nicotine "kick" and "impact" and thus support addiction. **METHODS:** IQOS aerosol was generated using a custom-built digital puffing machine using the Health Canada Intense (HCI) and ISO puffing regimes. For comparison, a regular cigarette was additionally used to generate aerosol using the ISO regime. **RESULTS:** IQOS generated lower nicotine yield relative to combustible cigarettes, and all the nicotine was in the protonated form; there was no freebase nicotine. Per session, the IQOS aerosol contained significantly lower levels of total ROS: 10(2.1) nmol H<sub>2</sub>O<sub>2</sub> vs. 56(11) from the combustible cigarette ( $p < .05$ ). The levels of ROS generated using the HCI and ISO regimes were not significantly different ( $p = 0.13$ ). **CONCLUSION:** ROS levels were lower in the IQOS aerosol relative to the regular cigarette. Interestingly, the nicotine in the IQOS aerosol was entirely in the protonated form. Tobacco industry internal documents show that the industry has long considered free-base

nicotine key to user experience and satisfaction, and has designed cigarettes accordingly. The absence of free-base nicotine from the IQOS aerosol thus raises a question about PMI's stated goal of marketing IQOS to get smokers to switch to reduced harm products.

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**POS5-119**  
**COMPARISON OF PATTERNS OF TOBACCO USE AMONG ADOLESCENTS AND YOUNG ADULTS IN APPALACHIA**

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**SIGNIFICANCE:** The use of nicotine/tobacco products among adolescents and young adults remains a public health concern, particularly with the increasing popularity of electronic cigarettes (ECIGs). While research on tobacco use patterns is growing, little of this research focuses on youth in Appalachia, an area of notably high rates of tobacco use. Purpose: This study compares patterns of tobacco use in two independent Appalachian samples: middle/high school students (569 "adolescents" aged 11-18) and incoming university freshmen (580 "freshmen" aged 18-24). **METHODS:** Respondents from both samples answered questions about their history of tobacco product use, including cigarettes, ECIGs, smokeless tobacco, and cigars. Latent class analyses were conducted separately for each sample and the patterns compared. **RESULTS:** Both the adolescent and freshmen samples were largely Caucasian (84% and 89%, respectively) and female (60.3% and 69.3%, respectively). As expected, samples differed significantly in age ( $p < .001$ ). A 3-class solution showed the best fit for both samples (Adjusted BIC's = 107.3-109.2), relative to other solutions (Adjusted BIC's = 114.2-166.6). Both solutions resulted in similar class definitions with similar proportions of respondents in each class. "Nonusers" (66% adolescent, 69% freshmen) were marked by very low rates of lifetime use of cigarettes and ECIGs (4-11%), and virtually no use of other products. "Experimenters" (22% adolescent, 23% freshmen) had relatively high rates of lifetime cigarette and ECIG use (43-100%), but minimal current use of SLT or cigars. Perhaps a distinguishing feature of Experimenter groups, lifetime and current ECIG use was notably higher among adolescent (100% and 46%, respectively) than freshmen samples (53% and 0%, respectively). "Users" (12% adolescent, 8% freshmen) revealed high lifetime (76-100%) and current (15-63%) rates of all tobacco products. **CONCLUSIONS:** While classes were similar between samples, ECIG use was higher overall among adolescents than freshmen. In these Appalachian samples, data support national-level patterns in that ECIGs have become the most popular tobacco product used among adolescents.

FUNDING: Academic Institution; Federal

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**POS5-120**  
**EXPOSURE TO TANK-BASED ENDS WITH HIGH VEGETABLE GLYCERIN E-LIQUID INCREASES OBSERVERS' DESIRE FOR CIGARETTES**

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As electronic nicotine delivery systems (ENDS, or e-cigarettes) share salient features of combustible smoking, they may be generalized as Pavlovian cues and trigger smoking urges among smokers. Our prior research has supported this idea as both first and second generation ENDS cues increased smoking urge similar to that of traditional cigarette cues. In the present study, we examined the role of ENDS constituents, particularly the e-liquid concentration of vegetable glycerin (VG) to examine whether a more visible exhaled aerosol ("vape cloud") augments the cue strength of ENDS. Young adult smokers ( $n=52$ ; mean age 26.5 yrs; 40% female; 8.7 cigarettes/day; 4.0 FTND; 51% past year e-cigarette use) were exposed to cues in the laboratory designed to mimic real-life exposures. During a social interaction, a study confederate delivered the cues which included drinking bottled water (control cue) and then vaping a tank-based ENDS with either low (0%) or high (73%) VG concentration e-liquid. Videotape review confirmed that



the high VG e-liquid produced significantly larger and denser vape clouds than the low VG e-liquid. Desire to use a traditional cigarette or an e-cigarette was assessed at baseline, after the control cue, after the active vape cue(s), and then after a 20-minute rest. Results showed that the high VG e-liquid cue significantly increased participants' desire for a traditional cigarette relative to the low VG e-liquid cue ( $p < 0.001$ ). Both the high and low VG e-liquid cues increased participants' desire for an e-cigarette immediately after the cue, but only the high VG cue produced a sustained increase in e-cigarette desire ( $p < 0.001$ ). The control cue did not affect desire for a cigarette or an e-cigarette. Women in the high VG condition tended to have greater smoking desire increases than men but this was not the case for the low VG cue. In sum, this study is the first to demonstrate a relationship between vape cloud size and cue salience of ENDS in young adult smokers, which may have important implications for the regulation of public ENDS use.

FUNDING: Federal; Academic Institution

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## POS5-121

### LATENT CLASS ANALYSIS OF TOBACCO AND OTHER SUBSTANCES AMONG WATER PIPE SMOKING YOUNG ADULTS

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**SIGNIFICANCE:** While cigarette smoking has been on a decline in the past decade, water pipe (WP) smoking in the US has continued to grow, particularly among young adults. The current study utilizes Latent Class Analysis (LCA) to (1) identify distinct patterns of tobacco product, alcohol, and marijuana use among WP smoking young adults, (2) compare WP users and non-users, and (3) share analytic challenges encountered. **METHODS:** Data were drawn from Wave 1 of the Population Assessment of Tobacco and Health (PATH) Study, and limited to young adults (18 to 24;  $n = 9,112$ ; 1,261 had used WP in the past 30-days). Measures included past 30-day use (Yes/No) of tobacco products (cigarettes, e-cigarettes, traditional cigars, cigarillos, filtered cigars, pipe, and smokeless tobacco), alcohol and marijuana. **RESULTS:** Among freely estimated models for WP users, the optimal solution yielded four distinct classes: (1) alcohol users (38.6%), (2) alcohol and cigarette users with some use of e-cigarettes (25.2%), (3) alcohol, marijuana, cigarillo and cigarette users (16.0%), and (4) cigarette, cigarillo, e-cigarette and alcohol users with some use of marijuana and cigars (20.2%). Among WP non-users, the LCA also resulted in four classes, but the largest was abstainers of the substances (60.9%) with some use of alcohol. The other three classes were similar to the other three WP user classes, but smaller (13.8%, 12.4%, and 13.0%). The 4-class model fit well when measurement invariance was imposed on WP users and non-users. Weighted results were similar but models were not always identified without imposing restrictions. **CONCLUSIONS:** At least 60% of WP users were using multiple tobacco products, alcohol, and/or marijuana. Measurement was strong for cigarillos and reasonably well for alcohol and cigarettes across all 4 classes of WP users. The estimate of poly use was higher (about 80%) among WP users with measurement invariance. LCA identified profiles set the foundation to further predict latent class membership using intrapersonal, interpersonal, and/or contextual factors, which can have implications for how best to target WP prevention and intervention messages to US young adults.

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## POS5-122

### UNDERSTANDING ELECTRONIC NICOTINE DELIVERY SYSTEMS (ENDS) USE AND ENDS SUSCEPTIBILITY AMONG RACIALLY AND ETHNICALLY DIVERSE US COLLEGE STUDENTS

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**SIGNIFICANCE:** With increasing technological advances around electronic nicotine delivery systems (ENDS), use of electronic cigarettes and vaping devices accelerate, especially in youth and young adults. The purpose of this survey study was to identify and understand key use and susceptibility characteristics of users and non-users of ENDS. **METHODS:** This online survey was administered

at a nontraditional, minority-serving university. Data was collected in December of 2017 on nicotine and tobacco use and attitudes about ENDS. ENDS, tobacco use, and device characteristic questions were taken from validated population surveys and adapted to fit the current survey. Some questions were coded to specify current use (past 30 days) and lifetime use, while some attitude questions were created specifically for this study. **RESULTS:** The sample ( $N=696$ ;  $M$  age=27.04,  $SD=9.16$ ) was predominantly female (72%), Hispanic (37%), with 54% minorities with respect to race. Of the sample, 18% ( $N=127$ ) reported ever using an ENDS and 7% ( $N=49$ ) reported daily use. An individual was considered "knowledgeable" about their device if they were able to answer all device characteristic questions (type, cost, % nicotine, etc.). Only 26% of users were deemed knowledgeable. For current ENDS users, 49% use another tobacco product. Thirty-seven percent of ENDS users reported using no nicotine in their device and 32% of users were unsure about concentrations of nicotine used in their device. Among non-ENDS users, 19% (106/569) were classified as susceptible based on endorsing that they would try an ENDS device if offered by their best friend. Susceptibles versus non-susceptibles were more likely to report having used a tobacco product (54% vs 33%) and report Hispanic ethnicity (47% vs 33%). **CONCLUSIONS:** Overall, the continued evolution of ENDS devices is a reminder that understanding how individuals use and interact with their device is key to understanding the role that ENDS has for both tobacco and non-tobacco users. In this study, looking into characteristics unique to ENDS, like knowledge about a device and the ability to have no nicotine, provides a more accurate representation of ENDS users.

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## POS5-123

### STATE-LEVEL DEMOGRAPHICS AND TOBACCO-CONTROL CORRELATES OF SMOKING CESSATION BEHAVIORAL CHANGE TECHNIQUES ON TWITTER

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**SIGNIFICANCE:** Identify behavioral change techniques for smoking cessation reflected in discourse on Twitter and explore state-level demographic composition, smoking prevalence, quit rates, smoking-related health conditions, cigarette prices, and tobacco-control expenditures that are associated with smoking cessation tweets volume. **METHODS:** Using Social Studio Radian 6 application programming interface (API), we retrieved tweets containing smoking-related keywords (eg, smoke) from 1/1/2009 to 12/7/2015. We developed a codebook based on Michie et al. (2011) taxonomy for smoking cessation behavioral change techniques. Two coders manually annotated 5715 random tweets, which were then used to build a machine learning algorithm using LightSide. We used geo-tags or self-report location to geocode tweets to the states using Google Maps Places API. We retrieved state-level data from Centers for Disease Control and Prevention and census data. A least absolute shrinkage and selection operator regression model was used to identify correlates between tweet volume and state-level variables. **RESULTS:** A total of 1,431,790 tweets included behavioral change techniques for smoking cessation and were retained for analysis. We identified 10 techniques that fell under four categories: motivation, self-regulatory capacity, adjuvant activities, and information gathering. Variance explained in tweet volume ranged from 3.5% for adjuvant activities to 14.4% for self-regulation. Motivation and information gathering were positively associated with percent smokers under age 35 and negatively associated with racial heterogeneity. Motivation was positively associated with percent population below poverty line and percent smoking adults but negatively associated with price per cigarette pack. Percent of smoking adults was positively associated with self-regulation and negatively associated with adjuvant activity. **CONCLUSION:** Geographic clustering of cessation tweets was associated with high smoking prevalence especially among young adults, high poverty levels, and cigarette prices. Social media reflect public interest in smoking cessation and state-level smoking profile and tobacco-control policy.

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## POS5-124

### SELECTING IMAGES TO DEVELOP PICTORIAL WARNINGS FOR CIGARILLOS: INSIGHTS FROM FOCUS GROUPS

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**SIGNIFICANCE:** The use of cigarillos remains high among young adults. The Food and Drug Administration (FDA) has mandated six text-only warnings for cigar products, including cigarillos, beginning in August 2018. Research has demonstrated the superiority of pictorial over text-only for cigarette warnings, yet no research exists on pictorial warnings for cigarillos and how to select images for warnings is limited. In this study, we sought to understand what types of images might be most effectively paired with the cigarillo text statements in order to develop pictorial warnings. **METHODS:** We conducted five focus groups with N=30 young adult (ages 18-29) cigarillo users and susceptible nonusers (53% female, 50% white, 33% black). Participants were shown at least four unique images for each of the six mandated text statements and discussed visual-verbal redundancy, emotional and cognitive reactions, and perceived effectiveness of each image. Sessions were recorded and transcribed; two investigators independently coded transcripts for emergent themes. **RESULTS:** Participants preferred images that were graphic or "gross", stating that such images would grab attention, and also discourage use of cigarillos. Images that evoked negative emotions, such as sadness, were discussed as being better than images that did not evoke emotion. Participants preferred images that were a direct representation of the corresponding text statement, rather than abstract images that required more cognitive processing. For example, an image of a diseased heart was preferred over a scar in the chest as a result of heart surgery. **DISCUSSION:** We identified several principles to inform the selection of images to pair with the FDA-mandated cigarillo text statements. We will use these principles to develop pictorial warnings for each of the six mandated text statements, which will then be further tested.

FUNDING: Federal

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## POS5-125

### DISRUPTION OF HIPPOCAMPAL NRG3-ERBB4 SIGNALING ABLATES NICOTINE WITHDRAWAL-INDUCED ANXIETY-LIKE BEHAVIORS

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Addiction to nicotine and the ability to quit smoking are influenced by genetic factors. Identifying altered gene networks and how those networks contribute to nicotine dependence and withdrawal will only accelerate therapeutic development of new smoking cessation aids. Previous work from our lab and that of our collaborators demonstrate that SNPs across the Neuregulin 3 (NRG3) gene and its cognate receptor, ERBB4, are associated with smoking cessation outcomes. Our aim is to interrogate the functionality of this signaling pathway during nicotine and withdrawal, and examine how nicotine-induced changes in NRG3 and ErbB4 may contribute to anxiety-like withdrawal phenotypes in genetically modified mice. Our current studies show that both mRNA and protein levels of NRG3 and ErbB4 are upregulated selectively in the ventral hippocampus during nicotine and withdrawal, suggesting that aberrant NRG3 signaling in this structure may underlie select nicotine withdrawal phenotypes. While the dorsal hippocampus has a well-documented role in learning and memory, the ventral hippocampus contributes to affective and anxiety responses. To evaluate the role of ventral hippocampal NRG3-ErbB4 signaling in mediating nicotine withdrawal anxiety-like phenotypes, we disrupted this pathway via conditional hippocampal ErbB4 deletion in ErbB4-floxed mice and evaluated nicotine withdrawal anxiety-like behaviors. We found that ErbB4 deletion results in the ablation of withdrawal-induced anxiety-like behavior as measured by both the novelty-induced hypophagia test and the open field exploration task, demonstrating a potential role of this signaling pathway in mediating anxiety-related withdrawal phenotypes. Ongoing studies are utilizing single molecule fluorescence in situ hybridization coupled with immunofluorescence to identify the underlying cell type and circuit-specific modulation of NRG3 signaling by nicotine within the hippocampus of these animals. Collectively, these data will

provide insight into NRG3-ErbB4 dependent mechanisms underlying nicotine withdrawal-induced phenotypes.

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## POS5-126

### THE HUMAN ORAL MICROBIOTA OF TOBACCO USERS IS ALTERED IN A PRODUCT-DEPENDENT MANNER

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The human oral cavity is home to over 700 bacterial species that have been critically linked to health, and associated with diseases when dysbiosis occurs. Tobacco use has been shown to trigger shifts in the oral microbiota and induce pathogenic processes, mostly through changes such as decrease in salivary pH and enzymatic activity. We have previously shown that tobacco products harbor potentially pathogenic bacterial species that could be transferred to tobacco users and contribute to this dysbiosis. Our study aims to investigate how tobacco bacterial species may impact the oral microbiome of tobacco users. We conducted a longitudinal study in which smokers, smokeless tobacco users and non-users provided saliva and buccal swab samples once a month for four months. Oral bacteria were characterized using PCR-amplification and sequencing of the V3V4 region of the 16S rRNA gene. Total RNA was also extracted from a subset of samples and metatranscriptomic profiling performed using Illumina HiSeq. Bacterial community profiling and metatranscriptomics both revealed bacterial communities dominated by typical oral genera - *Streptococcus*, *Prevotella*, and *Veillonella* - regardless of tobacco use status. However, alpha-diversity (Shannon) was significantly lower in non-users compared to tobacco users. Beta diversity analysis revealed distinct bacterial communities in cigarette and smokeless users, compared to non-users. Cigarette and smokeless tobacco users had a larger and more diverse core bacterial species, and unique bacterial species and expressed metabolic pathways could be identified for each group, suggesting that shifts in the oral microbiota of tobacco users are product-dependent. Our study provides a comprehensive characterization of the specific bacterial pathogens present in the oral microbiome of cigarette and smokeless tobacco users versus non-users, along with their associated metabolic activities. This work improves the scientific knowledge of the role that tobacco bacterial communities may play in the product-specific development of both acute infectious diseases and chronic diseases among tobacco users

FUNDING: Federal

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## POS5-127

### LONG-TERM NICOTINE REPLACEMENT THERAPY VERSUS STANDARD SMOKING CESSATION FOR SMOKERS WITH CHRONIC LUNG DISEASE: A RANDOMIZED CLINICAL TRIAL

Edward Ellerbeck<sup>1</sup>, Nikki Nollen<sup>1</sup>, Tresza Hutcheson<sup>\*1</sup>, Milind Phadnis<sup>1</sup>, Sharon Fitzgerald<sup>1</sup>, James Vacek<sup>1</sup>, Matthew Sharpe<sup>1</sup>, Gary Salzman<sup>2</sup>, Kimber Richter<sup>1</sup>, <sup>1</sup>University of Kansas Medical Center, KS, <sup>2</sup>University of Missouri-Kansas City, MO

**SIGNIFICANCE:** Smokers with chronic obstructive pulmonary disease (COPD) may be particularly resistant to tobacco treatment. Long-term nicotine replacement therapy (LT-NRT) may offer a strategy for reducing harm from smoking and provide a pathway for later cessation. This study compared LT-NRT versus standard smoking cessation (SSC) on cessation, cigarette smoke exposure and smoking-related harm among smokers with COPD. **METHODS:** Smokers (n = 398) were randomly assigned to receive either SSC consisting of cessation counseling at baseline, with 4 follow-up calls and 10 weeks of combination NRT provided to support those who set a quit date or LT-NRT including up to 12 months of combination NRT with baseline counseling and 6 follow-up sessions to support smoking reduction, cessation and maintenance. The primary outcome was carbon monoxide (CO)-verified 7-day point prevalence abstinence at 12 months. Secondary outcomes included cigarettes per day (CPD), exposure to CO, urinary excretion of NNAL (a tobacco-specific carcinogen), respiratory symptoms, functional status and COPD-related hospitalizations. **RESULTS:** Groups were similar at baseline;



participants were on average 56 (SD = 9.28) years old and smoked 23.1 (SD= 12.26) CPD. Retention was comparable across groups, with 94% completing final outcomes. At 12 months, CO-verified abstinence was 11.7% in SSC and 12.2% in LT-NRT (risk difference, 0.5% (95% CI, -5.9, 6.9)). Continuing smokers in both groups had significant, but similar levels of harm reduction: SSC and LT-NRT, respectively, reduced their cigarette consumption by 12.4 and 14.5 CPD, exhaled CO by 5.5 and 7.8 ppm, and mean NNAL by 21.7% and 23.0%. Other secondary outcomes did not differ between groups. LT-NRT reported more side effects than SSC; however, major adverse cardiac events did not differ. CONCLUSIONS: Both treatments had similar cessation rates and smoke exposure reductions. Since SSC has a shorter treatment duration and fewer side effects, it appears to be the preferred treatment for smokers ready to quit. LT-NRT might offer an option for high-risk smokers not willing to quit; but does not offer any benefits over SSC in terms of reducing tobacco smoke exposure.

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## POS5-128 ENDS CHARACTERISTICS AND SMOKING CESSATION PROFILES, 2017

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**SIGNIFICANCE:** The research is unclear if electronic nicotine delivery systems (ENDS) are an effective smoking cessation tool. Adult smokers who initiate ENDS use can continue to dual use, successfully move to exclusive ENDS use, or return to exclusive smoking. Although previous studies have examined dual use of ENDS and cigarettes, few studies have examined the impact of ENDS product characteristics among those with a history of smoking and ENDS use. In this presentation, we examine the association between ENDS product characteristics and current smoking and ENDS use status among adults with a history of cigarette smoking and ENDS use. **METHODS:** Data were drawn from the 2017 wave of a nationally-representative, cross-sectional survey. Adults reported current cigarette smoking and ENDS use, ENDS device type, and ENDS flavors used currently and at initiation. Weighted, Rao-Scott chi-square and multivariable multinomial regression were conducted to compare the demographic characteristics and ENDS characteristics of adults with several smoking/ENDS profiles: dual users of cigarettes and ENDS, current smokers who are former ENDS users (ENDS rejecters), and former smokers who are current ENDS users (exclusive ENDS users). **RESULTS:** Those who used rechargeable ENDS had higher odds (AOR: 6.56 [95% CI: 2.01, 21.49]) of exclusive ENDS use (v dual use). Conversely, those who used rechargeable ENDS (AOR: 0.52 [95% CI: 0.29, 0.94]) or tanks (AOR: 0.45 [95% CI: 0.28, 0.73]) had lower odds of being an ENDS rejecter (v dual user). Dual users and exclusive ENDS users largely did not differ in ENDS flavors used at initiation or currently, whereas use of certain flavors at initiation was associated with lower odds of being an ENDS rejecter (AORS 0.37 to 0.64). **CONCLUSIONS:** Most recently, use of rechargeable ENDS is associated with exclusive ENDS use but the association with flavors is less clear. Additional monitoring is needed to inform ENDS regulation that promote cessation.

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## POS5-129 STRESS IS ASSOCIATED WITH HIGHER LEVELS OF NICOTINE DEPENDENCE FOR LOW-INCOME SMOKERS, BUT NOT HIGH- INCOME SMOKERS

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**SIGNIFICANCE:** Perceived stress and psychological distress are associated with more cigarette craving and withdrawal, higher nicotine dependence, and less success during quit attempts. Low income smokers have disproportionately high rates of smoking and may be particularly vulnerable to the effects of stress on smoking dependence. The aim of the current study was to assess if the association between stress and nicotine dependence differs between lower and higher income smokers. **METHODS:** Data were obtained from the Pennsylvania Adult Smoking Study, which included 351 daily smokers. Subjects completed PhenX Toolkit and other self-report measures of socioeconomic factors, perceived stress, psychological distress, and nicotine dependence. Moderation analyses were conducted using linear regression to assess for income-related differences in the association between stress and nicotine dependence. **RESULTS:** Income groups were categorized above and below an annual household income of \$50,000 based on visual inspection of scatter plots of income by nicotine dependence. Lower income smokers had significantly higher levels of nicotine dependence [t(328)=4.28, p<.001], perceived stress [t(322)=2.89, p=.004], and psychological distress [t(331)=3.30, p=.001] compared to higher income smokers. Significant moderation effects were found, such that lower income smokers had stronger, positive associations between nicotine dependence and perceived stress (beta=-0.42, p=.002) and psychological distress (beta=-0.63, p=.018) than higher income smokers. Moderation analyses were not significant when income groups were categorized by U.S. federal poverty level. **CONCLUSIONS:** The results highlight the potential effect of stress on nicotine dependence for lower income smokers. Structural and environmental factors, like access to cigarettes and unenforced smoking restrictions, may contribute to more smoking accessibility for low income smokers experiencing stress-induced craving. This study also points to the value of using data-driven methods for determining cut-points of income for smoking research.

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## POS5-130 FACTORS INFLUENCING RETAIL STORE COMPLIANCE WITH LOCAL TOBACCO ADVERTISING REGULATIONS

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Following the 2009 Tobacco Control Act, states and localities have increased policy activities focused on limiting tobacco advertisements in retail stores. An understanding of factors that influence retail store compliance with tobacco advertising laws is needed to advance more effective tobacco control policies. This study adds to existing literature by exploring the influence of other local tobacco control laws beyond advertising on retail store compliance with tobacco advertising laws. Based on deterrence theory, which assumes that people tend to comply with laws to avoid punishments, this study assumed that an increase in regulatory activities such as increasing the number of tobacco control policies might improve retail store compliance levels. Using a two-stage cluster sampling method, probability proportion to size and random sampling, data was collected from 308 retail stores across 30 municipalities within Massachusetts. These municipalities had other tobacco control laws beyond retail store advertising including restrictions on sales permit, cigar pricing, sale of e-cigarettes and flavored products and sale of products in pharmacies. Multilevel regression modeling was used to assess the relationship between the number of other local tobacco laws and retail store compliance with tobacco advertising laws while controlling for other factors. Results showed that retail stores located in municipalities with more tobacco control laws beyond advertising in retail stores were more likely to be compliant with tobacco advertising laws (OR=1.416, p<0.10). On the average, each municipality had approximately three tobacco control laws beyond advertising at POS (mean=2.6, S.D=1.7). Overall, 92% of the retail stores were compliant with local tobacco laws restricting retail store advertising (N=283). These findings support existing theories and studies that call for an increase in laws to



improve compliance with tobacco control laws. Policymakers are encouraged to strengthen existing policies by adopting additional laws or creating new policies knowing that retail stores are highly likely to comply.

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### POS5-131 EMOTION REGULATION STRATEGIES MODERATE THE RELATION BETWEEN PHYSIOLOGICAL AND PSYCHOLOGICAL STRESS REACTIVITY AND RECOVERY IN CIGARETTE SMOKERS

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Arousal states are comprised of interrelated physiological and psychological components. There appears to be significant concordance between these domains in response to stress, and reactivity in one domain may predict recovery in the other. Initial evidence suggests that individual differences in self-regulation may also affect rate of recovery from stress across domains; however, research has yet to examine whether emotion regulation (ER) moderates the effects of stress reactivity on recovery. The current study examined the moderating effects of ER strategies on the relation between physiological stress reactivity and subjective recovery, and vice versa. Fifty-six smokers (46.4% female) completed the four-minute 10% CO<sub>2</sub> stress challenge. Heart rate (HR) and self-reported anxiety were continuously assessed during the stressor and recovery period. Individual growth curve models were conducted to examine the interaction between ER strategies and reactivity variables (i.e., heart rate and self-reported anxiety) on recovery in HR and anxiety. There was a significant interaction between lack of emotional clarity and HR reactivity on the linear ( $b=0.10$ ,  $SE=0.03$ ,  $t(297)=3.58$ ,  $p < .01$ ) and quadratic ( $b=-0.008$ ,  $SE=0.002$ ,  $t(297)=-3.35$ ,  $p < .01$ ) trajectories of anxiety recovery. There was a significant interaction between lack of emotional clarity and anxiety reactivity ( $b=-0.0004$ ,  $SE=0.0002$ ,  $t(302)=-2.01$ ,  $p=0.05$ ) on the quadratic trajectory of HR recovery as well as a significant interaction between lack of emotional awareness and anxiety reactivity ( $b=0.004$ ,  $SE=0.002$ ,  $t(302)=2.21$ ,  $p=0.04$ ) on the linear trajectory of HR recovery. Results suggest that greater physiological reactivity to stress predicts faster anxiety recovery in smokers reporting less emotional clarity, however, those with greater emotional clarity and subjective reactivity to stress exhibit faster heart rate recovery. Similar results were observed for smokers with greater awareness of emotions, suggesting that smokers who exhibit greater reactivity to stress and greater emotional awareness and clarity may evidence greater anxiety post-stress, yet faster physiological recovery.

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### POS5-132 THE IMPACT OF NICOTINE DELIVERY RATE ON REINFORCEMENT IN SMOKERS

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SIGNIFICANCE: Rapid delivery to the brain enhances the abuse potential of drugs of abuse, including nicotine. The threshold nicotine delivery rates that are essential for the reinforcing effects of nicotine have yet to be empirically determined by carefully controlled human studies. To address this gap, we developed a placebo controlled intravenous nicotine infusion procedure to establish a dose-effect curve for nicotine reinforcement as a function of nicotine delivery rate. METHODS: Non-treatment seeking male and female smokers (18 to 30 yo), who smoked  $\geq 5$  cigarettes per day for the past year completed four experimental sessions. In each session, participants were randomly assigned to a saline infusion, or a single dose of nicotine (1 mg per 70 kg body weight), delivered at three different rates (0.24, 0.048 or 0.024  $\mu\text{g}/\text{kg}/\text{second}$  over 1, 5 or 10 minutes, respectively). A total infusion duration of 10 min was maintained during each condition by adding saline infusions of variable duration via a separate infusion pump. Subjective drug effects, smoking urges, withdrawal symptoms, and cardiovascular effects were assessed throughout the session. Eighteen subjects completed all four sessions. RESULTS: The results indicate a delivery rate dependent change in the effects of nicotine. For example, the peak subjective stimulatory effects occurred at minute 2.3, 4.4 and 7.2 for the 0.24, 0.048 and 0.024  $\mu\text{g}/\text{kg}/\text{second}$  infusions, respectively.

The alleviation of smoking urges, as assessed by the Brief Questionnaire of Smoking Urges, seems to be less dependent on nicotine delivery rate than the reinforcing effects of nicotine and the alleviation of withdrawal symptoms as assessed by the Minnesota Nicotine Withdrawal Scale. CONCLUSIONS: This protocol will allow us to establish dose-effect curves that are based on nicotine delivery rate. The dose-effect curves will be used to estimate threshold rates for nicotine's reinforcing effects and to inform regulatory policies that target the nicotine yield of tobacco products.

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### POS5-133 CHANGES IN CORPORATE TOBACCO SALES POLICIES AND DIFFERENTIAL IMPACT ON RURAL VS. URBAN TOBACCO ACCESS: CASE OF CVS VS. DOLLAR STORES

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SIGNIFICANCE: CVS, the largest US pharmacy chain, made headlines in 2014 when it stopped selling tobacco products, claiming that "private retailers can play a meaningful role" in changing tobacco use behavior. Meanwhile, Family Dollar and Dollar General (FD&DG), the two largest dollar-store chains, began selling tobacco in 2012 and 2013, respectively. The purpose of this study is to evaluate the differential impact of CVS and FD&DG decisions on geospatial access to tobacco retailers in rural and urban areas. METHODS: The locations of all tobacco retailers, including CVS and FD&DG, for Florida were categorized within county-level NCHS rural-urban categories (1-2 as urban, 3-6 as non-urban). Tobacco retailer density (per 1000 adults) was calculated before/after excluding CVS and including FD&DG. Buffers of 0.5 miles per location (representing 15-min. walking distance) were created using ArcGIS. Area within walking proximity to a tobacco retailer was calculated to represent retailer geographic distance before and after the aforementioned corporate policy changes. We compared pre-post changes in retailer density in urban and non-urban. RESULTS: Two-thirds of CVS stores are in large metro areas vs. only 1/3 of FD&DG stores. The CVS policy change would have *decreased* tobacco retailer density in urban counties by 3.2% and non-urban counties also by 3.2%. However, due to the policy change by FD&DG the retailer density *increased* by 4.8% in urban counties and 9.6% in non-urban counties. The CVS policy change would have resulted in a 0.7% decrease in areas within walking distance to a tobacco retailer in urban counties and by 0.5% in non-urban counties. However, due to the FD&DG policy change, areas within walking distance to a tobacco retailer *increased* by 0.9% in urban counties and 3.5% in non-urban counties. CONCLUSION: Recent corporate policy changes on tobacco sales have increased access to tobacco retailers in rural areas considerably more than in urban areas. Increased access to tobacco retailers will contribute to the disproportionate burden of tobacco in rural communities.

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### POS5-134 DESIRE AND INTENT: SMOKING CESSATION AMONG INDIVIDUALS IN TWO SAMPLES OF SUBSTANCE USE TREATMENT

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INTRODUCTION: Tobacco use among individuals in substance abuse treatment remains disproportionately high. However, few studies have examined interest in quitting smoking and how this differs across substance abuse treatment modality. The goal of this study was to examine how desire and intention to quit smoking differed between individuals in two levels of community-based substance abuse treatment: residential and outpatient. METHOD: A total of 180 (45% male;  $M$  age = 37.31) patients in either medication-assisted (Suboxone) outpatient opiate treatment (MAT;  $n = 95$ ) or 28-day residential substance abuse treatment (RT;  $n = 85$ ) provided information about their smoking patterns, desire to and intentions about quitting. RESULTS: Demographic differences emerged across the two treatment samples. The MAT sample was less ethnically diverse (95% vs. 70% White;  $p < .001$ ), had



higher income ( $p = .01$ ) and, consistent with ongoing medication assisted therapy, had been clean for an extended time (793 vs. 17 days,  $p = < .001$ ). Mean smoking rates during treatment did not differ: MAT = 19.7 vs. RT = 18.8 cigs/day,  $p = .55$ . Desire and intention to quit smoking differed across samples. On a 7-point scale (7 = *strongly agree*), self-reported desire to quit smoking was significantly higher in the MAT ( $M = 4.85$ ) compared to the RT ( $M = 3.89$ ) sample,  $t(173) = 3.75$ ,  $p = .02$  as were intentions to engage in a quit attempt within the next 6 months (MAT  $M = 4.04$ ; RT  $M = 3.41$ ;  $t(173) = 2.25$ ;  $p = .025$ ). For both groups, desire was significantly higher than intention to quit (MAT  $t(91) = 5.4$   $p < .001$ ; RT  $t(81) = 2.6$ ,  $p = .011$ ). **CONCLUSION:** Individuals in other-drug treatment show moderate-to-high desire and interest in quitting smoking; however, this interest is significantly more pronounced in those in outpatient medication assisted treatment (MAT). As smoking rates and histories did not differ between the groups, this may be attributable to those in MAT having more economic resources as well as the experience of sustained abstinence from opiates. However, results suggest that smoking cessation should be discussed with patients in all AOD treatment modalities, particularly with those in MAT settings.

FUNDING: Academic Institution

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## POS5-135

### FIRST TRIMESTER CANNABIS USE, DEPRESSION, AND STRESS AMONG PREGNANT TOBACCO USERS

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**SIGNIFICANCE:** The National Survey on Drug Use and Health data indicates an increase in cannabis use in the U.S. from 2002-2014, with recent studies demonstrating a rapid increase specifically in daily cannabis use among female cigarette smokers. Third only to tobacco and alcohol, cannabis is the most commonly used substance during pregnancy, and has been associated with adverse maternal and infant health outcomes. Maternal stress and depression are associated with tobacco and substance use disorders. The purpose of this project is to describe the associations of cannabis use, depression, and stress among a sample of confirmed smokers in the first trimester of pregnancy. **METHODS:** Preliminary analysis of an ongoing, prospective study was conducted. Pregnant women in their first trimester, ages 18-44, with confirmed tobacco use (validated by preset urine cotinine limits using Nymox NicAlert® urine strips) were included. A survey was administered to collect self-report measures of depression (10 item, Edinburgh and 20-item, CES-D) and perceived stress (4 item, Perceived Stress Scale). Cannabis use was measured using a validated analytical method for measurement of urinary 11-nor-9-carboxy-D<sup>9</sup>-THC. **RESULTS:** Nearly 1/3 (30.7%) of women enrolled in our study were confirmed cannabis users. Overall, there were 36 first trimester cannabis users and 81 nonusers. There were no significant differences in psychosocial measures when comparing cannabis users and non-users. **CONCLUSION:** Alarming rates of cannabis use among pregnant tobacco users were found in this study. This is especially timely as more states are legalizing cannabis use which may lead to an increase during the perinatal period. Future research is needed to further illuminate links between stress, depression, and cannabis use during pregnancy.

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## POS5-136

### DISPARITIES IN TOBACCO USE BY ADOLESCENTS IN SOUTHEAST NIGERIA USING GLOBAL YOUTH TOBACCO SURVEY (GYTS) APPROACH

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**SIGNIFICANCE:** Tobacco use during adolescence is a substantial problem and adolescents are at higher risk of addiction and prolonged use. To reduce the bur-

den of tobacco-related morbidity and mortality, monitoring of adolescent tobacco use is imperative. We aimed to determine the prevalence of tobacco use among adolescents in urban, rural, public and private secondary schools in Enugu State, southeast Nigeria. **METHODS:** A cross-sectional study of 4,332 adolescents in 8<sup>th</sup> to 10<sup>th</sup> grades in 25 urban and 24 rural secondary schools in Enugu, Nigeria was done using Global Youth Tobacco Survey (GYTS) methodology. Students were asked about previous and current tobacco use, smoking cessation, and susceptibility to smoking initiation among non-smokers. Geographical, age and sex prevalence differences were examined. Analyses were performed for all adolescents (10-19 years) and for a subset of students, 13-15 years of age. All analyses were weighted. **RESULTS:** Nearly three in ten students had ever smoked cigarettes; about one in five were current tobacco users (13.3%, 5.8% and 7.8% for cigarettes, other smoked tobacco, and smokeless tobacco, respectively among all adolescents; and 12.6% 5.2% and 7.5% for cigarettes, other smoked tobacco and smokeless tobacco respectively among 13-15 year olds). Prevalence of all types of tobacco use was higher in rural schools (vs. urban schools), and among boys (vs. girls). Susceptibility to smoking initiation among non-smokers was 9.3% among all adolescents, and 9% among 13-15 year olds. Almost nine in ten smokers desired to quit and about six in ten of them had never received help to quit smoking. **CONCLUSIONS:** Prevalence of tobacco use is higher in rural schools and among boys in this setting. Most adolescent current smokers desire to quit and need culturally appropriate effective smoking cessation programs.

FUNDING: Federal

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## POS5-137

### PUFF3RD: A LARGE VOLUME, HIGH FLOW RATE CAPABLE PUFFING DEVICE FOR CURRENT GENERATION ELECTRONIC NICOTINE DELIVERY SYSTEMS (ENDS)

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Electronic nicotine delivery system (ENDS) use is rapidly spreading within the smoking community and beyond. ENDS have evolved rapidly and are expected to continue to do so with FDA premarket authorization deadlines delayed beyond August 2018. Limited research has been performed characterizing physical and chemical attributes of ENDS with even fewer specifically targeting third-generation (3rd gen) ENDS. No studies conducted to date have used flow rates appropriate for 3rd generation devices which may not affect the mass vaporized but will certainly affect particle size distribution, dilution and temperature of aerosol. We believe this lack of study is due to the lack of equipment capable of simulating the very high puff rates of 3rd gen ENDS (90-200 mL/sec). The goal of this project was to build a system capable of testing 3rd gen ENDS at real-world flow rates. PUFF3rd was built from a large aluminum syringe driven by a stepper motor and drive platform. Using a programmable microcontroller and custom Arduino code, the puff volume, puff rate, inter-puff-interval, number of puffs, and atomizer on-time are researcher-controlled. To validate PUFF3rd performance, volume and flow rate inputs were compared to measured volume and flow rate output using volumetric displacement and a primary standard flow calibration device. A correction regression was applied to increase accuracy of PUFF3rd. A blind evaluation of puff volume was performed at 10 points from 50 - 2,000 mL with overall accuracy of 98.7% and highly linear ( $R^2=0.99998$ ) across this range with repeatability of  $\leq 1.1\%$ . Puff rate was assessed from 15-165 mL/s with precision  $\leq 2.0\%$ , showing that this large system has the versatility to assess low flow rate "cigalike" ENDS, 2nd generation ENDS, and high-flow rate 3rd generation ENDS. The accuracy of this system far exceeds the ASTM guidelines for cigarette testing machine reproducibility and accuracy. PUFF3rd is able to evaluate nicotine delivery and aldehyde production of sub-ohm ENDS atomizers in the lab under realistic use conditions.

FUNDING: Federal; State

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## POS5-138

### COMPARING BREATH CARBON MONOXIDE READINGS AND ABSTINENCE DETECTION AMONG SMOKERS AND NON-SMOKERS

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**SIGNIFICANCE:** Breath carbon monoxide (CO) is an objective biochemical measure of recent smoking that is non-invasive and provides immediate feedback on abstinence. However, breath CO has a short half-life, requiring 2-3 samples per day to accurately capture sustained abstinence. Remote breath CO collection is appealing, but is a costly practice given the current selection of commercially available monitors. A less expensive CO monitor that interfaces with a mobile device has been released recently (iCO™, Bedfont®), but no published data exist that compare agreement between the iCO™ and other commercially available monitors. This study compares readings on two different CO monitors to assess agreement and the detection of abstinence. **METHODS:** Participants include adult smokers and non-smokers (ages 18+) who agreed to submit two CO samples. Data collection is ongoing, and thus far 67 comparisons have been collected (target N=130) among 37 participants. The iCO™ is being compared to the piCO™ (Bedfont®). Breath samples were separated by 1-2 minutes. Descriptive agreement values are presented, and additional analyses will use the Bland-Altman method of agreement. **RESULTS:** Of the 37 participants recruited (59% female), the average (SD) age is 33.6 (10.8) and average (SD) cigarettes smoked per day was 15.1 (6.2). The majority of participants (84%) are current smokers. Average CO readings for the iCO™ were 21.7 parts per million (ppm), while readings on the piCO™ were 24.8 ppm. The maximum difference between monitors was 17 ppm in a single comparison. Using an abstinence cut-off of equal to or less than 6 ppm, 12/67 (18%) samples were considered abstinent using the piCO™, while 19/67 (28%) were considered abstinent using the iCO™. **CONCLUSIONS:** The smartphone enabled iCO™ generally yielded lower CO readings compared to the piCO™. Despite that, these monitors appear to have comparable values, though abstinence cut-off values may need to be modified based on the monitor being used. Additional samples are being collected and agreement analyses will be conducted to better determine agreement on the monitors and the detection of abstinence.

FUNDING: Federal

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## POS5-139

### SMOKING STATUS MODERATES ASSOCIATIONS AMONG NICOTINE BELIEFS AND WILLINGNESS TO TRY TOBACCO PRODUCTS ADVERTISED AS LESS HARMFUL AND LESS ADDICTIVE

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**SIGNIFICANCE:** Beliefs about nicotine (e.g., nicotine causes cancer) may contribute to the use of tobacco products advertised by tobacco companies as less harmful or less addictive. This study investigated whether beliefs about nicotine were associated with willingness to try tobacco products advertised as less harmful or addictive, and whether cigarette smoking status moderated these associations. **METHODS:** Data were from the nationally-representative Health Information National Trends FDA Cycle 2 Survey, 2017. Participants (N=1,676) reported agreement with three nicotine beliefs: 1) nicotine causes cancer, low nicotine cigarettes (LNC) are less harmful, and LNC are less addictive. Two items assessed willingness to try products advertised as less harmful and less addictive. Participants were categorized as never, former, or current smokers. Weighted logistic regressions assessed associations of nicotine beliefs with willingness and whether smoking status moderated the associations. **RESULTS:** Former and never smokers were more willing to try LNCs advertised as less addictive and less harmful than current smokers. Smoking status moderated the relations of the beliefs that LNCs are less harmful,  $p < .05$ , and nicotine causes cancer,  $p < .01$ , on willingness to try cigarettes advertised as less addictive. In each case, the belief-willingness association was only evident among former smokers,  $OR=1.66$ , 95%CI [1.04, 2.62];  $OR=1.61$ , 95%CI [1.06, 2.43]. Smoking status also moderated the relation between the belief that LNC are less harmful and willingness to try cigarettes advertised as less harmful,  $p < .05$ . Again, the belief-willingness association was among former smokers only,  $OR=2.90$ , 95%CI [1.48, 5.69]. **CONCLUSION:** Believing LNCs are less harmful and nicotine causes cancer are associated with greater

willingness to try products advertised as less addictive among former smokers. Findings suggest these beliefs may be important in determining former smokers' willingness to try products that are advertised as low nicotine. Future research is needed to examine whether the marketing of these products and product beliefs have a causal influence on using LNCs among former smokers.

FUNDING: Federal

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## POS5-140

### COMPARISON OF CONVENTIONAL AND DUAL CIGARETTE USE ON IMMUNE AND TOBACCO BIOMARKERS THROUGHOUT PREGNANCY

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**SIGNIFICANCE:** Smoking during pregnancy is a primary risk factor for adverse perinatal outcomes and is associated with perinatal immune dysregulation. Nicotine, the primary constituent in tobacco is also a known teratogen, yet data is unclear regarding its effect of perinatal biomarkers. While electronic cigarette (e-cig) use in the US has been on the rise, minimal data exist regarding the effects of dual use (e-cigs plus conventional cigarettes) on perinatal immune and tobacco biomarkers. The purpose of this project was to compare perinatal serum immune and urinary tobacco biomarkers between dual users and conventional cigarette-only users. **METHODS:** A midpoint analysis of a prospective descriptive study of pregnant women, aged 18-44, with validated tobacco use was conducted. Serum immune biomarkers were measured using a multiplex electrochemiluminescent plate assay and included interleukin (IL)-1b, IL-2, IL-6, IL-8, IL-10, TNF $\alpha$ , CRP, and MMP-8. Urinary tobacco biomarkers were measured using an HPLC electrospray ionization tandem mass spectrometry method and included nicotine, cotinine, NNK, NNAL, and NNN. **RESULTS:** One hundred and thirty-nine women provided prenatal biomarkers. Differences were assessed between dual users (n=25) and conventional-only users (n=114). Dual users had significantly higher levels of MMP-8 ( $p=0.04$ ) in the 1<sup>st</sup> trimester, and significantly lower levels of IL-10 ( $p=0.01$ ) and TNF $\alpha$  ( $p=0.04$ ) in the 2<sup>nd</sup> trimester. Further, 2<sup>nd</sup> trimester comparisons of IL-8 approached significance ( $p=.056$ ). There were no significant immune differences in 3<sup>rd</sup> trimester serum samples, and no significant differences in any of the urinary tobacco biomarkers. **CONCLUSION:** Differences exist in serum immune biomarkers when comparing pregnant dual users to conventional-only users, suggesting a dysregulation of immune function. Lack of difference in tobacco biomarkers between the groups is noteworthy and may indicate similar health risk. These findings support the need for continued examination of changes in biomarkers among e-cig users during pregnancy.

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## POS5-141

### A COMPARISON OF SMOKING ABSTINENCE EXPECTANCIES AMONG INDIVIDUALS IN AOD TREATMENT

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**INTRODUCTION:** Tobacco use is widespread among those in substance abuse treatment but cessation programs remain limited. Better understanding of how patients in various AOD treatment modalities view quitting smoking could guide treatment. The structure of smoking abstinence expectancies held by patients in two levels of AOD treatment and how these expectancies align or differ from the actual experience of quitting their drug of choice was investigated. **METHOD:** A total of 180 active smokers in medication-assisted (Suboxone) outpatient treatment (MAT; n = 95) or 28-day residential AOD treatment (RT; n = 85) provided smoking/drug use and demographic information and completed the Smoking Abstinence Questionnaire (SAQ; Hendricks et al., 2014) and the Drug of Choice Comparison



Questionnaire (DCCQ). The DCCQ measures the SAQ domains and assesses subjective beliefs about how quitting smoking would compare to the actual experience of quitting a drug of choice. RESULTS: Age and smoking histories did not differ between the RT and MAT groups. The MAT group had higher income and averaged 793 days clean. A 2x10 between subjects MANOVA revealed SAQ factor differences,  $F(10, 169) = 8.23, p < .001$ . The MAT expected more withdrawal symptoms ( $p = .004$ ) but also believed quit aids would be effective ( $p < .001$ ). The MAT expected more benefits from quitting, including social improvement ( $p < .001$ ) and improved health ( $p < .001$ ). Conversely, the RT expected more general adverse outcomes from with quitting ( $p = .001$ ). A 2x10 between subjects MANOVA revealed significant DCCQ differences,  $F(8, 169) = 2.20, p = .03$ . Compared to RT, MAT expected quitting smoking would provide more health benefits than were gained when quitting their drug of choice ( $p = .04$ ) but also expected less social support for quitting smoking than what was received when quitting their drug of choice. CONCLUSIONS: Patients in two levels of AOD treatment differed in smoking abstinence expectancies; those in MAT anticipated both more withdrawal and more benefits than those in RT. Results suggest that as length of sobriety increases, concerns about tobacco withdrawal may intensify and concurrent cessation should be encouraged.

FUNDING: Academic Institution

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## POS5-142

### E-CIGARETTE USE CAUSES PROTEASE-ANTIPROTEASE IMBALANCE IN THE LUNG

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SIGNIFICANCE: Uncontrolled protease activity in the lung causes bronchiectasis and emphysema. As such, the role of combustible tobacco products in pulmonary protease-antiprotease imbalance, a critical component of the pathogenic triad of chronic obstructive pulmonary disease (COPD) development, is well accepted. However, knowledge of the impact of e-cigarette exposure (vaping) on lung protease activity is limited. METHODS: We analyzed bronchoalveolar lavage fluid (BALF) from healthy non-smokers, cigarette smokers (smoker) and e-cigarette users (vaper) for protease activity using nine fluorescently labeled peptide substrates to identify cysteine, serine and matrix metalloproteinases (MMPs). We also performed western blotting and zymography of concentrated BALF for validation of the protease assays. To confirm our BALF observations, we isolated neutrophils from peripheral blood of healthy volunteers and exposed them to the base liquid of e-cigarettes i.e. propylene glycol/vegetable glycerin (PG/VG), with and without 1.8% nicotine along with treatment of nicotine only and mannitol as PG/VG-induced osmotic stress control. RESULTS: We observed that elastase, MMP-2 and MMP-9 activities were significantly enhanced in both smokers and vapers in age- and sex-matched subjects ( $n=6$ ). Western blotting and zymography data confirmed these observations. No change was observed in the level of antiproteases tested, namely tissue inhibitor of metalloproteinases 1 (TIMP1) and secretory leukoprotease inhibitor (SLPI) among the three groups. We also observed that *in vitro* exposure of isolated neutrophils to PG/VG with nicotine elicited similar effects as BALF analysis. Interestingly, nicotine alone was able to cause the release of elastase from isolated neutrophils. CONCLUSIONS: Our observations suggest that vaping disrupts the protease-antiprotease balance by enhancing the activity of elastase and MMPs. We propose that long term vaping may cause increased protease activity in lung. Hence further detailed investigations should be done before prescribing vaping as a safer alternative to combustible tobacco use. Funded by the NIH/FDA HL120100 and HL135642

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## POS5-143

### INTENTION TO QUIT SMOKING AND EXPECTANCIES FOR ABSTINENCE AMONG INDIVIDUALS IN TWO LEVELS OF SUBSTANCE ABUSE TREATMENT

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INTRODUCTION: Little is known about the correlates of intention to quit smoking among those in other-drug treatment. A better understanding of the relative predictive power of demographic, tobacco use, and psychological (e.g., abstinence expectancies) variables for self-reported intention to quit smoking could increase substance treatment facilities willingness to promote smoking cessation. Unique predictors of the intention to quit smoking were modeled in two levels of community-based substance abuse treatment: residential and outpatient. METHOD: A total of 180 smokers in medication-assisted (Suboxone) outpatient treatment (MAT;  $n = 95$ ) or 28-day residential AOD treatment (RT;  $n = 85$ ) provided smoking/drug use and demographic information and completed the Smoking Abstinence Questionnaire (SAQ; Hendricks et al., 2014). RESULTS: Multiple linear regression was used to identify factors associated with self-reported intention to quit smoking within the next 6 months in each subsample. All predictors with a significant univariate association were retained, entered as a set and then sequentially removed until only significant predictors remained. For the RT group, the final model included length of current sober episode (Beta = .22,  $p = .04$ ), age at first cigarette (Beta = .26,  $p = .01$ ), current cigarettes/day (Beta = -.35,  $p = .002$ ), and the Social Improvement (Beta = .46,  $p = .002$ ), Adverse Outcomes (Beta = -.31,  $p = .02$ ), and Common Reasons (Beta = -.42,  $p = .02$ ) SAQ scales. For the MAT sample, length of current sober episode (Beta = .33,  $p < .001$ ), and the Withdrawal (Beta = -.17,  $p = .06$ ), Common Reasons (Beta = .41,  $p < .001$ ) and Social Support (Beta = .20,  $p = .05$ ) SAQ scales comprised the final model. CONCLUSIONS: Both similarities and differences emerged in predictors of the intention to quit smoking across two levels of substance abuse treatment. For both groups, being clean longer predicted intention to quit smoking. Smoking rate was more predictive in the RT group. The relative salience, and direction, of abstinence expectancies differed across treatment modalities, suggesting that cessation programs should be tailored based on AOD treatment level of care.

FUNDING: Academic Institution

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## POS5-144

### CHARACTERIZATION OF TEMPERATURE REGULATION AND HPHC PROFILE OF A NICOTINE SALT-BASED ENDS PRODUCT

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Combusted cigarettes operate at temperatures that can exceed 1000C; consequently over 4000 degradation products and HPHC's (harmful and potentially harmful constituents) are generated. JUUL is a nicotine-salt based, pre-filled (closed) ENDS system. JUUL has no user-modifiable controls, and incorporates automated temperature regulation designed to help minimize the generation of degradation products and to maintain consistency of temperature across a range of operating conditions. JUUL's temperature regulation is based on the change of electrical resistance of the heating wire, including advanced algorithms to account for internal resistances in the circuit. Actual atomizer temperatures were measured by infrared thermography measurements to be <300C, independent of puff duration. These measurements corresponded with computational models incorporating the physicochemical properties of the atomizer wick and fluid and both conductive and convective heat transfer mechanisms. The HPHC profile of aerosol generated from Virginia Tobacco, 5% nicotine-filled pods was characterized using smoking machines and validated analytical methods. A panel of 31 chemicals including HPHC's was measured. Glycerol, propylene glycol and nicotine were found in the aerosol, along with trace levels of anabasine, a nicotine analogue. HPHC's in the following classes were found to be below level of quantification (BQL): CO (carbon monoxide), PAH's (polycyclic aromatic hydrocarbons), VOC's (volatile organic compounds), TSNA's (tobacco-specific nitrosamines), carbonyls, and PAA's (primary aromatic amines). All metals were also BQL, with the exception of trace amounts of chromium (2% above LOQ). For comparison, reference Marlboro cigarette mainstream smoke was found to contain significant levels

of CO, PAH's, VOC's, TSNA's, metals, carbonyls, and PAA's. In summary, the temperature-regulated JUUL provided reduced exposure to multiple key categories of HPHC's with respect to the combusted cigarettes.

FUNDING: E-cigarette/Alternative

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## POS5-145

### DO ADULTS' PERCEPTIONS OF NICOTINE HARM TO CHILDREN VARY BY INDIVIDUAL CHARACTERISTICS? RESULTS OF A NATIONALLY REPRESENTATIVE SURVEY

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**SIGNIFICANCE:** The types and number of tobacco products through which children could be exposed to nicotine has grown rapidly and substantially over the past decade, as have the number of such exposures reported to poison control centers in the United States. Thus, it is particularly important to understand adults' perceptions of the harms of nicotine to children and to identify characteristics related to inaccurate risk perceptions and develop interventions to correct them. **METHODS:** We analyzed data from 2015 and 2016 U.S. nationally representative surveys ( $n = 11,959$ ). Multinomial logistic regression analyses examined whether demographic characteristics, number of tobacco products currently used, and having a minor child in the home are associated with the level of perceived harmfulness of nicotine to children. **RESULTS:** While a majority of respondents characterized nicotine as "definitely harmful" to children, notable subgroup differences were observed. Males (vs. females) had significantly lower odds of characterizing nicotine as 'definitely harmful' to children. Current single- and multiple- tobacco product users had significantly lower odds of endorsing 'definitely harmful' or 'don't know' than non-users. Black non-Hispanics, Hispanics, and "Other" non-Hispanics were significantly less likely to endorse 'definitely harmful' or 'maybe harmful' than Whites. **CONCLUSIONS:** We found important sub-group differences in adults' perceptions of nicotine's harmfulness to children based on gender, racial/ethnic background, and tobacco use status. Results highlight the need for public health efforts to better understand and target inaccurate risk perceptions among specific subgroups.

FUNDING: Federal

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## POS5-146

### SECONDHAND SMOKE EXPOSURE DURING PREGNANCY IN COSTA RICA, DOMINICAN REPUBLIC, AND HONDURAS

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**SIGNIFICANCE:** Secondhand smoke exposure (SHS) poses risks to pregnant women and children. Though tobacco use among pregnant women in many low- and middle income countries (LMICs) is low, tobacco companies have targeted LMICs, increasing risk to pregnancy outcomes. SHS among pregnant women in 3 LMICs was examined: Costa Rica (CR), Dominican Republic (DR), and Honduras (HON). **METHODS:** Postpartum women were surveyed in healthcare and community settings if they were 18+ years old, completed pregnancy in past 5 years, and spoke and understood Spanish. A CR, DR, and US investigative team trained and supervised survey data collection via tablets, assessing tobacco exposure and pregnancy-related variables. **RESULTS:** Data for 1072 women across countries (CR: 269, DR: 408; HON: 395) indicated low tobacco use during last pregnancy (1.01%-3.72%), more frequently being physically close (CLOSE) to smokers (28.91%-33.83%), and sometimes or often being close enough to breathe (BREATHE) others' smoke (31.99%-48.89%). Women in the DR vs. HON were more likely to report BREATHE. Smokefree home (SFH) policies were reported by 71.53-77.41% of women. In logistic regression models, smoking in pregnancy and no religion (vs. Catholic) were associated with greater SHS exposure. Having more adults in the home (vs. 1) was associated with less CLOSE but no SFH; older age and never lacking enough food were associated with less CLOSE; better

general health with SFH and medical condition in last pregnancy with no SFH; and more children in the home (2 vs. 1), feeling in control of your health, and having a wanted pregnancy were associated with less BREATHE. **CONCLUSIONS:** About one-third to nearly half of women reported exposure to SHS during their last pregnancy. Smoking in pregnancy and having no religion were robust predictors of SHS exposure. SHS exposure during pregnancy appears to be associated with a higher risk profile (smoking, lacking sufficient food, poorer health, unwanted pregnancy). Addressing SHS exposure in pregnancy in LMICs can improve outcomes for mother and child in vulnerable populations.

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## POS5-147

### CENSUS TRACT LEVEL ANALYSIS OF FDA COMPLIANCE CHECK VIOLATIONS OF TOBACCO SALES TO MINORS: AFTER FDA'S DEEMING RULE

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**SIGNIFICANCE:** Effective August 8, 2016, retailers selling tobacco products under the newly extended FDA authority were required to comply with regulations to prevent youth access to tobacco, including efforts to prevent sales to minors under the legal age of tobacco purchase. This study examined potential disparities in compliance by examining FDA's inspections of tobacco product retailers in New Jersey after the FDA deeming rule was in effect. **METHODS:** Researchers obtained inspection records from the FDA online database. Addresses of New Jersey tobacco retailers inspected by the FDA between August 8, 2016 and August 7, 2017 and their respective violations were geocoded and imported into ArcGIS. The census tracts in which the violations were located were subsequently analyzed for residents' sociodemographic characteristics. **RESULTS:** Overall, 3727 inspections with minors occurred in 1,139 (56.6%) of New Jersey's 2,010 census tracts. Of these, 671 sales to minors violations were recorded (18%), all concentrated into 22.9% of the state's census tracts. While violations occurred throughout the state, disproportionate concentrations of violations are evident. Nearly half (46.8%) of census tracts where at least one violation occurred, and 100% of tracts identified to have multiple violations were comprised of more than 50% non-white residents. Considerable violations also occurred in areas of low educational attainment and socioeconomic status. In 53.8% of census tracts where violations occurred, high school graduation rates were lower than the NJ statewide graduation rate. Similarly, 44.6% of census tracts with at least one violation, and 82.2% of tracts with more than one violation had average household incomes of less than the NJ average of \$73,702. **CONCLUSIONS:** The FDA's 2016 deeming rule to regulate all tobacco products is an important step to curb underage purchases of tobacco products, but the evidence suggests uneven compliance may contribute to racial/ethnic and socioeconomic disparities in minors' continued ability to purchase tobacco products in NJ. Further research is needed to identify additional associations and predictors of disproportionate violation.

FUNDING: Unfunded

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## POS5-148

### TAKING TEXAS TOBACCO FREE: CHANGES IN PROVIDER BEHAVIOR FOLLOWING THE IMPLEMENTATION OF A MULTICOMPONENT TOBACCO FREE WORKPLACE INTERVENTION AT BEHAVIORAL HEALTH CLINICS IN TEXAS

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**SIGNIFICANCE:** Tobacco use rates are significantly elevated among individuals with behavioral health disorders; however, tobacco dependence is not consistently addressed as a part of treatment planning in behavioral health clinics. Statistics indicate that individuals with behavioral health disorders suffer premature mortality



relative to their counterparts, at least partially due to elevated tobacco use rates. The provision of interventions to address tobacco use at behavioral health clinics is one way to address these disparities. The current presentation will highlight changes in provider behaviors from the most recent implementation of "Taking Texas Tobacco Free" (TTTF), a multicomponent, multi-level, evidence-based intervention designed to change the culture of how tobacco use is addressed among behavioral health consumers at clinics across 24 counties in Texas. METHODS: TTTF implementation included: 1) the initiation and enforcement of completely tobacco-free workplaces; 2) education to all staff and specialized training to clinicians; 3) the integration of tobacco use screenings in to routine practice; and 4) the provision of evidence-based tobacco use cessation services to behavioral health employees and consumers. Program evaluation entailed a pre- and post-implementation evaluation using survey methods. RESULTS: Overall, 286 providers participated in TTTF programming, and 198 completed survey procedures. Significant pre- to post-implementation gains ( $p < .001$ ) were recorded in provider knowledge and receipt of training on how to address tobacco use, as expected. Behaviorally, providers were significantly more likely to ask about tobacco use, assist with a quit attempt, and arrange a follow-up with consumers post-implementation ( $p < .001$ ). There were significant increases in the provision of behavioral counseling and nicotine replacement therapies, and decreases in "doing nothing" to address tobacco use from pre- to post-implementation ( $p < .01$ ). CONCLUSIONS: TTTF changed the landscape of how tobacco use was addressed by providers in behavioral health clinics across 24 Texas counties by increasing the provision of evidence-based interventions.

FUNDING: State

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## POS5-149

### CAN ELECTRONIC CIGARETTES BE USED IN NUCLEAR MEDICINE LUNG VENTILATION STUDIES? A PILOT TO QUANTITATE AEROSOLIZED TECHNETIUM-99M DTPA FROM AN ELECTRONIC CIGARETTE

Evan Floyd\*, Jonathan Baldwin, University of Oklahoma - Health Sciences Center, OK

OBJECTIVE: Examine the possibility and efficiency of using Technetium-99m (Tc99m) DTPA in a propylene glycol based e-juice as an alternative delivery method for nuclear lung ventilation studies. METHODS: This study was performed in the nuclear pharmacy of the OU Health Sciences Center. An air-tight, sealed box was modified to control electronic cigarette (EC) aerosol and facilitate paired duplicate sampling. Either non-radioactive or radioactive EC aerosol was delivered into the box from a 3-second, 450 mL simulated puff using a 500 mL syringe. The aerosol was sampled for respirable (RESP) and inhalable (IOM) particles to estimate a patient's potential dose of Tc-99. Sample filters were weighed and checked for radioactivity counts before and after each trial. Method blanks were performed on approximately 30% of trials. Aerosolized Tc-99 was evaluated for DTPA tagging efficiency to verify pharmaceutical integrity post-aerosolization. Mass and activity differences were compared using Wilcoxon tests with 5% alpha. RESULTS: For non-radioactive trials, mean RESP and IOM mass gains were 1.6 ( $p=0.0413$ ) and 2.3 ( $p=0.0409$ ) mg, demonstrating that EC settings were sufficient for aerosol measurement in these experiments. For radioactive trials, mean RESP and IOM mass gains were 1.0 mg ( $p=0.0186$ ) and 0.9 ( $p=0.0525$ ) mg, which was lower than in cold trials even though atomizer mass loss was equivalent. RESP and IOM samples had significant activity gain across trials of 3,066 counts (CI95%: 948, 6211) and 3,933 counts (CI95%: 602, 9171). Lastly, aerosolized Tc-99 DTPA tag efficiency was 93%, indicating good integrity of the pharmaceutical throughout the process. CONCLUSION: These experiments clearly demonstrate that non-volatile pharmaceuticals such as heavy metals and metal complexes can be aerosolized by an EC with a high respirable fraction. ECs have broader capability as medical devices delivering pharmaceuticals other than nicotine. If ECs were able to aerosolize Tc-99 DTPA complex, then they are capable of aerosolizing metals dissolved in the e-juice which have been found in other studies.

FUNDING: Unfunded

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## POS5-150

### THE EFFECT OF UGT2B10 ACTIVITY AND GENOTYPE ON PLASMA COTININE AND THE 3-HYDROXYCOTININE RATIO IN AFRICAN AMERICAN SMOKERS

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BACKGROUND: Tobacco exposure is often quantified by serum cotinine concentrations. However, average cotinine concentrations are higher in African American compared to Whites with similar smoking levels. Cotinine is metabolized by UGT2B10 and CYP2A6, and low UGT2B10 activity is common in African Americans, due to the prevalence of a *UGT2B10* splice variant. METHODS: UGT2B10-activity was phenotyped in 300 African American smokers by measuring the percentage of cotinine excreted as a glucuronide conjugate. Urinary total nicotine equivalents (TNE), the sum of nicotine and 6 metabolites were determined to quantify smoking dose, and cotinine and 3'-hydroxycotinine were quantified in serum and the 3HCOT/Cotinine ratio calculated. The UGT2B10 splice variant (rs116294140) was genotyped for all smokers. RESULTS: Smokers who were CC homozygous for the UGT2B10 splice variant ( $n=37$ ) excreted no cotinine glucuronide, and the level of cotinine excreted was significantly higher in these 37 smokers compared to smokers with UGT2B10 activity (genotype AC,  $n=103$ ; or AA,  $n=122$ ),  $p<0.01$ . The geometric mean concentration of plasma cotinine (adjusted for cigarettes per day and TNE) was 25% higher in smokers with the CC UGT2B10 genotype (null) compared to those with the AA genotype ( $p < 0.001$ ). The plasma 3HCOT/cotinine ratio was 12% lower in UGT2B10 CC smokers compared to those with the AA genotype. CONCLUSION: UGT2B10 genotype significantly influences plasma cotinine levels and the (3HCOT/cotinine) ratio in African American smokers. UGT2B10 genotype should be considered when using plasma cotinine as a tobacco exposure biomarker and when the 3HCOT/COT ratio is used as a measure of CYP2A6 activity.

FUNDING: Federal

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## POS5-151

### ACUTE USE OF NICOTINE SALT-BASED ENDS AND COMBUSTED CIGARETTES

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We compared nicotine pharmacokinetics, exhaled CO, tolerability/safety, and subjective perceptual measures for two nicotine salt-based ENDS products (Virginia Tobacco 5% and Cool Mint 5%, JUUL Labs) and two combusted cigarettes (Pall Mall Tobacco Flavor, British American Tobacco New Zealand; Newport Menthol Flavor, RJ Reynolds, USA). The study was a single-center, randomized, crossover design conducted in New Zealand, in 24 generally healthy, male and female adult smokers. Subjects were assigned a different product every 120 min, and consumed the products in sessions consisting of either ten 3-sec puffs or ad libitum for 4.5 min. Venous nicotine was sampled at -5, 0, 1.5, 3, 5, 7, 10, 12, 15, 30, and 60 min. The following statistics describe the tobacco-flavored ENDS and cigarette. Both products were well tolerated. Five non-serious transient AEs were reported; 1 during ENDS use, and 4 during cigarette use. For 10-puff sessions, there were no significant differences ( $P>.05$ ) between ENDS and cigarette for T<sub>max</sub> or baseline-adjusted C<sub>max</sub>. This was also true for ad lib sessions with respect to T<sub>max</sub> and baseline-adjusted C<sub>max</sub>. In 13 subjects, change in exhaled CO (dCO) was measured 5 min before start of session vs. 20 min after, and was significantly lower for ENDS compared to combusted cigarettes. This was true for 10-puff sessions (mean dCO  $0.2 \pm 0.9$  vs.  $4.5 \pm 1.1$  ppm) ( $P<.0001$ ), as well as for ad lib sessions ( $-0.1 \pm 0.5$  vs.  $4.2 \pm 2.5$  ppm) ( $P<.0006$ ). There were no significant differences between products in perceptual measures of satisfaction, taste, light-headedness, calming, concentration, alertness, hunger, nausea, reduced irritability, enjoyment of sensations, or reduction in cravings for cigarettes. In conclusion, tobacco-flavored, nicotine salt-based ENDS were well tolerated and provided similar nicotine exposure and perceptual satisfaction compared to tobacco-flavored combusted cigarettes, with reduced exposure to carbon monoxide.

FUNDING: E-cigarette/Alternative

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## POS5-152

### RETAILER COMPLIANCE WITH TOBACCO AGE OF SALE LAWS IN NEW JERSEY BEFORE AND AFTER RAISING THE MINIMUM LEGAL SALE AGE TO 21

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**SIGNIFICANCE:** There has been rapid diffusion of Tobacco 21 policies in the last few years, but little data exists on compliance with such laws. Underage buys have historically been used to measure tobacco sales to minors and this methodology can extend to Tobacco 21 laws. As of November 1, 2017, New Jersey banned tobacco sales to those under 21. This pilot study collected data pre and post enactment to assess compliance with the state law as well as federal regulations requiring tobacco retailers to check the photo ID of everyone appearing under age 27. **METHODS:** We drew a random sample of 15 retailers within a 3 mile radius of Rutgers University. Using a "familiarity protocol," our covert buyer (a 19 year old experienced tobacco user) visited the same 15 retailers weekly for five weeks pre and six weeks post for a total of 165 visits. Purchase attempts alternated weekly between Black & Mild cigars and Marlboro cigarettes. **RESULTS:** Non-compliance with checking photo ID was high overall (73%) and significant differences existed pre and post enactment of Tobacco 21 (81% v. 67%). Gas stations had higher non-compliance with ID checks (78%) compared to chain convenience stores (72%) and bodegas/non-chain convenience stores (69%). Photo ID non-compliance was also higher when our covert buyer attempted to purchase cigarettes (78%) compared to cigars (69%). Our 19 year old covert buyer successfully purchased tobacco in 61% of purchase attempts after Tobacco 21 went into effect. Bodegas had the lowest rate of non-compliance sales (47%) compared to chain convenience stores (73%) and gas stations (63%). **DISCUSSION:** Federal regulations require tobacco retailers to check the photo ID of everyone appearing under age 27 who attempts to purchase tobacco and we noted very high rates of non-compliance with this rule. Young adult tobacco users under 21 may continue to successfully purchase tobacco after Tobacco 21 laws are enacted. Future research examining compliance with Tobacco 21 laws should consider using a "familiarity protocol" to mimic real word conditions.

**FUNDING:** Unfunded

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## POS5-153

### GEOGRAPHICAL DIFFERENCES IN CIGARETTE SMOKING BY SECONDARY SCHOOL STUDENTS IN ENUGU STATE, SOUTHEAST NIGERIA, USING MULTILEVEL ANALYSIS

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**SIGNIFICANCE:** Tobacco is a risk factor for six of the eight leading causes of death worldwide. Studies, which have investigated tobacco use by adolescents in urban and rural parts of Nigeria are scarce. We compared the prevalence and examined the determinants of current cigarette smoking by adolescents in urban and rural secondary schools in Enugu State, southeast Nigeria. **METHODS:** We surveyed 4354 eighth to tenth grade students in 49 urban and rural secondary schools in Enugu State using anonymous self-administered questionnaires adapted from Global Youth Tobacco Survey, in November and December, 2015. Stratified two-stage cluster sampling was used to select students, with probability proportionate to school enrolment size. Multilevel mixed-effects logistic regression model identified socio-demographic and environmental factors associated with current cigarette smoking. **RESULTS:** Current cigarette smoking was more prevalent in urban schools (prevalence rate [PR]: 16.8%, 95% confidence interval [95%CI]:15.2–18.4%) than in rural schools (PR:10.3%[95%CI:9.0–11.5%]). Odds of current cigarette smoking was 1.5 times in rural compared to urban schools (adjusted odds ratio [AOR]:1.5[95% CI:1.03–2.04]). Female sex, reported employment of both parents, and teaching about tobacco use in school, were inversely associated with current cigarette smoking (AOR:0.72 [95%CI:0.58-0.90] for sex, AOR:0.61[95%CI:0.41-0.89] for parental employment, and AOR:0.60[95%CI:0.48-0.75] for tobacco teaching. Conversely, possession of weekly spending money, having smoking parents, friends or classmates, exposure to second-hand smoke or to pro-tobacco advertisement, and sale of cigarettes near schools were positively associated with current cigarette smoking. **CONCLUSIONS:** Geographic differences in cigarette smoking by school-going adolescents exist in Enugu State, southeast

Nigeria, with higher prevalence in rural than in urban schools. Possession of weekly spending money, parental and peer influence, and exposure to pro-tobacco advertisements increased the odds that adolescents would smoke cigarettes.

**FUNDING:** Federal

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## POS5-154

### SOCIO-ECOLOGICAL FACTORS ASSOCIATED WITH USE AND DUAL USE OF TOBACCO CIGARETTES AND E-CIGARETTES AMONG RURAL YOUTH

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A Social Ecological perspective posits that substance use is a result of the interaction among risk factors at the individual, interpersonal, community, and societal levels. We examined associations between socio-ecological factors and use and dual use of tobacco cigarettes and e-cigs among rural youth using survey data from 700 students ages 11-18 in rural south central Tennessee. Participants reported their past month use of tobacco cigarettes, e-cigs to vape nicotine, exposure to tobacco and nicotine advertising, parents' and friends' use, perceived disapproval by parents and friends, and demographics. Overall, 2.9% of students reported smoking cigarettes only, 8.4% reported vaping e-cigs to get nicotine only, and 8% reported dual use of tobacco cigarettes and e-cigs. Controlling for demographics, multinomial logistic regressions showed that past month exposure to nicotine or tobacco advertising was positively associated with use of tobacco cigarettes only, OR=2.10,  $p<.005$ , use of e-cigs only, OR=1.37,  $p<.05$ , and dual use, OR=1.52,  $p<.05$ . Perceived tobacco use by friends was associated with tobacco cigarette only use, OR=1.01,  $p<.005$ , and dual use, OR=1.01,  $p<.005$ . Although perceived e-cig use by friends was negatively associated with tobacco cigarette only use, OR=0.99,  $p<.05$ , it was positively associated with e-cig only use, OR=1.01,  $p<.05$ . Perceived past year e-cig use by parents was positively associated with e-cig only use, OR=1.00,  $p<.05$ . Parents' disapproval of tobacco was positively associated with e-cig only use, OR=2.22,  $p<.05$ . Friends' disapproval of tobacco was negatively associated with tobacco cigarette only use, OR=0.32,  $p<.005$ . Perceived harm of e-cig use was negatively associated with dual use, OR=0.44,  $p<.005$ . Results suggest that specific socio-ecological factors may be uniquely associated with tobacco cigarette use only, e-cigarette use only, and dual use. Notably, however, exposure to nicotine or tobacco advertising was positively associated with all three behaviors. These findings suggest that prevention efforts should address different risk factors for each behavior, but target tobacco and nicotine advertising in general.

**FUNDING:** Federal

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## POS5-155

### PATTERNS OF E-CIGARETTE USE IN BALTIMORE COUNTY

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**SIGNIFICANCE:** The popularity of e-cigarettes has risen in the recent past especially among the youth with peak initiation risk at 14-15 years. It has also gained popularity as a tool to combat tobacco addiction. Current scientific literature indicates that e-cigarettes are a far less harmful alternative as compared to traditional cigarettes. However, emitted e-cigarette aerosol contains known toxic chemicals such as formaldehyde, toxic metals, and nicotine. **Aim:** To characterize e-cigarette usage and vaping preferences among residents of Baltimore County **METHODS:** A total of 103 former smokers or non-cigarette smokers were recruited from Baltimore county with 53 e-cigarette users and 50 non-users. Information about demographics, patterns of e-cigarette use, and dental and physical health was collected through questionnaires. **RESULTS:** Majority of e-cigarette users were Caucasian (46%), male (38%) with a mean age of 28 years and had consistently used e-cigarettes for a little less than 3 years. 85% of users reported the need to vape within the first hour of waking up, with 28% feeling the need within the first 5 minutes. The mean nicotine concentration of e-cigarette juice used was 6.5 mg/



ml. Participants vaped an average of 46 ml of e-cigarette fluid per week and used a mean voltage setting of 2V. 47% of users intended to reduce nicotine concentration, and 49% planned to quit the use of e-cigarettes altogether. A preference for higher nicotine concentration with increase in age was observed; 0.37 mg/ml Cl: (0.21,0.54) in the unadjusted model and 0.41 mg/ml Cl: (0.23,0.59) when adjusted for sex, education level, race and smoking status. There was a higher prevalence of hypertension (21% vs 4%) and history of wheezing (17% vs 0%) in e-cigarette users compared to non-users. There were no significant differences between e-cigarette users and non-users in other health characteristics reported. CONCLUSION: Our study describes patterns of e-cigarette use in Baltimore County. Further research is required to understand the health effects of e-cigarette use.

FUNDING: State; Non-profit

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## POS5-156

### THE INFLUENCE OF TOBACCO SMOKING AND TIMING OF SMOKING CESSATION ON FATAL PROSTATE CANCER: EVIDENCE FROM THE ATHEROSCLEROSIS RISK IN COMMUNITIES (ARIC) STUDY

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SIGNIFICANCE: Current cigarette smoking is associated with increased risk for fatal prostate cancer. Few studies, however have considered changes in smoking behaviors, smoking of non-cigarette tobacco products, and whether associations with lethal and fatal prostate cancer differed by race. This study aimed to fill these gaps. METHODS: We studied 6,646 White and Black men (mean baseline age 54.5 years) who participated in the Atherosclerosis Risk in Communities study from 4 US communities, were free of a cancer diagnosis at baseline and followed for lethal and fatal prostate cancer through 2012. Smoking status was assessed at baseline (1987-1989) and during study visits through 1998. RESULTS: At baseline, 23% were never tobacco smokers, 21% current cigarette smokers, 27% former cigarette smokers, and 29% ever cigar/pipe smokers (irrespective of cigarette smoking). After a mean follow-up of 20.3 years, 91 died of prostate cancer. Compared to never tobacco smokers, hazard ratios (HR, 95% CI) for fatal prostate cancer were 2.28 (1.26, 4.12) for current cigarette smokers, 0.81 (0.44, 1.49) for former cigarette smokers, and 0.94 (0.52, 1.70) for ever cigar/pipe smokers. Men who quit smoking cigarettes >10 years ago did not differ from never tobacco smokers in risk of fatal prostate cancer. Findings were similar in White and Black men. CONCLUSIONS: Compared with never tobacco smoking, current cigarette smoking was associated with increased risk for fatal prostate cancer in White and Black men, but quitting in the distant past was not associated with increased risk. These findings support smoking cessation as a strategy to reduce prostate cancer mortality.

FUNDING: Federal

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## POS5-157

### ASSOCIATION OF NEIGHBORHOOD RACIAL/ETHNIC RESIDENTIAL SEGREGATION ON TOBACCO USE IN THE ATHEROSCLEROSIS RISK IN COMMUNITIES (ARIC) STUDY

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SIGNIFICANCE: In the US, race/ethnicity is highly correlated with residential location, with Whites and minorities often living segregated from one another. This differential residential location may produce differences in health behaviors, such as tobacco use. We examined the association of neighborhood racial/ethnic residential segregation with tobacco smoking. METHODS: We studied 10,089 White and 4,018 Black adults aged 45-64 at baseline (1987-1989) who participated in the Atherosclerosis Risk in Communities study from 4 US cities: Forsyth Co, NC; Jackson, MS; Minneapolis, MN and Washington Co, MD. Neighborhood racial/ethnic composition and residential segregation (G\* statistic; extent to which racial/ethnic composition in neighborhood and adjoining neighborhoods deviates from county's racial/ethnic composition) were estimated using 2000 US census tract data. We

estimated odds ratios (Or) for tobacco smoking at baseline using mixed-effects logistic regression models with random effects for census tracts and city. RESULTS: 29% of participants were tobacco smokers (27% of White participants and 32% of Black participants). After adjustment for individual and neighborhood factors, a 10% increase in percent of Black residents in a neighborhood was associated with a higher odds of current tobacco smoking among Black participants (Or: 1.07, 95% CI: 1.01, 1.14) but not White participants (Or: 1.00, 95% CI: 0.94, 1.07). Black participants living in a cluster of neighborhoods where minority populations (race/ethnicity other than non-Hispanic White) were overrepresented had a 54% (95% CI: 1.09, 2.16) higher odds of tobacco use compared to counterparts in non-clustered neighborhoods. Among White participants, living in a cluster of neighborhoods where minority populations were underrepresented was associated with a lower odds of tobacco use (Or: 0.87, 95% CI: 0.75, 1.00). CONCLUSIONS: Neighborhood factors, in particular, living in predominantly minority and segregated neighborhoods was associated with a greater odds of tobacco use among Black adults. These findings support the need for neighborhood-level tobacco control interventions to reduce tobacco use in the US.

FUNDING: Federal

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## POS5-158

### E-CIGARETTE USE AND QUANTITY OF CIGARETTE SMOKING AMONG ADOLESCENT CIGARETTE SMOKERS: A FINITE MIXTURE MODEL ANALYSIS

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SIGNIFICANCE: E-cigarette use is popular among adolescents and youth, but its long-term public health implications remain largely unknown. Much of the literature has focused on understanding the relationship between e-cigarette use and youth cigarette initiation. However, very little is known about e-cigarette use and cigarette quantity among those who continue to smoke cigarettes. While there is no safe level of tobacco use, understanding whether e-cigarette use is associated with lower frequency or intensity of smoking is crucial, given that a gradual reduction in cigarette use is a potential pathway to permanent quitting, at least for some. The objective of the present study was to examine the association between current e-cigarette use and quantity of cigarette smoking. METHODS: Cross-sectional data on current smokers were drawn from the 2014-2015 Canadian Student Tobacco, Alcohol and Drugs Survey among high school students (n = 1,411). A finite mixture model (FMM) was employed to account for unobserved heterogeneity due to clusters of finite sub-populations. RESULTS: Current e-cigarette users reported smoking more conventional cigarettes in the past week compared to non-e-cigarette users (t [1,409] = 4.7998; in unadjusted analysis). Results from a finite mixture regression showed that current e-cigarette use was significantly associated with the number of cigarettes smoked in the past week, but only among light smokers (IRR = 1.40; CI = 1.05 - 1.85). However, additional analyses found that the association between e-cigarette use and quantity of cigarette smoked varied by individual smoking pattern. An FMM with a group or class modelling using individual smoking pattern showed a weaker association between e-cigarette use and quantity of cigarette smoking. CONCLUSION: Findings of this study suggest that the significant association between e-cigarette use and quantity of cigarette smoking may be driven by patterns of use among experimental or beginner smokers.

FUNDING: Unfunded

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## POS5-159

### ELECTRONIC CIGARETTE (E-CIGARETTE) USE PATTERNS AND DEVICE CHARACTERISTICS OF DAILY E-CIGARETTE USERS IN MARYLAND

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SIGNIFICANCE: Over the past few years, the use of electronic cigarettes has steadily increased, particularly among former smokers and young adults who have

never smoked. Currently there is limited literature on daily e-cigarette users. This preliminary study investigates the use patterns and e-cigarette device characteristics of daily e-cigarette users in Maryland. **METHODS:** We recruited 64 participants (50 daily sole e-cigarette users and 14 daily dual users of tobacco cigarettes and e-cigarettes), and collected data on overall health status, e-cigarette use and smoking patterns, device characteristics, sociodemographic factors, and beliefs/perceptions of e-cigarette safety by interview. **RESULTS:** Dual and sole e-cigarette users were similar by age, sex, education, ethnicity, and employment status. The volume of e-liquid consumption ranged from 5 to 240ml/week. Mean nicotine concentration in e-liquid was lower for never smokers (0.6 mg/ml) than previous (4.0 mg/ml) or current smokers (6.0 mg/ml) ( $P=0.003$ ). The mean voltage reported was 4.4V, and the most common coils used were Kanthal (77%) and Nichrome (21%). The majority of participants intended to reduce nicotine levels in the e-liquid, but less than half planned to quit e-cigarette use altogether. **CONCLUSION:** This research reports e-cigarette use patterns and device characteristics of daily e-cigarette users. With chronic use and no intention to quit vaping, these users may be at risk for increased toxic exposures. Further research is needed to characterize the long-term health effects of daily e-cigarette use.

**FUNDING:** State; Federal

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## POS5-160

### DETERMINANTS OF ELECTRONIC VAPOR PRODUCTS USE AMONG EVER USERS OF ELECTRONIC VAPOR PRODUCTS: RESULTS FROM NATIONAL SURVEY

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**INTRODUCTION:** Electronic vapor product (EVPs) use has remained high among current and former smokers. Little is known about differences in the experiences which sustain and/or discourage continuation of EVP use among current and former smokers. In this study, we compared perceived satisfaction, opinions about addictiveness and harm perception across four groups: dual users of cigarettes and EVPs, current smokers who are former EVP users (EVP rejecters), former smokers who are current EVP users (exclusive EVP users), and former smokers who are former EVP users (those who quit both cigarettes and EVPs). **METHOD:** We used data from an online survey administered in 2015–2016 using a weighted probability sample of 2,572 current and 3,315 former U.S. adult smokers. Descriptive statistics and logistic regression was conducted while adjusting for demographic factors. **RESULTS:** Of the ever EVP users ( $n=2,019$ ) 33% rejected them, 29% used them along with cigarettes and 11% switched to exclusive use of EVPs. Exclusive EVP users found EVPs more enjoyable than cigarettes compared to EVP rejecters (55% versus 3%). Overall, the majority of current and former smokers and ever EVP users, perceived EVPs to be addictive ( $p < 0.001$ ). Compared to non-daily EVP users, those who used EVPs every day were more likely to perceive themselves addicted to EVPs (9% vs 58%;  $p < 0.001$ ). A smaller percentage of exclusive EVP users (15%) reported EVPs were equally or more harmful than cigarettes compared to dual users (33%), those who quit both cigarettes and EVPs (44%) and EVP rejecters (50%). Adjusted logistic regression analyses showed significant difference in risk perception. Dual users (AOR 0.46, 95% CI 0.32-0.65) and exclusive EVP users (AOR 0.17, 95% CI 0.09-0.34) were less likely to report EVPs as equally or more harmful than cigarettes compared to EVP rejecters. **CONCLUSIONS:** Most smokers who try EVPs reject or only use them along with cigarettes, and these smokers perceive using EVPs to be almost as risky as smoking cigarettes. These experiences and risk perceptions for EVP use are important determinants for continued EVP use among current and former smokers.

**FUNDING:** Federal

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## POS5-161

### EFFECT OF QUESTIONNAIRE WORDING AND ORGANIZATION ON YOUTH TOBACCO USE ESTIMATES: A SPLIT SAMPLE SURVEY EXPERIMENT

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**SIGNIFICANCE:** The New Jersey Youth Tobacco Survey (NJYTS) is conducted biennially to monitor tobacco use among NJ youth; it includes “core” questions recommended by the Centers for Disease Control and Prevention (CDC) as well as state-added questions specific to New Jersey. In 2016, revisions were made to the recommended questions, including changes to tobacco product definitions and addition of multiple questions about electronic cigarettes (e-cigarettes). Survey science suggests that such changes to questionnaires can impact participant responses. We conducted a split-sample survey experiment to assess the potential impact of these proposed changes on state tobacco use prevalence estimates. **METHODS:** Six to 8 classrooms in each of 5 schools participating in the 2016 NJYTS were randomized to complete one of two surveys: (1) the “regular” 2016 NJYTS instrument ( $n=476$ ) and (2) an “experimental” version ( $n=345$ ) of the 2016 NJYTS that was identical in content but modified to reflect the new CDC recommendations. Estimates of ever and past-30-day use of cigarettes, cigars, smokeless tobacco (SLT), hookah, snus, bidis, and electronic cigarettes (e-cigarettes) were computed by questionnaire version, with chi-square  $p$ -values less than 0.05 considered indicative of significant bivariate differences. **RESULTS:** The regular and experimental survey groups were demographically similar. Ever use of each product and past-30-day use of cigarettes, SLT, hookah, snus, and bidis did not differ by survey version. However participants who completed the “experimental” survey, relative to those who completed the regular version, reported past-30-day e-cigarette use at a significantly lower rate (5.8% vs. 9.9%,  $p=0.0386$ ) and reported past-30-day cigar smoking at a marginally lower rate (4.5% vs. 7.8%,  $p=0.06$ ). **CONCLUSIONS:** Our results suggest that changes to questionnaire wording and organization in youth tobacco surveys may influence responses and hence impact tobacco use prevalence estimates, especially for emerging products like e-cigarettes. State tobacco surveillance programs should exercise caution when comparing estimates over time in the presence of questionnaire changes.

**FUNDING:** State

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## POS5-162

### MULTI-PRODUCT EXPERIMENTING AND POLY TOBACCO USE AMONG SEXUAL MINORITIES

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**SIGNIFICANCE:** Compared to general population, sexual minorities have higher prevalence of tobacco consumption. However, not much is known about other tobacco-related risky behaviors among sexual minorities. **METHODS:** Using HINTS-FDA (cycle 2, 2017) data, this study examines multi-product experimenting and poly tobacco use among sexual minority populations. Specifically, the roles of perceived harm and perceived addictiveness are explored. Multi-product experimenting is derived from items measuring tobacco products tried even once. Poly tobacco use is derived from items measuring current use of various tobacco products. Sexual minorities are defined as those who self-identified as homosexual, bisexual, or others. **RESULTS:** ANOVA was conducted to compare the heterosexual population and sexual minorities, in terms of perceived harm, perceived addictiveness, poly use and multi-product experimenting. Results show that sexual minority people are more likely to try Hookah and e-cigarette. Use of cigarettes, cigars, e-cigarettes, and chewing tobacco are higher among sexual minorities. Without different perceptions about addictiveness of tobacco products, sexual minorities perceived cigarettes less harmful than heterosexual population did. Additionally, hierarchical regression analyses were conducted to investigate the role of sexual orientation, perceived addictiveness, and perceived harm in predicting poly tobacco use and multi-product experimenting. In explaining multi-product experimenting (Adjusted R Square = .10), sexual orientation is positively related to the variety of tobacco products tried before (Beta=.079,  $p=.048$ ). As predicted, those who have lower overall perceived harm (Beta= -.111,  $p=.019$ ) and lower overall perceived addictiveness (Beta=-.112,  $p=.010$ ) are more likely to try multiple tobacco products before. As for poly use (Adjusted R Square=.080), neither sexual orientation ( $p=.178$ ) nor perceived addictiveness



( $p=.072$ ) is a significant predictor. Perceived harm is negatively associated with poly use ( $\text{Beta}=-.181, p<.001$ ). Future research can examine the role of other predictors, such as discrimination and marketing practices.

FUNDING: Unfunded

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## POS5-163

### UNDERSTANDING URBAN/RURAL DIFFERENCES AMONG US ADULTS' TOBACCO USE AND RELATED ADDICTION AND HARM BELIEFS

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**SIGNIFICANCE:** Individuals living in rural areas of the US experience greater cancer disparities compared to their urban counterparts, but little is known about tobacco harm perceptions and attitudes related to tobacco use. This study examines tobacco use and related addiction and harm beliefs among rural vs. urban populations in a nationally representative sample. **METHODS:** Data from the Health Information National Trends Survey-FDA Cycles 1 and 2, a nationally representative population-based survey collected from 2015 and 2017, ( $n=5474$ ) were used. Descriptive and weighted multivariable analyses in separate models examined tobacco use behaviors, harm beliefs, and addiction beliefs. **RESULTS:** Approximately 16% of the sample resided in rural areas ( $n=1311$ ). Ever use of cigarettes was higher among rural residents (46.4%) compared to urban residents (37.6%) ( $p<0.01$ ), and more rural residents smoked cigarettes daily (15.3%) compared to urban residents (10.3%) ( $p=0.02$ ). More rural residents reported current smokeless tobacco use (6.7%) compared to urban residents (2.7%) ( $p<0.01$ ), and current cigar use (7.9%) compared to rural residents (3.6%) ( $p<0.01$ ). Rural residents did not differ significantly in ever ( $p=0.08$ ) or current e-cigarette use ( $p=0.10$ ), or ever cigar use ( $p=0.10$ ) compared to urban residents. There were no rural-urban differences in beliefs that tobacco products were harmful ( $p>0.05$ ). In separate multivariable logistic regressions, urban residents reported lower odds of addiction beliefs compared to rural residents for cigarette use ( $\text{OR}=0.60, p=0.04$ ) and cigar use ( $\text{OR}=0.71, p=0.01$ ) but there were no rural-urban differences in addiction beliefs for other tobacco products. **CONCLUSIONS:** Rural respondents had higher rates of tobacco use compared to urban residents; however, there were no significant differences between urban and rural residents regarding harm beliefs about various tobacco products. Urban residents had a lower odds of reporting beliefs related to addiction for cigarettes and cigars, but not other tobacco products. More research is needed to understand the observed differences in tobacco use and addiction beliefs between urban and rural residents.

FUNDING: Federal

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## POS5-164

### ESTIMATING CONVERSION FACTOR OF NICOTINE DELIVERY TO PLASMA COTININE

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**SIGNIFICANCE:** WHO and FDA are considering reducing nicotine to independent level. Plasma cotinine levels were used to infer daily nicotine intake with nicotine to cotinine conversion factor and bioavailability factor of nicotine. However, there are still missing factors in the calculation process, such as cigarette consumption amounts and smoking topography. This study aims to directly link plasma cotinine levels to nicotine daily delivery by introducing an estimated conversion factor. **METHODS:** 69 male participants were enrolled, whom were required to smoke an assigned cigarette brand ad libitum for three days. At the third day, smoking topography of each participant were recorded for six times using a topography device, daily cigarette consumptions were documented at the same time. Nicotine delivery per cigarette was obtained by simulating smoking topography of each participants on smoking machine. Then daily nicotine delivery was estimated with multiplying individual nicotine delivery per cigarette by the cigarette consumption. Plasma cotinine (COT) levels at 2 p.m. were adopted as an estimate of the time-weighted

average level of cotinine. **RESULTS:** The average daily delivery of nicotine ( $D_{\text{nic}}$ ) was 36.23 mg (range 10.40 to 91.20 mg), with an average nicotine delivery per cigarette of 2.10 mg (range 1.24 to 3.09 mg). Plasma cotinine level ranged from 10.5 to 347.2 ng/mL, with an average of 169.68 ng/mL. The equation for estimating conversion factor (F) of nicotine daily delivery to plasma cotinine was:  $F=D_{\text{nic}}(\text{mg}) / \text{Plasma COT}(\text{ng/mL})$ , where F averaged 0.32, with a range from 0.057 to 1.55. **CONCLUSIONS:** The present study provides quantitative perspective on the associations between nicotine daily delivery and plasma cotinine level. The F factor we developed can assist the usage of plasma cotinine as an indicator of nicotine daily delivery, and will shed light on the issue of nicotine regulation.

FUNDING: Unfunded

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## POS5-165

### FLEXIQUIT: DIGITALIZED INTERVENTION FOR SMOKING CESSATION IN ADOLESCENTS AND YOUNG ADULTS

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Smoking remains a global concern, especially in youth, and cessation practices have not sufficiently achieved to make youth quit. The aims of the present study were: (a) to create and examine the acceptability and satisfaction of a digitalized avatar led Acceptance and Commitment Therapy (ACT) for smoking cessation in youth (flexiquit) and (b) to compare ACT to a waitlist-control group for smoking cessation and smoking related outcomes. Participants were 357 high school and university students, aged 15-28 years old ( $M = 21.06, SD = 2.96$ ) randomized to either the treatment or waitlist-control group. The treatment group completed 6 sessions of the flexiquit program. Participants found the program satisfactory, useful and motivating. Analyses showed participants in the treatment group had significantly higher quit rates than the control group (51.9% vs. 14.3% respectively;  $\text{OR}=6.46, 95\% \text{ CI}=1.76 -23.71, p=.005$ ). A significant effect of the intervention was found on the treatment group by decreasing nicotine dependence, average number of cigarettes smoked, increasing self-efficacy and intention to quit smoking. Furthermore, the treatment group resulted in significant increases of acceptance of smoking triggers and smoking cognitive defusion compared to the control group. Mediation analyses showed that smoking cognitive defusion mediates the relationship between group and cessation self-efficacy and intention to quit. Results of this study are very encouraging for the use of digitalized ACT-based interventions for smoking cessation in youth.

FUNDING: Academic Institution; Eurolife Health Insurance Company and the Cyprus Antinarcotics Council

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## POS5-166

### RECRUITING DUAL CIGARETTE AND E-CIG USERS: COST AND ENROLLMENT EFFICACY OF ONLINE AND OFFLINE METHODS

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Recruitment is a critical component of any tobacco research study, both in terms of achieving the desired sample in a timely fashion, and also, in achieving an appropriately diverse and representative sample. Research on e-cigarettes is still in its early stages and as a result, the field does not yet have an established set of "lessons learned" for successful recruitment campaigns. We recruited dual users of cigarettes and e-cigarettes into a longitudinal study to assess how patterns of use change over time. Participation in the study required five in-person visits over 12-months, two 7-day ecological momentary assessment weeks, and twenty-six online surveys tracking use of cigarettes and e-cigarettes across the 12-months. This presentation will report the effectiveness and cost efficiency of various recruitment methods as well as differences in participant demographic characteristics between the various recruitment sources. We utilized several recruitment strategies: print advertisements in targeted locations; social media approaches; on line recruitment through various websites; and network based recruitments. All of these recruitment materials directed potential participants to an online survey to assess their eligibility to participate in the longitudinal study. Across all methods, we spent \$13,299 yielding 1,363 completed screening surveys which resulted in

267 enrolled participants. This is an average cost of \$9.76 per completed screening survey and \$49.81 per enrolled participant (the range is \$6-\$720). Yield from specific recruitment campaigns ranged from 1 to 647 completed screener (and a range of 0 to 70 enrolled participants) with online methods (Craigslist, online emailed recruitment messages, and Facebook) being the most effective in generating screening surveys and enrolled participants. The most cost-efficient recruitment methods were referrals (\$0 per enrolled participant) and Craigslist (\$6 per enrolled participant). The least cost efficient methods were print ads, which generally yielded very few screeners and enrolled participants with a larger cost than online methods. Recruitment challenges and creative solutions will be discussed.

FUNDING: Federal

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## POS5-167

### KNOWLEDGE, ATTITUDE, AND PRACTICES OF TOBACCO CESSATION SERVICES AMONG HEALTHCARE PROVIDERS IN THE AMBULATORY CARE NETWORK (ACN) AT THE NEW YORK PRESBYTERIAN HOSPITAL (NYPH)

Lubna Lubna Alnasser<sup>1</sup>, David Albert<sup>\*2</sup>, Angela Ward<sup>2</sup>, Emilie Bruzelius<sup>1</sup>, <sup>1</sup>Columbia University Mailman School of Public Health, NY, <sup>2</sup>Columbia University College of Dental Medicine, NY

**SIGNIFICANCE:** In the first year, Delivery System Reform Incentive Payment initiative, the NYPH Tobacco Cessation Program conducted a needs assessment utilizing clinician surveys and interviews to identify feasible strategies to promote sustainable, cost effective tobacco cessation services. This report summarizes the clinician survey component of the initial needs assessment and qualitative interviews of front line clinicians. **METHODS:** Clinician surveys were completed by a convenience sample of participants. All clinicians practicing within Ambulatory Care Network practices were invited to participate. The survey was available in an online (CUMC Qualtrics) and paper format. Qualitative sampling occurred in two stages. First, Medical Directors identified an initial purposive sample of ten (5) participants representing the spectrum of clinic front-line staff. Further theoretical sampling was then undertaken using snowball referrals to identify participants with key stakeholder groups. **RESULTS:** 109 clinicians responded to the survey. Nicotine replacement therapy and prescription medication were the most available resources (45%) for tobacco cessation. Most clinicians asked and documented tobacco use (71.6%), advised patients against tobacco (63.3%) and assessed willingness to quit (61%). Lack of time during consultations (68%) and lack of access to tobacco cessation resources (48%) were frequently cited as major barriers against engaging in tobacco cessation activities. Clinicians who were interviewed felt that patients had limited knowledge about tobacco use and its broad health consequences. They indicated that low health literacy was an important concern for their patient population. They believed that more education materials should focus on the risks of tobacco use, however they felt that one-on-one counseling, provided in a culturally competent setting, would be the most effective strategy for changing tobacco attitudes. **CONCLUSIONS:** Our analyses showed that NYPH clinicians are knowledgeable about brief tobacco intervention and most medical clinicians (both physicians and nurses) had received extensive training.

FUNDING: State

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## POS5-168

### STAYING HEALTHY AFTER CHILDBIRTH (PROJECT HATCH): A THEORY BASED SURVEY OF UK AND USA HCPS VIEWS ON THE PROMOTION OF SMOKING CESSATION AND INTERRELATED CANCER PREVENTATIVE BEHAVIOURS POSTPARTUM

Emma Ward<sup>\*1</sup>, Dian Nostikasari<sup>2</sup>, Allison Kurti<sup>3</sup>, Angelos Kassianos<sup>4</sup>, Jamie Payton<sup>5</sup>, Claire Adams Spears<sup>6</sup>, Fiona Mitchell<sup>7</sup>, Caitlin Notley<sup>1</sup>, <sup>1</sup>University of East Anglia, United Kingdom, <sup>2</sup>Rice University, TX, <sup>3</sup>University of Vermont, VT, <sup>4</sup>University College London, United Kingdom, <sup>5</sup>Temple University, PA, <sup>6</sup>Georgia State University, GA, <sup>7</sup>University of Strathclyde, United Kingdom

**BACKGROUND:** Across the UK and USA, postpartum smoking relapse rates are high for women who quit smoking during pregnancy. Simultaneously, rates

of exclusive breastfeeding and physical activity are low. These three cancer preventative behaviours have complex interactions, for example, smoking relapse often corresponds with discontinuing breastfeeding, and breastfeeding can be seen as a barrier to physical activity. Underpinned by the social ecological theoretical framework, Project HATCH aims to assess interrelated factors impacting continued smoking abstinence and increased rates of breastfeeding and physical activity among postpartum women. **METHODS:** Phase 2 of the study, presented here, includes an online survey of UK and USA health professionals to elicit their views on current practice relating to target behaviours (smoking relapse prevention, promotion of breastfeeding, physical activity), postpartum. **RESULTS:** We present survey data on perceived facilitators and barriers of the cancer preventing target behaviours relating to each ecological subsystem of the social ecological framework (individual, microsystem, mesosystem, exosystem, macrosystem). We explore how health professionals rate the importance of these barriers and facilitators for each target behaviour and how the barriers and facilitators are related to each other across the three behaviours. In addition, data are presented on health professionals' feedback about existing resources and ideas for future improvement. **CONCLUSIONS:** Willingness and ability to engage in continued smoking abstinence, physical activity and breastfeeding in the postpartum period is affected by physical and sociocultural variables in the larger community environment. There is a need to support women across these interlinked cancer preventative behaviours, within their unique contexts, with potential to significantly impact both maternal and child long-term health outcomes. The results of the survey will contribute to the wider aim of Project HATCH to develop a prototype intervention to target continued abstinence from smoking, alongside increased breastfeeding and physical activity among postpartum women.

FUNDING: Cancer Research UK - charitable organisation

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## POS5-179

### LOCUS OF CONTROL IS ASSOCIATED WITH TOBACCO AND ALCOHOL CONSUMPTION IN YOUNG ADULTS OF THE AVON LONGITUDINAL STUDY OF PARENTS AND CHILDREN

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**SIGNIFICANCE:** Individuals appraise events as a consequence of their own actions (i.e., internal locus of control, LoC) or as the outcome of chance or others' will (i.e. external LoC). We hypothesised that having a more external LoC would be associated with higher risk of tobacco and alcohol use in adolescence. Studies examining this association using large prospective data are lacking. **METHODS:** We conducted an observational study within the Avon Longitudinal Study of Parents and Children to evaluate associations between LoC at age 8 and 16 and tobacco and alcohol consumption at 17 and 21 years via logistic regression. **RESULTS:** Children at age 8 had a neutral LoC (median = 6) while adolescents at age 16 had a more internal LoC (median = 3) ( $P < 0.001$ ). LoC at age 8 years ( $N = 6,173$ ) was not associated with smoking or drinking behaviour at age 17 and 21. A more external LoC at age 16 ( $N = 4,656$ ) was associated with higher odds of being a weekly smoker at age 17 (OR=1.18, 95% CI 1.10, 1.25;  $P < 0.001$ ) and 21 (OR 1.14, 95% CI 1.07, 1.21;  $P < 0.001$ ) and with dependence measured using the Fagerström Test of Nicotine Dependence at age 17 (OR 1.26, 95% CI 1.05 to 1.51;  $P = 0.013$ ) and 21 (OR 1.25, 95% CI 1.05 1.49;  $P < 0.001$ ). Individuals with external LoC at age 16 were more likely to be hazardous drinkers according to the Alcohol Use Disorders Identification Test at age 17 (OR 1.09, 95% CI 1.04, 1.15;  $P < 0.001$ ) but not at 21 (OR 1.01, 95% CI 0.96, 1.06,  $P = 0.684$ ). **CONCLUSIONS:** Having a more external LoC at age 16 is associated with increased tobacco consumption in late adolescence and increased alcohol consumption at 17 years. If this relationship is causal, LoC may represent an intervention target for preventing the development of substance use and dependence.

FUNDING: Pharmaceutical Industry; Academic Institution

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## POS5-180

### IN-VITRO INVESTIGATIONS OF NICOTINE PERMEATION IN AIRWAY EPITHELIAL CALU-3 CELLS

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To better understand the systemic uptake of inhaled nicotine through the upper airways and estimate values of permeation coefficients that can then be employed into more complex physiologically based pharmacokinetic models (PBPK), nicotine transport was analysed experimentally in an established bronchial epithelial cell model, as well as theoretically applying a simple pharmacokinetic model. Nicotine transport was investigated in Calu-3 cells cultured on membrane inserts under submerged conditions. Nicotine was dissolved in culture medium and added to the apical compartment at concentrations of 10, 30, 100, 300, 1000 and 1500 µg/ml, while in the receiver compartment the amount of nicotine transferred was quantified at four time-points (15, 30, 45 and 60 min) under steady-state conditions. Calu-3 cells showed a good barrier formation before and after the experiments with transepithelial electrical resistance (TEER) values ranging from 558 to 477 Ω/cm<sup>2</sup>. The apparent permeability coefficients,  $P_{app}$ , were largely independent of the donor concentration and were in the range of  $(1.2 - 1.5) \times 10^{-5}$  cm/s for the bronchial cell layer. A simple pharmacokinetic (PK) model, using the permeability coefficients obtained in-vitro as input parameters, was developed to estimate systemic nicotine uptake kinetics. The model has been developed for absorption in the upper airways and in the total lung and is comprised of three compartments: lung lining liquid layer, tissue (epithelium, interstitium, endothelium) and capillaries. Morphological and physiological information was collected from literature. The PK-model has shown that the absorption half-life is about thirty times larger for transfer through the upper airways only compared to absorption from the total lung including pulmonary region (250 s vs. 8 s) for a permeability coefficient of  $1.2 \times 10^{-5}$  cm/s. According to these considerations, systemic uptake of substances in the different regions of the respiratory tract is assumed to be greatly affected by the total airway and capillary surface area in the relevant lung region. This effect might even outweigh potentially smaller permeabilities also observed for the alveolar region.

FUNDING: Tobacco Industry

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## POS5-181

### COMPARATIVE EFFECT OF A CANDIDATE MODIFIED RISK TOBACCO PRODUCT AEROSOL AND CIGARETTE SMOKE ON COLOR STABILITY OF ENAMEL, DENTIN, AND DENTAL COMPOSITE RESINS

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Pigmented compounds and metal ions are present the particulate phase generated by combustion of tobacco from cigarettes and may cause discoloration of dental hard tissues and composite resin restoration materials by depositing on their surface or penetrate into their matrix structure. Heating tobacco, instead of burning, may reduce dental color alteration due to a shift in the aerosol composition. The tobacco heating system (THS) 2.2 is a candidate modified risk tobacco product (MRTP) based on a heat-not-burn technology. Twenty-two human premolar teeth were prepared with Class V cervical cavities that were restored with a universal composite resin. Teeth were exposed 4-days/week for 3 weeks to smoke from reference cigarettes (3R4F) or aerosol generated by the THS2.2. Coloration in the CIE L\*a\*b\* color space was assessed at a baseline and after exposure and brushing with toothpaste at 1, 2 and 3 weeks. Inductively coupled plasma mass spectrometry analyses were used to determine the presence of heavy metals including lead (Pb) and cadmium (Cd) on resin surfaces after one week of exposure to 3R4F smoke or THS2.2 aerosol. Marked discoloration of enamel and dentin was observed following 3 weeks of CS exposure ( $\Delta E = 8.8 \pm 2.6$  and  $21.3 \pm 4.4$ , respectively), and color mismatch occurred between the composite-resin restoration ( $\Delta E = 25.6 \pm 3.8$ ) and dental hard tissues. Discoloration ( $\Delta E < 3.3$ ) was minimal in the enamel, dentin and composite-resin restoration in the THS2.2 group, and no color mismatch was observed after 3 weeks of THS2.2 aerosol exposure. Inductively coupled plasma mass spectrometry evidenced deposition of minimal levels ( $< 0.1$  ppb) of Cd and Pb on the 3R4F smoke-exposed resin, but not on the THS2.2-ex-

posed counterparts and controls. Aerosol derived from heating tobacco, causes significantly lower discoloration of enamel, dentin and composite-resin restoration, and color mismatch between dental hard tissues and restoration than cigarette smoke. Reducing or eliminating the deposits derived from tobacco combustion may minimize the impact on tooth color stability.

FUNDING: Tobacco Industry

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## POS5-182

### CROSS-SECTIONAL STUDY COMPARING BIOMARKERS OF EXPOSURE AND BIOMARKERS OF INFLAMMATION AND OXIDATIVE STRESS BETWEEN ADULT E-VAPOR USERS AND CONVENTIONAL CIGARETTE SMOKERS

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INTRODUCTION: There are approximately 10 million past 30-day e-vapor users in the USA but limited data exist on the health effects of long term use of e-vapor products (EVPs). This study was designed to measure biomarkers of exposure and biomarkers of potential harm in a cross-section of current exclusive users of EVPs relative to current conventional cigarette (CC) smokers. METHOD: 144 subjects with 6+ months of exclusive EVP use after 10+ years of CC use and 73 CC smokers with 10+ years of CC use history were recruited to participate in a cross-sectional study between January and March, 2017. Subjects were telephone screened then provided a log-in to an online portal where they were re-screened, provided informed consent, and completed quality of life and subjective measure questionnaires. Subjects then reported to one of 29 LabCorp Patient Service Centers in 9 states for collection of blood and urine samples. RESULTS: Overall, the biomarkers of exposure, total NNAL [4-(methylnitrosamino)-1-(3-pyridyl)-1-butanol] (NNK metabolite), 3-hydroxypropylmercapturic acid (acrolein metabolite), and carboxyhemoglobin (CO measure), were between 46% - 86% lower in EVP users as compared to CC smokers ( $p < 0.0001$  in all cases). Nicotine and 5 of its metabolites, expressed as Nicotine Equivalents, were 36% lower in EVP subjects as compared to CC smokers ( $p < 0.01$ ). All the biomarkers of potential harm were directionally favorable in EVP users as compared to CC smokers with 29% lower 11-dehydrothromboxane B2 ( $p = 0.04$ ), 23% lower 8-epi-prostaglandin F2α ( $p = 0.02$ ), 16% lower soluble intercellular adhesion molecule1 ( $p = 0.02$ ), 9% lower white blood cell counts ( $p > 0.05$ ) and 2% higher high-density lipoprotein cholesterol ( $p > 0.05$ ) in EVP subjects as compared to CC smokers ( $p > 0.05$ ). CONCLUSIONS: Biomarkers of exposure to select HPHCs are significantly lower, accompanied by favorable changes in biomarkers of inflammation and oxidative stress, in exclusive users of EVP for 6+ months after 10+ years of cigarette smoking relative to cigarette smoking. To confirm that the favorable changes in BOPH are due to switching to exclusive use of EVP, a prospective study of EVP users is warranted.

FUNDING: Tobacco Industry

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## POS5-183

### COMPARISON OF QUALITY OF LIFE AND SUBJECTIVE MEASURES BETWEEN ADULT E-VAPOR USERS AND ADULT CONVENTIONAL CIGARETTE SMOKERS

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INTRODUCTION: Approximately 10 million past 30-day e-vapor users are in the US but limited data exist on the quality of life in smokers switching to e-vapor products (EVPs). This study was designed to assess biomarkers and questionnaire responses in a cross-section of current regular users of EVPs relative to conventional cigarette (CC) smokers. METHOD: 144 subjects with 6+ months of exclusive EVP use after 10+ years of CC use and 73 CC smokers with 10+ years of CC use history were recruited to participate in a cross-sectional study between January and March, 2017. Subjects were telephone screened then provided a log-in to an online portal where they were re-screened, provided informed consent, and completed quality of life (QGEN® and TQOLIT™v1) and subjective measure (mCEQ) questionnaires. The QGEN® was used to estimate generic health pro-

files; the TQOLIT™ supplements the QGEN and includes smoking/vaping specific domains. An ANOVA model was used to assess the difference between the groups in summary scores for the questionnaires. RESULTS: Overall, subjects in the EVP group reported statistically significant and clinically meaningful differences in quality of life as measured by the QGEN® and TQOLIT™ instruments, as compared to the CC group: higher Physical Health General Score (50 vs 45.8), Emotional Health General Score (51.7 vs 48), ePhysical Component Summary (51.9 vs 47.5), Physical Function – extended (52.2 vs 48.5), and General Health – confidence scores (56.1 vs 49.9); and lower Smoking Symptom (47.8 vs 60.4) and Smoking/Vaping Impact scores (47.2 vs 57.4). Subjects in the EVP group reported a significantly lower frequency of cough in the past 30 days (28%) relative to smokers (47%). Subjects in the EVP group had higher Smoking/Vaping Satisfaction factor scores than subjects in the CC group (5.3 vs. 4.5). CONCLUSIONS: The study demonstrated differences in assessments of quality of life, frequency of cough, and satisfaction between self-reported exclusive users of EVP and cigarette smokers with smoking history of 10+ years. To confirm that the observed differences are due to switching to exclusive use of EVP, a prospective study of EVP users is warranted.

FUNDING: Tobacco Industry

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## POS5-184

### LONG-TERM EFFECTIVENESS OF VARENICLINE AND NICOTINE REPLACEMENT THERAPY IN PATIENTS WITH NEURODEVELOPMENTAL DISORDERS: A PROSPECTIVE COHORT STUDY OF ELECTRONIC MEDICAL RECORDS

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SIGNIFICANCE: There is a lack of population-based studies on smoking prevalence and cessation treatment amongst people with neurodevelopmental disorders. Varenicline has been shown to be more effective than nicotine replacement therapy (NRT) for smoking cessation in a primary care setting, but effectiveness has not yet been established in people with neurodevelopmental disorders. We aimed to test the effectiveness of varenicline versus NRT for smoking cessation in people with these disorders. METHODS: A prospective cohort study examined electronic medical records from 683 general practices across the UK, using three different statistical approaches: multivariable logistic regression, propensity score matching, and instrumental variable analysis. Exposure was prescription of varenicline versus NRT and the primary outcome was smoking cessation at 2 years. Neurodevelopmental disorders (intellectual disabilities, attention deficit hyperactivity disorder, autism spectrum disorder) were defined using ICD-10 based code lists. RESULTS: Smoking prevalence was higher in people with neurodevelopmental disorders than in those without these disorders. For the effectiveness analysis, we included 235,314 people aged 18 and above with eligible smoking cessation prescriptions. Amongst smokers with neurodevelopmental disorders (N=2,009), 1,611 were prescribed NRT and 398 varenicline. Smokers in this group were 50% (95% CI: 56% to 43%) less likely to be prescribed varenicline than NRT, compared to those without these disorders. In the fully adjusted model at 2-years follow-up, smokers prescribed varenicline were more likely to quit smoking than those prescribed NRT and estimates were similar for patients with (OR=1.31, 95% CI: 0.98 to 1.74) and without neurodevelopmental disorders (OR=1.24, 95% CI: 1.22 to 1.27). Similar results were obtained using propensity score matching and instrumental variable analyses. CONCLUSIONS: Varenicline is less likely to be prescribed to patients with neurodevelopmental disorders although there was little evidence it was less effective for smoking cessation in this group.

FUNDING: Pharmaceutical Industry

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## POS5-185

### THE ROLE OF MARKTEN® E-VAPOR FLAVOR VARIETY IN CIGARETTE SMOKING REDUCTION AMONG ADULT CIGARETTE SMOKERS NOT PLANNING TO QUIT SMOKING: RESULTS OF A 6-WEEK AT-HOME USE STUDY

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SIGNIFICANCE: FDA issued Draft Guidance related specifically to electronic nicotine delivery devices suggesting that manufacturers provide information regarding “adult appeal of...flavors in their decisions to... cease use of more harmful products, or dual use.” METHODS: To characterize MarkTen® e-vapor (MT) use behavior, its influence on other tobacco use behavior, and the potential role of flavor variety on behavioral outcomes, we conducted an 8-week, 2-phase, at-home use study in 614 adult cigarette smokers not planning to quit. Participants expressed a neutral to positive interest in trying and using MT prior to enrollment. During phase 1, participants tried 14 MT varieties (1 per day) during a two-week trial. During phase 2, participants had access to the 14 MT varieties and chose the amount and varieties to take home and use over six weeks. Daily surveys captured amount of cigarettes, MT use occasions and number of cartridges (by variety), and other tobacco use. RESULTS: By week 6 of phase 2, 43% of smokers reported no use of cigarettes, 42% reported a 20% or greater decrease from baseline in cigarettes, 10% remained the same, and 5% increased the number of cigarettes smoked per week. In addition, 34% stopped smoking cigarettes while still using MT in week 6 (switch). Almost 100% of participants used two or more MT cartridge varieties during the 6-week period and flavor variety appeared to play a role in smoking reduction. For example, over 40% of participants who switched from smoking cigarettes to using e-vapor and 33% of participants that reduced smoking used seven or more MT varieties during the 6-week period. Among participants continuing to use/planning to use MT in the future, 65% selected “has a flavor I like” and 55% selected “enjoy the taste” as reasons for use. CONCLUSION: Results of this study suggest that MT cartridge flavor variety may play an important role in adult cigarette smokers’ decisions to cease use of more harmful tobacco products.

FUNDING: Tobacco Industry; E-cigarette/Alternative

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## POS5-186

### A GAP TURNING INTO A CHASM: US ADULTS’ KNOWLEDGE OF TOBACCO AND NICOTINE HARMS FROM THE HEALTH INFORMATION NATIONAL TRENDS SURVEY (HINTS)

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SIGNIFICANCE: There is a continuum of risk for nicotine and tobacco products with cigarettes as the most hazardous to nicotine replacement therapies as the least hazardous. Previous research found US adults are often unaware of differences in the harms of various nicotine-containing products. The 2017 Health Information National Trends Survey (HINTS-FDA Cycle 2) assessed perceived harm and addictiveness of tobacco products and nicotine. METHODS: HINTS-FDA Cycle 2 data for all adults (N=1,736), cigarette only users (n=186), and e-cigarette only users (n=27) were analyzed to examine understanding of harmfulness and addictiveness of cigarettes and e-cigarettes and knowledge of nicotine. RESULTS: Nearly all adults correctly knew that cigarettes are harmful (96.2%) and addictive (87.4%). Overall, most adults believe e-cigarettes are harmful (72.8%) and addictive (55.8%). Cigarette smokers were more likely not to know whether e-cigarettes are harmful (36.3%) or addictive (48.7%) compared to e-cigarette users (6.7% and 7.8%, respectively) (ps<0.01). A majority of adults (84.7%) correctly knew nicotine is the substance that makes people want to smoke, but a majority either did not know (21.2%) or were incorrect (52.9%) about whether nicotine is the substance causing most smoking-related cancers. E-cigarette users (18.4%) were more likely than smokers (7.0%) to incorrectly believe that nicotine is not what makes people want to smoke (ns; p=0.27), but smokers were more likely (52.5%) than e-cigarette users (14.6%) to incorrectly believe that nicotine causes most smoking-related cancers (p=0.006). CONCLUSIONS: Many U.S. adults continue to be unsure or misinformed about nicotine, and many, particularly smokers, are unsure whether e-cigarettes are harmful or addictive. The finding that half the smokers surveyed thought nicotine causes cancer may deter switching to less



harmful forms of nicotine. Such misperceptions emphasize the need for clear, science-based communications that explain the differential health risks associated with tobacco and nicotine products to the public.

FUNDING: Tobacco Industry

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## POS5-187

### ESTIMATING THE POTENTIAL POPULATION HEALTH IMPACT OF AUTHORIZING THE MARKETING OF E-CIGARETTES IN THE US

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Computational models can be used to assess the likely impact of introducing a new tobacco product on the U.S. population. We have developed and validated an Agent-Based model using best modeling practices, as recommended by the International Society for Pharmacoeconomics and Outcomes Research and the Society for Medical Decision Making. Our model quantitatively integrates an estimate of the relative risk of e-cigarettes (compared to conventional cigarette) and a range of potential changes in behavioral patterns to assess different scenarios to estimate the likely impact of introducing a new tobacco product on the population as a whole. The results are presented as estimated changes in tobacco use prevalence and all-cause mortality by assessing the difference in number of survivors comparing a Base Case (the current market, where cigarettes are the predominately used tobacco product) and a Modified Case (a new market where cigarettes and e-cigarettes are both available). Statistical models combined with likely excess relative risks (ERRs) were used to determine survival probabilities of current and former e-cigarette users. Nationally representative transition probabilities were obtained for the Base Case. The Modified Case transition probabilities were estimated from a case study based on Wave 1 and Wave 2 data from the Population Assessment of Tobacco and Health (PATH) study which was designed to assess tobacco use transitions of non-users and established tobacco users. Employing these transition probabilities and a ERR value of 0.05 for e-cigarette use, we demonstrate a net benefit to the population of ~ 600,000 additional survivors, along with a reduction in cigarette smoking prevalence over a follow-up period of 60 years. Sensitivity analysis, varying the risk of e-cigarettes, a key input parameter, showed a decrease in additional survivors as the ERR of e-cigarettes increased (i.e. ERRs 0.025 to 0.4) resulted in ~650,000 to 270,000 additional survivors respectively). Population models are tools that can be used to predict the public health impact of changes in use of tobacco products with varying level of inherent risk on the population as a whole.

FUNDING: Tobacco Industry

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## POS5-188

### CHANGES IN BIOMARKERS OF EXPOSURE ON SWITCHING FROM A CONVENTIONAL CIGARETTE TO TOBACCO HEATING PRODUCTS: A RANDOMISED, CONTROLLED STUDY IN HEALTHY JAPANESE SUBJECTS

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SIGNIFICANCE: Smoking is a leading cause of numerous human disorders including pulmonary disease, cardiovascular disease and cancer. Disease development is primarily caused by years of exposure to cigarette smoke constituents, many of which are known toxicants. Switching smokers to modified risk tobacco products (MRTPs) has been suggested as a potential means to reduce the risks of tobacco use, by reducing such exposure. METHODS: This randomised, controlled study investigated whether biomarkers of toxicant exposure (BoE) were reduced when smokers switched from smoking combustible cigarettes to using glo™ (THP1.0) or an in-market comparator, IQOS (THS) tobacco heating product. 180 healthy Japanese smokers were recruited and smoked combustible cigarettes during a 2-day baseline period. After this period, they were randomized to either remain smoking cigarettes, switch to using mentholated or non-mentholated variants of glo™, switch to using a non-mentholated variant of IQOS, or quit any nicotine or

tobacco product use completely, for 5 days. Both baseline and post-randomisation, 24-h urine samples were collected for BoE analysis. Carbon monoxide was also measured daily in exhaled breath (eCO). RESULTS: During the 5-day period after switching, urinary BoE and eCO levels were significantly reduced compared to baseline in the groups using either glo™ or IQOS, or abstaining from any product use. These biomarkers remained unchanged or were moderately increased in subjects who continued to smoke cigarettes. CONCLUSIONS: This clinical study demonstrated that when smokers switched from smoking combustible cigarettes to using tobacco heating products (glo™ or IQOS) their exposure to smoke toxicants was significantly decreased. In many cases, this was to the same extent as that seen when subjects quit smoking completely. These results suggest that tobacco heating products have the potential to be reduced exposure and / or reduced risk tobacco products when used by smokers whose cigarette consumption is displaced completely. FUNDING: This work was funded by British American Tobacco (Investments) Ltd.

FUNDING: Tobacco Industry

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## POS5-189

### ESTIMATING THE POPULATION HEALTH IMPACT OF AUTHORIZING THE MARKETING OF A SMOKELESS TOBACCO PRODUCT WITH A PROPOSED MODIFIED RISK CLAIM

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Computational models are valuable tools for predicting the population effects following market authorization of a tobacco product with a modified risk claim. We have developed and validated a population model for Moist Smokeless Tobacco (MST) products using best modeling practices. Since MST is primarily utilized by males, the Markov compartmental model is based on a theoretical cohort of one million males starting at age 13 and followed to age 73, accounting for up to thirty transition states with defined transition probabilities. The model was coupled with statistical mortality models and excess relative risk to determine the survival probabilities from use of a MST product (candidate product). Our model results are presented as the difference in number of survivors and years of additional life expected by comparing a Base Case (where cigarettes and MST products are available under the existing scenario) and Master Case (where the candidate product is available with a modified risk claim authorized by FDA). Nationally representative transition probabilities were used for the Base Case. A Master Case scenario was estimated from a study involving 3,290 male participants, where we measured the percent difference between the relevant responses of a test group of users and nonusers of tobacco products (exposed to the modified risk claim associated with the candidate product) and control group (exposed to the candidate product without the modified risk claim), and then applied the percent difference to the Base Case transition probabilities. The estimated likely outcome of authorization of a modified risk claim for MST is 1120 additional survivors with 32,856 additional years of expected life, for the one million male cohort followed to age 73. Extending inferences from a single-cohort to a time-staggered multi-cohort approach, leads to ~ 93,000 additional survivors over a 60 year period. Our results suggest that a net benefit to the population can be expected upon market authorization of the proposed modified risk claim for the candidate product. Limitations of model predictions should be taken into consideration when drawing inferences from these results.

FUNDING: Tobacco Industry

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## POS5-190

### ESTIMATION OF SECOND-HAND EXPOSURE LEVELS FROM ENDS AND CONVENTIONAL CIGARETTE USE USING COMPUTATIONAL MODELING

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The pre-market tobacco product application (PMTA) draft guidance for an electronic nicotine delivery system (ENDS) recommends providing data that adequately



ly characterize the likely impact of the new product on the health of users and non-users of the tobacco product. Further, during the public seminar on PMTA for ENDS (November 2016), FDA suggested that when discussing the impact on nonusers, second-hand, and third-hand exposures should be considered. A computational model to estimate room air levels of selected aerosol constituents has been developed based on well-established physical laws of mass transfer, air flow, and thermodynamic relationships. The model has been verified and validated with experimental data and can be used to estimate the concentrations of selected constituents over time in pre-defined spaces based on the presence of selected constituents in the exhaled breath of ENDS users, or side stream smoke of burning cigarette. The amount of selected constituents in exhaled breath was determined experimentally in controlled clinical trials. The side stream smoke data were identified from the published literature. The model was applied to various space settings such as a car, a private office and a restaurant. Equivalent product use conditions (number of users, product consumption, length of use) for ENDS and conventional cigarettes were used in order to compare the estimated levels of nicotine, formaldehyde, propylene glycol, glycerin and other constituents in each air space. Results indicate that the estimated concentration of nicotine in each space setting due to exhaled aerosol from a cig-a-like ENDS product was approximately 20 times less than a conventional cigarette and two orders of magnitude less than the OSHA permissible limit. The estimated value for formaldehyde during ENDS use was three orders of magnitude less than during cigarette use and between four and five orders of magnitude less than the OSHA limit. The concentrations of propylene glycol and glycerin in each space were also estimated to be orders of magnitude less than the NIOSH and OSHA limits. More data are needed before extending our findings to open tank, modifiable systems.

FUNDING: Tobacco Industry

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## **POS5-191**

### **EXHALED BREATH LEVELS OF SELECTED CONSTITUENTS FROM CONTROLLED USE OF MARKTEN® E-VAPOR PRODUCTS IN ADULT E-VAPOR USERS**

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INTRODUCTION: Few reports exist of exhaled breath levels of constituents during use of e-vapor products (EVPs). MarkTen® e-vapor products (EVP) look similar to combustible cigarettes and consist of a battery and replaceable cartridges that contain propylene glycol [PG], glycerin [G], water, flavors and USP grade tobacco derived nicotine. The purpose of this study was to characterize the levels of selected constituents in exhaled breath during use of MarkTen® EVP. METHOD: EVP users (n=32, 57% male) were randomized to use one of four flavor varieties each day for four days (2 menthol and 2 non-menthol flavors delivering 0.13 mg to 0.23 mg nicotine per machine measured 5 second puff). Subjects were instructed to take 10 puffs from each EVP using 5 second puff durations with 30 seconds inter puff intervals. The collection was performed once with a "sham" device (inactive battery + empty cartridge) and then again with the study EVP. Exhaled breath was collected after the first puff until 1 minute after the last puff using a mouthpiece filter with a cryogenic condensation collection tube system. The collections were analyzed for PG, G, nicotine, menthol, formaldehyde, acrolein and acetaldehyde. RESULTS: Sham corrected exhaled breath levels (ANCOVA Least Square Means / 10 puffs) across the flavor varieties ranged from: 1199.7 to 3354.5ug for PG, 5366.8 to 6484.7ug for G; 89.4 to 195.7ug for nicotine, 0.17 (non-menthol product) to 31.01ug (menthol product) for menthol and from 0.25 to 0.34ug for formaldehyde. Inter-subject variability was high for these analytes, with the largest range occurring for G where individual values ranged from 0 to 20,645ug per 10 puff sample. All acrolein and acetaldehyde exhaled breath measurements were below the detection limits. E-liquid consumption (cartridge weight change) during the 10 puff collections ranged from 34 to 41 mg across the four products. CONCLUSIONS: Detectable levels of PG, G, nicotine, menthol and formaldehyde are present in exhaled breath during use of EVPs. These values are currently being used in computational models to estimate room air levels under different room and use conditions.

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