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**RAPID RESPONSE  
ABSTRACTS**

The peer-review process for SRNT's annual meeting entails review by society members of abstract submissions. Criteria for acceptance/rejection are based upon methodological rigor and not the funding resource or research findings. The views expressed by conference presenters are the author's own and do not necessarily represent that of SRNT.

**RAPID SESSION 1: EXAMINING TOBACCO FLAVOR PACKAGING AND POLICY****RAP1-1****WHY IT MATTERS WHEN FLAVORED CIGARS FLOUT FDA RULES**

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**Significance:** Through the FDA's deeming rule, cigars must secure pre-market FDA approval if they were not on the market by August 8, 2016. However, tobacco manufacturers may be circumventing this process. For example, in April 2018, Swisher Sweets introduced what appeared to be a new cigar, "Boozy Watermelon," after the 2016 cutoff. Swisher Sweets may argue this cigar is a renamed version of a cigar that was marketed before August 2016, "Island Madness." Indeed, both cigars bear the same watermelon rum-flavor descriptor on their packaging. However, consumers may perceive them as different products based on several differences. We examine this issue in a case study. **Methods:** We first used trade publications, manufacturer and consumer websites, and Nielsen scanner data to identify when certain cigar sub-brands were released for marketing. Second, we conducted an online experiment with 341 young adult (18-34) past-year cigar smokers who viewed and rated images of both Swisher Sweets cigars on various product characteristics (e.g., taste). **Results:** Aside from the common descriptor (watermelon rum), the two packs differed in names, colors, layout and design, raising the question of whether "Island Madness" was removed from the market and subsequently repackaged as "Boozy Watermelon" after the FDA's cutoff. Data from the online experiment found "Boozy Watermelon" was more likely to be perceived as tasting good and smelling nice, and less likely to be perceived as harsh and male-oriented compared to "Island Madness." Women generally provided more favorable ratings for "Boozy Watermelon" and were more likely to intend to buy it (27.1%) over "Island Madness" (20.1%). **Conclusions:** Packaging and labeling can influence perceptions. Despite a common descriptor, "Boozy Watermelon" was perceived more favorably than "Island Madness" overall and by women in particular. This case study points to potential industry evasion of regulatory pathways and suggests that the differences in packaging between Island Madness and Boozy Watermelon may raise different questions of public health, which is part of the standard for the FDA's substantial equivalence pathway to market. 2187 characters with spaces

FUNDING: Unfunded

**RAP1-2****A DISCARDED CIGAR WRAPPER ANALYSIS IN NEW YORK CITY: INDICATORS OF NON-COMPLIANCE WITH LOCAL FLAVORED TOBACCO RESTRICTIONS**

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**BACKGROUND:** In 2009, New York City (NYC) restricted the sale of flavored tobacco products including cigars. This law was meant to curb the increased prevalence of flavored non-cigarette tobacco among young people by reducing access and availability. **OBJECTIVE:** We assessed possible non-compliance with this law by analyzing discarded packaging of cigar, cigarillo, and blunt wrappers in New York City. **METHODS:** A discarded packaging survey was conducted in 2016, in a stratified random sample of 94 block groups in NYC resulting in the collection of 886 discarded packages including cigars, cigarillo and blunt wrappers. Each package was coded for brand name, flavor description (explicit and implicit) and packaging size. **FINDINGS:** We find (19.3%) of the cigar packages were explicitly flavored. An additional 9.3% of the packages reflected implicit flavors, which if sold in NYC would technically violate the law but are not part of the NYC's enforcement scheme. **CONCLUSION:** Roughly one in four cigar package collected in NYC was non-compliant with the flavor ban. This is consistent with previous research that suggest that while the NYC policy reduced flavored cigar sales, flavored cigars remain available. Non-compliance is likely fueled by licensed wholesalers and retailers who continue to sell restricted flavored products. Increased enforcement appears warranted. **Funding:** This work was funded by the Rutgers School of Criminal Justice, Dean's Research Grant.

FUNDING: Academic Institution

**RAP1-3****COMMUNICATION OF FLAVORED CIGARETTES IN THE PHILIPPINES: A COMPARISON OF PACK FEATURES ACROSS CATEGORIES OF CIGARETTE PACKS DISTINGUISHED BY FLAVOR AND FLAVOR CAPSULE**

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The Philippines has one of the world's largest menthol cigarette markets. Menthol cigarettes are associated with smoking initiation and decreased likelihood of quitting; flavor capsule cigarettes are associated with misperceptions of harm. Packaging is an important marketing tool that is integral to brand positioning. This study aims to understand how product characteristics are communicated to consumers. Cigarette packs were purchased in the Philippines in 2016 using a systematic protocol. Legal packs (those displaying the country's health warning label) were coded for a variety of features, including pack type (soft, hard), color, imagery and descriptors. We compared prevalence of each feature by flavor and flavor capsule presence using Fisher's exact test. 76 unique packs were collected (37 no flavor/no capsule, 23 menthol/no capsule, 10 menthol/capsule, 10 other flavored/capsule). A higher proportion of menthol/capsule cigarettes were sold in a hard pack compared to no flavor/no capsule cigarettes (100% vs. 48%) (p=0.005). A higher proportion of menthol/capsule (60%) and menthol/no capsule (91%) packs used green as a prominent color or descriptor compared to no flavor/no capsule packs (3%) (p<0.001). More other flavored/capsule packs displayed a variation of the descriptor "fresh" (50%) compared to no flavor/no capsule packs (0%) (p=0.002) and menthol/no capsule packs (0%) (p=0.005). Menthol/capsule packs more often displayed the descriptors "cool", "ice", "cold", "chill", or "frost" (30%) and "sensation" (20%) compared to no flavor/no capsule packs (0%) (p=0.002) and menthol/no capsule packs (0%) (p=0.042). More menthol/capsule (100%) and other flavored/capsule packs (100%) displayed technology descriptors or imagery compared to no flavor/no capsule and menthol/no capsule packs (8.1% and 4.3%) (p<.001 for all comparisons). Pack components that are potentially used to communicate innovation, flavor, and mislead consumers are used to market and distinguish different cigarette types in the Philippines. Findings can inform future policies that call for flavor bans and plain packaging. Future research will explore consumer perceptions of these packs.

FUNDING: Non-profit grant funding entity

**RAP1-4****AN EXPERIMENTAL EVALUATION OF THE FDA WARNING STATEMENT IMPACT ON YOUTH AND YOUNG ADULTS' PERCEPTIONS OF JUUL**

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**Significance:** Since August 2018, the FDA has required that all ENDS products include a specific warning that the product contains nicotine and that nicotine is addictive on the packaging. However, there has been limited experimental evidence of the impact of the ENDS warning statement on youth perceptions of ENDS. **Methods:** A national probability sample of youth and young adults (16-25 years-old; n=998) completed an online experiment and survey in October 2018. Participants were shown photographs of the packaging for the Juul and a pack of four flavor pods that were digitally altered to reflect the randomly assigned warning statement (FDA vs. MarkTen vs. no statement) and flavor (Tobacco vs. Mint/Menthol vs. Fruit Medley/Mango/Cool Cucumber vs. Crème Brule) condition. Following exposure, participants completed a survey assessing recall and perceived effectiveness of the warning statement, risk/benefit perceptions of the Juul, and use intentions. The effect of the FDA warning statement was estimated using weighted generalized linear models. **Results:** Most youth in the FDA (74%) and MarkTen (67%) warning conditions recalled a warning statement (compared to 34% in the No Statement condition). Perceived effectiveness of the FDA statement was lower than for the MarkTen statement (adj. M: 3.33 vs. 3.67; p<.001). Perceptions that the Juul contained nicotine were more likely among those in the FDA statement condition compared to controls (AOR=5.0; p<.05), although there was no effect on perceived addictiveness. Although main effects of warning statement on harm/benefit perceptions and, among non-users, intentions to use, were nonsignificant; the warning statement effect significantly interacted with flavor condition and/or age and ever ENDS use. **Conclusion:** This study found mixed results for the impact of the FDA mandated ENDS warning statement on youth knowledge and perceptions of ENDS. While the FDA



statement was associated with accurate recall and knowledge that the Juul contained nicotine, it did not affect perceived addictiveness or, for all groups or flavors, perceived harm and intentions to use.

FUNDING: Federal

## RAPID SESSION 2: LATE-BREAKING RESEARCH ON E-CIGARETTE USE AND HEALTH EFFECTS

### RAP2-1

#### IN VITRO VOCAL FOLD CYTOTOXICITY SCREENING OF ELECTRONIC CIGARETTE VAPOR EXTRACTS

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**SIGNIFICANCE** Electronic Cigarettes (ECs) are increasingly popular battery-operated devices that vaporize EC liquids (E-liquids) composed of propylene glycol and vegetable glycerin mixed with or without nicotine and/or flavorings. The larynx is an important structure that coordinates respiration, coughing and swallowing and, in humans, it is essential for phonation. An area of constriction at the level of the vocal folds likely acts as a substrate for deposition of inhaled EC vapor. The objective of these experiments is to establish an *in vitro* screening system to expose cultured vocal fold fibroblasts (VFFs) to EC vapor extract for the purpose of identifying the cytotoxic effects. VFFs play an important role in tissue homeostasis by contributing to structural support and wound healing. Altered viability of these cells by nicotine or other components of EC vapor may lead to laryngeal pathology. **METHODS** Commercially available e-liquid consisting of 50% propylene glycol and 50% vegetable glycerin with nicotine concentrations of 0mg/mL, 12.5mg/mL, 25mg/mL, and 50mg/mL were evaluated for cytotoxicity. E-liquid vapor was generated using the e-cigarette extension of the InExpose exposure system (Scireq inc.). Computer programmed activation of the device vaporized and pumped 200mg of e-liquid into 20 mL of culture medium. The vapor extracts produced by this process were filter sterilized and identified as 100%. Dilutions (50%, 25%, 12.5% and 6.25%) were also evaluated for cytotoxicity. The extracts and respective dilutions were applied to cultured human vocal fold fibroblasts for 24 hours and viability was measured by 3-(4,5-dimethylthiazol-2-yl)-2,5-diphenyltetrazolium bromide (MTT) assay. Viability of less than 70% relative to internal control was considered cytotoxic. **RESULTS** EC vapor extracts from e-liquid containing 50mg/mL nicotine showed cytotoxic effects at concentrations of 50% and 100%. The lower nicotine containing e-liquid's extracts were not considered cytotoxic by this assay. **CONCLUSION** Popular EC devices are currently being marketed with significantly higher nicotine concentrations, such as 50mg/mL, a formulation which is shown here to be cytotoxic to vocal fold fibroblasts. The *in vitro* method described by these experiments can be applied to different cell types of the vocal folds, e-liquid formulations, and flavorings for the purpose of identifying cytotoxic components and/or concentrations of these nicotine products.

FUNDING: Federal

### RAP2-2

#### INVESTIGATING DNA METHYLATION SIGNATURES OF E-CIGARETTE USE

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**Significance** Epigenetic differences have been found between cigarette smokers and non-smokers in the form of pronounced changes in DNA methylation. We aimed to ascertain whether e-cigarette use is associated with changes in DNA methylation and to evaluate the degree of similarity between methylation signatures in tobacco-naïve e-cigarette users ("vapers") and cigarette smokers (compared with non-smokers). **Methods** The SEE-Cigs study recruited individuals aged 16-35 years who could be classed as: "Vapers" (vaped at least weekly for the past 6 months and smoked <100 times in their lifetime), "Non-smokers" (smoked and/or vaped <100 times in their lifetime) and "Smokers" (smoked at least weekly for the past 6 months and vaped <100 times in their lifetime). Participants who were deemed eligible for inclusion were sent a saliva collection kit from which DNA was extracted. DNA methylation was assayed using the Illumina HumanMethylationEPIC array which targets >850,000 "CpG" sites in the genome. Ethical approval was granted by the University of Bristol Faculty of Science Human Research Ethics Committee. All participants have provided written informed consent. We performed an epigenome-wide association study (EWAS) to identify methylation differences in: i) vapers (n=32) vs. non-smokers (n=32) and ii) smokers (n=32) vs. non-smokers (n=32). Models were adjusted for sex, age, education level, body mass index, household smoking, recreational drug use and batch. We also assessed whether there was evidence for



enrichment of smoking-related methylation sites identified in previous studies. Results Methylation at 19 CpG sites was associated with vaping (vs non-smoking) and at 4 CpG sites was associated with smoking (vs non-smoking) at  $p < 10^{-5}$ . There was some evidence for enrichment of previously identified smoking-related sites in the EWAS of smoking but less so in the EWAS of vaping. Conclusion Findings revealed that vaping is associated with differences in DNA methylation at numerous sites in the genome and that the methylation profile of vapers is distinct from that of smokers. Further work to investigate the biological importance and potential health implications of the observed methylation changes is required.

FUNDING: Non-profit grant funding entity

## RAP2-3

### CAN URINE PROPYLENE GLYCOL AND/OR VEGETABLE GLYCERIN CONCENTRATION BE USED AS A BIOMARKER OF RECENT ELECTRONIC CIGARETTE USE?

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**Significance:** The scarcity of biomarkers specific to recent electronic cigarette (ECIG) use challenges assessment of ECIG use status. This study evaluated whether urine propylene glycol (PG) and/or vegetable glycerin (VG) concentration are biomarkers for recent ECIG use. **Methods:** Urine samples were collected from 50 experienced ECIG users (ECIG use > 3 months, use of  $\geq 1$  ml ECIG liquid daily with  $\geq 3$  mg/ml liquid nicotine concentration) before and after 12 hours self-reported ECIG abstinence and also from 50 individuals who reported no use of any nicotine-containing product (controls). Samples were analyzed for cotinine (to verify nicotine use status), PG, and VG using established methods. **Results:** Of 42 ECIG users with pre-abstinence urine cotinine > 200 ng/mg, mean (SD) ECIG device power was 58.4 W (44.9) and liquid nicotine concentration was 8.2 mg/ml (7.7). Controls reported no past year tobacco use and  $\leq 100$  lifetime cigarette/ECIG uses. Consistent with these reports, mean (SD) urine cotinine concentration for ECIG users before abstinence was 1053.7 ng/ml (874.5) and for controls was 11.5 ng/ml (16.6); after abstinence, ECIG users' mean cotinine concentration decreased significantly to 615.4 ng/ml (753.0;  $ps < 0.05$ ). For ECIG users, mean urine VG concentration pre-abstinence was 7.5 mcg/ml (7.0) and decreased to 5.0 mcg/ml (4.4), with a higher mean VG concentration of 13.5 mcg/ml (24.9) observed for controls relative to pre- and post-abstinent ECIG users ( $ps < 0.05$ ). For ECIG users, mean urine PG concentration pre-abstinence was 25.6 mcg/ml (20.0) and decreased post-abstinence to 9.5 mcg/ml (15.0); with significantly lower mean PG concentration of 9.8 mcg/ml observed for controls relative to pre-abstinent ECIG users only ( $ps < 0.05$ ). **Conclusions:** Because ECIG users' mean urine PG concentration decreased after 12-hours ECIG abstinence and was also lower than controls who did not use any nicotine-containing products, this measure may be useful for verifying short-term ECIG abstinence and may also be useful, in conjunction with urine cotinine and expired air CO, for discriminating ECIG users from non-users.

FUNDING: Federal

## RAP2-4

### EFFECT OF E-CIGARETTE FLAVORS ON PUFFING TOPOGRAPHY AND NICOTINE DELIVERY: RESULTS FROM A RANDOMIZED CLINICAL TRIAL OF DAILY SMOKERS

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**SIGNIFICANCE:** There is limited understanding how various flavors used in e-cigarettes may influence the behavior of naïve users who are regular smokers. **METHODS:** Eighteen daily smokers (mean age 44.1 $\pm$ 7.0; 9 males; average CPD 13.0 $\pm$ 5.8) smoked their combusted tobacco cigarettes during an initial visit and returned five times to try an e-cigarette (eGo type) refilled with a nicotine solution (24 mg/ml) of five different flavors: cherry, classic tobacco, espresso, menthol, and vanilla (in a random order). During each visit, participants completed two puffing sessions. During the first session, participants were directed to take 20 puffs, one every 30 seconds. During the second puffing session, participants were allowed to puff ad lib on the same e-cigarette device connected to a puffing topography monitor. Blood samples for plasma nicotine (PNic) measurement were drawn at multiple time points during and after puffing, and partici-

pants subjectively assessed nicotine effects and their withdrawal symptoms. **RESULTS:** Vaping liquids of various flavors resulted in different levels of nicotine delivery. The flavor producing the highest median  $C_{max}$  (peak PNic) was cherry (21.2 ng/ml) and it was not significantly lower than the participant's combustible cigarette (29.2 ng/ml). The lowest  $C_{max}$  was observed for the vanilla-flavored liquid (9.7 ng/ml). Flavors did not differ in the speed of nicotine delivery (same  $T_{max}$ ). Puffing of mentholated liquid led to the highest  $AUC_{0-120}$  (314 ng/ml/min). Participants rated menthol highest on satisfaction (47.2 $\pm$ 27.9, scale of 0 to 100) and enjoyment (50.3 $\pm$ 27.5, scale of 0 to 100). Only the menthol flavor significantly reduced nicotine withdrawal symptoms ( $p=0.029$ ). During the ad lib puffing session, participants took larger puffs of cherry-flavored liquid compared with the other 4 flavors (average puff volume 87.8 $\pm$ 69.3 ml). **CONCLUSIONS:** Flavors tested in the study yielded different patterns of nicotine delivery and led to differences in reducing nicotine withdrawal. When using different flavors, users may change their puffing behaviors, which may explain differences in nicotine delivery.

FUNDING: Federal



## RAPID SESSION 3: EVALUATING TOBACCO CONTROL COMMUNICATION EFFORTS

### RAP3-1

#### AN EVALUATION OF QUIT FOR GOOD, NEW YORK CITY'S FIRST ANTI-TOBACCO AD TARGETING MEN WHO SMOKE

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**Significance:** In New York City (NYC), men (17%) are twice as likely as women (9%) to smoke and men who smoke are less likely to use cessation services offered by the New York State Smokers Quitline (NYSSQL). To address this persistent disparity, we convened men who smoke to help develop an ad campaign that would resonate and encourage use of NYSSQL. The final concept ("Quit for Good") highlights various reasons why men who smoker might choose to quit (e.g., relationships, family, future goals). The campaign launched in October 2018 in the NYC metro area with targeted TV placement on shows with predominantly male viewership, augmented by digital, radio and print buys. **Methods:** We analyzed NYSSQL client demographics from the Quitline Partners System for a baseline period when regional ads were not running (9/3/18-10/2/18) and the "Quit for Good" campaign period (10/3/18-10/16/18). The primary measures were: a) mean NYC residents receiving NRT per day and b) the proportion of men among NYC residents receiving NRT per day. Data from residents of New York counties outside of New York City (ROS), where the "Quit for Good" campaign was not placed, were used as a comparison. Recipients were limited to one course of NRT during the campaign, therefore counts are unique. Analyses were conducted using SAS v 9.4. **Results:** Mean NYC recipients per day was higher during the campaign period (142.7) than baseline (32.8) ( $p=.03$ ). The proportion of men among NYC recipients also increased from 41.8% at baseline to 52.5% during the campaign ( $p<.001$ ). No change was seen in the proportion of men among ROS clients between baseline (45.1%) and campaign (46.6%) periods ( $p=.46$ ). **Conclusions:** "Quit for Good" was NYC's first campaign intended to disproportionately reach men who smoke. Our findings suggest that using a male-centered anti-tobacco ad and targeted placement can lessen the sex disparities seen in quitline service use. Because men comprise two thirds of smokers in NYC, additional innovative programming and targeting approaches are needed to further address persistent sex disparities in smoking.

FUNDING: Unfunded

### RAP3-2

#### THE ROLE OF BRAND EQUITY IN EVALUATING THE FRESH EMPIRE CAMPAIGN: MEASURE DESIGN, RELIABILITY, AND VALIDITY

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**Background:** Measuring brand equity (BE), the associations that an audience makes with a brand, can help predict media campaign effects on targeted cognitive and behavioral outcomes. Brand equity provides a way to measure effects of a social marketing brand beyond awareness and comprehension. Campaigns with strong BE have achieved healthy behavior change. **Purpose:** To develop and assess reliability and validity of a BE scale for *Fresh Empire*, FDA's public education campaign among youth at-risk for smoking who identify with the Hip Hop peer crowd. **Methods:** We adapted 12 BE items from previous studies (e.g., truth, VERB) to align them with the *Fresh Empire* brand. We collected data from Hip hop-identified 12-17-year-olds with two surveys ( $n = 2,403$  in 2016 and 2,051 in 2017). We asked the BE items of respondents who reported exposure to *Fresh Empire* after campaign launch. We used exploratory factor analysis and tested the association of BE with perceived ad effectiveness (PE; a validated measure of ad receptivity), normative beliefs about tobacco, and past 30-day smoking. Models controlled for age, gender, smoking status, and race/ethnicity. **Results:** We identified two factors underlying BE: 1) personal perceptions of the brand and 2) perceived popularity. Each achieved high reliability (factor 1  $\alpha = 0.92$ ; factor 2  $\alpha = .87$ ). The BE scales were significantly correlated with PE of the *Fresh Empire* ad tested (factor 1:  $r = 0.55$  in 2016 and  $r = 0.54$  in 2017,  $p<.001$ ; factor 2:  $r = 0.37$  in 2016,  $r = 0.35$  in 2017,  $p<.001$ ), and, in 2017, with past-30-day smoking, injunctive and descriptive

norms, and willingness to associate with smokers. **Conclusions:** *Fresh Empire* BE is a multidimensional construct and behaves as expected with similar metrics and outcomes. Results provide confidence that BE could be a valuable analytic tool for future campaign evaluation efforts, such as those examining BE's role as a mediator of the relationship between campaign exposure and outcomes. BE provides evaluators a way to measure the value of a brand, beyond measures of affinity for singular advertisements, and may explain changes in downstream beliefs and behaviors.

FUNDING: Federal

### RAP3-3

#### YOUNG FEMALE SMOKERS' PERCEPTIONS OF HEALTH WARNING LABELS ON CIGARETTE PACKS IN MEXICO CITY

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**Background:** As restrictions on tobacco marketing increase, the role of the pack as a communication platform gains in importance. Health warning labels (HWLs) on packs communicate risks and diminish appeal. Mexico requires a pictorial HWL to cover 30% of the pack front, and text warnings covering the back and side. As part of a project examining the appeal of cigarette packs, this study examines responses to HWLs among female smokers in Mexico City. **Method:** We conducted 5 focus group discussions (FGD) with female smokers in Mexico City: 3 with adolescents ages 13-17 years and 2 with young adults ages 18-24 years. Each FGD was video-recorded, transcribed and translated, and subjected to thematic analysis. **Results:** Adolescents discussed HWLs in relation to the rest of the pack whereas young adults described the impact of HWLs on their interactions with packs. Some adolescents described how the pack detracts from HWLs: "First thing I notice are the colors and design of the pack. I don't really notice these [HWL] images." Others thought the HWLs were too small: "They don't distract from the rest of the pack because they are very small and hidden. They don't draw attention." Young adults described having become accustomed to HWLs: "We're used to seeing these now. It has little effect." Still, the young adults described coping strategies to manage their reactions to HWLs. Some manipulated the pack or turned it over so as not to see the HWL. Other participants explained how they "make jokes about them so we don't take them seriously anymore." Coping strategies were not explicitly mentioned in adolescent girls' discussions of HWLs, though the participants in these FGDs did not feel susceptible to the effects described on the HWLs, explaining, "I think it happens if people smoke a lot daily." **Discussion:** Certain pack features may limit the full impact of HWLs, particularly for younger smokers, and the placement of the HWLs allows smokers to easily avoid exposure to the messaging. Larger, more prominent HWLs would enhance visibility and may improve effectiveness.

FUNDING: Non-profit grant funding entity

### RAP3-4

#### I QUIT TESTING THE ADDED VALUE OF INCLUDING AN EFFICACY FOCUSED MESSAGE ON CIGARETTE WARNING LABELS

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**Significance:** Most pictorial warnings on cigarette packs evoke fear - depicting the scary, visceral, and gross consequences of smoking - to increase risk perceptions and motivation to quit. Theorists suggest that fear appeals work best when combined with strong efficacy cues. However, research on the US Food and Drug Administration's (FDA's) proposed pictorial warning labels has largely not focused on the role of efficacy. **Methods:** In this study, we test the impact of exposure to the FDA-proposed efficacy message ("Quitting Smoking Now Greatly Reduces Serious Risks to Your Health"). We conducted an online, between-subjects experiment with 398 adult smokers. Participants were randomly exposed to a set of four pictorial or text-only warnings, assigned from the pool of 9 FDA-proposed labels. Approximately 45 percent of respondents ( $N = 179$ ) saw the efficacy message. Each of the four warnings appeared for 10 seconds, and was followed by a posttest gauging affect, efficacy, and quit intentions. **Results:** Exposure to the "Quit" label was associated with higher levels of reported hope ( $B=0.75$ ,  $p<0.001$ ) and self-efficacy ( $B=0.14$ ,  $p=0.01$ ), and lower levels of reported negative affect ( $B=-0.47$ ,  $p<0.001$ ). The pictorial version of the "Quit" label further amplified hope (interaction  $B=0.39$ ,  $p=0.07$ ) and negative affect (interaction  $B=-0.36$ ;  $p=0.03$ ) but had no effect on self-efficacy (interaction  $B=0.17$ ,  $p=0.12$ ). There was no direct relationship between



"Quit" label exposure and response efficacy ( $B=0.02$ ,  $p=0.73$ ) or quit intentions ( $OR=1.2$ ,  $p=0.18$ ). Additional analyses indicated that hope and negative affect were significant predictors of quit intentions (hope  $OR=1.28$ ,  $p<0.001$ ; negative affect  $OR=1.51$ ,  $p<0.001$ ). **Conclusion:** The observed pattern of results suggests an indirect relationship between exposure to the "Quit" label and quit intentions, driven by hope. Messages that elicit hope could be integral for warning label success at promoting efforts to quit smoking.

FUNDING: Federal; Academic Institution

## RAPID SESSION 4: USING OBJECTIVE MARKERS TO TAILOR CESSATION TREATMENT

### RAP4-1

#### USING A NEUROAFFECTIVE BIOMARKER TO MATCH SMOKERS TO EITHER VARENICLINE OR NICOTINE PATCH TREATMENT

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**Significance** Progress in basic neuroscience has improved our understanding of addiction neurobiology, but translating this knowledge into effective relapse prevention treatments has been difficult. In previous retrospective studies we showed that 1) smokers with larger brain responses to cigarette-related cues than pleasant stimuli (C>P) are more vulnerable to relapse than smokers with the opposite brain reactivity profile (P>C), and 2) when trying to quit, C>P smokers benefit from varenicline more than P>C smokers. The goal of this study was to show the feasibility of using this biomarker to prospectively assign P>C and C>P smokers to the smoking cessation treatment most likely to benefit them. **Methods** We used a newly developed classification algorithm to identify, on a subject-by-subject basis, the P>C and C>P brain reactivity profiles in a group of 154 smokers interested in quitting. We used this neuroaffective biomarker as a stratifier when we randomized smokers to either varenicline (VAR) or nicotine patch (NRT). We assessed biochemically verified abstinence at the end of treatment (EOT, 10 weeks after the quit date), three, and six months after the quit date. **Results** The results confirmed that, when trying to quit, smokers with the C>P brain reactivity profile are more likely to benefit from VAR than from NRT. While smokers in the P>C group had similar abstinence rates irrespective of treatment, in the C>P group there were three times more abstinent smokers assigned to VAR than to NRT. The Bayesian analyses showed that the posterior probability of this effect was .96 at EOT, .75 at the three months follow up, and .96 at the six months follow-up. **Conclusions** These results demonstrate that identifying the neurobiological mechanisms underlying relapse can contribute to the development of better targeted therapeutic interventions to prevent smoking relapse and improve treatment outcomes.

FUNDING: State; Academic Institution

### RAP4-2

#### TOWARDS PERSONALIZED TOBACCO TREATMENT-POINT OF CARE BIOCHEMICAL QUANTIFICATION OF TOBACCO CONSUMPTION WITH THE USER'S SMARTPHONE

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**SIGNIFICANCE:** Titrating medications based on a patient's individual characteristics is common throughout the field of medicine. More than 25 years ago clinicians and researchers recommended individualization of tobacco treatment and improved nicotine replacement dose matching based on smokers' baseline nicotine and cotinine levels. Until recently nicotine and related metabolite assays were expensive, inconvenient and time-consuming rendering point of care testing (POCT) impractical. **METHODS:** NicCheck is a commercially available FDA cleared, CLIA waived, 15-minute POCT assay which quantifies tobacco consumption via a variable red-pinkish color produced by the Konig reaction. The more nicotine metabolites present the darker the red-pinkish color. Urine samples were collected from adult smokers under IRB approval, other samples were generated from manufactured controls (N=50). NicCheck urine strips were transferred to test tubes containing 0.5 to 1.0 ml of unprocessed urine. After 15 minutes photographic images of the urine strips were captured via smartphone. Each captured image was analyzed via computer vision (CV) for the Red, Green and Blue (RGB) components of the visible light spectrum producing a colormap. Urine samples were frozen and transferred to the University of Minnesota's Department of Chemistry for laboratory analysis. **RESULTS:** The total nicotine equivalent (TNE) results obtained from the Reference Lab were used to train neural network architecture via deep learning to determine the mathematical relationship between each urine strip's colormap and the TNEs laboratory value. Measuring the NicCheck colormap via CV, neural network architecture and deep learning, we generated an algorithm that returned a predicted TNE that was very highly correlated with the university-based reference chemistry lab results ( $R^2=0.998$ ;  $RMSE=1.68$ ). **CONCLUSION:** The CV relationship to lab results



was as good or better than those between specialized nicotine laboratories allowing clinicians and researchers with smartphone access easy quantification of TNEs aiding tobacco medication management.

FUNDING: Other

## RAP4-3

### OBJECTIVE BRAIN MARKER LINKS STRESS AND SMOKING CESSATION

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**Background:** Subjective stress is a well-documented predictor of early smoking relapse, yet our understanding of stress and tobacco use is limited by reliance on self-reported measures of stress. We utilized a validated functional neuroimaging paradigm to examine whether stress exposure during early abstinence alters objective measures of brain function. **Methods:** 75 participants underwent blood oxygen level dependent (BOLD) functional magnetic resonance imaging (fMRI) during the Montreal Imaging Stress Task (MIST) on two occasions: once during smoking satiety and once following biochemically confirmed 24-hour abstinence (order counter-balanced). The primary outcome measure was brain response during stress (vs. control) segments of the MIST, assessed using whole-brain analysis corrected for multiple comparisons using clusters determined by  $Z \geq 3.1$ . **Results:** Abstinence (vs. satiety) was associated with significantly increased activation in the left inferior frontal gyrus, a brain region associated with inhibitory control. Abstinence-induced change in brain response to stress was associated significantly with change in self-reported stress. **Conclusions:** This study provides objective evidence that the brain response to stress is altered during the first 24 hours of a quit attempt compared to smoking satiety. **Impact:** These results points to the potential value of inoculating smokers with stress management training prior to a quit attempt.

FUNDING: Federal

## RAP4-4

### PREDICTION OF THERAPEUTIC OUTCOME USING REAL-TIME FMRI NEUROFEEDBACK IN TOBACCO DEPENDENT PATIENTS

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**Background:** One of the most prominent symptoms in addiction disorders is the strong desire to consume a particular substance (craving). The strong association between craving and the probability of relapse emphasizes the importance of craving in the therapeutic process. Former studies have demonstrated that neuromodulation using real-time fMRI (rtfMRI) neurofeedback (NF) can be used as a treatment modality in tobacco-dependent smokers. During the rtfMRI NF training patients participate in several rtfMRI NF sessions in order to train the modulation of neuronal responses. The aim of the present project was to determine, whether it is possible to predict the outcome of NF training plus group psychotherapy at the beginning of the treatment. For that purpose neuronal responses during the first rtfMRI NF session of patients who remained abstinent for at least three months were compared to those of patients with a relapse. **Methods:** 46 dependent smokers participated in the study. All patients were participants of a certified smokefree course. In addition, all patients took part in three NF sessions within 5 weeks. Patients were randomized to a real (n=22) and a sham condition (n=24). During the rtfMRI NF sessions tobacco-associated and neutral pictures were presented. Subjects were instructed to reduce their neuronal responses during the presentation of smoking cues in an individualised region of interest for craving (ROI). Directly before and after the rtfMRI session, resting state data as well as craving and affective symptoms were collected. The patients of the real group were stratified to different groups (abstinence vs. relapse) according to their individual smoking status three months after the rtfMRI NF training. **Results:** Patients of the real-group revealed enhanced neuronal responses during the first NF session. The results of the first NF sessions could be useful as predictor whether a tobacco-smoking person will be able to achieve success after the behavioural group therapy and NF training in quitting smoking or not. **Conclusion:** These results suggest that there is a probability of estimating the chance of a successful withdrawal in patients smoking tobacco by analyzing the first rtfMRI NF session.









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that genetic variants in CYPs 2A6 and 2C19 are associated with decreased CotOx formation, potentially affecting the levels of free cotinine and the calculated NMR in smokers and clinical practices surrounding smoking cessation therapies.

FUNDING: Federal; State; Academic Institution

## POS5-1

## APPLICATIONS OF PHYSIOLOGICALLY BASED PHARMACOKINETIC MODEL TO SMOKEABLE INHALABLE TOBACCO PRODUCTS

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Mathematical modelling is a non-invasive approach for predicting the time course concentration of compounds within human tissues. We have developed and validated a physiologically based pharmacokinetic (PBPK) model with physiological and biological components to describe nicotine pharmacokinetics using tobacco products. The previous model has been enhanced to divide the uptake route in the model into three regions; Buccal Cavity (BC), Upper Respiratory Tract (conducting airways, URT) and Lower Respiratory Tract (transitional airways and alveolar region, LRT). Our PBPK model was validated for various tobacco products, including cigarette, smokeless tobacco, E-vapor, and nicotine inhaler. Based on regional deposition and permeation rate of nicotine within each region, the PBPK model predicts the product specific nicotine PK profile. In this study, a sensitivity analysis was carried out in an attempt to examine the effect of nicotine level in the e-vapor product, aerosol mass and regional deposition of nicotine within different regions of human respiratory tract on nicotine PK profile. The results demonstrated that higher nicotine deposition in BC, and URT leads to a lower nicotine  $C_{max}$  (maximum plasma concentration), due to the slower uptake in these regions compared to LRT. Additionally, higher aerosol mass results in higher nicotine delivery, and hence, a higher level of nicotine concentration in plasma over time. Increasing the nicotine delivery increased  $C_{max}$  proportionately, however, did not significantly affect  $t_{max}$  (time to reach  $C_{max}$ ), as  $t_{max}$  mainly depends on type of product along with the use conditions. In addition to the aforementioned validation cases, capability of the model for predicting PK profile of Tobacco Heating System (THS, IQOS) is also tested, and the results demonstrate good agreement between PK data from the experiment and prediction by the model. We report here a robust PBPK model that can be used to predict nicotine pharmacokinetics from e-vapor and heat-not-burn products.

## POS5-2

## ASSOCIATION BETWEEN COTININE-N-OXIDE LEVELS WITH CYP2C19 AND CYP2A6 GENOTYPES AND THEIR POTENTIAL EFFECT ON THE NICOTINE METABOLIC RATIO (NMR)

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**Significance:** The major mode of metabolism of nicotine is via cotinine and subsequently 3-hydroxy (OH)-cotinine by the enzyme CYP2A6. The nicotine metabolic ratio (NMR) is the ratio of cotinine/3-OH-cotinine in smokers and a determinant of CYP2A6 activity, and it is widely used in clinical practice to help select smoking cessation pharmacotherapy. Cotinine is also metabolized to cotinine-N-glucuronide and to cotinine-N-oxide (CotOx), accounting for ~7 and 5% of its metabolites, respectively. The goal of the present study was to investigate the enzymes that catalyze CotOx formation and determine whether genetic variation in these enzymes may affect this pathway. **Methods:** We used specific inhibitors (furafylline, tranilcypromine, clopidogrel, montelukast, sulfaphenazole, quinidine, chlome-thiazole, and ketoconazole) of the major hepatic cytochrome P450 (CYP) enzymes including CYPs 1A2, 2A6, 2B6, 2C8, 2C9, 2C19, 2D6, 2E1, and 3A4 in cotinine oxidation reactions using pooled human liver microsomes (HLM). CotOx formation was monitored by UPLC-MS/MS, and enzyme kinetic analysis was performed using microsomal fractions from CYP over-expressing HEK293 cell lines. Additionally, genotype-phenotype analysis was performed in a panel of 85 normal HLM specimens. **Results:** Inhibition of CotOx formation was only observed when using inhibitors of CYPs 2A6, 2C19, and 3A4. CYPs 2A6 and 2C19 exhibited similar oxidation activity against cotinine, with  $V_{max}/K_m$  values of 42, and 39  $nL \cdot min^{-1} \cdot mg^{-1}$ , respectively; the  $K_m$  of CYP3A4 was greater than 10 mM. We measured the levels of CotOx formation in 85 HLM specimens and genotyped variants in CYPs 2A6 [\*2 (rs1801272) and \*9 (rs28399433)] and 2C19 [\*2 (rs4244285) and \*17 (rs12248560)] using Taqman probes. An association was observed between CotOx formation and CYP variants 2C19\*2 and 2A6\*9, with CotOx formation decreased by 31% and 42%, respectively, in HLM exhibiting the \*2/\*2 and \*9/\*9 genotypes as compared to their wild-type counterparts; no effect was observed for the CYP2C19\*17 or CYP2A6\*2 variants. **Conclusions:** These results demonstrate

## POS5-3

## THE ROLE OF THE PACAP/PAC1 RECEPTOR SYSTEM IN NICOTINE WITHDRAWAL

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**Significance:** Nicotine addiction characterized by high rate of relapse is a major public health and socioeconomic issue. However, there is a handful of pharmacotherapies to treat this relapsing brain disorder. This is because the underlying mechanism of nicotine reward and dependence is not fully characterized. In the present study, we determined the role of endogenous pituitary adenylyl cyclase activating polypeptide (PACAP) in nicotine reward and dependence. To this end, we used mice lacking PACAP and their wild-type controls and assessed if nicotine-induced conditioned place preference (CPP), used as an animal model of reward, or mecamylamine-precipitated withdrawal, used as a model of nicotine dependence, would be different between mice lacking PACAP and their wild-type controls. **Method:** Male and female mice of each genotype were tested for preconditioning place preference in the CPP paradigm on day 1, then received conditioning with nicotine (1 mg/kg) or saline (once a day for 10 days) and then tested for postconditioning place preference. On each test day, mice were placed in the central neutral chamber of the CPP apparatus and allowed to explore the CPP chambers for 15 min. The amount of time that mice spent in each chamber was recorded. Three days later, mice were tested for affective signs of nicotine withdrawal, in which mice were injected with mecamylamine (3 mg/kg) and tested for anxiety-like behaviors using the elevated plus maze (EPM) test. The amount of time that mice spent in the EPM arm was recorded and the decrease in the amount of time on the open arm was used as a measure of anxiety-like behaviors. Mice were then, 2 h later, forced to swim for 15 min and tested for depression-like behaviors 24 h later. On the test day, mice were placed in the water and allowed to freely swim for 6 min. The amount of time that mice remained immobile was recorded and used as a measure of depression-like behaviors. **Results:** Mice of each genotype and sex exhibited preference toward the nicotine-paired chamber and this response was blunted only in female mice lacking PACAP compared to their wild-type controls. In addition, male but not female mice lacking PACAP showed reduced anxiety- and depression-like behaviors compared to their wild-type controls when exposed to withdrawal. **Conclusion:** Endogenous PACAP is involved in nicotine reward and dependence but there is a sex-related difference in this regard.

## POS5-4

## BEST PRACTICES FOR MEASURING TOBACCO 21 STATE-LEVEL POLICIES

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**Significance:** Studies suggest raising the minimum legal sales age (MLSA) of tobacco to 21 years will decrease youth initiation. However, no current research accounts for inconsistencies between Tobacco 21 policy components (e.g., age verification, compliance checks). Our study developed a tool to compare and evaluate strength of state-level Tobacco 21 laws. **Methods:** A multi-step process was used to develop an assessment tool. A team of policy experts, tobacco researchers, and attorneys created a tool based on literature and recommendations from the CDC and Tobacco Legal Consortium. Multiple advisory groups, composed of national experts, evaluated the face validity of the instrument and recommended modifications using a rating system. Components within the tool included: rationale; comprehensive tobacco definition; MLSA at 21; age verification; signage; enforcement; tobacco retail license (TRL); violations and penalties; and education. Additionally, negative components were considered: possession, use, and purchase (PUP) laws; military exemption; and grandfathering. Four coders evaluated the six state laws passed before December 2018 independently, then discussed discrepancies. Inter-coder reliability was measured using kappa's light ( $K=0.90$ ). Three senior coders reviewed all codes and discussed until consensus was reached (triangulation of researchers). **Results:** While all six states raised the MLSA, only CA, ME, MA, and OR required request for photo ID based on appearance (e.g., 30 years). Five states included enforcement; only CA and NJ provided rationale for conducting compliance checks (e.g. smoking rates). All except OR required a TRL,



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and all but MA renewed their TRL annually; fee ranged from \$20-\$265. Violation fines ranged from \$100-\$600, \$200-\$2,000, and \$300-\$2,000 for the first, second, and third violation, respectively. Two states included TRL suspension or revocation for repeat violations. All except ME penalized the clerk with an equal or additional penalty. No law required education or training for retailers or the community. One contained a military exemption, two were phased in over time, and three contained PUP laws. Conclusion. Our Tobacco 21 best practices tool is the first measure to evaluate strength of policy components. Currently, no state law meets all criteria of a 'model policy'; rather, each contains strengths and weaknesses. Public health advocates should use best practice components in new laws and amend existing Tobacco 21 policies to protect youth from access and exposure to tobacco products.

## POS5-5

### PAIN PERCEPTION IS ASSOCIATED WITH SHORT-TERM SMOKING ABSTINENCE

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**Background:** Smoking is highly prevalent among individuals who experience pain, and evidence suggests that pain may increase difficulty in quitting smoking. This study prospectively examined the association between pain and smoking abstinence among adults who were participating in a smoking cessation trial. **Methods:** Participants (N=81) enrolled in a three-armed pilot clinical trial that compared in-person and smartphone-based smoking cessation interventions. Participants were followed for 13 weeks (1 week pre-quit through 12 weeks post-quit). At baseline (1 week pre-quit), participants self-reported their level of pain in the past four weeks. Continuous smoking abstinence was assessed via self-report and biochemically confirmed via expired carbon monoxide 4 and 12-weeks after the quit day. Unadjusted and adjusted logistic regressions were conducted to explore the association between pain perceptions and smoking cessation. **Results:** Participants had a mean age of 49 years, were mostly White (63%), had an average of 13 years of education, and most reported household incomes < \$50,000 per year (67%). One week before quitting, participants reported moderate nicotine dependence on the Heaviness of Smoking Index (M=1.2, SD=0.5), and 54% of participants reported experiencing moderate or severe pain. Results indicated that those who reported moderate or severe pain were five times less likely to remain continuously abstinent throughout the first four weeks of the scheduled quit attempt than those who reported mild or no pain (OR = 5.6 [95% CI = 1.4, 22.2]). Similar results were found after controlling for covariates (i.e., race, sex, age, nicotine dependence, education, income, treatment group, and past 30 day physical and mental health). Baseline pain perception was not related to continuous smoking abstinence 12-weeks after the scheduled quit date ( $p=.24$ ). **Discussion:** Individuals who reported higher levels of pain at baseline were less likely to maintain smoking abstinence during the early phase of a smoking cessation attempt. Future research could benefit from momentary assessment methods to investigate the temporal relation between pain perception and smoking lapse.

FUNDING: Federal; State; Academic Institution

## POS5-6

### SECONDHAND SMOKE CAUSES LIVER STEATOSIS THROUGH Deregulation of Genes Involved in Hepatic Lipid Metabolism

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**Significance:** Hepatic fat accumulation (steatosis) is the first step in the genesis of non-alcoholic fatty liver disease (NAFLD), a leading cause of liver-related morbidity and mortality, worldwide. Exposure to secondhand smoke (SHS) has been associated with liver steatosis and NAFLD; however, the role of SHS in the pathogenesis of these diseases remains unknown. **Methods:** We sub-chronically exposed standard-diet-fed mice to SHS generated by a microprocessor-controlled smoking machine. Subsequently, we performed histological and molecular analyses on the liver of SHS-exposed mice, immediately after treatment and following one-month recovery in clean air. **Results:** Histological analysis revealed significant hepatic fat accumulation in SHS-exposed mice relative to controls, which intensified after one-month-recovery of the animals in clean air. Whole transcriptome microarray analysis showed a unique and persistent transcriptomic response in the liver of SHS-exposed mice, with several hundred aberrant transcripts being detectable both pre- and post-recovery. The lasting transcriptional changes observed in SHS-exposed mice predominantly affect genes and functional

networks involved in lipid metabolism and steatosis. Of significance is the SHS-induced upregulation of the regulator of G-protein signaling 16 (*Rgs16*) and lipin 1 (*Lpin1*), two steatogenic genes known to modulate fatty acid oxidation and synthesis. Both *Rgs16* and *Lpin1* are downstream targets of the tumor suppressor *TP53* gene and contain potential sterol regulatory element (SRE) binding sites for SREBP. *TP53* is a preferential target of tobacco smoke carcinogens, and SREBP-1 is a key player in lipid homeostasis. Thus, upregulation of the *Rgs16* and *Lpin1* consequent to SHS exposure may provide novel insights into the interplay of carcinogenic assault, p53-dependent response, and metabolic liver disease. **Conclusions:** Our findings have significant public health implications as they underscore how environmental carcinogens, such as SHS, in addition to cancer-causing effects, may contribute to metabolic liver disease.

FUNDING: Federal; State

## POS5-7

### A VALIDATED METHOD FOR RAPID DETERMINATION OF NICOTINE CONCENTRATION AND PROPYLENE GLYCOL-VEGETABLE GLYCERIN RATIO IN E-CIGARETTE REFILL SOLUTIONS

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**Background:** A limited number of analytical methods were developed to quantitate nicotine in e-cigarette refill solutions independently from propylene glycol (PG) and vegetable glycerin (VG), two most commonly used solvents. The aim of our study was to develop a rapid and accurate analytical method to determine nicotine concentration and PG/VG ratio in commercial e-cigarette products. **Methods:** First, 30  $\mu$ L of refill solution samples were pipetted, diluted with 3 mL of methanol, and spiked with 100  $\mu$ L of 10 mg/mL pyridine-d5 in methanol (internal standard). Samples were vortexed vigorously for 5 mins then analyzed using an Agilent 7890A GC coupled with an Agilent 5988B MS. The injection volume was 1  $\mu$ L with a split ratio of 75:1 using the carrier gas helium. An Agilent DB WAX UI (30mm x 0.25mm x 0.25 $\mu$ m) column was used. MS detector was operated in SIM mode. A total of 11 calibrators and 5 QC samples were prepared ranging from 100:0 PG/VG (v/v) to 0:100 PG/VG (v/v) and 0.1-74.1 mg/mL of nicotine. Calibration curves were constructed using internal standard quantitation with a quadratic 1/x weighting factor. This method was validated using the Scientific Working Group for Forensic Toxicology Standard Practices for Method Validation in Forensic Toxicology. **Results:** Calibration curves for PG, VG and nicotine recovered an  $r^2$  value >0.99. Recovery of all calibrators and QC were within 80-120%. The average coefficient of variation did not exceed 20% at each concentration both within and between runs. The limit of quantitation of nicotine was 0.1 mg/mL. This method was used to test 20 commercial products purchased from the United States, Canada and Australia. PG and VG ratios in commercial products varied from 35:65-80:20 (v/v). A total of 5 products had undetectable nicotine and 15 products contained a nicotine concentration in a range from 0.2-53.1 mg/mL. **Conclusion:** The developed and validated method allows for simultaneous determination of nicotine concentration and PG/VG ratio in a single run. It has significantly reduced sample preparation and analysis time without compromising sensitivity, accuracy and precision.

FUNDING: Federal

## POS5-8

### LESIONS OF THE GRANULAR INSULAR CORTEX DISRUPT NICOTINE STIMULUS EFFECTS

Briana Renda, Allyson K. Andrade, Zoë Katz, Diana Segal, Lauren D. King, **Jennifer E. Murray**. University of Guelph, Guelph, ON, Canada.

**Significance:** The insular cortex has been shown necessary for maintenance of smoking in humans. In rats, inactivation of the posterior granular insula (GI) disrupts nicotine self-administration. Further, the GI is required for learning about interoceptive stimuli, suggesting it may be necessary for learning about nicotine as an interoceptive conditioned stimulus. **Methods:** Male Sprague-Dawley rats were given bilateral lesions of the GI (AP-0.4mm, ML±4.8mm, DV-6.0mm (injector 10° divergent from vertical) with ibotenic acid (0.4  $\mu$ L/site, 10 mg/ml in pbs) over 2min with a 5-min diffusion period (n=7) or sham lesions (n=8). Following recovery, rats began discrimination training. Rats were given daily 20-min sessions in which they received either nicotine or 0.9% saline subcutaneously 5 min before placement in a conditioning chamber. On nicotine sessions, rats had 36 deliveries of 4-sec access to 0.01 ml 26% (w/v) liquid sucrose. On saline sessions, no sucrose was delivered. Dipper entry rate (goal tracking) before the first sucrose delivery or equivalent time on saline sessions was the main dependent measure. A photobeam transected each chamber 5.5 cm from the sidewall containing



the dipper to provide a measure of locomotor activation. Rats underwent the following phases of training: discrimination with 0.4 mg/kg nicotine; extinction with 0.4 mg/kg nicotine; discrimination with 0.1 mg/kg nicotine; discrimination with 0.025 mg/kg nicotine; and discrimination with 0.4 mg/kg nicotine. **Results:** There was little effect of GI lesions on acquisition of the Pavlovian drug discrimination; sham rats showed a slightly more reliable discrimination than GI rats. However, locomotor activity showed a marked blunting of nicotine-induced locomotor sensitization in the GI compared to sham rats across training conditions until they switched to the low 0.025 mg/kg nicotine training. There were no effects of lesions on saline session locomotor activity or total dipper entries. **Conclusions:** Conditioned nicotine stimulus effects were only mildly impacted by GI lesions. However, the unconditioned nicotine effects were impaired with lesions of the GI.

FUNDING: Academic Institution

## POS5-9

### USING LOGIC MODELS TO INFORM TOBACCO CONTROL POLICY OUTCOME EVALUATION

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**Background** A key challenge in the evaluation of population-level tobacco control policies is understanding how each policy is likely to work and in whom. This is particularly challenging in settings where several policies are implemented in a short period of time. Logic models are a visual representation of the anticipated causal pathway of an intervention and are useful in identifying the key measures of policy impact. We aimed to develop a set of logic models that could be widely used in tobacco policy evaluation. **Methods** We developed logic models for several policies recently implemented in England, including smokefree legislation, changes to age of sale laws, mass media campaigns and point-of-sale display bans. We used an iterative process to develop models for each policy, before combining outcomes into a single overarching model. We initially reviewed policy documents to identify the outcomes expected to result from the implementation of each policy, and then conducted a literature review of existing policy evaluations to identify further outcomes. The draft models were refined through meetings of the research team, and we obtained feedback from a range of stakeholders including a public involvement group and national tobacco control policymakers and revised the models accordingly. **Results** The final models represented expected causal pathways for each policy and identified the populations in which outcomes were expected to occur (e.g. adult smokers, young people). The models included short term outcomes (such as policy awareness, compliance and social cognitive outcomes), intermediate outcomes (such as changes in smoking behaviour) and long term outcomes (such as mortality, morbidity and health service usage). **Discussion and conclusions** The logic models guided the development of hypotheses and choice of outcome measures in subsequent evaluations of tobacco control policies. The use of logic models enables prospective and theory-based planning of evaluation analyses, which in turn enhances the transparency of policy evaluation. The use of logic models should be encouraged in the evaluation of tobacco control policy, as well as in other areas of public health. This study is funded by NIHR PRP (PR-R14-1215-24001). The views expressed are those of the authors and not necessarily those of the NHS, the NIHR, the Department of Health and Social Care, arms length bodies or other government department.

FUNDING: Federal

## POS5-10

### USE OF TOBACCO PRODUCTS FOR MARIJUANA CONSUMPTION AND ASSOCIATION WITH SUBSTANCE USE PROBLEMS AMONG U.S. YOUNG ADULTS AT WAVE 3 OF THE PATH STUDY

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**SIGNIFICANCE:** Between 2017 and 2018, the U.S. nationally representative Monitoring the Future survey found that among 12th graders, past 30 day vaping of nicotine products nearly doubled (11% to 20.9%) and past 30 day vaping of marijuana increased by 50% (4.9% to 7.5%). 12<sup>th</sup> graders are transitioning to young adulthood, and young people ages 18-24 in the U.S. have the highest rates of marijuana and electronic nicotine delivery systems (ENDS) use compared to youth and adults 25+ years. This study reports the prevalence of U.S. young adults using tobacco products for marijuana consumption and associations between using tobacco products for marijuana and substance use problems. **METHODS:** U.S. nationally representative data from Wave 3 (2015-2016) of the Population Assessment of Tobacco and Health (PATH) Study were used to assess young adults' (18-24 years old, unweighted sample = 8,453) ever marijuana use and

ever use of a hookah, a cigar product (blunt), or ENDS with marijuana constituents. Weighted multinomial logistic regression models were fit to predict the Substance Use Problem subscale of the Global Appraisal of Individual Needs (GAIN-SS) inventory categorized into low (0-1 symptoms), moderate (2-3 symptoms) and high (4 or more symptoms). **RESULTS:** Weighted analyses indicated about half of young adults (52.1%) had ever used marijuana. Of this group, the majority (80.1%) had ever used any tobacco/nicotine device for marijuana use including: hookah (25.2%), cigar product (74.0%), or ENDS device (24.5%). Ever use of tobacco products for marijuana significantly predicted moderate (OR=1.39, p=0.017) and high (OR=1.97, p=0.009) substance use problems after controlling for sex, employment status, and past-30-day cigarette, cigar, ENDS, hookah, and marijuana use. **CONCLUSIONS:** Ever use of tobacco products for marijuana consumption is associated with higher levels of substance use problems. Given the increased availability of tobacco products, rising trends of vaping among young people, and changing policies regarding access to marijuana, it is critical to better understand how devices are being used and how policy and public health messages need to be targeted.

FUNDING: Other

## POS5-11

### CHEMICAL CHARACTERISATION OF AEROSOL EMISSIONS FROM A PROTOTYPE HEATED TOBACCO PRODUCT

Grant O'Connell, PhD. Imperial Brands PLC, Bristol, United Kingdom.

Heated tobacco products generate a nicotine-containing aerosol with a tobacco taste through the heating of tobacco by an electrical device. As the tobacco is heated and not burned, the aerosol generated is expected to contain substantially lower levels of the toxicants found in the smoke produced when tobacco is burned. In this study, the emissions of "tar", nicotine and carbon monoxide generated by a prototype heated tobacco product were compared with those from a 3R4F cigarette under the ISO Intense machine-puffing regime. As "tar" refers to the residue from cigarette smoke when a cigarette is burned, here the "tar" collected from the heated tobacco product is referred to as "nicotine-free dry particulate matter" or NFDPM. A further 42 toxicants of notable public health interest were also analysed and compared. These analytes included those proposed by the World Health Organization Study Group on Tobacco Product Regulation (TobReg) and the US Food and Drug Administration (FDA). All yields are reported as the mean value across three replicates for each product type. The low heating temperature of tobacco in the heated tobacco product resulted in a distinct shift in the composition of the aerosol compared with cigarette smoke. The heated tobacco prototype produced 111 µg nicotine, 40 µg carbon monoxide and 1830 µg NFDPM per puff whereas the cigarette produced 180 µg nicotine, 3010 µg carbon monoxide and 2650 µg "tar" per puff. The NFDPM produced by heated tobacco product was principally composed of the aerosol former glycerol. In comparison to the cigarette, the toxicant levels in the heated tobacco product emissions were substantially reduced across all chemical classes measured. For the nine toxicants proposed by TobReg for mandated reduction in cigarette emissions, the mean reductions in the heated tobacco product aerosol were 87.2-99.9% per puff with an overall average reduction of 97.1%. For the abbreviated list of harmful and potentially harmful constituents of smoke specified by the FDA Tobacco Products Scientific Advisory Committee (excluding nicotine), reductions in the aerosol of the heated tobacco product were 68.8-99.9% with an overall average reduction of 95.7%. These results show that the tested heated tobacco prototype product produces a much simpler aerosol than cigarettes with relatively low levels of targeted cigarette smoke toxicants. Such products may offer the potential for substantially reduced exposure to toxicants when used as an alternative to cigarettes.

## POS5-12

### LONG-TERM BEHAVIORAL CONSEQUENCES OF HIGH-DOSE NICOTINE EXPOSURE DURING ADOLESCENCE IN RATS

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**Significance:** Adolescent exposure to high doses of nicotine is an increasing concern with the emergence of electronic cigarette devices (e.g. JUUL), making the importance of considering long-term behavioral consequences of adolescent exposure to high-dose nicotine more critical. **Methods:** Male Sprague-Dawley rats (n=16, 8/group) were treated daily with 1.0 mg/kg subcutaneous nicotine from post-natal days 28-42. Upon reaching adulthood, the rats underwent behavioral assessments: novel object recognition memory, conditioned avoidance response, and intravenous nicotine self-administration. **Results:** Adolescent nicotine-treated rats displayed a significant, but selective, impairment of short-term memory (5-minute delay). A significant within-animal delay by drug



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interaction ( $F(1,14)=4.748, p=0.047$ ) was observed; between group analyses showed that the nicotine treated animals displayed significantly decreased discrimination ratio compared to vehicle-treated animals ( $p=0.011$ ). No group differences were observed in acquisition or extinction of conditioned avoidance response learning. For nicotine self-administration (0.023 mg/kg/infusion), there was no effect of adolescent nicotine pretreatment on nicotine infusions delivered on the initial fixed ratio 1 schedule. However, during the fixed interval 1 schedule, rats pretreated with nicotine in adolescence self-administered more nicotine than rats not pretreated with nicotine, [Session x Group Interaction:  $F(7,70)=2.403, p=.029$ ]. During the final repeated progressive ratio schedule, that group difference disappeared. A similar pattern was also observed for active lever presses. **Conclusions:** Adolescent exposure to high-dose nicotine produces long-lasting changes in short-term memory and nicotine reinforcement, underscoring the need for understanding the long-term consequences of heavy e-cigarette use in adolescence.

FUNDING: Academic Institution

## POS5-13

### MIXTURE ANALYSIS OF NEIGHBORHOOD SOCIOECONOMIC STATUS (SES) VARIABLES AND ASSOCIATIONS WITH TOBACCO RETAIL OUTLET (TRO) COUNT AND DENSITY

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**Significance:** Tobacco retail outlet (TRO) placement may help to explain disparities in smoking prevalence and identify geographic areas for prevention or policy modification. The study objective was to estimate an area-level socioeconomic status (SES) index measuring neighborhood disadvantage and determine associations with TRO count and density within Virginia, the third largest tobacco producing state. **Methods:** Between 2017 and 2018 the Department of Health used a standardized methodology developed by CounterTools to curate a databases of all TROs within Virginia ( $N = 5621$ ). This involved using publicly available data sources and mobilizing a team of community partners to "ground-truth" every TRO within Virginia. TRO locations were geocoded and spatially linked to census tracts and assigned 12 neighborhood SES variables from the American Community Survey. Poisson weighted quantile sum (WQS) regression models were used to estimate the neighborhood disadvantage index and its association (relative risk) with TRO count and density as measured by the count per total number of households. Each variable in the index received a weight empirically estimated to be between 0 and 1, with weights summing to 1. **Results:** Results demonstrate that the estimated neighborhood disadvantage index was significantly associated with both TRO count and density. For TRO density, a 1-unit increase in the neighborhood disadvantage index was associated with a 72% increased likelihood of greater TRO density (relative risk = 1.72,  $p$ -value <0.0001). The most important variables in the neighborhood deprivation index according to the estimated weights were: inverse median monthly housing costs (0.13), percent US citizen (0.12), percent vacant housing units (0.11), percent Hispanic population (0.11), inverse median gross rent (0.10), and percent without a bachelors' degree (0.09). **Conclusions:** The important variables were consistent for TRO count and density and align with existing research suggesting that TROs are more likely to be located in neighborhoods with greater concentrated disadvantage. Furthermore, the novel analytic methods used here demonstrate that certain variables are more useful in explaining TRO density than others.

## POS5-14

### FRIENDS, INTIMATE PARTNERS, AND SPANGING ARE THE PRIMARY SOURCES OF CIGARETTES FOR HOMELESS YOUTH

Julianna Nemeth, PhD, Joseph Macisco, MPH, Lauren Miller. OH State University, College of Public Health, Columbus, OH, USA.

**Significance:** Six percent of U.S. youth ages 14-24 are homeless. Seven in ten homeless youth smoke – a rate 2.5 times higher than among all youth. Accordingly, one million homeless U.S. youth smoke each year. Despite this, limited research exists on the smoking practices of homeless youth. The aim of this study was to characterize the source of tobacco access among homeless youth in preparation to develop a cessation intervention targeted to the population. **Methods:** From March–September 2018, youth who smoke tobacco were recruited from a Midwestern homeless youth drop-in center on age (14-17 and 18-24) and willingness to quit. Youth completed a qualitative interview concerning tobacco use, quit attempts, and needs for supported cessation ( $n=36$ ). Youth were asked close-ended questions in order to characterize the sample, including past week and past month source of combustible tobacco access. **Results:** 69% of the youth were 18-24 years old, 75% smoked daily in the past 7 days, and

64% were willing to try to quit smoking in the next 30 days. 56% of youth were black or African-American. 53% were female; of those, 16% were pregnant. 67% perceived their sexual identity as straight. In the past week and month, respectively, homeless youth obtained cigarettes from these primary sources: 83% and 94% from friends, 64% and 67% from an intimate partner, 61% and 72% from spanging (spare change), 53% and 61% purchased using money from a job, and 42% and 50% from relatives. In the past week and month, respectively, 11% and 19% smoked other people's discarded cigarette butts, 8% and 11% dealt drugs to obtain cigarettes, and 6% and 14% stole cigarettes. **Conclusion:** Homeless youth primarily obtain tobacco from friends. However, homeless youth also engage in riskier practices to obtain cigarettes, including spanging, smoking discarded butts, dealing drugs and stealing. Sources of tobacco access should be considered in targeted cessation development for homeless youth. **Funding:** This project was supported by NIH grant K07 CA216321-01A1.

FUNDING: Federal

## POS5-15

### SMOKING PATTERNS BY INCOME AND BIRTH COHORT IN THE UNITED STATES

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**Background:** People from lower family income groups in the US have higher smoking prevalence, longer smoking durations and lower cessation rates than people from higher income groups. However, little is known about how smoking patterns, including rates of initiation, cessation, and intensity, differ across income levels by birth-cohort. **Methods:** Using family income data from the National Health Interview Survey (NHIS) 1982-2017, we calculated individual income-to-poverty ratios. Missing family income data from 1982-1996 was imputed using sequential regression multivariate imputation, using the NHIS approach to impute missing continuous income from 1997-2017. Age-period-cohort models with constrained natural splines were used to estimate the annual probabilities of smoking initiation, cessation, and intensity by sex and birth-cohort for five income-to-poverty ratio groups (<1, 1-2, 2-3, 3-4 and 4+ times the poverty threshold). Age-specific prevalences of current and ever smoking by income, sex and birth cohort were also estimated. **Results:** For all income-to-poverty-ratio groups, smoking prevalence and initiation rates are decreasing by birth-cohort, while cessation rates are increasing. However, the disparity between low- and high-income groups, as measured by relative smoking prevalence, is markedly increasing by birth-cohort. Smoking initiation probabilities are highest among those living below the poverty threshold, and inversely associated with income. Conversely, people living below the poverty threshold have the lowest probabilities of quitting, with smoking cessation probabilities increasing with income. Age-specific smoking cessation probabilities vary considerably by income, especially in recent birth-cohorts. **Conclusions:** While smoking is decreasing for all income groups, the smoking disparity between high and low-income populations is increasing with more recent birth-cohorts. It will be important to establish effective smoking intervention strategies specifically for low-income groups. Future studies evaluating disparities in smoking by income should consider differences by birth-cohort.

FUNDING: Federal

## POS5-16

### PATTERNS OF TRANSITION: CIGARETTE AND ENDS USE IN SMOKING CESSATION ATTEMPTS

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**SIGNIFICANCE:** Smokers who begin using an electronic nicotine delivery system (ENDS) will face fewer health risks if they transition fully from smoking to ENDS. However, dual use of both smoked tobacco and ENDS is commonly reported, raising questions about how transition from smoking to vaping (and from vaping to becoming vape-free) occurs, and what 'dual use' means. **METHODS:** We used a mixed methods longitudinal approach to examine transition patterns among 28 participants who smoked and were willing to make a quit attempt using an ENDS device. Participants completed a baseline interview and were bought an ENDS device costing up to NZ\$80. They attended follow-up interviews at weeks 2, 6, 12 and 18; 22 participants completed at least four interviews. During follow-up interviews, participants completed a day-grid that recorded their smoking (number of cigarettes each hour) and vaping practices (number of vaping 'sessions' and puffs per session) throughout the day. **RESULTS:** Analysis of the



day-grids showed five distinct patterns: no transition to exclusive vaping with sustained smoking; slow transition to exclusive vaping with sustained smoking for several weeks; slow transition with episodic smoking for several weeks; rapid transition to exclusive vaping with declining ENDS use over time; rapid transition to exclusive vaping with increasing ENDS use over time. **CONCLUSIONS:** Transitions from smoking to vaping showed considerable variation. Dual use describes very different smoking and vaping practices, not all of which appear to lead to exclusive vaping. If these patterns hold with larger samples, they could inform more specific cessation advice regarding the speed of transition, management of 'sticky' cigarettes, the need for complete transition, and potential vaping cessation. Future work could examine whether transition patterns vary by heaviness of smoking, thus enabling more targeted advice that recognises variation in smoking frequency.

FUNDING: Non-profit grant funding entity

## POS5-17

### E-CIGARETTE VAPING IN ADVERTISING PORTRAYALS AND BEHAVIORAL OUTCOMES RESEARCH E-VAPOR STUDY - A RANDOMIZED CONTROLLED EXPERIMENT AMONG YOUNG ADULT DUAL USERS

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**Significance:** Research suggests that e-cigarette ads that contain depictions of vapor elicit increased cigarette smoking urge among adult smokers. This study examined the effects of exposure to vapor cues in e-cigarette ads on vaping and smoking urges and smoking intensity among young adult e-cigarette and cigarette dual users. We further analyzed whether e-cigarette/cigarette nicotine dependence would moderate the effects on study outcomes. **Methods:** We conducted a between-subjects randomized controlled experiment among young adult dual-users (ages 21-30; N=217) who were randomly assigned to view seven video ads in one of the following conditions: 1) e-cigarette ads with vapor, 2) identical e-cigarette ads without vapor, or 3) beverage ads. Outcomes were post-test vaping and smoking urges and mean volume of the first six puffs of smoking one cigarette ad libitum using a CReSS topography device. We utilized multiple linear regression to test the main effects of message condition on post-test vaping and smoking urges (controlling for pre-test urges, respectively) and mean puff volume. Separate models tested the interactions between condition and e-cigarette/cigarette nicotine dependence on the study outcomes. **Results:** There were no significant main effects of the experimental condition on vaping or smoking urge and mean puff volume. Cigarette nicotine dependence interacted with exposure to vapor cues in influencing vaping urge and mean puff volume. Those who had moderate/high dependence in the vapor condition reported reduced vaping urge ( $b=-2.06$ ,  $p=0.005$ ) and increased mean puff volume ( $b=26.25$ ,  $p=0.005$ ) compared to those in the no vapor condition. **Conclusion:** Study findings suggest that young adult dual users who are more dependent on cigarettes are more sensitive to vaping portrayals within e-cigarette ads. Exposure to vaping cues reduced vaping urge but were associated with heavier cigarette smoking in this population. These findings may have broader implications on regulating the presence of vapor in e-cigarette advertising.

FUNDING: Unfunded; Federal

## POS5-18

### AN ASSESSMENT OF NICOTINE KINETICS AND SUBJECTIVE EFFECTS OF TWO TOBACCO HEATING PRODUCTS IN COMPARISON TO CIGARETTES AND A NICOTINE REPLACEMENT THERAPY

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**Significance:** Switching smokers to modified risk tobacco products (MRTPs) has been suggested as a potential means to reduce the risks of tobacco use. Understanding nicotine pharmacokinetic (PK) profiles and smokers' subjective impressions of candidate MRTPs relative to those of combustible cigarettes and other nicotine products is important, as this may help understand likelihood of switching success and provide data on potential abuse liability. **Methods:** This randomised, crossover study investigated

nicotine PK when subjects used the glo tobacco heating product with consumables of two different nicotine yields (THP1.0 and THP1.1), compared to smoking a cigarette of their usual brand, and to using a licensed nicotine replacement therapy (nicotine inhaler), during a 5-minute product use session. 32 healthy smokers were recruited and, in accordance with pre-defined randomization sequences, assigned a different product for assessment during each of four PK periods, following overnight (minimum 12-hours) in-clinic nicotine abstinence. Subjective effects (product liking, urge to smoke a usual-brand cigarette, urge to use the study product, overall intent to use the product again) were also assessed at various points during each PK period via single-item questionnaires. **Results:** Systemic nicotine exposure, based on  $C_{max}$  and  $AUC_{0-240min}$  was greater for the THPs than for the nicotine inhaler, but lower than the usual-brand cigarette. Median  $T_{max}$  for the THPs (4 min) was closer to that observed for the cigarette (6 min) than for the nicotine inhaler (15 min). Product liking and overall intent to use again was greater for the THPs than for the nicotine inhaler, but lower than for cigarettes. Urge to smoke was reduced to the greatest extent when smoking a cigarette, and to the least extent when using the nicotine inhaler. **Conclusions:** This clinical study demonstrated that the nicotine PK profiles of the glo THPs assessed were more representative of that of the subjects' usual-brand cigarettes than the nicotine inhaler, and that subjective impressions of glo were more positive than those for the nicotine inhaler.

FUNDING: Tobacco Industry

## POS5-19

### NICOTINE DEPENDENCE, BUT NOT ALCOHOL DEPENDENCE, IS ASSOCIATED WITH INCREASED DEMAND IN THE PURCHASE TASK AMONG ALCOHOL-ABUSING SMOKERS

**Paulina Linares Abrego**<sup>1</sup>, Yong Cui<sup>1</sup>, Paul Cinciripini<sup>1</sup>, Nassima Ait-Daoud Tiouririne<sup>2</sup>, Robert Anthenelli<sup>3</sup>, Maher Karam-Hage<sup>4</sup>, Jin Yoon<sup>5</sup>, Jason Robinson<sup>1</sup>. <sup>1</sup>UT MD Anderson Cancer Center, Houston, TX, USA, <sup>2</sup>University of Virginia, Charlottesville, VA, USA, <sup>3</sup>University of CA, San Diego, School of Medicine, La Jolla, CA, USA, <sup>4</sup>Houston, TX, USA, <sup>5</sup>University of TX Health Science Center at Houston, Houston, TX, USA.

**Background:** Behavioral economics has been used in addiction research to investigate seemingly irrational decision making among drug abusers. Two frequently examined constructs are delay discounting, which evaluates whether immediate rewards are valued over future rewards, and demand, which quantifies an individual's drug consumption as a function of cost. Previous research has generally examined these constructs in nicotine or alcohol users, and little research has been conducted in alcohol-abusing smokers, who often have more difficulty quitting either drug. **Methods:** As part of a clinical trial that treated alcohol-abusing smokers with topiramate, participants ( $n=101$ ) completed a cigarette purchase task (CPT), an alcohol purchase task (APT), and a delay discounting task (DDT) at baseline before taking the medications or quitting smoking. We also administered the Barratt Impulsivity Scale (BIS-11), Fagerström Test for Nicotine Dependence (FTND), and the Alcohol Use Disorder Identification Test (AUDIT). We characterized these smokers' delay discounting, price sensitivity for alcohol and cigarettes, and self-reported impulsivity in relationship to dependence severity at baseline. **Results:** With the CPT, we found that higher scores on Omax (maximum cigarette purchase expenditure), Pmax (price associated with Omax), intensity (smoking level when cigarettes were free), breakpoint (the first price to completely suppress smoking), and lower scores on elasticity (sensitivity of consumption to increases in cost) were significantly associated with higher FTND scores, while APT-related measures were not associated with AUDIT scores. Higher BIS-11 scores were associated with higher AUDIT scores. Delay discounting was associated with neither nicotine nor alcohol dependence severity. **Conclusion:** In this alcohol-abusing smoking sample, demand for cigarettes increased with the level of nicotine dependence, whereas demand for alcohol was unrelated to the level of alcohol dependence.

FUNDING: Federal



## POS5-20

### USING DAILY ASSESSMENTS TO CHARACTERIZE YOUNG ADULTS' PATTERNS OF MARIJUANA AND TOBACCO USE AND CO-USE BY MODE OF ADMINISTRATION AND MARIJUANA HIGH INTENSITY

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**Background:** Past-month marijuana (MJ) use has increased significantly among US young adults (YAs; aged 18-24) and MJ use often overlaps with tobacco (TOB) use. This pilot study characterized patterns of MJ-TOB use and co-use in 23 YA past month MJ and TOB co-users who completed daily interactive voice response (IVR) surveys three times a day for 28 days. **Methods:** Five completed <20% of surveys and were dropped from analyses. Analyses are based on 18 YAs who provided 460 completed surveys. [Complete data on 70 participants will be reported by February 2019]. Participants answered questions about MJ and TOB use and their co-use, modes of MJ administration, and MJ high intensity (1-10). Analyses examined the prevalence of days of MJ-TOB use and co-use, different modes of marijuana administration, and variations in average and maximum high intensity by MJ mode of administration and days of MJ-only use vs co-use with TOB. **Results:** Overall IVR compliance was 70%. MJ-only was reported on 37% of days; MJ-TOB co-use was reported on 23.3% of days; TOB-only was reported on 20% of days; and neither MJ nor TOB use was reported on 19.8% of days. Across modes of MJ administration, joints were most popular, reported on 71.2% of the MJ use days, followed by concentrates (24.5% of MJ use days), blunts (21.6% of MJ use days), vaporizers (21.9% of MJ use days), edibles (15.1% of MJ use days), and spliffs (14.8% MJ use days). Average maximum daily MJ high intensity (on days of MJ use) was 6.7 (out of 10); the maximum high intensity (10 out of 10) was reported on 9.7% of MJ use days. Average high intensity varied by mode of administration and days of MJ-only use vs co-use. Average high intensity was greatest for edible and concentrates use, and lowest for joint and spliff use. Average per period high intensity was slightly greater on days of MJ-TOB co-use (6.4) than days of MJ-only use (6.2). **Conclusions:** In YA MJ and TOB co-users, tobacco products were co-used with MJ on 25% of the days reported, and average marijuana high intensity was greater on days of co-use. Ecological momentary assessments of single use and co-use can elucidate new processes that can be targeted in young adult tobacco prevention and health messaging campaigns.

FUNDING: Federal

## POS5-21

### U.S. ADOLESCENTS' PERCEPTIONS OF THE HARMFULNESS AND ADDICTIVENESS OF USING A JUUL E-CIGARETTE AND SMOKING CONVENTIONAL CIGARETTES

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**Significance:** Adolescents' perceptions of the health risks of using a tobacco product are key predictors of their likelihood of initiating use or continuing to use the product. This study assessed adolescents' perceptions of the absolute and relative harmfulness and addictiveness of using the JUUL e-cigarette and smoking conventional cigarettes. **Methods:** U.S. adolescents aged 13-17 years (n=9,872) were recruited from an internet research panel to complete an online survey between 23-November and 13-December 2018. Absolute harm perceptions were assessed by asking, "How much do you think people harm themselves when they...": (i) smoke cigarettes some days but not every day; (ii) smoke cigarettes every day; (iii) use a JUUL e-cigarette on some days but not every day; and (iv) use a JUUL e-cigarette every day. Relative harm/addiction perceptions were assessed by asking, "Do you believe using a JUUL e-cigarette is less harmful/addictive, about the same, or more harmful/addictive than...? (i) smoking cigarettes; and (ii) using other types of e-cigarettes. **Results:** A significantly higher proportion of adolescents perceived daily cigarette smoking as likely to cause 'a lot of harm' compared to daily use of a JUUL e-cigarette (78.2% vs. 45.9%). Daily use of a JUUL e-cigarette and occasional cigarette smoking were equally perceived by adolescents as likely to cause 'a lot of harm' (45.9% vs. 47.9%). Approximately 1.0% and 6.1% of adolescents believed daily cigarette smoking and daily use of a JUUL e-cigarette carry no risk of harm, respectively. When comparing the two behaviors directly, 39.3% and 39.2% of adolescents perceived using a JUUL e-cigarette as likely to be less harmful and equally harmful as cigarettes, respectively. In comparison, 29.3% and 51.6% perceived using

a JUUL to be less addictive harmful and equally addictive as cigarettes, respectively. **Conclusions:** Although the impacts of long-term use of a JUUL e-cigarette are not yet known, U.S. adolescents were more likely to believe that using a JUUL e-cigarette is less harmful but equally addictive as smoking regular cigarettes, and equally likely to believe that people cause themselves a lot of harm if they use a JUUL e-cigarette every day or if they smoke cigarettes occasionally.

FUNDING: E-cigarette Alternative Industry

## POS5-22

### UPDATE ON THE ASSOCIATION BETWEEN ELECTRONIC CIGARETTE USE AND CHANGES IN QUIT ATTEMPTS, SUCCESS OF QUIT ATTEMPTS, QUIT RATES AND CIGARETTE CONSUMPTION IN ENGLAND: TIME SERIES ANALYSIS OF POPULATION TRENDS

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**Significance** To provide an update on estimates in England of how far changes in the prevalence of electronic cigarette (e-cigarette) use have been associated with changes in quit success, quit attempts, quit rates and cigarette consumption per day. **Methods** Participants came from the Smoking Toolkit Study, which involves repeated, cross sectional household surveys of individuals aged 16 years and older in England. Data were aggregated on about 1200 smokers quarterly (total n= 222,856) between 2006 and 2017. Time series analysis was used to assess the association between 1) prevalence of e-cigarette use in current smokers with a) prevalence of quit attempts among last-year smokers, b) overall quit rates among last-year smokers and c) mean cigarette consumption per day among last-year smokers and 2) prevalence of e-cigarette use during a quit attempt among last-year smokers with a) prevalence of quit success among last-year smokers and b) overall quit rates among last-year smokers. **Results** Quit rates increased by 0.054% (95%CI 0.032 to 0.076, P<0.001) and 0.050% (95%CI 0.031 to 0.069, p<0.001) for every 1% increase in the prevalence of e-cigarette use by smokers and e-cigarette use during a recent quit attempt. Prevalence of quit success increased by 0.060% (95%CI 0.043 to 0.078, P<0.001) for every 1% increase in the prevalence of e-cigarette use during a recent quit attempt. There was no clear evidence for an association between e-cigarette use and rate of quit attempts or mean cigarette consumption per day. **Conclusion** Changes in prevalence of e-cigarette use in England have been positively associated with the success rates of quit attempts and overall quit rates but are not clearly associated with average cigarette consumption and the prevalence of quit attempts.

FUNDING: Non-profit grant funding entity

## POS5-23

### RELATIVE NICOTINE EXPOSURE WITH AD LIBITUM USE OF ELECTRONIC AND COMBUSTIBLE CIGARETTES AMONG DUAL USERS

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Electronic cigarettes (ECs) may be a viable harm-reduction tool for combustible cigarette (CC) smokers. While the vast majority of EC users report using ECs as a means to quit CC use, most continue to use CCs in addition to ECs (i.e. 'dual use'). One possible reason for the poor efficacy of ECs as harm-reduction tools might be insufficient delivery of nicotine to the user. To test this possibility, nicotine exposure and subjective effects from ECs and CCs were examined in a clinical study. Thirty-six dual users completed two 48 h sessions confined to a research ward while they used their own EC or CC ad-libitum. Plasma nicotine levels were measured throughout the day during the first 24 h, while subjective effects were measured during the entire 48 h. On average, systemic exposure to nicotine was significantly less for ECs (70%) compared to CCs (F[1,35]=6.58, p=.015). Among EC device types, tank devices with adjustable voltage were associated with significantly higher average nicotine levels compared to cig-a-like and non-variable voltage type ECs. Relative nicotine exposure within-participants and between EC or CC was calculated and defined as 'nicotine titration.' Relative frequency of EC use compared to CC use during the 30 days preceding the study was significantly correlated with nicotine titration (r[36]=0.56, p<.001), such that greater ratio of EC/CC use was associated with greater relative exposure to nicotine from ECs compared to CCs. Neither withdrawal symptoms or craving was significantly associated with nicotine titration. These data suggest that many dual users are not achieving comparable nicotine exposure from their ECs relative to their CCs. This might indicate that increased nicotine





exposure from ECs may increase EC smoking cessation efficacy among dual users. The lack of significant association between nicotine titration and subjective effects - and particularly smoking withdrawal symptoms - suggests that positive reinforcement is greater for CCs vs ECs, possibly related to differences in nicotine intake.

FUNDING: Federal

## POS5-24

### INVOLVING STAKEHOLDERS IN THE DESIGN OF IDIOGRAPHIC TOBACCO RESEARCH

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**Background:** There has recently been a call for assessment approaches (e.g., ecological momentary assessment [EMA]) that yield person-specific (idiographic) information about mechanisms driving tobacco use that would allow for the tailoring of tobacco treatment. Currently, there are not clear guidelines regarding how best to construct an EMA survey for idiographic research. To address this gap, we present a method for designing idiographic studies allowing for input from multiple data sources. Specifically, we aimed to 1) review existing research to develop a list of constructs that have been linked to tobacco use, 2) examine current tobacco users' (stakeholders) thoughts and attitudes about the relevance of these constructs to their own smoking behavior, and 3) synthesize these information sources to develop survey items to be used in a future EMA study. **Methods:** We conducted a literature review regarding within-person mechanisms driving tobacco use. From these articles, we extracted a list of measured constructs and generated a list of potential survey items to be considered for study inclusion. We then conducted three focus groups to examine stakeholders' perceptions about the relevance of these items to their own smoking behavior. Focus group transcripts were coded using qualitative content analysis. Finally, we developed decisions rules for weighing data collected through the previous aims, and determined final study design. **Results:** We identified 15 constructs from the literature that were theoretically or empirically linked to the likelihood of smoking. From these constructs, we developed 39 EMA survey items to be considered by the focus groups. The focus groups yielded 7 constructs related to increased smoking and 6 related to decreased smoking. The synthesis resulted in a final survey consisting of 30 items assessing 17 constructs. **Discussion:** The present study outlines a series of steps researchers can take to improve the quality and relevance of idiographic EMA studies. The approach we suggest provides a systematic framework for making design decisions that allows for input from relevant theory, past empirical research, and stakeholder perspectives.

## POS5-25

### YOUTH MEDIA USE AND SMOKING INITIATION IN A LONGITUDINAL COHORT

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**INTRODUCTION.** Youth media use is associated with many risk behaviors, including tobacco use. However, few studies have examined changes in this association over time or explored the unique effects of different types of media. **OBJECTIVE.** Examine the impact of 4 types of media use (social media, gaming, television, and YouTube) and restrictions on media use (ability to watch R-rated movies) on smoking initiation among youth. **METHODS.** Data are from five waves of a national longitudinal in-home and online survey of U.S. youth conducted by RTI International as part of The Real Cost evaluation between 2014 and 2016. Youth indicated the time spent the previous day using each type of media. Baseline responses were recoded into a 4-level variable: no use (reference category) and tertiles for three levels of use. We used discrete-time survival analysis to analyze the risk of initiating smoking as a function of all types of media use, controlling for demographics and psychosocial characteristics. **RESULTS.** Over time, the cohort's use of YouTube and social media increased, while TV watching and gaming decreased. High levels of social media use (3<sup>rd</sup> tertile vs. no use, OR = 1.59, p<.01) and ability to watch R-rated movies ("once in a while" or more vs. never, OR 1.48, p<.01) were risk factors for smoking initiation. Moderate TV watching (2<sup>nd</sup> tertile vs. no use, OR = 0.67, p<.05) and high levels of gaming (3<sup>rd</sup> tertile vs. no use, OR =0.71, p<.05) were protective. There was no relationship of smoking initiation with YouTube use. **CONCLUSIONS.** Study results may help identify at-risk youth and suggest platforms for tobacco public education campaigns to engage with youth. Future research is warranted to understand why different types of media pose different risks, for example whether certain types of youth are drawn to specific media platforms or how media content models risky behavior.

FUNDING: Federal

## POS5-26

### CHARACTERISTICS OF ADULT WATERPIPE TOBACCO USE IN THE UNITED STATES

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**Significance:** The Tobacco Use Supplement-Current Population Survey (TUS-CPS), conducted every 3-4 years, is a key source for understanding tobacco use behavior, attitudes, and policies in the U.S. This study uses these data to understand the waterpipe use among U.S. adults. **Methods** We used the TUS-CPS dataset from 2014-2015 to estimate weighted prevalence and descriptive statistics of waterpipe smoking in comparison to other tobacco products. This dataset includes a nationally representative sample of U.S. adults ages 18+, as part of the US Census Current Population Survey. We assessed current waterpipe users (both every-day and some-day users) as well as ever waterpipe users by gender, age, race, education, region and cigarette smoking status. We then assessed use of other tobacco products (cigarettes, cigars, e-cigarettes, and smokeless) by waterpipe use category; and by cigarette smoking status (i.e. dual use or not **Results** Three percent (3.2%) of U.S. adults have ever used waterpipe, and 0.5% currently use waterpipe, with 0.02% using the product daily. Almost half of current waterpipe users (48.3%) were 18 to 24 years old; this concentration of use among the youngest age group was greater than that seen for any other tobacco product, including e-cigarettes. Current waterpipe users were more educated compared to other tobacco product users, with over 65% completing some college or more. Current waterpipe users also seemed more racially diverse than other current tobacco product users, with 71.9% identifying as white compared with 80% or greater for other forms of tobacco use. Over 50% of current waterpipe users (53.8%) reported never smoking cigarettes. **Conclusion** In 2014-2015, the majority of current waterpipe users were never cigarette smokers and were aged 18-24. These results confirm a trend that waterpipe and other non-cigarette tobacco users are characteristically different from cigarette users, and that a large group of non-cigarette tobacco users do not smoke cigarettes. Interventions for these groups, therefore, may differ than those for cigarette smokers.

FUNDING: Unfunded

## POS5-27

### REGIONAL SALES OF NATURAL AMERICAN SPIRIT CIGARETTES IN THE U.S. AND CORRELATES OF BRAND POPULARITY

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**Significance:** Amid declines in overall cigarette consumption, Natural American Spirit (NAS) cigarettes have recently grown popular in the U.S., potentially driven by the brand's use of misleading health-related descriptors such as "organic" and "natural," and environmentally-friendly images and terms. We used regional cigarette sales data to examine geographic differences in the market share of NAS and assessed associations with state-level tobacco control policies and local measures of environmental friendliness. **Methods:** We obtained 2016 data on cigarette sales in convenience, drug, grocery, and mass merchandise stores from the Nielsen Research Company in 25 of the largest U.S. market regions (each named for the region's primary city). We computed the market share of NAS (ie, total NAS packs among all cigarette packs sold) for each region as an indicator of brand popularity. Pearson correlations measured associations between regional NAS market share and: per capita cigarette consumption, state cigarette tax, and the primary city's environmental sustainability score (calculated using 26 weighted environmental metrics). **Results:** Regions with the highest NAS market share were San Francisco (7.5%), Seattle (6.1%), Denver (6%), and Los Angeles (5.2%), versus 2.1% nationally. NAS market share was negatively correlated with per capita cigarette consumption (r: -0.69, p<.001) and positively correlated with state cigarette tax (r: 0.52, p<.001). A city's sustainability score was the strongest correlate of NAS market share (r: 0.78, p<.0001). **Conclusion:** NAS is more popular in regions with stronger tobacco control policies, where tobacco consumption is lower, and in cities with a more "health conscious" culture. The brand's implicit health and environmental claims may undermine public health progress in reducing tobacco use. Regulators should protect the public from misleading claims and address consumer misperceptions about health risks.

FUNDING: Federal



## POS5-28

### SMOKERS' AND NON-SMOKERS' ASSESSMENT OF STRATEGIES TO MANAGE TOBACCO PRODUCT WASTE

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**SIGNIFICANCE:** The trillions of cigarette butts littered each year cause serious environmental damage and impose significant clean-up costs on local authorities. Tobacco companies have framed smokers as both the cause of this problem and the source of its solution. However, an extended producer responsibility perspective challenges this view and holds tobacco companies responsible for the full life-cycle costs of tobacco product waste (TPW). Although these perspectives support very different interventions, we know little about how the public perceives TPW or strategies that could address this problem. **METHODS:** We conducted an online survey of 396 New Zealand smokers and 414 non-smokers to estimate awareness of TPW, attribution of responsibility for TPW to different actors, and support for interventions designed to reduce TPW. We used descriptive analyses and logistic regression models to examine associations between demographic attributes and smoking behaviours, and perceptions of TPW and potential solutions to this problem. **RESULTS:** Few respondents saw TPW as a major threat to the environment, though most agreed butt litter was toxic to the environment and not biodegradable. Smokers and non-smokers held different views on which measures would have the greatest impact on TPW, with smokers favouring educative approaches that targeted individual smokers, such as advertising campaigns (OR 1.59 CI 1.17 - 2.15) or on-pack labelling (OR 1.93 CI 1.45 - 2.57). By contrast, non-smokers supported policy interventions that targeted tobacco companies, such as changing the product design by disallowing filters (Smokers OR .44 CI .44 - .59) or adding a levy of \$2 to fund clean-up costs (Smokers OR .49 CI .37 - .66). **CONCLUSIONS:** Increasing awareness of TPW and tobacco companies' role in creating this problem could foster support for product stewardship measures that relocate the costs of managing TPW to tobacco companies. Nonetheless, policy measures should aim to increase smoking cessation and decrease uptake, as reducing smoking prevalence presents the best long-term solution to reducing TPW.

FUNDING: Academic Institution

## POS5-29

### RESPONSE TO CALLS FROM STATE QUITLINE TO ELECTRONICALLY REFERRED MEDICAL CENTER PATIENTS

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**SIGNIFICANCE:** The New York State Smokers' Quitline (NYSSQ) provides free counseling and Nicotine Replacement Therapy (NRT) to smokers who are trying to quit. NYSSQ has proven successful with an annual reach 2.7 times higher than that of similar programs in other states. In August 2017, healthcare providers at University of Rochester Medical Center in Rochester, NY (URMC) started using the eReferral tool in the Electronic Health Record (EHR) to refer patients using tobacco to the NYSSQ. The success of reach to these patients was evaluated. **Methods:** NYSSQ data from URMC eReferrals were collected from October 2017 to November 2018. A descriptive analysis of the response rate included the number of patients reached, the outcome of the attempts made, quit status, and NRT eligibility. **Results:** Of the 497 patients for whom calls were attempted, the mean age was 53 years (range, 20 - 80). Final disposition data were available for 309 (62.2%) patients; the remainder were still in progress. Overall, 193/309 (62.5%) were reached, 116 (37.5%) completed Quit Coach counseling, and 77 (24.9%) declined cessation services. Of the 116 who completed counseling, 75.9% had chosen a quit date, 7.8% had not and declined further services, 13.8% were not ready to quit, and only 2.6% had already quit. Of those who completed counseling, 69.8% were eligible for and received a free 2-week supply of NRT. The remaining 30.2% were ineligible for free NRT, as they were either already using NRT or had not chosen a quit date. **Conclusion:** About two-thirds of patients referred through the EHR were reached by the NYSSQ, demonstrating improvements in reach and utilization. Over one third completed Quit Coach counseling and nearly 70% of these received free NRT. Identify methods to improve the reach and utilization of quitlines is beneficial in providing more smokers with NRT and counseling.

FUNDING: State

## POS5-30

### ARE TOBACCO 21 POLICIES ASSOCIATED WITH CHANGES IN TOBACCO PREVALENCE AMONG 18-20 YEAR OLDS? A MULTI-STATE EVALUATION USING BRFS 2013-2017

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**SIGNIFICANCE:** In January 2016, Hawaii was the first state in the US to increase the age to purchase tobacco (including e-cigarettes) from 18 to 21 through a policy called 'Tobacco 21'. Six months later California implemented a similar policy. This analysis examines the association between the implementation of Tobacco 21 policies and the change in state prevalence of tobacco use among 18-20 year olds. **Methods:** Using the 2013-2017 Behavioral Risk Factor Surveillance System, a difference-in-difference approach was used to compare the change in the prevalence of current cigarette smoking among 18-20 year olds before the policy (2013-2015) to the first (2016) and 2<sup>nd</sup> (2017) year of policy implementation in Hawaii and California; two Western states without policies (Washington and Utah) were compared for reference. The prevalence of current e-cigarette use was also examined as an outcome, but 2016 was compared with 2017 because of data availability. Logistic regression models adjusted for race, gender, education, and health care were used to obtain difference-in-difference estimates. Analysis was limited to adults 18-20 who were not missing age or smoking status (n=7,361). **Results:** In California, there was a decrease in smoking prevalence (8.9% in 2013-2015; 6.8% in 2016; and 3.1% 2017), and the decrease from 2013-2015 to 2017 was 54% lower than the decrease in the reference states (p=0.05). In Hawaii, there was also a decrease in smoking prevalence (8.2% in 2013-2015; 7.8% in 2016; 5.9% in 2017), but the decrease was not statistically different than the reference states. In California, there was a decrease in current e-cigarette use (10.2% in 2016 to 6.6% in 2017), but this decrease was not statistically different than the decrease in the reference states (14.6% to 13.0%; p=0.49). **Conclusion:** From 2013-2017, there was a decline in the prevalence of tobacco use among 18-20 year olds in California, Hawaii, and the reference states, but only the change in smoking prevalence in California was nearly statistically lower than the reference states. These results suggest a decrease in smoking prevalence in California one year after the implementation of the Tobacco 21 policy.

FUNDING: Federal

## POS5-31

### THE IMPACT OF INITIAL SUBJECTIVE RESPONSES TO ELECTRONIC CIGARETTES ON CIGARETTE SUBSTITUTION AND ELECTRONIC CIGARETTE USE

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**SIGNIFICANCE:** Over the past few years, the use of electronic cigarettes (ECs) has increased in adult cigarette smokers. While dual use of cigarettes and ECs has been a method for many to reduce cigarette consumption, only complete substitution of cigarettes with ECs leads to substantial decrease in carcinogen and toxicant exposure. Understanding the factors that affect one's ability to completely substitute traditional cigarettes with ECs is important in decreasing tobacco-related harm. Therefore, this study examined whether a cigarette smoker's initial subjective response to ECs impact EC use and successful switching behavior 8 weeks later. **METHODS:** Adult cigarette smokers (N=58) uninterested in quitting were asked to completely substitute their cigarette smoking with an EC (Vuse V2) for 8 weeks. At week 1, following EC trial period, subjective responses were measured, including satisfaction, psychological reward, sensory enjoyment using the modified Cigarette Evaluation Questionnaire geared toward assessment of EC and a perceived health risk scale. A Poisson regression examined whether these initial subjective responses predicted cigarettes per day, EC use, and number of smoke-free days measured between weeks six and 8. **RESULTS:** Perceived addiction risk of ECs led to significant increases in cigarettes per day at week 8, with a ratio of 1.14 (95% CI 1.02, 1.27; p=0.025). EC satisfaction at week 1 led to significant increases in EC use at week 8, with a ratio of 1.32 (95% CI 1.01, 1.42; p=0.042). No predictor variable significantly predicted number of smoke free days. **CONCLUSIONS:** While initial subjective responses to ECs predicted cigarettes per day and EC use 6-8 weeks later, these measures were not able to predict effective cigarette substitution using a measure of smoke-free days. This suggests that other variables (e.g. education on ECs, previous use of ECs, social aspects of ECs) may be dictating how well an individual is able to substitute cigarettes with ECs.

FUNDING: Federal



## POS5-32

### TOBACCO USE BEHAVIORS, ATTITUDES, DEMOGRAPHIC CHARACTERISTICS OF TOBACCO OPINION LEADERS AND THEIR FOLLOWERS ON TWITTER

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**Background:** Tobacco-related content on social media is generated and propagated by online opinion leaders, who disseminate messages to their followers. Opinion leaders can exert powerful influences on their followers' knowledge, attitudes, and behaviors, yet little is known about the demographic characteristics and tobacco use behavior of online tobacco opinion leaders and their followers, compared with the general Twitter population. **Objective:** We hypothesized that opinion leaders would use more tobacco products and have higher nicotine dependence than the other two groups, and that followers would be more likely to be in demographic groups that are vulnerable to tobacco marketing influence (e.g., young adults, racial/ethnic minorities). We also explore reasons for tobacco product use among opinion leaders, followers and general Twitter users. **Methods:** We constructed the social networks of people who tweet about tobacco and categorized them using a combination of social network and Twitter metrics. To understand the characteristics of tobacco opinion leaders and their followers, we conducted a survey of tobacco opinion leaders, their followers, and general Twitter users. The sample included 347 opinion leaders, 567 followers, and 519 general users. The opinion leaders had a median of 1000 followers, whereas followers and general users had fewer than 600. **Results:** Opinion leaders were more likely than their followers to report past-month use of tobacco products; followers, in turn, were more likely to report past-month use of these products than general Twitter users. The followers appeared to be an especially vulnerable group; they tended to be younger (mean age=22.4 years) and have lower education compared with the opinion leaders and the general users. Differences in followers, opinion leaders, and general users' reasons for tobacco use and nicotine dependence are also reported. **Conclusions:** Followers of Twitter tobacco opinion leaders are a vulnerable group that might benefit from anti-tobacco education to counter the pro-tobacco communications they see on social media.

## POS5-33

### QUALITY IMPROVEMENT TO INCREASE NURSE DRIVEN TOBACCO USE TREATMENT DELIVERY TO CARDIOVASCULAR INPATIENTS

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**Significance** Hospitalization is a prime opportunity to treat tobacco dependence because patients are often more motivated to quit after life-threatening medical events. Continued tobacco use in patients with cardiovascular (CV) diseases is correlated with increased risk of readmission, worse surgical outcomes, and increased risk of heart attacks. Current practice suggests that gaps still exist in delivery of evidenced-based care to CV inpatients who use tobacco. In 2016, only 28.6% of patients with a positive tobacco use status admitted to CV units at a large academic medical center were referred for inpatient counseling. **Methods** An interdisciplinary Spread of Innovation Project driven by Registered Nurses (RN) and the Inpatient Tobacco Treatment Program (TTP) at UNC was initiated to increase evidence-based tobacco treatment delivery by increasing the number of patients counseled. Other goals included increasing utilization of Nicotine Replacement Therapy (NRT) during hospitalization and NRT prescription rates at discharge. Phase 1 began in March 2016 and involved implementation of the following four quality improvement (QI) tools across 5 CV units: 1) A TTP flyer was displayed on CV units; 2) A QI team presented on referral processes at RN staff meetings; 3) TTP referral reminders were placed on RN computers; and 4) TTP referral reminders were sent in weekly staff updates. In January 2018, Phase 2 of the project began with development of a report informing RNs of the status of TTP referrals and NRT orders for eligible patients. In addition, units kept NRT stocked in medication dispensers to increase ease and frequency of medication administration. **Results** One year after Phase 1 began, an 80% increase (from 28.6% to 51.4%) occurred over baseline in eligible patients referred for counseling. A 22% increase occurred in NRT ordered during hospitalization and at discharge. Both changes were maintained over time. Phase 2 caused an additional 60% increase (from 49.5% six months before to 79.1% six months after phase 2 implementation) in eligible patients referred for counseling but no change in NRT prescription rates. **Conclusion** Collaborating with RNs and utilizing QI tools to streamline referral processes and improve visibility of services offered increases the number of tobacco treatment referrals. Dissemination of this intervention in the inpa-

tient setting increases reach to high-risk populations, allowing more patients to access evidence-based treatment and pharmacotherapy, which significantly increases chances of becoming tobacco free.

**FUNDING:** Academic Institution

## POS5-34

### BURDEN OF DEATHS ATTRIBUTABLE TO TOBACCO IN NORTH AFRICAN REGION

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**Significance:** The global burden of deaths attributable to tobacco amounts to around 7.1 million with 17% of all deaths in males and 8% of deaths in females were attributable to tobacco in 2016. Percentages of deaths attributable to tobacco (PDATs) differ widely between regions and countries. Tobacco smoking prevalence remains low in many African countries. However, growing economies and the increased presence of multinational tobacco companies in the African Region have the potential to contribute to increasing tobacco use rates in the future. The main objective is to examine describe the mortality attributable to tobacco and its impact on premature deaths in the North African Region. **Methods:** Estimates of age standardized percentages of deaths attributable to tobacco (PDATs) in 2016, by sex, country and cause of death were retrieved from the database of Global Burden of Diseases Study (GDB) 2016 by using the *GBD Compare tool* that is available on the website of *The Institute for Health Metrics and Evaluation (IHME)*. 05 countries are included in this study (Algeria, Lybia, Morocco, Tunisia and Mauritania). **Results:** Within the non communicable disease group, ischemic heart disease accounted for 112, 267, 285, 394 and 269 deaths per 100.000 population aged 30 years and over, for respectively Algeria, Tunisia, Morocco, Mauritania and Libya with 8%, 6%, 8%, 7% and 8% of these deaths attributed to tobacco. Cancer of the trachea bronchus and lung (TBL) accounted for 25, 22, 20, 16 and 15 deaths per 100.000 respectively in Algeria, Tunisia, Morocco, Mauritania and Libya. **Conclusion:** Among those who died prematurely, almost one in every 12 deaths among those aged 30-44 and one in 10 among those aged 45-59 years were attributable to tobacco use. Of those who died in the 45-59 year age, tobacco use accounted for 8,1% of those whose death was due to a lower respiratory infection; 16,7% of deaths due to the category of all cardiovascular diseases combined and 61,3% of those who had died from cancer of Trachea, bronchus and lung.

## POS5-35

### LUNG CANCER SURVIVAL IN 6 ARAB COUNTRIES, 2000-2014: FINDING FROM THE CONCORD3

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**Background:** Lung cancer is the most common cancer in men and the third most common in women. Tobacco smoking, including second-hand smoke, is the predominant cause of lung cancer worldwide. Screening for lung cancer is under development. It is one of the most aggressive human cancers, with a 5-year overall survival of 10-15%. Our aim objective is to describe lung cancer survival in Arab countries from the recent worldwide cancer survival study published in the Lancet 2018. **Materials and Methods:** CONCORD-3 includes individual records for 37.5 million patients diagnosed with cancer during the 15-year period 2000-14. Data were provided by 322 population-based cancer registries in 71 countries and territories. Individual lung tumour records were submitted by 07 population-based cancer registries in 06 Arab countries (Algeria, Lybia, Tunisia, Jordan, Saudi Arabia and Qatar) for 60.208 adults (15-99 years) diagnosed during 2000-14 and followed up to 31 December 2014. Estimated five-year net survival, adjusted for background mortality by single year of age, sex, calendar year in each country. **Results:** Age standardised five year net survival was generally low in the range 10-20% for most geographical areas both in the developed and developing world. Survival was very low less than 10% (only 02% in Lybia). **Conclusion:** Surveillance of cancer survival is seen as important by national and international agencies, cancer patient advocacy groups, departments of health and research agencies. Cancer survival research is being used to formulate cancer control strategies to prioritise cancer control measures and to evaluate both the effectiveness and cost-effectiveness of those strategies.



## POS5-36

### DELIVERING A LUNCH TRUCK SMOKING CESSATION INTERVENTION AT THE CONSTRUCTION WORKSITE: PERSPECTIVES FROM CONSTRUCTION COMPANY SENIOR SAFETY LEADERSHIP

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**Significance:** The work environment is a useful setting to provide smoking cessation services to construction workers who are known to have the highest smoking prevalence among all U.S. workers. Despite employer interest in improving their workers' health and enforcing anti-smoking workplace policies, little is known about construction firms' interest in delivering workplace smoking cessation services. This study explores the perspectives of leadership and management at construction firms on supporting the implementation of smoking cessation programs at construction workplace. **Methods:** Process evaluation data collected August to October 2018 as part of a workplace-based smoking cessation intervention trial targeting Hispanic construction worker were analyzed. Senior leadership and safety managers were interviewed individually using semi-structured interview scripts assessing topics on implementing worksite-based smoking cessation programs, recommendations to improve program delivery, and real-world worksite implementation facilitators and barriers. A qualitative interpretative approach was taken, combining thematic analysis with constant comparison. **Results:** Fourteen senior leaders and safety managers were interviewed. Mean years employed in construction was 14.5 ± 10.5 years, 57.1% identified as Hispanic, 85.7% Caucasian, and 14.3% as current smokers. They represented seven nationally operating construction firms of which 14.3% were unionized, 21.4% publicly traded, and 42.9% provided daily safety training and quarterly health promotion activities to their workers. The thematic analysis identified three major themes: 1) leadership desire for flexibility in scaling worksite smoking cessation programs; 2) training on-site safety managers to support smoking cessation program delivery; and 3) engaging construction firm top leadership in delivery of health promotion programs. **Conclusion:** Construction firm leadership seeks flexible and scalable smoking cessation interventions that include safety managers as part of the program. Top leadership and senior safety managers should be included in the design and delivery of the smoking cessation intervention.

FUNDING: Federal; Academic Institution

## POS5-37

### THE EFFECTIVENESS OF REMOTE-DELIVERED INTERVENTIONS FOR SMOKING CESSATION AMONG CANCER SURVIVORS: A META-ANALYSIS

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**SIGNIFICANCE** Tobacco and alcohol use contribute to cancer recurrence and second cancers, cancer mortality and iatrogenic effects of treatment. This review evaluates current evidence for the effectiveness of remote-delivered interventions to support smoking cessation (SC) or alcohol use moderation (AM) among cancer survivors. Secondary, differences in effectiveness are explored regarding multi-behaviour interventions versus single-behaviour interventions targeting SC or AM only. **METHODS** A systematic search of PubMed, PsycINFO, Web of Science, EMBASE, CINAHL and Cochrane Central Register of Controlled Trials up to 8 November 2018 was conducted. Cohort studies with and without control groups, and randomised controlled trials were included and RCTs were assessed for risk of bias according to the Cochrane Risk of Bias 2.0 tool. Random effects meta-analyses were conducted for the main outcomes: rates of SC and AM at the follow-up closest to 6 months after baseline. Using subgroup-analyses and meta-regression, effectiveness of single-behaviour versus multi-behaviour interventions was evaluated. **RESULTS** We included a total of 17 studies with 3,796 participants; 9 studies on SC only, 8 studies on multi-behaviour interventions including an SC or AM module, and no studies on AM only. At least some concerns regarding bias were identified for all included studies. Remote-delivered SC interventions led to significantly higher cessation rates than control conditions (10 studies, OR=1.56, 95%CI 1.13-

2.15,  $p=.007$ ). Single-behaviour SC interventions reduced smoking rates compared to baseline (RD=0.29 95%CI 0.19-0.39,  $p<.0001$ ). No evidence was found for the effect of multi-behaviour interventions on SC (RD=0.13 95%CI -0.05-0.31,  $p=.15$ ). **CONCLUSIONS** Remote-delivered SC interventions are effective in supporting SC among cancer survivors. Single-behaviour SC interventions are more effective than multi-behaviour interventions. Trial registration: PROSPERO identifier CRD42017074567 on 31 October 2017. **Funding** The current study is supported by grant #TBOS2014-7169 from the Dutch Cancer Society (KWF Kankerbestrijding). The sponsor has no role in the design, data collection, analysis and interpretation of the data, nor in writing the article or the decision to submit for publication.

FUNDING: Non-profit grant funding entity

## POS5-38

### CURRENT JUUL USE IS 28% IN A 2018 SAMPLE OF YOUNG ADULTS

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JUUL is a newer generation electronic nicotine delivery systems (ENDS) device that has recently come to dominate the electronic cigarette market, resembles a flash drive that can be recharged via USB, and has prefilled e-liquid pods that contain a very high nicotine content. While empirical research is limited, in non-random samples of teenagers and young adults, 30-day usage rates of JUUL was reported to be 8% in 2017 (Willett et al., 2018) and 9.2% in 2018 (McKelvey, Baiocchi, & Halpern-Felsher, 2018). The purpose of the current study was to examine young adult awareness of JUUL and 30-day prevalence of use. The cross-sectional convenience sample gathered in 2018 included 1,268 young adults (median age 18; 79.3% female; 57.7% Non-Hispanic White) from a university in the southwest region of the United States. The online survey asked about knowledge/awareness of JUUL, 30-day use of JUUL, and 30-day conventional tobacco cigarette (CTC) use. Overall, 86.9% of participants had ever heard of JUUL and 28.1% has used a JUUL in the past 30-days. CTC 30-day use was 3.6%. Predictors of JUUL 30-day use were examined in a hierarchical multiple regression analysis, entering sociodemographic variables including sex, age, and race/ethnicity (White/Non-Hispanic vs. all others) in block one and CTC 30-day use in block two. Non-Hispanic White participants were significantly more likely to have used JUUL in the past 30-days ( $X^2(1) = 11.36, p = .001, OR = 1.61, CI: [1.22 - 2.12]$ ). Further, 30-day CTC use was also a significant predictor ( $X^2(1) = 23.51, p < .001, OR = 5.12, CI: [2.65 - 9.90]$ ). Data from the current study is alarming in that 30-day JUUL use was over three times higher than that noted in prior studies with data from 2017 and 2018 (McKelvey et al., 2018; Willett et al., 2018). Also, the vast majority of the sample were aware of JUUL, which is much higher than noted in previous studies. Based on this data, it appears that use of Juul in young adults has increased over a very short period of time and ongoing monitoring is definitely warranted.

## POS5-39

### CHARACTERISTICS OF REUSING CIGARETTES AMONG SOCIOECONOMICALLY DISADVANTAGED SMOKERS WITH MOOD DISORDERS RECEIVING OUTPATIENT PSYCHIATRIC TREATMENT

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**Significance:** Smoking (reusing) used cigarettes has additional health risks (e.g. higher exposure to toxins) compared to smoking new cigarettes, but it is an understudied topic. Understanding factors related to reusing cigarettes and its impact on smoking behavior is important especially among high risk populations. **Methods:** This study used data from a randomized clinical trial examining a mindfulness smartphone-based smoking cessation intervention. Participants included 49 adult daily smokers with mood disorders receiving outpatient psychiatric treatment. Of the 49 participants, 28 (57.1%) were racial minorities, 31 (63.3%) were Hispanic, and 18 (37.5%) had less than high school education. All participants reported household incomes of less than \$49,999, 37 (75.5%) reported less than \$25,000, and 23 (46.9%) were on disability. **Results:** At baseline, 27 (55.1%) participants reported reusing a single cigarette multiple times ( $M=2.1, SD=0.97$ ) over the course of a day. Among those "reusers," 51.9%, 51.9%, and 77.8% continued to reuse cigarettes at 2-week, 4-week, and 3-month follow-ups, respectively. Rates of reusing cigarettes among non-reusers at baseline increased over time (18.2%, 22.7%, and 27.3%) after target quit date. A logistic regression model showed that education was associated with cigarette reuse: those with high school degree or higher (vs. less than high school education) were less likely to be reusers ( $p = 0.040$ ). While Fagerström Test for Cigarette Dependence [FTCD] ( $M=4.84$ ) did not predict smoking outcomes, replacing number of cigarettes per day (CPD) with frequency (number) of smoking per



day for FTCD score ( $M = 5.16$ ) predicted smoking abstinence at 3-month follow-up ( $p = 0.037$ ). Reusers, compared to non-reusers, at baseline were more likely to have greater CPD post-quit ( $p = 0.042$ ), controlling for treatment condition, time, and baseline CPD. **Conclusions:** Over one half of these high risk smokers were reusers, and some became reusers in a quit attempt. The results suggest that frequency of smoking (vs. number of cigarettes) may reflect more accurate dependence, and therefore assessing cigarette reuse is important in the future studies.

## POS5-40

### PHASE I STUDY ASSESSING SAFETY AND EFFICACY OF NFL 101 AS TOBACCO CESSATION THERAPY

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**Background:** Long-term smoking cessation has been observed in thousands of patients when Target Quit Date (TQD) took place concomitantly with 1 or 2 subcutaneous injections of a desensitization treatment against tobacco allergy. Based on these observations, NFL Biosciences developed a drug candidate (NFL-101) for tobacco cessation, consisting of a nicotine-free extract of tobacco proteins. The objective of this phase I study was to assess safety, effect description and efficacy of NFL-101. **Methods:** Twenty-four participants were recruited in two waves from 05/15 to 02/16 at the Montpellier Cancer Institute (MCI) in France and followed for 1 year. The first 12 were recruited under the MCI and were not highly motivated to quit, while the following 12 were recruited through press advertisements and more motivated to quit. Half of participants in each wave received 100µg of NFL-101 at day 1 and day 29 and half received 200µg. Participants were asked to quit when they felt ready, i.e. not concomitantly with the injections. Main outcomes were toxicity, effect description and continuous abstinence validated by exhaled CO. **Results:** Mean age of participants was 47.9 (SD 10.9), 41.7% were women and mean Fagerström score for Nicotine Dependence was 6.25 (SD 1.5). No serious adverse events were reported. Wave 1: 3 participants did a quit attempt between day 1 and day 36 (recruitment failure for efficacy). Wave 2: 9 participants did a quit attempt, 5 were continuous abstinent between day 36 and week 12, 3 between day 36 and week 52 and 11 had reduced their consumption by more than half between day 36 and week 12. All 24 participants felt an effect lasting a week after each injection with a peak at days 3-4. They described "less desire to smoke", "a cigarette disgust", "to be unable to smoke cigarettes until the end" and "a lack of need". No significant differences were observed between the 2 doses. **Conclusions:** NFL-101 appears to work by reducing cigarette appetite immediately and over a week. This Phase I served to design a placebo-controlled trial in patients receiving two injections of NFL-101, alone or on top of a nicotine patch, one week apart and concomitantly with their TQD in order to ease early quit success.

**FUNDING:** Other

## POS5-41

### DOES E-CIGARETTE USE IN NON-SMOKING YOUNG PEOPLE ACT AS A GATEWAY TO SMOKING? A SYSTEMATIC REVIEW AND META-ANALYSIS

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**Significance:** Current evidence suggests that e-cigarette use is far less harmful than smoking, however, there are concerns that e-cigarettes may act as a gateway to smoking cigarettes among young people. The aim of this review was to investigate whether e-cigarette use compared to non-use in young non-smokers is associated with subsequent cigarette smoking. **Methods:** We conducted a systematic review using PubMed, Embase, Web of Science, and Wiley Cochrane Library databases, and the 2018 Society for Research on Nicotine and Tobacco, and Society for Behavioural Medicine conference abstracts. All studies of young people (up to 30 years) with a measure of e-cigarette use prior to smoking (exposure) and an outcome measure of smoking for which an odds ratio could be calculated were included. Reviews and animal studies were excluded. **Results:** Of 9,199 results from the search (after duplicates were removed) 14 studies were included in the meta-analysis. There was strong evidence for an association between e-cigarette use among non-smokers and later smoking (odds ratio [OR] = 4.74, 95% confidence interval [95%CI] 4.38 to 5.13) when the results were meta-analysed in a random effects model. However, there was high heterogeneity ( $I^2 = 89%$ ). **Conclusion:** Although there was high heterogeneity between studies, the meta-analysed results suggest that e-cigarette use among non-smoking young people

is strongly associated with later smoking. Whilst the association between e-cigarette use among non-smokers and subsequent smoking is strong, the available evidence is limited by the reliance on self-report measures of smoking history without biochemical verification. Additionally, none of the studies included negative controls which would provide stronger evidence for whether the association may be causal. Much of the evidence also failed to measure and take into account the nicotine content of the e-liquids used by non-smokers meaning no conclusions can be made regarding nicotine as a possible mechanism driving this association.

**FUNDING:** Academic Institution

## POS5-42

### A CONTENT ANALYSIS OF QR CODE-DIRECTED WEBSITES MARKETED ON CIGARETTE PACKS IN CHINA

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**Significance:** Worldwide, China is home to the largest population of smokers and is responsible for producing the most cigarettes. Quick Response codes, commonly known as "QR" codes, are used widely in China: for mobile payment, marketing, public transportation, and various other applications. In this study we examined the content of QR code-directed websites on cigarette packs collected in China. **Methods:** In February 2017, unique cigarette packs were collected from Beijing, Guangzhou, Shanghai, Kunming, and Chengdu using a systematic protocol. Cigarette packs were initially coded by two independent coders for presence of QR codes on packaging. 115 packs containing QR codes were scanned using the WeChat app and then websites were double coded for required verification, the type, age- and health-related statements, engagement strategies, and marketing appeals. Unique websites were identified based on website content. **Results:** From the 739 unique cigarette packs, 115 packs (15.6%) had a QR code on the packaging. Of the 115 QR codes, there were 25 (21.7%) unique websites, but due to a legal statement for one site, 24 websites were analyzed. Of the 24, 19 (79.2%) led to brand-specific websites and 5 (20.8%) led to social media websites. Only 3 (12.5%) websites had age-restricted site access. 14 websites (58.3%) had other required verification such as phone number, location service enablement, and permission to view WeChat profile. Only 7 (29.2%) websites had any mention of health-related risks associated with product usage. For engagement strategies, 6 (25%) had a prompt to follow on social media, 9 (37.5%) had product authenticity verification, 7 (29.2%) had contests and giveaways, and 4 (16.7%) had advertisements for new or existing products. For marketing appeals, 3 (12.5%) had youth appeals and 13 (54.2%) had national appeals. **Conclusion:** The tobacco industry in China uses QR codes on cigarette packaging for marketing purposes such as social media recruitment, contests and giveaways, and product advertisement. It is important to understand where packs send consumers online and what messages they receive, and to consider QR codes on packaging when drafting policy.

**FUNDING:** Non-profit grant funding entity

## POS5-43

### NEGATIVE URGENCY AND AD LIBITUM SMOKING TOPOGRAPHY

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**Introduction:** Negative urgency (NU), the tendency to act rashly in response to acute changes in distress, is associated with negative reinforcing smoking expectancies. The current study aimed to evaluate the role of NU in terms of behavioral smoking reinforcement, and the contextual role of acute distress. **Method:** Adult non-treatment seeking daily smokers ( $n=124$ ) completed an ad-libitum outdoor smoking trial. Puff topography included puff volume, duration, velocity, and inter-puff interval, which were averaged across the cigarette and evaluated at the puff-to-puff level. NU was assessed with the Urgency, Premeditation, Perseverance, and Sensation Seeking Impulsive Behavior (UPPS) scale, and pre-smoking momentary subjective distress was self-reported using the Subjective Units of Distress scale (SUDs). **Results:** Multi-level models revealed a significant interaction of NU and SUDs over the course of smoking in terms of puff duration and inter-puff interval. There was a significant effect of quadratic time x NU x SUDs on puff duration ( $b=-0.00004$ ,  $p=0.04$ ). Among smokers with low NU, puff du-



rations gradually decreased over the course of a cigarette, which occurred at a faster rate of decline in the context of low versus high distress states. In contrast, persistently elevated puff durations were observed over the course of a cigarette among smokers with elevated NU, regardless of acute distress. There was also a significant linear time x NU x SUDs interaction on inter-puff interval ( $b=-0.01$ ,  $p=0.04$ ). Smokers with low NU, regardless of acute distress, exhibited initially increasing inter-puff intervals that gradually stabilized over the course of a cigarette. A similar pattern of inter-puff intervals was observed among smokers with higher self-reported NU in the context of low distress. In contrast, in the context of high distress, smokers with elevated NU demonstrated a faster rate of increasing inter-puff intervals, which was then followed by decreasing inter-puff intervals over the course of smoking. **Discussion:** Findings suggest that trait NU in the context of subjective distress may contribute to differences in puff topography, a behavioral index of reinforcement smoking.

## POS5-44

### LOWER SMOKING RATES AND IMPROVED SMOKING RELATED PERCEPTIONS ONE YEAR AFTER COMPREHENSIVE TOBACCO CONTROL MEASURES IN FRANCE

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**Significance** France has high smoking rates, and recently intensified tobacco control policies that were spearheaded by the introduction of plain tobacco packaging (PP). We examined changes in smoking-related perceptions and behaviours before (2016) and one year after (2017) the introduction of PP. **Methods** DePICT (*Description des Perceptions, Images, et Comportements liés au Tabagisme*) is a two waves cross-sectional national telephone survey among residents of Metropolitan France. At each wave, approximately 2000 adolescents (12-17 years) and 4000 adults (18-64 years) were recruited. Data were weighted to be representative of the French population. Adjusted prevalence ratios (PR (95% CI)) estimating changes between the two study waves were calculated using multivariate Log-Binomial regression models. **Results** In 2017, as compared with 2016, smoking rates decreased in France among adults (PR=0.94 (0.89 to 1.00)). Further, French adults were more likely to report fear of the consequences of smoking (PR=1.09 (1.06 to 1.13)) and that smoking is dangerous (PR=1.08 (1.06 to 1.11)). Among adolescents, fear of the consequences of smoking (PR=1.06 (1.02 to 1.09)), and perceived harmfulness of smoking (PR=1.08 (1.05 to 1.11)) increased in 2017 compared to 2016. Smoking initiation also significantly decreased (PR=0.96 (0.93 to 0.98)) in 2017 compared to the year before. **Conclusions** Our findings provide early and encouraging results on potential effect of tobacco control strategies in France, and especially PP.

FUNDING: State

## POS5-45

### PRENATAL POLYSUBSTANCE USE AMONG WOMEN WHO REPORT SMOKING CIGARETTES IN THE MONTH PRIOR TO PREGNANCY

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**Significance** Cigarette smoking prior to pregnancy is often a predictor for continued smoking during pregnancy. The negative maternal and neonatal health implications of smoking during pregnancy have been well-established; however, recent studies suggest that women who stop smoking during pregnancy may continue use of other substances that are perceived as less risky or may continue smoking while using multiple other substances that may have additive or multiplicative negative health effects. It is important to understand how cigarette smoking is associated with use of other substances during pregnancy, including alcohol, cannabis, and prescription pain medications. **Methods** A convenience sample of 500 pregnant women was recruited from two urban prenatal clinical settings between January 2017 and January 2018. Participants completed the 4P's Plus screener, which inquired about substance use in the month prior to pregnancy and in the past month. Participants who self-reported smoking any cigarettes in the month prior to pregnancy were further assessed to determine past-month use of other substances. Descriptive analyses were conducted to examine prenatal polysubstance use and frequency of prenatal use in the past month. **Results** A total of 140 pregnant women reported smoking cigarettes in the month prior to pregnancy, with 84 continuing to smoke during pregnancy and 56 recently quit. Average age was 27.5 (SD: 4.7) years; 29%, 40% and 31% were 1<sup>st</sup>, 2<sup>nd</sup> and 3<sup>rd</sup> trimesters respectively. Past month alcohol use [21.4% v 14.3%,  $p=0.44$ ] and prescription drug use [7.1% v 1.8%,  $p=0.48$ ] were not significantly different between recent quitters and continued smokers. Prenatal cannabis

use was significantly less common among recent quitters than continued smokers [53.6% v 14.3%,  $p < 0.0001$ ]. **Conclusion** Pregnant women who continue to smoke tobacco cigarettes during pregnancy are significantly more likely to also use cannabis during pregnancy. This indicates that it is important to screen all women, particularly those who smoke tobacco, for cannabis use in pregnancy and to counsel about the potential negative, additive effects on neonatal outcomes.

FUNDING: Federal

## POS5-46

### QUIT RATIOS ASSOCIATED WITH SMOKING CESSATION AIDS AND E-CIGARETTES USE AMONG A LARGE ONLINE SAMPLE OF SOUTH AFRICAN EVER SMOKERS, 2018

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**Significance:** Since their debut in South Africa in 2008, e-cigarettes sales have dramatically increased, with a 47.7% volume growth projected between 2016 and 2021. While the South African Medicines Act only permits e-cigarettes to be sold at a pharmacy store with a doctor's prescription, e-cigarettes can still be accessed in retail stores and are often targeted at smokers as cessation aids despite insufficient evidence. This study assessed effectiveness of e-cigarettes and approved cessation aids among South African ever smokers during 2018. **Methods:** Data was obtained from an Internet survey of South African adults aged  $\geq 18$  (N= 18,208; 50.5% Male) fielded in July 2018. Attitudes and behaviors towards e-cigarettes were assessed. Among ever smokers, self-reported quitting was regressed against e-cigarettes ever use, adjusting for ever use of cessation aid(s), socio- and psychographic characteristics. **Results:** Ever-use prevalence was 62.5% for cigarettes, 35.6% for e-cigarettes and 18.1% for approved cessation aids. Current regular-use was 32.0% (n=5821) and 5.8% (n=1056) for cigarettes and e-cigarettes respectively. Furthermore, 9% and 7.9% of ex-smokers and current regular smokers respectively, regularly use e-cigarettes. Among ever smokers, awareness of e-cigarettes (95.4%) was higher than for cessation medication (77.8%) or available counseling programmes (59.2%). Many smokers believed e-cigarettes could help them quit (30.7%) or cut down (44%). Only 27.1% opposed regulating e-cigarettes same way as ordinary cigarettes. Among ever cigarette smokers, compared to never e-cigarettes users, the odds of successfully quitting was lower for past regularly e-cigarettes users (AOR=0.57; 95%CI=0.49-0.65); and not significantly different for current regular e-cigarettes user (AOR=0.87; 95%CI=0.75-1.01). However, pharmacotherapy (AOR=1.36; 95%CI=1.18-1.58) and counseling with or without pharmacotherapy (AOR=1.47; 95%CI=1.20-1.80) was associated with higher odds of successfully quitting. Of e-cigarettes users, 23% had ever used cessation medication and/or counseling. **Conclusions:** E-cigarette use was not associated with successful quitting. Furthermore, about a quarter of e-cigarette users reported using another cessation aid, suggesting that any putative cessation among e-cigarette users may not be entirely attributable to e-cigarettes alone. Within the study's limitations, these findings support the implementation of the proposed *Control of Tobacco and Electronic Delivery System Bill* in South Africa.

FUNDING: Non-profit grant funding entity

## POS5-47

### ADOLESCENTS' EXPOSURE TO TOBACCO RELATED ADVERTISEMENTS AND WARNING MESSAGES BY PLATFORM

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**Objectives:** To (1) identify specific venues where adolescents are being exposed to advertisements for and messages about harms of conventional cigarettes, e-cigarettes, cigars, smokeless tobacco and hookahs across different platforms (i.e., Internet, broadcast, print, and point-of-sale), (2) examine differences in exposure between users and non-users, age, and sex. **Methods:** Participants (N=786) were recruited directly from classrooms from 10 public high schools in Northern and Southern California to participate in an ongoing study evaluating marketing, messaging, tobacco perceptions, and tobacco use. **Results:** While most adolescents reported seeing ads across the sites, 68% reported seeing ads for e-cigarettes, 50% reported seeing ads for chewing/dip tobacco or moist snuff, 68% reported seeing ads for cigarettes and 50% reported seeing ads for Hookah. Among those adolescents seeing e-cigarette ads, 24% were seen on YouTube, followed by 18% on Instagram; fewer reported seeing ads on other Internet sites. Among those seeing ads for chewing/dip tobacco/moist snuff, 13% were seen on blogs, 13% on YouTube. Among those adolescents seeing ads for cigarettes,



23% were seen on YouTube followed by 18% on Instagram. Among those adolescents seeing ads for cigars/cigarillos, 15% were on YouTube and 13% on Blogs. Among those adolescents seeing ads for Hookah, 26% on Instagram and 16% on both YouTube and Twitter. For ads, the most common exposure was point of sale for all the products, and the lowest was broadcast. Reported exposure to ads and warning labels did not differ between users and non-users. For warnings, the most common exposure channel was the Internet, and the lowest was point of sale or broadcast (for hookah only). For ever cigarette users, they were less likely to have seen any cigarette ads. For hookah users, users were more likely to have seen an ad for hookah ads, and more likely to have seen a hookah warning ads. No other differences were found by user status. Females were more likely to be exposed to ads for hookah than males. No differences by age were found. **Conclusion:** Adolescents are exposed to advertisements on the Internet, broadcast, print, and point of sales. Exposure to ads and warning labels did not differ between users and non-users. These findings suggest that implementation of policies regarding Internet sale and advertising as well as more rigorous laws pertaining to the sale and access of tobacco and tobacco-related products are warranted.

FUNDING: Federal

## POS5-48

### LONGITUDINAL CHANGES IN TOBACCO PRODUCT POINT OF SALE ADVERTISEMENTS NEAR NEW JERSEY HIGH SCHOOLS

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**Significance:** Exposure to tobacco advertisements at point of sale may lead to increased tobacco product use and susceptibility among youth. For a comprehensive assessment of the point-of-sale environment surrounding youth, we examined the exterior and interior advertisements for various tobacco products at tobacco retailers near schools over four years. **Methods:** Each spring from 2015-2018, research staff collected data on the presence or absence of interior and exterior advertisements for cigarettes, cigars, smokeless tobacco, and e-cigarettes from the same tobacco retailers within a half mile of 41 New Jersey high schools. The final analytic sample consisted of data collected from 163 non-chain convenience, chain convenience, and other stores. Analyses were conducted to examine changes over time in exterior and interior advertising by product type using a general linear mixed regression model, controlling for store type and urbanicity. **Results:** From 2015 to 2018, the percent of retailers with cigarette advertisements on the exterior significantly declined from 57.7% to 46.0%, whereas the percent with interior advertisements did not significantly change (70.6% in 2018). In contrast, there was an increase in both exterior and interior advertising of cigars, from 10.4% to 20.9% and 15.3% to 25.8%, respectively. Exterior and interior e-cigarette advertising initially decreased from 2015-2017, but significantly increased in 2018 with 15.3% and 21.5% of stores advertising e-cigarettes on their exterior and interior, respectively. Exterior and interior smokeless tobacco advertising was infrequent (3.1% and 12.3% in 2018) and did not change over time. **Conclusions:** The longitudinal changes observed for each product's advertising reflect national trends regarding youth use rates of the corresponding products. The point-of-sale environment around schools may be influencing youth tobacco product use, and must be monitored and regulated.

FUNDING: State

## POS5-49

### LIVE CHAT MESSAGING FOR SMOKING CESSATION: USE OF MOTIVATIONAL INTERVIEWING SKILLS AND BEHAVIOR CHANGE TECHNIQUES

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**Background:** Live chat is a digital communication modality that has become commonplace for website customer support. It allows for real-time communication and easy provision of information. Truth Initiative and the Mayo Clinic Nicotine Dependence Center developed a live chat intervention for tobacco cessation delivered as a premium feature on BecomeAnEX.org. Tobacco users can 'chat' synchronously with a Tobacco Treatment Specialist who provides smoking cessation planning and support and assists with use of the BecomeAnEX intervention. **Methods:** Between December 1, 2017, and December 1, 2018, a total of 105 chats of at least 10 minutes were conducted. N=20 of these chat transcripts were randomly selected for analysis.

Coding focused on identification of motivational interviewing skills (i.e., open-ended questions, reflective listening statements) and specific behavior change techniques (BCT) using a validated taxonomy by Mitchie et al. Coding was conducted by the lead author. **Results:** An average of 5.9 BCT per chat was employed by the TTS. The most commonly used BCT were social support 23 (1.2 per chat), pharmacologic support 23 (1.2 per chat), information about health consequences 12 (.6 per chat), and behavioral substitution 6 (.3 per chat). The ratio of open to closed-ended questions was 2.5/1 and an average of 4.4 reflective listening statements was per chat analyzed. **Discussion:** This study is one of the first efforts to document the use of behavior change techniques and motivational interviewing communication skills in synchronous coaching for tobacco cessation. Live chat messaging is a feasible method for individualizing and delivering smoking cessation coaching. Behavior change techniques and motivational skills can be delivered through this easy-to-access and convenient digital modality. Research to utilize inter-rater reliability methodology, and to examine links between specific BCTs and communication strategies and participant satisfaction and abstinence is underway. **Keywords:** Cessation, Technology **Sources of Funding:** This study was funded by Truth Initiative and the Mayo Clinic Nicotine Dependence Center.

FUNDING: Academic Institution; Non-profit grant funding entity

## POS5-50

### THE EFFECTS OF "KEEP TOBACCO SACRED" MESSAGES ON AMERICAN INDIAN SMOKERS' INTEREST IN SMOKING CESSATION

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**Significance:** The prevalence of smoking among American Indians/Alaska Natives (AI/AN) is 60% in Minnesota. High smoking rates contribute to significant disparities in lung cancer, heart disease, and other tobacco-related disease. Engaging smokers in cessation treatment is critical to reducing cancer-related disparities among the AI/AN population. However, traditional tobacco use is very important in American Indian culture. The objective of this project was to compare smoking cessation messages that emphasize that quitting smoking keeps traditional tobacco sacred to messages including more generic arguments about health effects of quitting smoking (that do not refer to the cultural significance of traditional tobacco) on perceptions of smoking cessation. **Methods:** 259 AI/AN smokers aged 30-65 were sampled in the Minneapolis-St. Paul metropolitan area. The study used a between-subjects experimental design (message conditions: 1) control (healthy eating), 2) quit smoking for health, 3) be tobacco-free for health, and 4) keep tobacco sacred). The four messages were presented in flyers that were visually identical, only differing in argument, followed by a questionnaire. **Results:** Findings showed a highly consistent pattern that the sacred tobacco message induced more positive reactions to smoking cessation than the health consequences and tobacco-free messages. The healthy eating control message induced similar effects on smoking cessation beliefs as tobacco-free messages. Compared to health consequences and tobacco-free conditions, participants in the sacred tobacco condition felt the message was more believable; was meant for someone like them; gave them a strong reason to quit smoking; and that quitting smoking would reduce cancer risk, improve breathing, let them be a role model for children, and live according to American Indian values. **Conclusions:** These results suggest including AI/AN cultural cues to sacred tobacco in smoking cessation messages can positively affect perceptions of smoking cessation. This study has important implications for the design of messages that encourage AI/AN to quit smoking.

FUNDING: State



## POS5-51

### PATH STUDY WAVE 1 BIOMARKERS OF INFLAMMATION AND OXIDATIVE STRESS AMONG ADULT E-CIGARETTE AND CIGARETTE USERS

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**Background:** In 2013-14, 7.8% of U.S. adults reported current e-cigarette use. Inflammation and oxidative stress can be induced by smoking and play roles in smoking-related diseases. We evaluated the cross-sectional association between these biomarkers of potential harm with e-cigarette and cigarette use. **Methods:** Adult blood and urine samples collected from 3,625 Population Assessment of Tobacco and Health (PATH) Study Wave 1 (2013-2014) participants were analyzed for biomarkers of inflammation (high sensitivity C-reactive protein [hs-CRP], interleukin-6, fibrinogen activity, soluble intercellular adhesion molecule-1) and a marker of oxidative stress (8-isoprostane). We evaluated five tobacco user groups: e-cigarette-only users, cigarette-only users, dual users, recent former smokers (<12 months), and never tobacco users. We estimated geometric mean ratios (GMRs) by tobacco user group compared with former smokers adjusting for age, sex, race/ethnicity, education level, cardiovascular disease (CVD) and CVD risk factors, cancer, respiratory diseases, pack-years and time since cessation. We compared biomarker concentrations using never tobacco users and cigarette users as referents. **Results:** The mean age of e-cigarette-only users is 41.2 years, and 95% are former smokers who average 1.6 years of e-cigarette use. We did not observe differences in biomarker concentration between e-cigarette-only users and former smokers. Compared to cigarette-only users, e-cigarette-only users have lower concentration of all biomarkers. Dual users have significantly greater concentration of 8-isoprostane than smokers (GMR: 1.09 (95%CI 1.03, 1.16)). Compared to former smokers, we observed greater concentrations of all biomarkers in cigarette-only users and dual users, including a greater concentration of hsCRP in dual users (GMR: 1.75 (95%CI 1.15, 2.68)). Biomarker values were similar for former smokers and never tobacco users. **Conclusions:** E-cigarette-only users have similar levels of biomarkers of inflammation and oxidative stress as recent former smokers without e-cigarette use and lower levels than smokers and dual users. Dual users have a greater level of oxidative stress than smokers.

**FUNDING:** Federal

## POS5-52

### HOOCAH PENS, CIGALIKES, VAPES/MODS, AND E-PIPE: AN INVESTIGATION OF USAGE PATTERNS OF VARIOUS ENDS DEVICE TYPES

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Electronic Nicotine Delivery Systems (ENDS) have evolved quickly with device types such as "cigalike," "e-hookah/hookah pen," and "vapes/mods," and "e-pipe." However, research on patterns of use of various device types has lagged as much research on ENDS has surveyed users asking only about "electronic cigarettes." Understanding user preference and use of different device types is important because device types differ in amounts of nicotine and thus influence toxicity, abuse potential, and product risks. The purpose of the current project was to provide descriptive data of usage patterns among young adult ENDS ever users. The cross-sectional convenience sample gathered from December 2015 to May 2016 included 421 young adults (median age 19; 69.1% female; 86% heterosexual; 60.3% Non-Hispanic White) from two universities in the southwest region of the United States who reported ever use of any ENDS product. The online survey asked about ever use and 30-day use of cigalike, e-hookah/hookah pen, vape/mod, e-pipe, and conventional tobacco cigarettes (CTC). Each device type was described including examples of brand names. Regarding specific ENDS device type ever use, 83.8% had used e-hookah/hookah pen, 57.8% had ever used a vape/mod, 30.5% cigalike, and 7.7% had ever used e-pipe. Poly-ENDS use, defined as having used two

or more of the device types, was 54.9%. Overall past 30-day use of any ENDS device was 36.8%. Past 30-day prevalence by device type was 26.5% for vape/mod, 17.1% for e-hookah/hookah pen, 6.3% for cigalike, and 2.7% for e-pipe. There was no significant difference by sexual orientation or race/ethnicity for any ENDS use in the past 30 days. However, a greater proportion of females (55.6%) than males (44.4%) had used any ENDS device in the past 30-days, ( $X^2(1) = 21.25, p < .001, OR = 2.71, CI: [1.76 - 4.16]$ ). Based on our survey of device types, e-hookah/hookah pen were most widely used, followed by vape/mod, cigalike, and e-pipe. However, vapes/mods were most widely used in the past 30-days, which might be due to the fact that the temperature can be controlled and thus they deliver higher doses of nicotine.

## POS5-53

### ASSOCIATION OF E-CIGARETTE AND OTHER TOBACCO PRODUCT USE WITH SUBSEQUENT CIGARETTE SMOKING IN ADOLESCENTS: A PROPENSITY SCORE MATCHING ANALYSIS

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**Significance:** The debate about the impact of e-cigarettes on youth smoking, in particular gateway effects, is ongoing. Standard observational studies cannot rule out confounding, likely producing biased estimates. This study used a two-pronged case-control approach to address confounding and assess whether use of e-cigarettes increases the likelihood of later cigarette smoking. We compared smoking rates among adolescents with initial e-cigarette use compared with 1) a real-world control group (adolescents with initial non-combustible, non-cigarette tobacco (NNT) use) and 2) a synthetic control group, selected using propensity score matching (PSM) analysis. **Methods:** Data come from the National Youth Tobacco Survey (2014-2017, N=78,265), an annual, cross-sectional, nationally representative survey of US middle/high school students aged 9+ years. In 2014/15 (N=37,417), adolescents were asked which tobacco product they had tried first, producing the exposure variable: adolescents with initial e-cigarette (3.2%) or NNT (chewing tobacco, snus or dip) use (1.4%). The main outcome was ever smoking and current smoking (100+ cigarettes in life-time and at least one in past 30 days). Socio-demographic and school characteristics, future smoking susceptibility, environmental tobacco exposure and perceived smoking health effects were used in PSM to select matched control samples from across all survey waves. **Results:** Compared with adolescents who reported trying NNT first, those who reported trying e-cigarettes first were less likely to ever have smoked (24.3% vs 53.4%; OR 0.29, 95%CI 0.25-0.34) or currently smoke cigarettes (0.8% vs 9.3%; OR 0.09, 95%CI 0.05-0.14). Similarly, matched controls without initial e-cigarette use were more likely to ever (30.7%; OR 1.38, 95%CI 1.21-1.58) or currently smoke cigarettes (2.7%; OR 3.77, 95%CI 2.20-6.46) than those with initial e-cigarette use. By contrast, NNT-matched controls were less likely than adolescents with initial NNT use to have ever smoked cigarettes (43.9%, OR 0.68, 95%CI 0.57-0.82), with no differences for current smoking (9.6%, OR 1.03, 95%CI 0.76-1.39). **Conclusions:** While e-cigarettes attract never smokers, few adolescents initiate e-cigarette use first. E-cigarette initiators appear less likely than users of NNT products or propensity score matched adolescents who did not try e-cigarettes to go on to smoke. Unlike e-cigarette use, NNT use appears to increase ever smoking.

**FUNDING:** Unfunded; Academic Institution; Non-profit grant funding entity

## POS5-54

### TOBACCO SMOKING AND ALTERNATIVE NICOTINE DELIVERY SYSTEMS; PATTERNS OF USE AND PERCEPTIONS IN 13 COUNTRIES

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**Background:** Smoking tobacco products remains a significant public health problem worldwide. There is a range of available alternative nicotine delivery systems (ANDS) but it is unknown if smokers are aware of these options. **Methods:** The Foundation for a Smoke-Free World commissioned a survey to gain a clearer understanding of the current landscape of smoking behavior, knowledge and usage of ANDS and preferences across the world. More than 17,000 participants in 13 countries, representing different regions and income groups, were interviewed about their smoking patterns and product use, their social context, their motivation to smoke, quit, or switch, and their perception of risks of products and substances. Rim weighting was done for each country to align responses with population demographics, and an additional 200 smokers for each country were surveyed to achieve sufficient sample size for sub-analyses of smoker data. **Results:** The observed prevalence of smoking ranged from an age-adjusted low of 8.4% in New Zealand to a high of 57.5% in Lebanon among men, with lower rates





for women. The majority of smokers were between 25-54 years old, had daily routines and social patterns associated with smoking, used boxed cigarettes, and rated their health more poorly compared to never smokers. Among a range of products and substances, smokers tended to give both cigarettes and nicotine the highest harm ratings. Smokers in high income countries were largely familiar with ANDS; the most commonly given reasons for using them were to cut down or quit smoking. A majority of smokers had tried to quit at least once, and while many tried without assistance, motivations, intentions, and methods for smoking cessation, including professional help, nicotine replacement therapies, medications, or electronic cigarette use, varied among countries. **Conclusions:** Smoking is deeply integrated in smokers' daily lives worldwide. Although a majority of smokers have tried to quit, and are concerned for their health, they do not seek help. Smokers lack understanding of the harmful components of smoking tobacco products and the risk profile of alternatives.

FUNDING: Non-profit grant funding entity

## POS5-55

### METHOD FOR ESTIMATING NON-STUDY CIGARETTE USE AMONG SWITCHERS TO VERY LOW NICOTINE CONTENT (VLNC) CIGARETTES IN AMBULATORY CLINICAL TRIALS

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**BACKGROUND:** In March 2018, FDA issued an advance notice of proposed rulemaking (ANPRM) on a nicotine standard for cigarettes to make them minimally- or non-addictive. Some studies have reported reductions in the number of cigarettes per day (CPD) smoked after switching to VLNC while others reported no change. Non-compliance is a common limitation in VLNC studies where smokers continue to have access to conventional nicotine content (CNC) cigarettes. While methods for estimating the prevalence of non-study cigarette use have been reported, no method for estimating its magnitude (i.e., CPD) has been published. We describe a method for estimating non-study CPD and the implication of the resulting estimates in interpreting data from VLNC studies. **METHODS:** This method is based on the same principle used in published methods for estimating the prevalence of non-compliance. Between two randomized groups exclusively smoking assigned cigarettes, the biomarker of exposure (BOE) level for a smoke constituent is proportional to the amount of the constituent per cigarette (Yield) and CPD, i.e.,  $BOE = Yield * CPD * k$ , where  $k$  represents the bioavailability factor. When non-study cigarettes are also smoked, the equation needs to be modified to account for both sources:  $BOE = Yield_{study} * CPD_{study} * k_{study} + Yield_{non-study} * CPD_{non-study} * k_{non-study}$ .  $CPD_{non-study}$  can be derived when the relevant BOE, Yield, CPD, and  $k$  data are available. **RESULTS:** The method was verified against data from a published VLNC study where participants did not have access to non-study cigarettes. Estimates using data from published VLNC studies where participants had access to CNC indicate that 1) under-reporting on the magnitude of non-study cigarettes use was common, 2) estimates of non-study CPD vary by study, and 3) estimated non-study CPD under-reported can exceed the reduction in self-reported CPD after switching to VLNC. **CONCLUSIONS:** Controlling and accurately estimating non-study cigarette use is critical for ambulatory VLNC switching studies to ensure the resulting data can be appropriately evaluated for use in science-based regulatory decision-making.

FUNDING: Tobacco Industry

## POS5-56

### IS TOBACCO CONTROL FAILING? RISING AFRICAN AMERICAN VERSUS FALLING WHITE YOUNGER MALE LUNG CANCER DEATH RATES

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**Background and methods:** Tobacco control leading indicators like lung cancer and ischemic heart disease (IHD) mortality rates in younger adults measures are unaffected by the smuggling and sampling, social desirability, and other biases that affect indicators like tax-paid cigarette sales and smoking prevalence, respectively. So we assessed lung cancer and ischemic heart disease (IHD) mortality rate trends by race in US men ages 35-44 using NCHS data and 1969-2015 Joinpoint and 2010 to 2017 regression analyses. **Results:** In African American (AA) men ages 35-44 years, lung cancer mortality rates went from annual percent changes (APCs) of -3.4% in 1978-2002 and -13.4% in 2002-2010, both significantly below zero, to -0.4% in 2010-2015 not significantly changing, per Joinpoint, and +0.3% from 2010-2017, per regression. In contrast, ages 35-44 years lung cancer mortality rates in white men had APCs of -8.3 in 2004-2012 and -2.1, not significantly changing, from 2012-2015, but nearly perfectly linear ( $R$ -squared 0.96) declines from 1999-2017. As a result, AA men ages 35-44 years

went from a lung cancer mortality rate over 100% above whites in 1970 to slightly below whites in 2010, to 3.5 deaths/100,000/year, over 50% above whites' quite monotonically falling rates of 2.1 deaths/100,000/year in 2017 and slope -0.16 (95% CI -0.23 to -0.10,  $p < 0.001$  vs AA slope from 2010-2017). IHD mortality rates show trends that are similar, but less stable, than the lung cancer trends. **Discussion:** Stable to slightly rising lung cancer death rates in age 35-44 AA men from 2010 to 2017 are fairly consistent with their IHD death rate trends and suggestive of a: 1) lack of progress in reducing their smoke exposure; 2) a rapidly rising disparity in AA versus white male smoke exposure by age 35-44; 3) multiple present and future smoke-related health burdens in AA men, especially versus white men.

FUNDING: Unfunded

## POS5-57

### NICOTINE CUES AND THEIR NEUROPHYSIOLOGICAL CORRELATES IN FUNCTIONAL MAGNETIC RESONANCE IMAGING

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**Background:** One of the most prominent symptoms in addiction disorders like tobacco dependency is the strong desire to consume a particular substance (craving). The severity of craving is depending on the time of the last nicotine intake and can be increased by certain cues, like cigarettes, cigarette packs, ash trays or smoking people. The aim of the present project was the examination of the neurophysiological correlates of craving depending on the time of nicotine intake and in comparison to the control group. **Methods:** 17 smokers were examined before and after nicotine intake and compared to a non-smoking control group. During the functional magnetic resonance imaging (fMRI) sessions tobacco-associated and neutral pictures were presented while registering the BOLD (blood-oxygenation-level-dependent) -signal. The responses to the cues presented were compared and analysed (tobacco-associated vs. neutral, smokers vs. non-smokers, before vs. after nicotine intake). Questionnaires were used to acquire clinical characteristics of the participants and were analysed regarding possible associations with the responses to the cues. BOLD data were assessed using Brain Voyager QX and IBM SPSS. **Results and discussion:** Smokers revealed enhanced neuronal responses to the tobacco-associated cues compared to the neutral cues, not depending on the status of tobacco intake. These changes were found especially in the frontal regions of the brain, the limbic system and the brain areas processing visual stimuli. Therefore the cue-related responses in smokers were recognised particularly in areas of the brain that are related to complex processing of sensory stimuli, attentiveness regulation and planning of action, and were significantly more distinct than in non-smokers. Responses in the limbic system were increased by nicotine withdrawal. In addition there was detected a positive correlation between the number of cigarettes consumed per day and the BOLD-reaction in the medial and dorsolateral prefrontal cortex during nicotine withdrawal. The results suggest the importance of tobacco-associated cues in dealing with dependent smokers. Hence the impact of cue analysis in the context of withdrawal therapy might be increasing. It seems useful to enlighten smokers about these mechanisms, so handling these cues can be trained to possibly gain habituation and reduce craving.

## POS5-58

### UNDERSTANDING EXCLUSIVE AND DUAL USE OF CIGARETTES AND E-CIGARETTES IN THE CONTEXT OF STIGMA: A MIXED METHOD APPROACH

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Using a mixed method approach of qualitative interview and survey data, we investigated the role of dual use of cigarettes and e-cigarettes in adult sexual and gender minorities (SGM). In-depth interview and survey data were obtained from 170 SGM exclusive users and dual users in California (19-65 years old). Data were collected as part of a qualitative study on SGM adults and tobacco-related stigma that investigated questions related to discrimination, intersecting identities, motivations for and practices of tobacco use, and perceptions of cigarette smoking and policies. In the survey, participants reported their race, past month housing insecurity, past month cigarette and e-cigarette use, any attempt to quit smoking in the past year, number of lifetime experiences with SGM discrimination, and perceptions of tobacco-related stigma (e.g., social withdrawal from non-smokers). Of study participants, 7% were current e-cigarette users, 59% were current cigarette smokers, and 34% were current dual users. In multinomial models, we found that compared to cigarette users, dual users were more likely to be younger ( $RRR=0.96$ ) and report housing insecurity ( $RRR=3.51$ ), a proxy for economic



disadvantage. Also, dual users, compared to cigarette smokers, were more likely to perceive that smokers socially withdraw from nonsmokers (RRR=2.56), but they did not differ from cigarette smokers in attempting to quit smoking. To further understand the experiences of dual users, we conducted a thematic analysis of the narratives of dual users which revealed a tension between (1) concerns about the threat smoking posed to future physical health and (2) the perceived value of smoking for preserving present mental health in the context of extreme disadvantage and discrimination. To balance these paradoxical concerns, some participants considered dual use as an important harm reduction strategy for negotiating future and present health issues. Combining the qualitative and quantitative analyses, results suggest that dual users who experience intersecting stigmas may be working towards cessation but may not be ready to give up smoking just yet due to other more pressing concerns.

FUNDING: Federal; State

## POS5-59

### COGNITIVE DECISION MAKING PROCESSES UNDERLYING MENTAL HEALTH PROFESSIONALS' JUDGMENTS OF TOBACCO HARM REDUCTION AND ELECTRONIC CIGARETTES IN MENTAL HEALTHCARE: A QUALITATIVE STUDY

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**Background:** Smoking prevalence remains significantly higher amongst individuals with mental health conditions compared with the general population. Electronic cigarettes (ECs) are the most popular smoking cessation aid in England and could potentially be an alternative to cigarettes for smokers who find it difficult to quit. Exploring how mental health professionals' (MHPs) perceive ECs as tobacco harm reduction (THR) products is essential in order to determine the feasibility of incorporating ECs into mental healthcare treatment settings. **Methods:** We conducted six focus groups between March and August 2017. A total of 39 MHPs were recruited from six primary and secondary mental healthcare services in England. Discussions were guided by a semi-structured guide, and responses were recorded, transcribed and coded using thematic framework analysis. Analysis was informed by the cognitive psychology literature regarding cognitive processes underlying judgments and decision making. **Results:** We identified two higher-order themes: 1) Cognitive biases impact MHPs perceptions of THR and ECs, and 2) Patient circumstances encourages rational cognitive processing and decision making regarding THR and ECs. Cognitive biases included the ambiguity effect, representativeness heuristics, focalism, availability heuristics and confirmation bias. Mitigation of these cognitive biases was apparent for MHPs who were able to engage in conscious evaluation of patients' diagnosis and treatment circumstances. **Conclusion:** The scientific evidence supporting ECs as effective cessation products which are less harmful than combustible tobacco products does not seem to be effectively disseminated among MHPs through NHS resources. As a result, MHPs heavily rely on cognitive mental shortcuts when making judgments about ECs and THR. Improved education regarding smoking, THR and ECs in mental healthcare settings is essential in order to encourage MHPs to engage in a rational decision-making process.

FUNDING: Non-profit grant funding entity

## POS5-60

### PREVALENCE OF CIGARETTE AND E-CIGARETTE USE AMONG WOMEN WHO USED OPIOIDS DURING PREGNANCY

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**Introduction:** The use of opioids during pregnancy has increased substantially in recent years. Tobacco and/or nicotine use during pregnancy appears to enhance the risks associated with opioid use during pregnancy (e.g., risk of neonatal abstinence syndrome). To date, the prevalence tobacco and/or nicotine use within this population has relied on estimates from convenience samples. Therefore, we sought to estimate the prevalence of the use of cigarettes and e-cigarettes among this specific population using a representative data source. **Methods:** We used data from Phase 8 (2016) of the Pregnancy Risk Assessment Monitoring System (PRAMS), which contains a representative sample of women who have given birth to a live infant. Survey respondents were restricted to those who reported use of an opioid during pregnancy, including prescription medications (e.g., oxycodone) or illicit substances (e.g., heroin). We then calculated the weighted prevalence of cigarette use and e-cigarette use within this sample using SAS version 9.4. **Results:** A total of 739 survey respondents were identified. Of these, 371 (50.2%) reported use of cigarettes during pregnancy with most reporting smoking between 1 to

10 cigarettes per day (51.5%) followed by 11 to 20 cigarettes per day (8.8%). Further, 151 (20.4%) reported use of e-cigarettes during pregnancy. Most reported vaping once a day (12.6%) followed by more than once a day (7.4%). Finally, 139 (18.1%) reported use of both cigarettes and e-cigarettes. **Conclusion:** The prevalence of cigarette and e-cigarette use during pregnancy is substantially higher among women who have also used opioids during pregnancy (50.2% and 20.4%, respectively) as compared to the general population of pregnant women (7.2% and 6.5%, respectively). Smoking cessation interventions should be designed and implemented per the needs for this high-risk population.

FUNDING: Unfunded

## POS5-61

### CORRELATES OF YOUTH VAPING AND SMOKING FREQUENCY

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**Significance:** Few studies have looked at the correlates of more frequent vaping and smoking among youth. We assessed and compared correlates of vaping and smoking frequency among youth users across three countries with contrasting regulatory environments. **Methods:** Data were analyzed from the 2017 International Tobacco Control Policy Evaluation Project (ITC) Youth Tobacco and E-cigarette Survey, which surveyed 16-19 year-old youth in Canada, England, and the United States. We used censored binomial regression with truncated distribution to assess correlates of the frequency of lifetime vaping and smoking amongst ever users. Poisson regression with truncated distribution was used to assess correlates of frequency of vaping and smoking in the prior 30 days among last month users. Independent variables included sociodemographic factors, cigarette/e-cigarette susceptibility and use (i.e., former, current, or experimental smoker/vaper), alcohol and marijuana use, and vaping and smoking among family and friends (i.e., no use, exclusively vapers, exclusively smokers, users of both products). **Results:** Correlates of lifetime frequency for both vaping and smoking were use of the other product (i.e., former, experimental, or current use vs. never use), having parents or friends who use both product types (relative to neither product), and ever-use of marijuana. The only shared correlate of more frequent past month vaping and smoking was having parents who use both product types. Unique correlates of vaping frequency were being male and having friends and parents who vape (but not smoke). Unique correlates of smoking frequency were older age, being White, lower SES, and having parents who smoke (but not vape). **Conclusions:** Correlates of youth vaping and smoking frequency were somewhat different from each other. Consistent with other studies, however, more frequent use was correlated with prior or current use of the other product and current product use among family and friends. Future longitudinal research should further investigate these differences, especially how they relate to trajectories of use and product use transitions over time.

FUNDING: Federal

## POS5-62

### PHARMACOKINETIC PROFILE OF SPECTRUM REDUCED NICOTINE CIGARETTES

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**Significance:** *Spectrum* research cigarettes have been developed with varying nicotine content for use in studies evaluating the effects of a regulatory policy reducing the permissible nicotine content in cigarettes. This study aimed to characterize the nicotine pharmacokinetic profile of *Spectrum* cigarettes. **Methods:** 12 daily smokers attended 4 sessions and had blood nicotine, exhaled carbon monoxide (CO) and subjective effects measured before and after smoking either a single cigarette of their preferred brand or high (10.9 mg/cig), medium (3.2 mg/cig) or very low (0.2 mg/cig) nicotine content *Spectrum* research cigarettes, in a double-blind design with order counter-balanced. **Results:** The boost in blood nicotine concentration was dose-dependent, with a boost of 0.3, 3.9 and 17.3 ng/ml for low, medium, and high nicotine content *Spectrum* cigarettes. The high dose *Spectrum* had a similar nicotine boost to the "preferred brand" cigarettes (19 ng/ml). Subjects took longer puffs on the low nicotine cigarettes, but smoked these cigarettes faster than other cigarette types. High nicotine *Spectrum* cigarettes reduced the urge to smoke more than other cigarette types. **Conclusions:** This study shows that *Spectrum* research cigarettes produce blood nicotine absorption in a dose-depen-



dent manner and therefore are appropriate for use in studies of nicotine reduction in cigarettes. **Implications:** This is the first study to determine the pharmacokinetic profile of *Spectrum* reduced nicotine research cigarettes following an overnight abstinence. These data could provide evidence to regulatory agencies about the effects of reduced nicotine cigarettes when considering regulations on tobacco reduction.

FUNDING: Federal; Academic Institution

## POS5-63

### MISLEADING DESCRIPTORS ON TOBACCO PACKAGING IN NINE LOW- AND MIDDLE-INCOME COUNTRIES

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Many consumers mistakenly believe that cigarette packs displaying descriptors such as "light", "mild", and "low tar" are less harmful than other cigarettes. The WHO FCTC calls for bans on misleading descriptors and many countries have bans in place. We examined compliance with bans on misleading descriptors on tobacco packaging and the use of alternative descriptors and tactics to convey less harm in nine low- and middle-income countries. A census of cigarette packs on the market were purchased from 2015-2017 in Bangladesh, Brazil, China, India, Indonesia, the Philippines, Russia, Thailand, and Vietnam. Packs displaying the country's health warning label in rotation were coded for the presence of explicitly banned misleading descriptors and for pack features and appeals (e.g. color, descriptors, imagery). Descriptive statistics were calculated. 1,409 packs were collected across nine countries. Regulations greatly varied in terms of strength with three descriptors in Russia banned unless appearing with a disclaimer and 24 descriptors completely banned in Thailand. Compliance with bans on misleading descriptors was 100% in Bangladesh, Brazil, China, India, the Philippines, and Russia. Compliance was 76% in Indonesia, 96% in Thailand, and 97% in Vietnam. In terms of alternative misleading packaging descriptors and tactics, we found the following across the sample: 21% of all packs displayed "blue", "gold", or "silver"; 4% of packs displayed the descriptors, "soft", "smooth" or "mellow"; and 20% of packs were slim or contained slim cigarettes. Notably, in Russia, 36% of packs displayed "blue", "gold", or "silver" and 37% of packs were slim or contained slim cigarettes. 17% of packs in Bangladesh and 14% of packs in India displayed "soft", "smooth" or "mellow". Overall, compliance is high with bans on misleading descriptors. However, in some countries, regulations of misleading descriptors are limited and alternative marketing tactics that mislead consumers are now sometimes used in lieu of banned descriptors. These findings have implications for stricter packaging regulations such as bans on additional descriptors, standard size and colors, and plain packaging.

FUNDING: Non-profit grant funding entity

## POS5-64

### ALL ENDS DEVICES ARE NOT PERCEIVED THE SAME: RISK PERCEPTIONS OF CIGA-LIKES, VAPES/MODS, AND ELECTRONIC HOOKAHS

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Electronic nicotine delivery systems (ENDS) use has increased in recent years. Further, various types of ENDS devices have developed as vaping has evolved, including ciga-likes, electronic hookahs, and vapes/mods. Risk perception research on electronic cigarettes have found that these perceptions predict adoption of electronic cigarette use and that overall electronic cigarettes are perceived as less harmful than conventional tobacco cigarettes (CTC). Despite the advent of various types of ENDS products, published studies to date on risk perceptions have asked using the wording "electronic cigarettes." The purpose of the current study was to investigate risk perceptions of different ENDS products, in regards to perceived general health harm, harm to pregnant women, and addictiveness. The current study consisted of a cross sectional convenience sample of 689 young adults collected in December 2015 to May 2016. Participants were asked to rate their perceptions of harm (to general health and to pregnant women) and addictiveness regarding CTC, ciga-likes, e-hookahs, and vapes/mods. Three Friedman's ANOVAs showed that there were significant differences in perceptions of general harm, harm to pregnant women, and addictiveness for CTC and the various products (Addictiveness:  $X^2F(3) = 607.84, p < .001$ ; General Harm:  $X^2F(3) = 618.67, p < .001$ ; Pregnancy Harm:  $X^2F(3) = 330.37, p < .001$ ). Post hoc Wilcoxon comparisons, with Bonferroni corrections, indicated that the following significant differences were

found ( $p < .001$ ): overall, CTCs were perceived as most harmful and most addictive, followed by ciga-likes. For general harm perceptions and harm to pregnant women, vapes/mods and e-hookahs were seen as less harmful than ciga-likes, but equivalent. Finally, for addictiveness, vapes/mods were seen as less addictive than ciga-likes, while e-hookahs were seen as least addictive of all. Future research should examine whether device-specific risk perceptions predict initiation of use of different device types. Also, future research should examine risk perceptions for newer ENDS products such as JUUL.

## POS5-65

### ESTIMATED SHORT RUN STATE MEDICAID SAVINGS ASSOCIATED WITH REDUCING CIGARETTE SMOKING PREVALENCE

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**Significance:** In FY2017, Medicaid costs were \$577 billion and Medicaid recipients smoke more than the general population, suggesting that investments to reduce smoking in this population would reduce Medicaid costs in the short run. **Methods:** To estimate the effects of 1 percent drops in absolute cigarette smoking prevalence by state, we began with overall population cigarette smoking prevalence from the 2017 Behavioral Risk Factors Surveillance System for each state then used the 2017 National Health Interview Survey (NHIS) to estimate cigarette smoking prevalence among Medicaid recipients by census region, then applied the ratio of these two prevalences to every state in each of the four census regions to estimate cigarette smoking prevalence among Medicaid recipients in each state. Lightwood and Glantz quantified short run changes in healthcare costs *the year after* changes in smoking behavior and found that 1% relative reductions in current smoking prevalence and mean packs smoked per current smoker are associated with a 0.118% reduction in per capita healthcare expenditure (elasticities). Applying the 0.118 elasticity between changes in cigarette smoking prevalence and changes in health care expenditures the following year to each state yielded estimated Medicaid savings in each state if they lowered absolute cigarette smoking prevalence by 1 percent. **Results:** Reducing absolute smoking prevalence by 1% in each state is predicted to lead to substantial Medicaid savings the following year, totaling \$2.6 billion (in 2017 dollars). The median state would save \$25 million (interquartile range \$8 to \$35 million). These estimates are based on cigarette smoking only and the use of non-cigarette tobacco products is increasing. To the extent that tobacco control programs also reduce use of these other tobacco products there would be additional savings. **Conclusion:** In addition to the benefits in terms of improved health, reducing smoking among Medicaid recipients would result in substantial savings to the Medicaid program which would release these funds for other state and federal priorities. FUNDING: Federal

## POS5-66

### CREATING RYO-SPECIFIC WARNINGS: A QUALITATIVE EXPLORATION

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**BACKGROUND:** Rising tobacco excise taxes prompt some smokers to switch to more cost-effective roll-your-own (RYO) tobacco rather than stop smoking. Studies show many RYO smokers believe RYO tobacco is less harmful and more natural than tailor-made cigarettes. We used a novel elicitation method to explore on-pouch warnings challenging self-exempting beliefs and potential themes, messages and executions that may prompt thoughts of quitting among New Zealand (NZ) RYO smokers. **METHOD:** During interviews, participants sorted and selected design elements (photos, messages) to construct a physical RYO pouch they thought likely to prompt an RYO smoker to think about quitting. Photos depicted death, disfigurement, material hardship, financial loss, harm to pets and chemicals/additives; message themes included health warnings, chemicals/additives, addiction, regret, hope, harm to others and cessation efficacy. Messages had both informative and overtly affect-arousing executions, including personal testimonials. **RESULTS:** We recruited 22 participants (n=11 women) aged 18-67 years. Over half chose themes of death and regret depicting real, identifiable smokers and personal, affect-arousing, loss-framed testimonials. Other themes selected were hardship, finances, harm to pets and chemicals/additives. Aside from financial loss (a photo of burning money lighting a cigarette), metaphorical imagery did not resonate with participants. Many participants wove the design elements into a cohesive story that reflected their personal circumstances. Virtually all participants dismissed health-framed, information-oriented messages, and themes of chemicals/additives, as lacking impact. Almost all thought the pouch they created was more likely to prompt thoughts of quitting than their most recently purchased pouch. **CONCLUSION:** Nearly all participants constructed pouches with markedly different themes than NZ's recently implemented standardised packaging. Instead of the currently used generic health messages, they found personally affecting themes and message executions more salient and impactful.



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Regret for future losses, and hope that they could avert these, appeared more motivating emotions than fear. Our findings suggest eliciting more diverse emotional responses may be effective in prompting thoughts of quitting among RYO smokers.

FUNDING: Academic Institution

## POS5-67

### TRENDS AND CORRELATES IN THE USE OF PALL MALL AMONG MEXICAN SMOKERS BETWEEN 2009-2016: RESULTS FROM NATIONAL SURVEYS

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**Significance:** In 2008 the tobacco industry transformed a Mexican domestic brand (Boots) into an international brand (Pall Mall), offering the same product with a more refined image to attract new consumers. After that, the market share of Pall Mall has been increasing every year. Our objective was to determine the trends in the use of Pall Mall and to analyze the characteristics of the smokers who bought this brand in Mexico in the period 2009-2016. **Method:** Data came from the Global Adult Tobacco Survey (GATS 2009 and 2015), the National Survey on Addictions (NSA 2011) and the National Survey of Drug, Alcohol and Tobacco use (ENCODAT 2016). The study sample (n=14,118) consisted of current smokers aged 15 to 65 and the change in the Pall Mall use was estimated by generalized linear models (binomial family, log-link function). Demographic and tobacco consumption characteristics included sex, group of age, place of residence, education, smoking pattern (daily/occasional) and way of purchase (single/pack). **Results:** The proportion of smokers who bought Pall Mall in 2016 was 14.2%, and this represents a dramatic relative change of +914% compared to 2009 (1.4%). Pall Mall smokers tend to be young (AOR<sub>15-24 vs 45-65 years</sub> = 1.60, 95%CI 1.10, 2.33), females (AOR<sub>Female vs male</sub> = 1.61, 95%CI 1.05, 2.48) and people with junior high school educational level (AOR<sub>7-9 grades vs <6</sub> = 1.54, 95%CI 1.14, 2.07). In addition, Pall Mall smokers usually bought their cigarettes by pack (AOR<sub>Pack vs. single cigarette</sub> = 1.70, 95%CI 1.39, 2.08). **Conclusion:** The growth of Pall Mall in Mexico is preceded by strong marketing strategies that includes product innovations and the improvement of the packaging. Females and young people have been attracted by the image of this brand which is reflected in a higher prevalence of purchase in these groups. More restrictive regulations are needed in Mexico in terms of packaging, total prohibition of advertising at points of sale as well as the content of tobacco products to discourage consumption in these specific population groups.

FUNDING: Federal

## POS5-68

### HETEROGENEITY IN SMOKING CESSATION BEHAVIORS AMONG LIGHT AND INTERMITTENT SMOKERS

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**Significance:** A growing proportion of US smokers are light/intermittent smokers (smoke <10 cigarettes per day[CPD] and/or non-daily). Light/intermittent smoking may be a stable behavior and a transitional stage between initiation, heavy use, and cessation. We aim to determine the heterogeneity in smoking cessation behaviors by smoking trajectories among light/intermittent smokers. **Methods:** 27,611 US adult light/intermittent smokers who participated in the 2010-2011 Current Population Survey – Tobacco Use Supplement reported current (T1) and past 12-month (T0) smoking behaviors. Responses were categorized into light (<10 CPD vs. ≥10 CPD) and intermittent (non-daily vs. daily) smoking at T0 and T1. Combinations of T0 and T1 smoking behaviors resulted in 15 smoking trajectories ending in light/intermittent smoking (e.g., light daily smoking at T0 to light non-daily smoking at T1). Demographics and smoking cessation behaviors were assessed. Weighted prevalence of smoking trajectories in the full sample by demographic and smoking cessation behaviors by trajectory were estimated. **Results:** The 3 most prevalent trajectories were maintaining light daily smoking (LD to LD; 61%), reducing from heavy daily smoking to light daily smoking (HD to LD; 13%), and changing from nonsmoking to light non-daily smoking (NS to ND; 8%) between T0 and T1. The top 3 trajectories differ by race/ethnicity, education and income. For example, among individuals with <high school education or a family income <US\$25,000, the third most prevalent trajectory was increasing from light non-daily smoking at T0 to light daily smoking at T1 (8%). Among LD to LD smokers, only 37% tried to quit in the past year, and 53% were advised to set a quit date by healthcare providers, compared with

50% and 62% respectively among HD to LD smokers, and 57% and 63% respectively among NS to ND smokers. Over two-thirds of smokers in these 3 trajectories received a recommendation from healthcare providers for cessation treatment related programs.

**Conclusion:** Majority of the light/intermittent smokers maintained light daily smoking. Future research needs to explore how to motivate these smokers to try quitting. **Funding Information:** National Institute on Minority Health and Health Disparities Intramural Research Program, National Institutes of Health Office of the Director

FUNDING: Federal

## POS5-69

### A LUNCH TRUCK SMOKING CESSATION INTERVENTION FOR MALE HISPANIC CONSTRUCTION WORKERS: A 6-MONTH ASSESSMENT OF INTERVENTION SATISFACTION

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**Significance:** In South Florida, Hispanics/Latinos account for 91% of construction workers. Construction workers have the highest smoking rate versus other occupational groups (39%). Locally, over 54% of construction workers currently smoke. We created a smoking cessation intervention partnering with lunch trucks visiting construction sites to conduct a brief face-to-face plus quitline referral plus 6-weeks of NRT compared to quitline referral plus 6-weeks of NRT. We examined intervention satisfaction and cessation rates at the 6-month assessment. **Methods:** Process evaluation data included a short survey and semi-structured qualitative assessment via telephone (n=43) lasting 15 minutes from August-October 2018. Participants were divided between interventional (n=21) and standard of care arms (n=20). Survey items rated program content/usefulness and interview topics included quit reasons, program satisfaction, education material helpfulness, quitline referral helpfulness, NRT use, program improvement areas, and smoking status. Descriptive statistics were calculated for survey data and the constant comparative method was used to analyze qualitative data. **Results:** About 52% of participants reported quitting smoking at 6-months, with nearly equal representation from intervention and standard of care arms (53% and 50%, respectively). Also, 83% of participants rated intervention quality as excellent, 85% were very happy with the information, 85% had a major change of opinion on smoking, and all participants would recommend it to a friend. No participants rated it poorly. Constant comparative analysis showed several themes across intervention arms: 1) participants quit smoking for health reasons, 2) participants liked program content, 3) participants found NRT useful, and 4) participants relapsed because they did not commit to quitting nor made a real effort to quit (e.g., did not read the materials or follow the program). **Conclusion:** Irrespective of treatment arm, participants stated similar reasons for quitting and relapsing. Overall, participants were very satisfied with the program. To decrease relapse, interventionists should gauge participant commitment to quitting.

FUNDING: Federal

## POS5-70

### COMPARING IMMEDIATE PHYSIOLOGICAL RESPONSES AND FUTURE INTENTIONS OF USE BETWEEN COMBUSTIBLE AND ELECTRONIC WATERPIPE SMOKERS

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**Significance:** The reduction of waterpipe smoking remains a national public health priority based on the health risks associated with use including cancer, respiratory disease, cardiovascular disease, and nicotine addiction. Despite continuous efforts to decrease waterpipe use, use prevalence has increased over the past decade, particularly in young adults and college students. In addition to combustible waterpipe, there is relatively new, non-combustible waterpipe that may be seen as a "safer" alternative; the electronic waterpipe (e-waterpipe; EWP). This is the first known study comparing immediate physiological responses between combustible and electronic waterpipe use among young adults. The present study also identifies future intentions of use of the new EWP compared to traditional, combustible waterpipe (TWP). **Methods:** Data were collected from 36 individuals on two separate days, one day to smoke the TWP and one day to smoke the EWP. Physiological measurements including change in exhaled carbon monoxide (CO), heart rate (HR), blood pressure (BP), and spirometry param-



ters (forced expiratory volume [FEV] and estimated lung age) were measured pre-and post-smoking. After smoking each device, a questionnaire measured future intentions to use the respective waterpipe. Mixed effect modeling using repeated measures was used to evaluate the association between the type of waterpipe smoked (TWP or EWP) and total smoke exposure on the associated short-term health impacts and future intentions of use. **Results:** Smoking EWP compared to TWP was associated with a significantly smaller average change ( $\Delta$ ) in CO ( $p=0.001$ ),  $\Delta$  HR ( $p=0.001$ ), and  $\Delta$  FEV ( $p=0.026$ ). Total smoke exposure from both waterpipes was associated with a significantly smaller  $\Delta$  CO ( $p=0.001$ ). The interaction between type of waterpipe smoked and the total smoke exposure displayed a significantly smaller  $\Delta$  CO ( $p=0.001$ ). Therefore, EWP smoke exposure compared to TWP smoke exposure resulted less  $\Delta$  CO. Additionally, results showed no significant relationship between any predictor variable and future intentions to use. **Discussion:** It can be suggested that the EWP exposes the smoker to significantly less CO compared to TWP smoking. Further research is necessary to better understand these present findings. Overall, the results highlight a crucial need for more investigation into the use of EWP, as well as the need for comprehensive EWP regulation.

## POS5-71

### AMERICAN INDIAN/ALASKA NATIVE AND WHITE CALLERS TO THE CALIFORNIA SMOKERS' HELPLINE: A SNAPSHOT OF CHARACTERISTICS, USE, AND OUTCOMES FROM 2008-2018

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**Significance:** American Indians/Alaska Natives (AIAN) have some of the highest smoking prevalence rates, highest smoking-attributable mortality rates, and lowest past-year quit attempt rates. Telephone counseling quitlines could be used to help AIAN persons stop smoking. **Objective:** This study examined use and outcomes of California's smoking quitline among AIANs. **Methods:** California Smokers' Helpline (CSH) callers responded to a telephone survey at intake. A random selection of clients was called for evaluation seven months after intake. The current study compared 2008-2018 California Smokers' Helpline callers (intake  $N = 181,259$ ; evaluation  $N = 8762$ ) who self-identified as AIAN single-race, AIAN multi-race, and White single-race on cigarettes smoked at baseline, participation in counseling, and quit rates (no longer smoking, quit attempt for 24 hours). **Results:** Of 331,485 callers of all races at intake, approximately 1.7% were AIAN single-race, 3.0% were AIAN multi-race, and 50.0% were White (Other = 45.3%). At intake, AIAN single-race and multi-race smoked significantly fewer cigarettes per day than White callers ( $M = 17.8$ , 95% CI: 17.6-18.1;  $M = 17.4$ , 95% CI: 17.2-17.6;  $M = 18.5$ , 95% CI: 18.4-18.6, respectively). Significantly more AIAN single-race and multi-race chose counseling than White callers (87.8%, 95% CI: 87.0-88.7%; 88.3%, 95% CI: 87.7-89.0%; 86.3%, 95% CI: 86.1-86.4%, respectively). At evaluation, there were no significant differences in the proportion of each group that was no longer smoking (AIAN single-race = 27.5%, 95% CI: 22.1-32.8%; AIAN multi-race = 26.0%, 95% CI: 22.1-30.0%; White single-race = 30.1%, 95% CI: 29.1-31.1%) nor were there significant differences in quit attempts that lasted at least 24 hours (AIAN single-race = 69.6%, 95% CI: 64.1-75.1%; AIAN multi-race = 75.7%, 95% CI: 71.9-79.6%; White single-race = 71.4%, 95% CI: 70.5-72.2%). **Conclusions:** Smoking rates and quit attempts were similar across groups seven months after intake. The rates of engagement in counseling and their quit rates suggest that quitline counseling is a viable approach to help AIAN persons quit smoking.

FUNDING: State

## POS5-72

### FEASIBILITY OF A SUPPORT PERSON INTERVENTION TO INCREASE USE OF QUITLINE SERVICES AMONG DIVERSE LOW INCOME SMOKERS

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**Significance:** Disparities in smoking prevalence in the U.S. persist with higher prevalence among under resourced individuals. Prior randomized trials demonstrated the efficacy of a support person (SP) intervention targeting nonsmokers for increasing smokers' utilization of a Quitline. This pilot study evaluated the feasibility of translating the

SP intervention to a racially diverse low-income population. **Methods:** The intervention goal was for SPs to motivate their smoker to use free, MN state quitline services, an evidence-based treatment. The study consisted of 3 waves; for each, 10 SP-smoker pairs were enrolled to iteratively adapt/refine the SP intervention. For all 3 waves, the SP intervention consisted of 1 phone coaching call and written materials. Waves 2 and 3 added supportive text messages and a monetary incentive for Quitline utilization. SP assessments at baseline and 1 month follow-up assessed treatment acceptability. Smoker assessments were done at baseline and 3 months follow-up with biochemical verification of abstinence. Quitline staff tracked smoker treatment utilization data. **Results:** Recruitment of 30 SP-smoker pairs was feasible through face-to-face outreach at community organizations. 60% of SPs across all 3 waves completed the coaching call. SP follow-up retention was 53%. In waves 2 and 3, 9 of 20 SPs were adherent to the text messaging intervention component. Feedback from SPs indicated high acceptability with no refinement needed to the coaching call or the supplemental texts. Knowledge of the Quitline was reported as new and interesting. Overall, 6.7% (2/30) of smokers utilized Quitline services. The biochemically confirmed smoking abstinence rate was 6.7% (2/30). **Conclusions:** This pilot demonstrated feasibility to recruit SP-smoker dyads from diverse, low-income communities. The SP intervention was delivered successfully and was well received by participants. However, there was low effectiveness of the SP intervention at prompting smokers to utilize Quitline services. We did observe a higher than expected smoking abstinence rate, suggesting that the SPs may have promoted smoking cessation behavior changes among their respective smoker.

## POS5-73

### SMOKING AND COGNITIVE FUNCTION AMONG CHINESE

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**Background:** Smoking is prevalent among people, especially men in China. However, existing studies examining the relationship between smoking and cognitive function have primarily targeted people in western countries. In this study, we examined the association between smoking and cognitive function in a representative sample of adults aged 45 years and older in China. **Methods:** Baseline data for 16,892 participants of the China Health and Retirement Longitudinal Study (CHARLS) were analyzed. Smoking was measured by smoking status (never, former, and current smokers) and pack years (one pack year equals 20 cigarettes per day for one year). Cognitive function was assessed for visuospatial ability, episodic memory, orientation/attention, and overall cognitive function. Multivariate linear and logistic regressions were used to examine the independent association between smoking and cognitive function controlling for socio-demographic factors, domestic partner status, and depressive symptoms. **Results:** The study participants were, on average, 60 years old. The prevalence of former and current smoking in this population was 8.4% and 28.8% respectively. Compared to non-smokers, former and current smokers had better cognitive function ( $P<0.0001$ ). After controlling covariates, only former smokers, compared to non-smokers have better orientation and attention ( $P=0.01$ ) and overall cognitive function ( $P=0.0002$ ). Moreover, pack years are positively associated with orientation, attention, and overall cognitive function ( $P=0.03$ ). **Conclusions:** This study suggests a protective effect of smoking history on cognitive function, especially attention and orientation among middle-aged Chinese adults who stopped smoking. More studies to clarify this relationship are needed.

## POS5-74

### CIGARETTE/ E-CIGARETTE DUAL USERS' PERCEIVED HARM AND PRODUCT SUBSTITUTION

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**Background:** Millions of U.S. adults dual use cigarettes and e-cigarettes, a product type that exposes users to fewer toxicants and carcinogens compared to cigarettes. Dual users' perceptions of the harmfulness of e-cigarettes compared to cigarettes may influence their product use decisions. **Aims:** Among U.S. adult dual users in 2014-15, we examined whether perceiving e-cigarettes as less harmful than cigarettes (vs. equally harmful, more harmful, or "Don't know") was associated with product use frequencies and changes in product use status one year later. **Methods:** Data were from Waves 2 (2014-15) and 3 (2015-16) of the U.S. Population Assessment of Tobacco and Health (PATH) Study. The sample included adults who reported using both cigarettes and e-cigarettes within the past-30 days in 2014-15. Linear and logistic regressions quantified associations between perceived e-cigarette harm and patterns of e-cigarette and cigarette use. **Results:** Dual users in 2014-15 became more likely to perceive e-cigarettes as equally or more harmful than cigarettes (or "Don't know") over time (2014-15: 40.8%; 2015-16: 58.2%); over 4 million dual users did not perceive e-cigarettes as less harmful than cigarettes in 2014-15 whereas over 6 million did not do so one year later. Dual users who perceived e-cigarettes as equally or more harmful than cigarettes (or "Don't know") in 2014-15 currently smoked cigarettes on more of the past 30 days ( $B=2.5$ , 95%



CI: 1.5,3.5), used e-cigarettes on fewer of the past 30 days ( $B=-5.6$ , 95% CI: -6.6,-4.6), were less likely to become exclusive e-cigarette users one year later (2.7% vs. 7.5%;  $OR = 0.3$ , 95% CI: 0.2-0.6), and were more likely to become exclusive smokers one year later (59.4% vs. 44.8%;  $OR=1.8$ , 95% CI: 1.5-2.2), compared to dual users who perceived e-cigarettes as less harmful than cigarettes. **Conclusions:** Among U.S. adult dual users in 2014-15, the perception that e-cigarettes are equally or more harmful than cigarettes (or "Don't know") increased over time and may have discouraged substitution of e-cigarettes for cigarettes. Experimental studies can test effects of providing relative risk information on dual users' product use patterns.

## POS5-75

### FACTORS ASSOCIATED WITH PAST 30-DAY ABSTINENCE FROM CIGARETTE SMOKING IN A NON-PROBABILISTIC SAMPLE OF 15,456 ADULT ESTABLISHED CURRENT SMOKERS IN THE UNITED STATES WHO USED JUUL VAPOR PRODUCTS FOR THREE MONTHS

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**Significance:** JUUL is the fastest growing and highest selling brand of e-cigarette/vapor products in the United States. Assessing the effect of JUUL vapor products on adult smokers' use of conventional tobacco cigarettes can help inform the potential population health impact of these products. **Methods:** Online surveys assessed past 30-day use of conventional cigarettes, JUUL vapor products, and other e-cigarettes/vapor products, monthly for three months, in a non-probabilistic sample of 15,456 U.S. adults (21+ years). Participants were established current smokers and recruited at their first purchase of a JUUL Starter Kit in a retail store or through JUUL's website. Logistic regression models examined factors associated with participants' odds of reporting past 30-day smoking abstinence at the 3-months assessment. **Results:** Past 30-day smoking abstinence at the 3-months assessment was reported by 28.3% of the intent-to-treat (ITT) sample ( $n = 15,456$ ) and 47.1% of an efficacy subset sample that completed the 3-months assessment ( $n = 9,272$ ). Covariate-adjusted odds for reporting past 30-day smoking abstinence at the 3-months assessment were significantly higher among participants who primarily used Mint or Mango flavored JUUL refill pods (versus Virginia Tobacco flavor) in the past 30 days; exclusively used JUUL refill pods in characterizing flavors (versus tobacco flavors) in the past 30 days; used a JUUL on all 30 of the past 30 days; purchased their first JUUL device in a retail store (versus online); and first purchased a JUUL Starter Kit to help quit smoking completely. Odds for reporting past 30-day smoking abstinence were significantly lower among participants who, at study enrolment, had smoked regularly for  $\geq 20$  years, smoked  $\geq 20$  cigarettes per day, and smoked on all 30 of the previous 30 days. **Conclusions:** Approximately half of new JUUL users reported having quit smoking after using a JUUL for three months. The availability of JUUL pods in characterizing flavors, particularly Mint and Mango, through both retail and e-commerce channels appears to be important to new JUUL users' chances of quitting smoking. The impact of banning retail sales of flavored JUUL refill pods on adult smokers' likelihood of quitting should be closely assessed.

FUNDING: E-cigarette Alternative Industry

## POS5-76

### FEW FORMER AND CURRENT ADULT SMOKERS IN THE US USING E-CIGARETTES, INCLUDING JUUL, FOR CIGARETTE SMOKING CESSATION

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**Significance:** Research suggests exclusive electronic cigarette (e-cigarette) use is less harmful to the consumer than combustible tobacco use. JUUL holds the largest US e-cigarette market share (78.1%) and promotes itself as a product intended for adult smokers looking to switch. However, research is limited on e-cigarettes' effectiveness for cessation. This study examines e-cigarette and JUUL specific use among U.S. adults, and whether e-cigarettes are used as cessation aids. **Methods:** U.S. adults ages 18-64 years old were surveyed in Oct-Dec 2018 using a probability-based online sample ( $n=2979$ ). E-cigarette use was measured by product brand. Current use was defined as past 30-day use. Descriptive univariate analyses were conducted to characterize smoking status, any e-cigarette use, and any e-cigarettes use for smoking cessation, specifically examining JUUL. Data were weighted for representativeness of the US population. **Results:** About 13% ( $n=375$ ) of the sample were current smokers and 20% ( $n=673$ ) were former smokers. Approximately 5% ( $n=136$ ) were current e-cigarette users, including JUUL. About 29% of current e-cigarette users were current JUUL

users, but only 1% of the full sample ( $n=33$ ) were current JUUL users. E-cigarette use was proportionally highest among 18-24 year old adults (7%) and lowest among 55-64 year old adults (3%). Among current smokers, 46% ( $n=163$ ) had made a quit attempt in the past 12 months. Few former smokers (4%,  $n=23$ ) and current smokers who had made a quit attempt (13%,  $n=21$ ) had used e-cigarettes to quit. Few former smokers (1%,  $n=6$ ) and current smokers who had made a quit attempt (2%,  $n=2$ ) had used JUUL in a quit attempt. **Conclusion:** Very few adult smokers, especially adults ages 25-64, are using e-cigarettes or JUUL for smoking cessation. Given the low rate of e-cigarette and JUUL use for cessation, it is unlikely that JUUL is being used by adults looking to quit combustible tobacco products. More data are needed to assess use patterns of e-cigarettes, and specifically JUUL, as cessation tools. These data are currently being augmented to increase the sample of adult JUUL users, in an effort to understand use for cessation purposes.

FUNDING: Unfunded; Non-profit grant funding entity

## POS5-77

### DISRUPTIVE BEHAVIOR IN SIBLINGS DISCORDANT TO MATERNAL SMOKING DURING PREGNANCY; THE MOMATCH STUDY

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**Significance:** Maternal smoking during pregnancy (SDP) is the most important preventable factor causing adverse effects on fetal development and child's postnatal health, including behavioral outcomes such as disruptive behavior. There has been increasing debate if the association between SDP and later behavioral problems is a potentially causal association or spurious effect confounded by shared genetic and environmental factors. **Methods:** This study is a part of the Missouri Mothers and Their Children Study (MO-MATCH). In a sample of families ( $n = 173$ ) specifically selected for sibling pairs (aged 7 to 16 years) discordant for SDP, we use a sibling comparison approach to disentangle the effects of SDP from genetic and environmental factors on disruptive behavior. A SDP severity score was created for each child. This severity score was defined by a combination of the timing, duration, and amount of SDP. Disruptive behavior (a combination of oppositional defiant disorder and conduct disorder scores) was measured by (i) maternal report on the DSM-IV semi-structured interview (MAGIC-Parent on Child) and (ii) parent and teacher report on the Child Behavior Checklist (CBCL) and Teacher Report Form (TRF), respectively. **Results:** The variability in disruptive behavior was primarily a function of differences between siblings (71-92%) rather than differences across families (8-29%). Consistent with prior genetically-informed approaches, the associations between SDP and disruptive behavior, as measured by DSM-IV-based interview as well as symptom-based CBCL and TRF, were primarily explained by familial confounds rather than a causal teratogenic effect. However, when using a multi-rater approach that capitalizes on both parent and teacher report (CBCL and TRF), results suggest a potentially causal effect of SDP on disruptive behavior (beta 0.39, standard error 0.19,  $P = 0.04$ ). The results remained in sensitivity analyses that considered different operationalizations of SDP (e.g. overall quantity of SDP). **Conclusion:** These findings suggest that familial confounds as well as both parent and teacher reports are important considerations in the potential association between SDP and disruptive behavior in non-clinical samples.

FUNDING: Non-profit grant funding entity

## POS5-78

### TEN YEARS AFTER: HOW HAVE SMOKERS' SMOKING AND QUITTING BEHAVIOUR CHANGED SINCE THE INTRODUCTION OF SMOKE-FREE LEGISLATION IN ENGLAND?

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**Significance:** The introduction of Smoke-Free legislation in England in 2007 was a landmark in tobacco control. This study compared smoking and quitting behaviour in the following 10 years to assess how these had changed, and whether any changes had been driven by changes in smokers' sociodemographic characteristics. **Methods:** Data were obtained from 208,813 respondents aged 16+ to nationally representative monthly household surveys in England from 2008 to 2017. Information was gathered on



their age, sex, social grade and region, and smoking and quitting behaviour. Generalised linear modelling was used to examine changes over time. **Results:** Over the period, mean daily cigarette consumption ( $B=-0.30$ , 95%CI= $-0.33$  to  $-0.27$ ) and the time to first cigarette score decreased ( $B=-0.03$ , 95%CI= $-0.03$  to  $-0.02$ ). The proportion of smokers attempting to cut down or quit decreased (OR range= $0.96-0.97$ , 95%CI= $0.95-0.97$ ). Use of behavioural support (OR= $0.89$ , 95%CI= $0.86-0.92$ ) or no support decreased (OR= $0.98$ , 95%CI= $0.96-0.99$ ), whilst use of pharmacological support increased (OR= $1.04$ , 95%CI= $1.02-1.05$ ). There was no evidence that changes in social grade differed between smokers and non-smokers ( $p=.157$ ; ABC1 smokers= $38.3\%$  to  $38.4\%$ ). Changes in smoking and quitting behaviour were independent of changes in sociodemographic characteristics. **Conclusions:** Ten years on from the Smoke-Free legislation, smokers daily cigarette consumption decreased and time to first cigarette increased, indicating that cigarette dependence decreased. This is in contrast with concerns that falls in smoking prevalence inevitably leave behind a more dependent smoking population. Attempts to quit and cut down have decreased, as has use of behavioural support such as NHS stop-smoking services, highlighting the need to reinstate and improve easy to access effective services. Of those smokers making quit attempts, fewer use behavioural support or none, whilst more use pharmacological support to quit. The proportion of smokers of low social grade remains high but unchanged. This lack of progress in reducing the social gradient implies the need for new targeted interventions and policies.

FUNDING: Academic Institution; Non-profit grant funding entity

## POS5-79

### SEXUAL ORIENTATION AS A POTENTIAL MODERATOR IN THE ASSOCIATION BETWEEN RELIGIOSITY CIGARETTE AND MARIJUANA USE

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**Objective:** While increased religiosity is associated with decreased marijuana and cigarette use in the general population, the association is inconsistent for sexual minority populations. The present study examines sexual minority status as a moderator of the associations between religiosity and the use of tobacco and marijuana products. **Method:** College/university students across Oregon ( $N=616$ ) completed an online Qualtrics survey. The sexual minority subgroup ( $n=113$ ) included those who reported a non-heterosexual identity, same-sex attraction, or same-sex behavior. Religiosity was assessed using the 15-item Centrality of Religiosity Scale. Using logistic models in PROCESS, sexual minority status was examined as a moderator of the relations between religiosity and four outcomes indicating no use vs any use in the past 30 days for cigarettes, e-nicotine, marijuana, and blunts. Covariates were gender and race/ethnicity. **Results:** Smoking prevalence was relatively low (4.1%), especially compared to use of marijuana (40.0%), e-nicotine (28.1%), and blunts (10.0%). Cigarette, marijuana, and blunt use did not differ by sexual minority status ( $ps>.05$ ); there were more heterosexual e-nicotine users (29.8%) than sexual minority users (20.4%;  $p<.05$ ). For marijuana use, sexual minority status moderated the religiosity effect ( $b=.58$ ,  $p=.04$ ). Conditional effects revealed that while increased religiosity was associated with decreased likelihood of past 30-day marijuana use for the heterosexual group ( $b=-.14$ ), it was associated with increased likelihood of use for the sexual minority group ( $b=.44$ ). For the other substances, sexual minority status was not a significant moderator ( $ps<.05$ ) and there was no association with religiosity ( $ps<.05$ ). **Conclusions:** Religiosity may be a protective factor for heterosexual groups, but act as a risk factor for sexual minority groups. Furthermore, across college/university students in Oregon, the prevalence of smoking cigarettes was quite low. Longitudinal designs, which account for regional differences in substance use, would help further clarify how religiosity is associated with substance use.

## POS5-80

### TRENDS IN THE AGE OF SMOKING ONSET ACROSS RACE/ETHNIC GROUPS IN CALIFORNIA AND THE U.S.

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**Significance** California (CA) has invested considerably to reduce cigarette smoking over the past 30 years. Delaying the age of smoking onset can be considered one indicator of an effective tobacco control program as an older age of smoking onset is associated with fewer years of smoking. This study aimed to examine differences in the age of regular cigarette smoking onset among racial/ethnic groups in CA compared to

the rest of the US (US). **Methods** Cross-sectional data from the 1992-2015 Tobacco Use Supplements to the Current Population Survey were weighted to estimate trends in the mean age of onset of regular smoking onset (MARSO) for CA and the US. Data were stratified by race/ethnicity: Asians/Pacific Islanders (APIs), Hispanics/Latinos (HLs), non-Hispanic Blacks (NHBs), and non-Hispanic Whites (NHWs). **Results** Over the past 20+ years in both CA and the US, the MARSO was higher among APIs and NHBs relative to NHWs. In addition to a generally increasing trend in the MARSO among NHWs, NHBs and HLs since 2003 in both CA and the US, in 2014-15, the MARSO was higher in CA than the rest of the US for NHB (CA:  $19.6\pm 0.47$  yrs vs. US:  $18.8\pm 0.13$  yrs) and NHWs (CA:  $18.1\pm 0.14$  yrs vs US:  $17.7\pm 0.03$  yrs). Counter to a similarly increasing MARSO among APIs in the US, there was a trend towards younger MARSO among APIs in CA that was observed starting in 2003, when the MARSO was  $19.8\pm 0.49$  yrs and declined to  $18.9\pm 0.34$  yrs by 2014-15. This 2014-15 MARSO among APIs in CA was also significantly lower than in the US ( $19.8\pm 0.27$  yrs). For HLs, NHBs and NHWs in the 2000-2009 decade, the proportion of ever smokers that initiated at 18-21 years old increased from previous decades and continued through 2010-2015. **Conclusions** Despite the increase in MARSO among HLs, NHBs and NHWs since 2003 in both CA and the US, a disturbing trend was observed among APIs wherein the MARSO decreased during this period in CA. That HLs and NHWs are more likely to initiate regular smoking as adolescents, and APIs and NHBs are more likely to initiate as adults, suggests that effective adolescent cigarette prevention programs should be combined with those that focus on young adults.

FUNDING: State

## POS5-82

### U.S. ADOLESCENTS' INTEREST IN USING E-CIGARETTES IN FLAVORS MARKETED AND NOT MARKETED BY JUUL

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**Significance:** The U.S. FDA has identified flavors as the "core of the epidemic" of youth use of e-cigarettes that has emerged in 2018. FDA has also claimed that much of the past-year rise in youth e-cigarette use has been driven by one brand - JUUL. Understanding the youth appeal of flavors marketed by JUUL is critically important. **Methods:** U.S. adolescents aged 13-17 years ( $n=9,872$ ) were recruited from an internet research panel to complete an online survey between 23 November and 13 December 2018. Participants rated their interest (0-10 scale) in using e-cigarettes in 30 flavors, including four tobacco/mint/menthol flavors and four characterizing flavors currently offered in JUULpods. The other 22 flavors represented fruit, sweet, dessert/pastry and drink flavors not offered in JUULpods that were expected to appeal to youth. Flavor interest was compared within and across current ( $n=1,479$ ), former ( $n=1,032$ ) and never users ( $n=5,583$ ) of e-cigarettes. **Results:** Never users' reported very low interest in using an e-cigarette in each of the 30 tested flavors, with medians ranging from 0.3 ("Virginia Tobacco", IQR:0.0-1.1) to 1.8 ("Cotton Candy", IQR:0.2-6.7). Overall, never users' interest in non-JUUL flavors was low (Med.=1.9, IQR:0.3-5.0) but significantly higher than the characterizing flavors (Med.=1.4, IQR:0.2-4.1) and tobacco/mint/menthol flavors (Med.=0.7, IQR:0.1-2.2) offered in JUULpods ( $ps<.001$ ). For each flavor, current users reported significantly higher interest than former users, and former users reported significantly higher interest than never users ( $ps<.001$ ). Of the flavors offered in JUULpods, "Fruit" appealed most to each e-cigarette use group; absolute interest was low among never users (ranked 7<sup>th</sup>/30; Med.=1.4, IQR:0.2-5.8) but high among current users (ranked 3<sup>rd</sup>/30; Med.=7.3, IQR:5.1-9.4) and former users (ranked 2<sup>nd</sup>/30; Med.=6.7, IQR:2.9-8.7). **Conclusions:** Adolescents who had never used an e-cigarette had very low interest in using an e-cigarette in the eight flavors offered in JUULpods. The availability of these flavors is therefore unlikely to have been a significant driver of recent increases in youth use of e-cigarettes. The availability of several highly appealing flavors not offered in JUULpods (e.g. Cotton Candy, Strawberry), and one of eight flavors offered in JUULpods (Fruit), however, may encourage adolescents to continue or re-initiate e-cigarette use.

FUNDING: E-cigarette Alternative Industry



## POS5-83

### EXPANDING INDICATORS OF YOUTH TOBACCO CONSUMPTION; AN ANALYSIS OF AVERAGE DAILY CIGARETTE SMOKING AMONG US HIGH SCHOOL STUDENTS OVER TWO DECADES

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**SIGNIFICANCE:** Smoking prevalence among US high school students, typically defined as any cigarette smoking in the past 30 days, has decreased dramatically the past two decades. Prevalence estimates tell us how many smoke, but not how many cigarettes are consumed. As such, reliance on this sole measure of youth smoking is insufficient as it fails to account for frequency and intensity. We examined average daily cigarette smoking over time for US youth. **METHODS:** We analyzed data from the 1991 through 2017 Youth Risk Behavior Survey, a nationally representative study of US high school students. We classified smoking frequency among current smokers based on the number of past 30 days they smoked: rare (1-5 days), infrequent (6-9 days), moderate (10-19 days), frequent (21-29 days), and daily (all 30 days). We calculated average daily consumption (ADC) as the product of smoking frequency (number of smoking days in past 30 days) and intensity (number of cigarettes smoked on smoking days) divided by 30. We estimated ADC overall and by smoking frequency group. **RESULTS:** From 1991 to 2017, the prevalence of current cigarette smoking declined 68% from 27.5% (95% CI, 24.7-30.3) to 8.8% (7.1-10.5) while ADC declined by 77% from 1.3 (1.0-1.6) to 0.3 (0.2-0.3) cigarettes. There were no significant changes in ADC within smoking frequency groups; for example, daily smokers smoked about half a pack of cigarettes daily in 1991 and 2017. Meanwhile, the proportion of current smokers who smoked rarely increased from 33.5% in 1999 to 48.9% in 2017 while the proportion who smoked frequently or daily decreased from 46.2% to 29.5%. Taken together, this suggests that changes in smoking frequency, rather than intensity, drove the overall decline in ADC. **CONCLUSION:** The standard definition of current cigarette smoking among youth understates the degree to which high school students in the US have rejected cigarette smoking. At a minimum, future reporting on youth tobacco use should include average daily cigarette consumption as it would capture changes in frequency and intensity. Reporting of more refined measures of smoking prevalence (e.g., frequent or daily smoking) is also warranted.

FUNDING: Unfunded

## POS5-84

### THE ASSOCIATIONS OF SMOKING DEPENDENCE MOTIVES WITH DEPRESSION AMONG CURRENT CIGARETTE SMOKERS

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Little is known about the association of smoking dependence with depression symptoms. We analyzed how dimensions of smoking dependence are associated with depression symptoms in current smokers and if the associations are independent of shared familial factors including genetic liability. Data were based on the 2011 survey of the Finnish Twin Cohort (participation rate 72%, n=8410, 45% men, mean age 60 years, born in 1945-57). Current depression symptoms were assessed using the Center for Epidemiologic Studies Depression (CES-D) scale (cut off value  $\geq 20$ ) showing depression prevalence of 13% (11% in men, 15% in women) in the full sample, and 20% (16% in men, 24% in women) in 1,475 current smokers. Dependence was assessed using the Fagerström Test (FTCD) and three subscales from the multi-dimensional Brief Wisconsin Inventory of Smoking Dependence Motives (WISDM): Primary Dependence Motives (PDM), Affective Enhancement (AE), and Taste (T). The WISDM and FTCD scores were standardized for comparisons. Logistic regressions adjusted for sex, age and education with correction for sampling as twin pairs were used in the individual-based analyses. Higher depression was associated with higher dependence as measured by the PDM (OR 1.77, 95% Confidence Intervals [CI] 1.51 - 2.08) and AE (OR 1.74, 1.49 - 2.05). Significant associations were also found for T (OR 1.21, 1.04 - 1.42) and FTCD (OR 1.59, 1.36 - 1.86). There were no interactions ( $p > 0.05$ ) between sex and any of the dependence variables related to depression. Conditional logistic regression was used to adjust for the effect of familial factors in twin pairs focusing on genetically identical (monozygotic, MZ) pairs who were concordant for smoking and discordant for depression (23 MZ pairs). Both PDM and AE but not T had a significant association with depression within these MZ pairs. This suggests an association independent of familial factors including genetic liability. Depression and smoking dependence motives

associated with heavy, automatic use and use to regulate affective states may share an underlying non-genetic cause. However, causality related to association needs to be confirmed with longitudinal studies.

FUNDING: Federal; Academic Institution; Non-profit grant funding entity

## POS5-85

### ASSOCIATIONS OF SOCIO-DEMOGRAPHIC CHARACTERISTICS AND CONVENTIONAL CIGARETTE SMOKING BEHAVIORS WITH POLY-TOBACCO USE IN HONG KONG CHINESE: A POPULATION SURVEY

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**Significance** Use of alternative tobacco products is increasingly popular in Hong Kong, where the prevalence of daily conventional cigarette smoking is low (10.0%). We examined the associations of sociodemographic characteristics, tobacco addiction, and readiness to quit of conventional cigarettes with poly-tobacco use in current conventional cigarette users. **Method** A representative sample of 1139 current conventional cigarette users aged 15+ (84.1% male) were telephone interviewed in Tobacco Control Policy-related Surveys in 2015 and 2017. The respondents reported (1) current poly-tobacco use (past 30-day use of electronic cigarettes, waterpipe, cigars, smoking pipe, snus, snuff or self-rolling cigarettes in addition to conventional cigarettes); (2) Heaviness of Smoking Index (HSI) of conventional cigarettes; (3) readiness to quit conventional cigarettes within 30 days (yes/no); and (4) sociodemographic characteristics (age, sex, educational attainment, income). Adjusted odds ratio (AORs) for current poly-tobacco use (versus conventional cigarette use only) in relation to socio-demographic characteristics, HSI and readiness to quit were calculated. Prevalence were weighed by age and sex of current cigarette users in census reports. **Results** The prevalence (95% CI) of any tobacco products use was 13.4% (11.3-15.3%) for current poly-tobacco, 6.3% (4.8-8.4%) for cigars, 5.6% (4.2-7.4%) for self-rolling cigarettes, 3.8% (2.6-5.6%) for waterpipe, 2.02% (1.1-3.6%) for electronic cigarettes and 2.01% (1.2-3.4%) for smoking pipe. Current poly-tobacco use was associated with being male (AOR 2.00, 95% CI 1.11-3.61) (vs. females), younger age (AORs range from 1.40-4.89,  $P$  for trend  $< .001$ ) and smoker who were less ready to quit (1.94, 1.08-3.49). HSI was not associated with current poly-tobacco products use. **Conclusions** Being male, younger and less ready to quit were more likely to use poly-tobacco products.

## POS5-86

### CIGARETTE SMOKERS' USE OF FILTERED CIGARS AND CIGARILLOS DURING TIMES OF FINANCIAL HARDSHIP

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**Significance:** Although some filtered cigars and cigarillos are similar to cigarettes in terms of size and packaging, cigarillos and filtered cigars can cost less in the U.S., in part, because of differences in state excise taxes. In this study, we examine whether cigarette smokers experiencing economic hardship are more likely to use less costly cigarillos or filtered cigars compared to other cigarette smokers. **Methods:** Data were drawn from the Population Assessment of Tobacco and Health (PATH) Study Wave 3 Adult Restricted Use File. Weighted proportions compare the demographic characteristics of past 30 day cigarette users who also used cigarillos or filtered cigars in the past 30 days to those who did not. Cross-sectional weighted logistic regression analyses examined correlates of past 30 day cigarillo or filtered cigar use among past 30 day cigarette users. Economic hardship was assessed as being "unable to pay important bills on time in the past 30 days because of shortage of money" or "received assistance or income from federal, state, or local programs in the past 12 months." **Results:** Among past 30 day cigarette users, the percentage of people who could not pay important bills was higher among those who used cigarillos or filtered cigars in the past 30 days compared to those who did not (32.88% vs. 21.66%). The percentage of people who received public assistance was also higher among cigarillo or filtered cigar users (33.17% vs. 25.86%). Past 30 day cigarette users who could not pay important bills or who received public assistance were significantly more likely to use cigarillos or filtered cigars than those who did not have a shortage of money (aOR=1.31, CI=1.10 - 1.56) or received public assistance (aOR=1.24, CI=1.07 - 1.43) after adjusting for age, sex, race/ethnicity, education, income, marijuana use, and other tobacco use. **Conclusion:** After controlling for age, sex,





race/ethnicity, education, income, marijuana use, and other tobacco use, our findings suggest that cigarette smokers who experience a shortage of money or receive public assistance are more likely to smoke cigarillos or filtered cigars.

FUNDING: Other

## POS5-87

### OFFERS OF CIGARETTES AND E-CIGARETTES AMONG STUDENTS IN CALIFORNIA

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**Significance:** The intention to use cigarettes or e-cigarettes is a strong predictor of use among youth. However, access to these products is also critical, and youth who are offered a cigarette or e-cigarette may be at higher risk of use. There is currently a lack of data about the prevalence of youth being offered cigarettes or e-cigarettes and about the characteristics of youth who are offered these products. The objectives of this study are to measure the prevalence of youth being offered cigarettes and e-cigarettes in the last 30 days, and to identify the characteristics of those receiving product offers among a large, school-based sample of students in California, USA. **Methods:** Using representative data collected from the 2015-16 California Student Tobacco Survey (n=45,956), this study identified the prevalence of offers of cigarettes and e-cigarettes in the last 30 days. Separate multilevel logistical regression models identified student-level demographic and behavioral characteristics associated with being offered cigarettes and e-cigarettes. **Results:** In the weighted sample, 9.5% and 14.0% of students reported being offered cigarettes and e-cigarettes, respectively. The prevalence of offers varied according to responses to measures of susceptibility to future product use. A large proportion of offers (>33.0%) were reported by never-users. Students with friends that used cigarettes or e-cigarettes, with high sensation seeking tendencies, and with more weekly spending money had higher odds of reporting offers of cigarettes and e-cigarettes. **Conclusions:** Offers of cigarettes and e-cigarettes are common among all students and are of particular concern among never-users. There are marked differences in the prevalence of offers of cigarettes and e-cigarettes according to susceptibility to future product use. Including measures of offers of cigarettes and e-cigarettes in surveillance systems could help identify those at highest risk of future cigarette and e-cigarette use.

FUNDING: State

## POS5-88

### EXAMINING OTHER TOBACCO AND MARIJUANA USE AMONG EXPERIMENTERS AND CURRENT USERS OF JUUL

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**Objective:** Use of marijuana and other tobacco products (co-use) is common. JUUL, a new e-cigarette, has recently entered the market, and use of it has increased significantly in the past two years. While some studies have examined different aspects of JUUL, limited studies examine the co-use of marijuana, other tobacco products (OTP), and JUUL. This study explored use patterns of marijuana, OTP, and co-use of JUUL. **Methods:** Survey respondents were 263 U.S. adults (Mage = 31.9 years; 55% female; 68% Non-Hispanic White) registered on Amazon Mechanical Turk (MTurk) who reported JUUL ever-use and indicated past 30-day use of marijuana. Survey items included measures assessing JUUL use, OTP use, state legalization status of marijuana (i.e., legal vs. illegal), age of first marijuana use, and self-reported nicotine dependence (Hooked on Nicotine Check List (HONC)) and disordered marijuana use (Cannabis Use Disorder Identification Test Revised CUDIT-R)) addiction. Differences were examined via independent samples t-tests by other tobacco use status (JUUL+OTP User vs. JUUL-exclusive) and marijuana legalization status such as medicinal and/or recreational (legal vs. illegal). **Results:** The majority of the sample were JUUL+OTP users (68%, n = 157), reported taking less than 10 puffs per JUUL session (81%), with less than 10 JUUL sessions per day (88%) for less than 10 minutes (89%). Regarding marijuana use, the majority of respondents reported marijuana use for an average of 14 days per month (SD = 12 days; Median = 10, Mode = 31 days) for an average of 4 months (SD = 3 months). JUUL+OTP users reported significantly greater scores on the CUDIT-R (M = 9.19; SD = 6.34, t(261) = 2.40, p = .02) and the HONC (M = 1.47, SD = 2.42, t(261) = 2.59, p = .01) compared to JUUL-exclusive users (CUDIT-R, M = 7.36, SD = 5.69; HONC, M = .77, SD = 1.90). Users who resided in states where marijuana was legalized indicated greater CUDIT-R scores (M = 9.2, SD = 6.5) than those who resided in states where it is illegal (M = 7, SD = 5), t(226) = 3.07, p = .005). No differences were observed in age of first marijuana use (p = .28) by legalization status.

**Conclusions:** In this sample, JUUL+OTP users reported greater nicotine dependence and disordered marijuana use compared to JUUL-exclusive users. Users in states with legalized marijuana also reported greater disordered marijuana use.

FUNDING: State

## POS5-89

### IMPLEMENTING AND PROMOTING MEDICAL CENTER ELECTRONIC REFERRALS TO A STATE QUITLINE

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**Significance:** In New York, smoking prevalence is 14.2%, causing about 28,000 deaths annually. The Electronic Health Record (EHR) offers healthcare providers an eReferral tool to quickly and efficiently refer patients to state quitlines. This observational study examined eReferral data from two Western New York health systems: University of Rochester Medical Center (URMC), and Rochester Regional Health (RRH). Both systems refer patients to the New York State Smokers' Quitline (NYSSQ). **Methods:** RRH began using eReferral in March 2016 without announcements or promotions. In the following 12 months, 2,445 patients were referred. URMC began using eReferral in August 2017 and announced its availability. URMC sent a promotional email in May 2018 encouraging use by providers. URMC data on eReferrals from September 2017 to November 2018 were collected and examined (n=949). The number of eReferrals made during the months 1-5 of 2018, prior to the May announcement, were compared for these systems with those during months 6-10 of 2018. **Results:** At RRH, the difference between eReferrals in months 1-5 (488) and those in months 6-10 (648) was not statistically significant (t(1136)=1.09, p=0.93). Similarly at URMC, the increase in the total number of eReferrals during the second five-month time period (394) compared to the first time period (333), was not statistically significant (t(727)=1.03, p=0.98). URMC eReferral patients were 55% women, middle-aged (mean age=52), and smoking an average of 15 cigarettes per day. Monthly eReferrals averaged 63, (max=116 in month 10). Just over 13.2% (n=125) of these patients were concurrently prescribed medication. **Conclusion:** An increase in NYSSQ referrals occurred in both health systems after eReferral was introduced, irrespective of efforts to raise awareness. Promotion of eReferrals was feasible and sustainable at URMC. Future work is needed to identify the optimal methods of encouraging use of eReferrals to smoking cessation resources and analyzing patient quit outcomes.

FUNDING: State

## POS5-90

### RELIGION, RACE AND CIGARETTE AND E-CIGARETTE USE

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**SIGNIFICANCE:** Religious involvement is associated with lower risk of smoking initiation and frequency among youth. The relationship between religiosity and smoking appears moderated by race, such that black religious youth are more likely to abstain from smoking than their white religious counterparts. Research examining religion and tobacco use among Hispanic youth is rare. Additionally, little is known about whether religious involvement protects against other forms of tobacco use, including vaping, and whether this relationship varies by race-ethnicity. **METHODS:** Using nationally representative data from the 2016 Monitoring the Future (MTF) study, we examined associations between religious attendance and religious salience and ever use of cigarettes and vaping, current use (i.e., within past 30 days) and frequency of use of the two products among 12th graders using logistic and linear regression models. To examine the moderating effects of race-ethnicity, we include two-way interactions between race-ethnicity (i.e., Black, Hispanic and White youth) and religious attendance and salience. **RESULTS:** Religious attendance was associated with lower odds of ever smoking (OR: .90, p<.01) and current smoking (OR: .83, p<.001), but not with smoking frequency. Religious salience was inversely related to ever smoking (OR: .89, p<.01), but not current smoking or frequency of smoking. No significant associations between religious involvement and any vaping behaviors were found. In models examining the moderating effects of race-ethnicity, higher levels of religious attendance and salience reduced the odds of ever smoking among Hispanic youth compared to Whites. Also,



religious attendance had a stronger, inverse relationship with current smoking among both Hispanic and Black youth, compared to their White peers. We did not find any statistically significant interactions between religion and race-ethnicity in models for ever vaping, current use and frequency of vaping. **CONCLUSION:** Religious involvement was inversely associated with smoking among adolescents, with stronger effects found for Hispanics and Blacks. However, religious involvement was not associated with any vaping behaviors. Religion may encourage a form of "technical abstinence," where religious youth eschew tobacco use for moral and practical reasons, but rationalize vaping as a less risky substitute. Research reported in this publication was supported by the National Cancer Institute of the National Institutes of Health under Award Number R37CA214787-S1.

FUNDING: Federal

## POS5-91

### ROLL-YOUR-OWN SMOKERS AS TOBACCO POUCH DESIGNERS

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**BACKGROUND:** No jurisdictions have developed on-pack warnings targeting roll-your-own (RYO) use, even though RYO smokers may have more difficulty quitting and be at greater risk of relapse than other smokers. RYO use is also increasing in many countries; in New Zealand (NZ), half of all smokers report using RYO tobacco, with use especially high among Māori (indigenous peoples), young adults, and people experiencing lower prosperity. RYO-specific on-pouch warnings may be a cost-effective population-level strategy to increase cessation among these priority groups. To assess this idea, we piloted a novel construct-a-pouch elicitation method with NZ RYO smokers to generate initial theme ideas for RYO-specific warnings. **METHOD:** In in-depth interviews, participants successively sorted photos (depicting themes of death, disfigurement, material hardship, financial loss, harm to pets, and chemicals/additives) and three types of messages (headline warning, secondary warning, explanatory message) according to whether the photo or message would be highly likely to prompt an RYO smoker to think of quitting, maybe likely or unlikely. At each sorting stage participants' choices were probed. After each sorting task, the photo or message the participant chose as being most likely to prompt an RYO smoker to think about quitting was placed on a physical pouch mock-up based on NZ's standardised packaging legislation. Participants were prompted to reflect on the pouch they created. **RESULTS:** Pouches were constructed by 22 participants (n=11 women) aged 18-67 years. We obtained detailed and rich responses even from participants with no desire to quit, reading difficulties, or passive-aggressive attitudes. Following the interview, over half of the participants gave unprompted feedback that they found the pouch construction task fun and interesting. **CONCLUSION:** The construct-a-pouch method was engaging and well-liked by participants. Our approach is one of the first studies to explore a pouch gestalt, rather than isolated design elements. Participants' engagement suggests this approach could be used to develop more cohesive warning narratives and a more holistic approach to warning design.

FUNDING: Academic Institution

## POS5-92

### A COMPREHENSIVE EVALUATION OF THE IMPACT OF RECENT ENGLISH TOBACCO CONTROL POLICY USING SECONDARY DATA

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**Background** Smoking is the biggest avoidable cause of death and disability in England. A range of laws and policies aimed at preventing this harm have been introduced in England to try to prevent young people from becoming smokers, and encourage existing smokers to quit and to protect others from the harmful effects of cigarette smoke. This study aimed to evaluate the effects of these policies using publicly available data. **Methods** We developed logic models for each policy that indicated the anticipated causal pathways for each policy and used these to develop hypotheses for our analysis. Interrupted time series analysis was carried out systematically and using a consistent approach across policies, datasets, outcomes and populations. Outcome measures were adult smoking prevalence, quitting behaviour and consumption. Models were adjusted for sociodemographic factors, e-cigarette prevalence and mass media expenditure. Datasets included the Smoking Toolkit Study (STS) and the Health Survey for England (HSE). **Results** Following a point of sale display ban in large shops in April 2012, based on the STS data, there was a significantly steeper declining trend in adult smoking prevalence. This finding was supported by results from the HSE. A similar result was found when analysing quit attempts. Following a point of sale ban in small shops in April 2015, there was a significantly steeper decline in trend in adult prevalence. There was also a

significant decline in trend in quit attempts. No significant impact of the smoke-free policy on smoking prevalence was found and we found no evidence of a combined impact of three policies that were implemented in October 2015 (proxy purchase ban, minimum age of purchase for e-cigarettes and smoking ban in cars carrying children) on adult prevalence. **Discussion and conclusions** Both display ban policies were followed by a decline in the trend for smoking prevalence and quitting attempts in adult smokers. A key strength in this study was its consistent and theory-based approach which allowed us to assign impacts to a certain policy with more confidence. This novel approach to policy analysis could also be applied in other public health disciplines. This study is funded by NIHR PRP (PR-R14-1215-24001). The views expressed are those of the author(s) and not necessarily those of the NHS, the NIHR, the Department of Health and Social Care, arms length bodies or other government department.

FUNDING: Federal; State

## POS5-93

### ANTICIPATED VS. ACTUAL POSTPARTUM CONTRACEPTIVE USE AMONG PREGNANT CIGARETTE SMOKERS

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**SIGNIFICANCE** Smoking during pregnancy is the leading preventable cause of poor pregnancy outcomes. Efforts to prevent smoking-exposed pregnancies have focused almost exclusively on trying to help pregnant smokers quit, with little attention paid to the fact that more than half of these pregnancies are unintended. Correct and consistent use of effective contraception prevents unintended pregnancy, but little is known about contraceptive use specific to female smokers. Thus, the present study examined pregnant smokers' contraception intentions for after delivery as compared to actual contraception use once postpartum. **METHODS** Data were collected from pregnant cigarette smokers enrolled in a clinical trial for smoking cessation. At approximately 17- and 28-weeks antepartum (AP), women were asked what contraceptive methods they planned to use after delivery. At approximately 4- and 8-weeks postpartum (PP), they were asked what methods they had used since delivery. Initial data are from 32 women. **RESULTS** AP, most women (87%-97%) reported they were planning to use contraception PP. Of these, the majority (58-59%) intended to use one of the most effective contraceptive methods (intrauterine device, implant, or sterilization), but actual use PP was initially only 16% at 4 weeks PP before rising to 31% at 8 weeks PP. Although few women (3-13%) reported that they were not planning to use contraception PP, 50% of women reported no use at 4 weeks PP, decreasing to 3% at 8 weeks PP. **CONCLUSION** These preliminary results suggest a large percentage of women (40%) who want one of the most effective methods do not receive it and that across all methods, half of all women are not protected in the early PP period. More research is needed to further these findings and to better understand contraceptive use in this vulnerable population as another method for reducing smoking-exposed pregnancies. Supported in part by NIH grants R01 HD075669, R01 DA036670, T32 DA007242 and P20 GM103644

FUNDING: Federal

## POS5-94

### PRELIMINARY FEASIBILITY AND ACCEPTABILITY OF STAY QUIT TOGETHER - A SMOKING RELAPSE PREVENTION INTERVENTION

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**Significance:** Many women who quit smoking during pregnancy relapse after birth. This research reports preliminary findings on the feasibility and acceptability of a smoking relapse prevention intervention for couples. **Methods:** The Stay Quit Together RCT enrollment started in June 2018. The target population is comprised of women who just gave birth and who quit smoking during pregnancy or up to 6 months before and their partners. Eligibility criteria included age $\geq$ 18; owning a smartphone; with a stable partner; and willing to share partner contact info. A Research Assistant enrolled women in the largest two Obstetrics-Gynecology Clinics in Cluj-Napoca, Romania. The intervention was delivered in the first six weeks after birth and the couples were randomized in one of the three groups: the xSmoker App (n=24); the xSmoker App + tailored SMSs focused on relapse prevention (n=26); or usual care (n=25). We report preliminary feasibility and acceptability findings. **Results:** Of the 631 women approached, 86.2% were not eligible due to their smoking status. Of the 87 who went fully through eligibility assessment, 86% were eligible (n=75) and were enrolled in the study. Twenty-five women were randomized in the app-only group, 25 in the app+SMS group, and 25 to the control group. Among the women in the intervention arms, 64% (n=16) in the app-only subgroup and 72% (n=18)



in the app + SMS installed the app. Only 2 of the partners (in the App+SMS subgroup) used the app. Five of the 26 women in the app + SMS subgroup opted out of the trial and 4 asked for messages to stop. Women in the app + SMS arm who completed the trial received on average 124 messages. Of the 18 partners in the app + SMS arm, 6 asked for messages to stop and 4 opted out of the trial. Partners in the app + SMS arm who completed the trial received on average 87 messages. **Conclusion:** A couple-focused postpartum intervention for smoking relapse prevention shows early evidence of feasibility and acceptability among mothers. More efforts are needed to engage partners in using the app portion of the intervention. **Acknowledgement:** This work was supported by a grant of Ministry of Research and Innovation, CNCS - UEFISCDI, project number PN-III-P4-ID-PCE-2016-0632, within PNCDI III.

FUNDING: State

## POS5-95

### PSYCHOMETRIC EVALUATION OF THE 10 ITEM QUESTIONNAIRE OF SMOKING URGES BRIEF

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**Significance:** There are many brief versions of the Questionnaire of Smoking Urges (QSU) with different items, rating scales, and scoring. A commonly used version is the 2-factor 10-item "QSU-Brief". Despite its popularity, little is known about its psychometric properties and previous research has yielded inconsistent findings. Therefore, the purpose of this research is to generate guidance for researchers through a psychometric evaluation of the QSU-Brief (7-point rating scale (RS)). **Method:** Using a Rasch modeling framework, we evaluated the QSU-Brief using data from 3 clinical studies (N=314) where adult cigarette smokers were randomized to their own brand cigarettes, e-vapor, or nicotine gum. **Results:** A principal components analysis on the probability scale residuals provided evidence of dimensionality. The first dimension represented "intention and desire to smoke" (IDS), while items 4, 8, and 9 loaded onto a second dimension, "relief of negative affect with an urgent desire to smoke" (RNA). IDS: We sequentially removed items 10, 5, and 2 due to problems with RS functioning and item fit. The remaining 4 items exhibited appropriate RS functioning, good reliability (person reliability = .86, separation=2.52), unidimensionality, and did not exhibit bias (evaluated via differential item function (DIF)) based on gender, race, or age. The person-to-item map suggested a ceiling effect. IDS differed between products. Change in IDS scores following ad lib use differed by product, whereby subjects randomized to cigarettes reported greater reduction in IDS than e-vapor or gum. Exploratory analyses suggested that change in IDS was related to amount of product used during ad lib use. RNA: We collapsed the 7-point RS to a 5-point RS due to disordered thresholds. Person reliability and separation were .76 and 1.79, respectively. The items did not exhibit bias. Results suggested a floor effect, limited person-to-item targeting, and provided some evidence of known-groups validity and responsiveness. **Conclusion:** This is the first study to comprehensively evaluate this QSU-Brief. While results provide support for the 4-item IDS scale, psychometric properties of the 3-item RNA scale were generally less robust. Therefore, strengths and weaknesses of this scale should be carefully considered before use. Overall, findings presented here are intended to aid researchers in selecting appropriate metrics for future studies.

FUNDING: Tobacco Industry

## POS5-96

### GEOGRAPHIC AND ETHNIC DIFFERENCES IN TOBACCO USE IN THE DEMOCRATIC REPUBLIC OF THE CONGO

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**Significance** The Demographics and Health Survey (DHS) is a standardized survey conducted in over 90 countries around the world periodically, collecting biological and behavioral information, as well as geographic location for all respondents. The data collected can provide valuable insights to assist with planning a variety of public health interventions. We analyzed data from the 2013-2014 DHS in the Democratic Republic of the Congo to examine patterns in tobacco use in the country. With modernity & slowly improving economic conditions, the prevalence of tobacco-induced disease is increasingly recognized as a public health concern. **Methods** We analyzed men's and women's responses by provinces and product used. Crosstabs were created and chi-square analyses conducted. Additionally, tobacco use data were linked with location information and were entered into mapping software for additional examination. **Results** Final samples included 18,827 women and 8656 men and ages of respondents ranged

from 18 to 49 among women and 18 to 59 for men. Nationwide, 21.2% of men smoked cigarettes while 0.5% of women smoked cigarettes. Analysis by province and ethnicity, however, indicated stark differences in use patterns. Rates ranged from 13.5% in Kinshasa, the capital city, to nearly 40% in Kasai, Ituri and Haut-uele provinces. Among women, use exceeded 1% only in Ituri province. Nearly 8% of men used dry snuff, but the rate exceeded 36% in Kwango and Kasai provinces. Rates exceeded 1% among women only in 3 provinces. **Conclusions** National-level tobacco use prevalence reports can be misleading when examining highly diverse ethnic groups with very different traditional use patterns. DHS data provide a wealth of information that can provide greater specificity about types of tobacco used and use patterns. Mapping use, with provincial and ethnic group overlays can be of great assistance in fully analyzing data and developing interventions. These maps will be demonstrated.

FUNDING: Unfunded

## POS5-97

### VISUAL ATTENTION AND RECALL OF EXPLICIT AND IMPLICIT NATURAL SELLING PROPOSITIONS

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**Significance:** Several tobacco brands use natural and organic selling propositions, which have been shown to communicate reduced harm messages to consumers. Better understanding of how smokers' attention to these selling propositions affects their perceptions will inform regulatory oversight of misleading messages in tobacco advertising. **Methods:** Adult daily smokers (n = 297) were randomly assigned to view a Natural American Spirit cigarette ad in a parent experimental study that manipulated health warning size; none of the participants used this brand. We used eye-tracking software to measure visual attention to precise wording in the advertisement and identified areas of interest (AOI) for specific words explicitly or implicitly supporting two dominant selling propositions in the advertisement: "natural" and "ecofriendly." For the natural theme, AOIs included the words "natural," "organic" and "premium"; for the eco-friendly theme, AOIs included the words "sustainable," "recycle," "earth-friendly," etc. We summed milliseconds of viewing time for these AOIs and converted to a percentage of total viewing time. Two outcomes of interest, recall of "natural" and "ecofriendly" words, were measured with an unaided recall question. A verbatim transcript for all recall responses was independently coded for conceptual themes; themes were dichotomized into any recall versus none. Descriptive statistics were used to examine the correlations between visual attention to selling proposition terms and recall of selected themes in SAS 9.4. **Results:** Smokers spent 12.5% (SD: 0.10) of their viewing time on the natural AOI, and 10.7% (SD: 0.14) on environmentally-friendly AOI; 13.1% recalled the natural theme, and 4% recalled the environmental theme. The percent of viewing time of environmentally-friendly AOIs had a small but significant correlation with recall (r=0.19, p<0.01). There was no significant association between the natural AOI and recall (p>0.05). **Conclusion:** Attention to minor wording in a non-preferred brand advertisement was correlated with recall of environmentally-friendly but not natural as a selling proposition.

FUNDING: Federal

## POS5-98

### ASSOCIATIONS BETWEEN PARENTAL PRACTICAL AND EMOTIONAL SUPPORT AND ADOLESCENT SMOKING BEHAVIOR TRANSITIONS IN A NATIONAL STUDY

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**Significance:** Most tobacco users initiate the behavior during adolescence. Parental support can be a protective factor against adolescent tobacco use, which is linked to other risk behaviors and mental health issues as well as physiological effects. We examine if different types of parental support are associated with subsequent development of smoking behaviors, and if the associations differ by sociodemographic context. **Methods:** We analyzed data from 14,738 adolescents (11-19 years old) who completed Wave I (1994-1995) and Wave II (1996) of the National Longitudinal Study of Adolescent to Adult Health. Participants reported past and present tobacco use at each wave. Participants also responded to items about their relationships with their parents. Factor analysis was used to extract two factors: practical and emotional support. Covariates included demographics, parental smoking, tobacco availability, and neighborhood safety. Weighted multiple logistic regression was used to examine the associations of two parental support factors with transitions in smoking behaviors between Waves I and



II, in the full sample and stratified by covariates. **Results:** Among adolescents who had tried smoking but never smoked regularly at Wave I, greater practical support predicted lower odds of current (AOR .73, 95% CI .59, .90) and regular (AOR .71, 95% CI .56, .91) smoking at Wave II. In stratified analyses, practical support predicted lower odds of Wave II smoking trial among Wave I never-smokers from families with low parental education (AOR .69, 95% CI .51, .93) or low income (AOR .67, 95% CI .47, .95). Practical support was also associated with lower odds of Wave II current (AOR .36, 95% CI .18, .70) and regular (AOR .16, 95% CI .05, .49) smoking among Wave I never-smokers from unsafe neighborhoods. **Conclusion:** The effects of practical and emotional support vary across sociodemographic contexts, with practical support notably predicting lower odds of smoking progression among some at-risk groups. As technologies and trends emerge, future research should address the influence of parent-child relations and social determinants on adolescent tobacco use, including e-cigarettes.

FUNDING: Federal

## POS5-99

### JUUL USE AND SUSCEPTIBILITY AMONG FLORIDA YOUTH AND YOUNG ADULTS

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**Background:** National surveys suggest that rates of youth e-cigarette use ("vaping") are increasing. JUUL dominates the e-cigarette marketplace, and the product is particularly popular among young people. Given the paucity of recent data, it is critical to understand JUUL use, perceptions, and susceptibility among adolescents and young adults. **Methods:** In late Fall 2018, we recruited 501 Florida youth (aged 15-17) and 506 Florida young adults (aged 18-24) through social media. Respondents completed an online survey assessing JUUL awareness, use, purchase behavior, perceptions, and susceptibility as well as demographics and use of tobacco products and non-JUUL e-cigarettes. **Results:** In Florida, 87.9% of youth and 67.7% of young adults had heard of JUUL, and 29.5% of youth and 22.7% of young adults had tried JUUL at least once. JUUL was the most popular brand of e-cigarette for both youth and young adults, and JUUL was perceived as easier to get and easier to hide than other e-cigarettes. Among all youth and young adults who had ever used JUUL, 47.8% had used at least once in the past 30 days and 4.5% had used every day. Sharing was the most popular means of accessing JUUL devices and pods for both youth and young adults. More than half of youth (58.1%) and nearly half of young adults (42.3%) who had heard of JUULs but never tried them were susceptible to vaping JUULs in the future. Respondents were more likely to be susceptible to JUUL use if they were youth rather than young adults, had ever used a vaping product other than JUUL, and had ever used tobacco; they were less likely to be susceptible if they endorsed higher perceived risk from vaping. **Conclusions:** Concern about JUUL use and susceptibility among Florida's young people appears warranted. Because most youth access JUUL devices and pods through sharing rather than purchasing, efforts to regulate retail sales may have limited effects. Public health campaigns should target young people who are susceptible to vaping JUULs.

FUNDING: State

## POS5-100

### USE OF HEATED TOBACCO PRODUCTS IN HONG KONG CURRENT SMOKERS WAS ASSOCIATED WITH LOWER MOTIVATION AND GREATER PERCEIVED DIFFICULTIES TO QUIT CIGARETTE SMOKING

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**Background:** Heated tobacco products (HTP) are widely promoted as a smoking cessation aid without sound evidence. We investigated the associations of HTP use with quitting related characteristics in Chinese adult smokers in Hong Kong. **Methods:** Current smokers (N=1712, 83.7% male, 46.8% aged ≥ 50 years) were interviewed through landline random digit dialing from February to September in 2018. Their use of HTP was categorized as current (used in the past 30 days), past (used before the past 30 days) vs. never. Smokers who planned to quit cigarette smoking within 30 days were regarded as ready to quit smoking (vs. not ready) and their quit attempts (abstinence for 24 hours or more) in the past 12 months were recorded (yes vs. no). Their motivation to quit cigarette smoking were measured by their perceived importance and confidence of

quitting on a scale of 0-10 (higher score indicating stronger perceptions) and perceived difficulties were assessed in a similar way. Socio-demographic characteristics were also recorded. Descriptive statistics were weighted by the age and sex distribution of current smokers in Hong Kong. Multiple linear and logistic regressions yielded adjusted beta-coefficient (Beta) and odds ratios (AORs) of quitting related characteristics in relation to HTP use, adjusting for age, education, employment and monthly household income. **Results:** Over 1/10 current smokers were past HTP users (12.5%, 95% CI 10.7% to 14.5%) and 6.4% (5.1% to 8.1%) were current users. Past and current HTP use were not associated with readiness to quit or quit attempt (all P > 0.05). Past HTP users had less confidence in quitting (Beta -2.45, 95% CI -3.50 to -1.40) and perceived quitting as less important (-1.43, -2.52 to -0.34) and more difficult (1.77, 0.34 to 3.19). Stronger associations were found for current HTP users (confidence: -3.22, -4.60- to -1.83; difficulties: 2.65, 0.77 to 4.53). **Conclusions:** HTP users were not more ready to quit or try quitting cigarette smoking but had lower confidence and greater perceived difficulties of quitting. Our results suggest that HTP use may not help quitting but may reduce smokers' motivation to quit. Prospective studies are warranted.

FUNDING: Non-profit grant funding entity

## POS5-101

### THE USE OF MENTHOL AND TOBACCO CHARACTERIZING FLAVORS AMONG YOUNG ADULT CIGARETTE SMOKERS

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**Significance.** The Food and Drug Administration (FDA) has proposed to ban menthol flavors in cigarettes and cigars, but not in electronic cigarettes. Yet, few studies have examined the popularity of tobacco and menthol flavors in electronic cigarette and other tobacco products. This study examined the first use and the prevalence of tobacco and menthol flavored tobacco products among cigarette smokers. **Methods.** In August 2018, the Center for the Study of Tobacco Products administered a cross-sectional online survey to cigarette smokers aged 18-35 (n=320) who were recruited via Craigslist from randomly selected localities in the United States. **Results.** Data on the choice of the flavor used at first use of a tobacco product show that among cigarette smokers, 41% used menthol flavor at first use of cigarettes; 2% used menthol flavor at first use of large cigars; and 5% used menthol flavor at first use of little cigars/cigarillos. Fifty-four percent of smokers reported menthol as their usual flavor of cigarettes; 5% reported menthol/mint and 33% reported tobacco as their usual flavor of large cigars; and 5% reported menthol/mint and 14% reported tobacco as their usual flavor of little cigars/cigarillos. Two-thirds of cigarette smokers who concurrently use electronic cigarettes had ever tried menthol flavored electronic cigarettes; but only 24% reported menthol/mint and 8% reported tobacco as their usual flavor of electronic cigarettes. The use of any electronic cigarette liquid flavor is common. Ninety-four percent of cigarette smokers who tried electronic cigarettes had used a flavor and 91% used a flavored electronic cigarette in the past 30 days. The most commonly reported favorite electronic cigarette flavor among cigarette smokers was fruit flavor followed by menthol/mint, dessert, tobacco, and vanilla/creme flavors, respectively (50%, 13%, 7%, 7%, 6%). **Conclusion.** The majority of cigarette smokers who concurrently use electronic cigarettes have tried menthol or mint flavored electronic cigarettes, but fruit flavor was reported more frequently as the usual flavor and the favorite electronic cigarette flavor. Studies are needed to investigate whether cigarette smokers will switch to menthol, mint, and tobacco flavored electronic cigarettes as part of the FDA's approach to harm reduction.

FUNDING: Federal

## POS5-102

### ADOLESCENTS' INITIATION AND PAST 30-DAY USE OF A JUUL VAPORIZER CONTAINING POD FLAVORS MANUFACTURED AND NOT MANUFACTURED BY JUUL

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**Significance:** An increasing number of e-cigarette manufacturers now market pre-filled flavored e-liquid pods that are compatible with the JUUL vaporizer and/or closely



resemble JUUL's pre-filled pods in size, shape and color. This study assessed the pod flavors that adolescents reported using in a JUUL vaporizer at initiation and in the past 30 days. **Methods:** U.S. adolescents aged 13-17 years (n=9,872) were recruited from an internet research panel to complete an online survey between 23-November and 13-December 2018. Participants who had ever used a JUUL vaporizer (n=2,693) and in the past 30 days (n=1,548) selected from a list of 36 flavor descriptors: (i) the first pod flavor they ever used in a JUUL vaporizer; and (ii) the pod flavors they had used in a JUUL vaporizer in the past 30 days. The list contained the eight flavors that are offered in pre-filled pods manufactured by JUUL (known as 'JUULpods') and 28 flavors not offered in pods manufactured by JUUL. **Results:** Ever-users of a JUUL vaporizer were significantly more likely to report having initiated use with a pod containing a characterizing flavor (58.7%) than a tobacco flavor (5.6%) or menthol/mint flavor (20.9%), and more likely to report having initiated use of a JUUL vaporizer with a pod flavor not manufactured by JUUL (54.0%) than with a pod flavor manufactured by JUUL (31.2%). 'Mint', 'Menthol' and 'Mango' were the JUUL-manufactured flavors most commonly reported as used at initiation (6.1%-8.7%) and in the past 30 days (12.5%-14.9%). 'Iced Strawberry', 'Iced Watermelon' and 'Watermelon' were the non-JUUL flavors most commonly reported as used at initiation (3.6%-5.8%) and in the past 30 days (8.4%-12.2%). **Conclusions:** Around half of adolescent ever-users of a JUUL vaporizer reported having initiated use with a pod flavor not manufactured by JUUL, and the majority of current users reported using the JUUL vaporizer to vape pod flavors not manufactured by JUUL. It is possible a proportion of youth are uncertain about the brands of pod-style vaporizers and pods they have used/are using. Estimating the public health impact uniquely attributable to JUUL requires research that carefully distinguishes between youth use of products manufactured by JUUL and use of other brands of vaporizers and refill pods that closely resemble those manufactured by JUUL.

FUNDING: E-cigarette Alternative Industry

## POS5-103

### BELIEFS, PERCEPTIONS, AND BEHAVIORAL INTENTIONS RELATED TO NICOTINE, LOW NICOTINE CIGARETTES, AND REDUCED RISK PRODUCTS AMONG U.S. ADULTS

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**Significance:** In March 2018, the U.S. Food and Drug Administration (FDA) published an advance notice of proposed rulemaking to obtain information for consideration in developing a tobacco product standard to set the maximum nicotine level for cigarettes. We examined beliefs about nicotine and low nicotine cigarettes (LNC) among U.S. adult current, former, and never smokers. **Methods:** Data from the 2017 Health Information National Trends Survey (HINTS FDA), a nationally representative cross-sectional probability-based survey, were analyzed using the PROC SURVEYFREQ procedure in SAS 9.4. **Results:** The majority of respondents believed that nicotine is the main substance in tobacco that makes people want to smoke, and over half of respondents believed that nicotine causes most of the cancer attributed to smoking. More than a third of respondents did not believe that a cigarette could be low nicotine. LNC were frequently viewed as less harmful (29.2 percent), less addictive (32.8 percent), and posing a lower risk of causing lung cancer (22.7 percent) compared to typical cigarettes. Less than one in five respondents indicated that they were likely to use a tobacco product claiming to be less harmful or less addictive. Outcomes were consistent regardless of smoker status. **Conclusion:** Findings from this analysis highlight the need to educate the public about the effects of nicotine, as well as LNC. **Implications:** In this analysis of nationally representative data, many respondents believed that nicotine is cancer-causing, and some respondents perceived LNC to be less harmful than typical cigarettes. **Funding:** RAI Services Company

FUNDING: Tobacco Industry

## POS5-104

### GAP NICOTINE REPLACEMENT THERAPY (NRT) FOR RESIDENTIAL TREATMENT FACILITIES: A PILOT PROJECT

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**Significance:** An ever-growing body of research indicates the integration of tobacco cessation interventions into mental health and substance use disorder treatment improves recovery outcomes by 25%, reduces the prevalence of co-morbidities and increases the life expectancies for this population. Particular behavioral health programs are more difficult to engage with tobacco cessation interventions such as Residential Treatment Providers (RTP). Historically, RTPs minimally engage consumers with Quitlines.

However, because all RTP facilities have tobacco-free property policies in Oklahoma, consumers do not use tobacco products during their stay. As a result, consumers are forced into a quit attempt while in care, but without continued NRT and quit coaching at discharge, many relapse. Furthermore, there is an approximate two week delay in services once a consumer is referred to the Quitline and challenges for Quit Coaches to make inbound contact with restrictive programs like RTPs. These gaps in service prevent RTPs to see the value of the Quitline and therefore do not connect consumers to this valuable resource. **Methods:** The Oklahoma Department of Mental Health and Substance Abuse Services (ODMHSAS) piloted the Gap Nicotine Replacement Therapy (NRT) project with six RTPs in Oklahoma. The goal of the program was to ensure that tobacco-users receive quit coaching and NRT while in care and after discharge. The following actions were taken for this case study: Identify project sites through consumer population-based tobacco use rates and rates of provider prescriptions of NRT. Training and technical support to assist facilities to incorporate 5A's intervention. Tobacco users diagnosed by treatment providers as tobacco dependent, in accordance with DSM-V criteria. Treatment providers offering cessation counseling and prescription NRT upon admission. Referred all tobacco dependent consumers to Quitline at intake. RTPs provided cessation materials and support groups for consumers. Consumers discharged with remaining NRT from Quitline. **Results:** Information examined from the Gap NRT project sites revealed a significant increase in the number of referrals to the Quitline (210 to 833); 90% referral rate for participating program sites; 40% acceptance rate for program sites; 85% quit rate at 30 day follow-up; and an average of 50% increase of tobacco cessation counselling services. **Conclusion:** This pilot project had a positive impact on Quitline referrals and the ability of RTPs to provide consumers with NRT and support Quitline enrollment.

FUNDING: Unfunded; State; Other

## POS5-105

### CORRELATES OF CANNABIS AND ELECTRONIC CIGARETTE CO-USE AMONG VIRGINIA YOUTH

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**Significance:** Use of cannabis and certain tobacco products (electronic cigarettes; e-cigs) individually as well as in combination (co-use) is increasing among adolescents. Co-use may place youth at greater risk to engage in other negative health behaviors. Identifying co-user characteristics is needed to inform prevention efforts for youth. The purpose of the study was to determine factors associated with current (past 30-day) cannabis and e-cig co-use among a state-based sample of youth. **Methods:** Data were obtained from a cross-sectional survey of Virginia high school students in 2015 (unweighted n=5195). Three weighted binary logistic regression models were conducted: co-use vs. no co-use (model 1), co-use vs. e-cig only use (model 2), and co-use vs. cannabis-only use (model 3). Independent variables were sex (male/female), age (<15/15 or older), race (White/non-White), cigarette and alcohol use (none/<10 days in past 30/+10 days in past 30). The dependent variable was current cannabis and e-cig co-use for all models (p<0.05). **Results:** Co-use was reported by 8%, e-cig-only by 17%, and cannabis-only by 16%. Controlling for all covariates, none of the models indicated that age or sex were significantly associated with co-use. Relative to those who identified as White, non-White race was significantly associated with co-use in model 1 (relative to no co-use) and model 2 (relative to e-cig-only use) but not model 3. High frequency cigarette and alcohol use was significantly associated with co-use in all models, but the strength of these associations differed between models. The weakest associations of co-use with other substance use were in model 3 (relative to cannabis-only use). **Conclusion:** Few studies have identified correlates of current co-use, and results revealed unique associations compared to previous work. Findings suggest co-users may be similar in terms of race and other substance use to cannabis-only users relative to non-co-users and e-cig-only users. Identified co-user characteristics indicate risk for other frequent substance use and a need for targeted prevention. Future work should examine a wider set of correlates to help inform these efforts.

FUNDING: Federal; State

## POS5-106

### DEVELOPING A TEXT MESSAGING BASED SMOKING CESSATION INTERVENTION FOR HOMELESS YOUTH

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**Significance:** An estimated 70% of homeless youth are current cigarette smokers, yet this population has been virtually ignored in efforts to reduce youth smoking. Smoking



cessation programs are needed that are both tailored to the needs of homeless youth and feasible to deliver in the settings where they typically seek services. This study describes results from the development phase of a study to create and evaluate a text messaging-based intervention (TMI) for homeless youth that provides 6 weeks of ongoing support for smoking cessation as an adjunct to standard treatment (group counseling session and provision of the nicotine patch). **Methods:** Focus groups (n=18) and usability testing (n=10) were conducted with homeless 18-25 year olds (80% male, 54% Hispanic) recruited from drop-in centers serving homeless youth in Los Angeles County. Focus group discussions provided initial feedback on the content and delivery of the TMI, and subsequent usability testing interviews obtained feedback from smokers who used the TMI for a one-week period. Survey data assessed the acceptability and feasibility of the TMI, including potential barriers to using mobile phones for intervention delivery. **Results:** Nearly all youth who expressed interest in the study had a cell phone that could receive text messages, demonstrating that a TMI was practical for this population. Of the 28 participants, 93% had unlimited texting and 81% could view webpages on their phone. Qualitative analysis of focus group data identified specific TMI content across 5 themes: staying motivated, getting support, and dealing with cravings, negative moods, and slips. Among usability testing participants, 88% indicated that the TMI content was relevant and 88% reported that they would use a TMI in the future if they wanted to quit. No major technical or phone-related problems were identified, although some youth reported challenges keeping their phone charged. **Conclusions:** Given near universal cell phone ownership among homeless youth, and limited service provider resources for offering cessation treatments, a TMI adjunct to brief cessation counseling can be a promising approach to reducing smoking among homeless youth. Funded by the California Tobacco Related Disease Research Program (271P-0051)

FUNDING: State

## POS5-107

### RESULTS FROM A RANDOMIZED TRIAL FOR A MOBILE-PHONE TEXT MESSAGING PROGRAM FOR TOBACCO RISK COMMUNICATION AMONG COMMUNITY COLLEGE STUDENTS

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**BACKGROUND:** Compared to 4-year-college students, community college students are more likely to use tobacco and exhibit lower tobacco risk perception. In this study, we evaluated the *Project Debunk* program aiming to compare the efficacy of different types of validated mobile phone text messages, based on scientific reports of tobacco risk. **METHOD:** Within a randomized trial in 3 community colleges, we randomized 636 young adults to 1 of 8 message types, based on the combination of 3 attributes: emotional versus rational, simple versus complex, and gain-framed versus loss-framed. With a crossover design, we conducted 2 campaigns (1 month each, 2 messages per day), crossing over between messages on conventional tobacco products (CTP; e.g., cigarettes and cigars) and new and emerging tobacco products (NETP; e.g., electronic cigarettes and hookah) with a one-month washout period. We measured perceived risk of NETP and CTP at baseline and 2-month post-campaign. With 7 mixed-effect models, a P-value of 0.007 was considered significant. **RESULTS:** Upon exposure to NETP messages, participants increased perceived NETP risk (P<0.001). Participants increased perceived NETP risk upon exposure to gain-framed (P=0.003), but not loss-framed messages (P=0.012). They increased perceived NETP risk upon exposure to simple (P=0.002), but not complex messages (P=0.012). Finally, they increased perceived NETP risk upon exposure to rational messages (P=0.005), and marginally upon exposure to emotional messages (P=0.007). Upon exposure to CTP messages, participants marginally increased perceived CTP risk (P=0.008). Participants did not increase perceived CTP risk upon exposure to gain-framed (P=0.221) or loss-framed messages (P=0.012). Participants did not increase perceived CTP risk upon exposure to simple (P=0.026) or complex messages (P=0.106). Finally, participants marginally increased perceived CTP risk upon exposure to emotional (P=0.009), but not rational messages (P=0.217). **DISCUSSION:** Text messaging can be effective in increasing youth perceived tobacco risk. Specific message types need to be strategically implemented depending on the products of interest. Funding: 5P50CA180906-02

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## POS5-108

### SHIFTS IN E-CIGARETTE USE AMONG MINNESOTA ADULTS 2014-2018

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**Significance:** Recent studies indicate that e-cigarette use is most prevalent among youth. Similar to national trends, Minnesota observed declining combustible tobacco use and a striking increase in e-cigarette use among high school students between 2014 and 2017. Less is known about the changing profile of adult e-cigarette users in Minnesota. E-cigarette manufacturers argue that their products are intended for adults to aid in quitting combustible tobacco, however, evidence to date is mixed as to their cessation benefit. The 2018 Minnesota Adult Tobacco Survey (MATS) provides trend data on the use of e-cigarettes among adults. **Methods:** MATS is a cross-sectional, random digit-dial telephone survey representative of adult Minnesotans (18 and over). MATS measured e-cigarette use in 2014 (n=9,304) and 2018 (n=6,065). **Results:** Compared to 2014, significantly more Minnesota adults reported having tried an e-cigarette in 2018 (17.7 percent and 20.7 percent respectively; p<0.05). Only 6.0 percent reported using an e-cigarette in the past 30 days in 2018, which was unchanged from 2014 (5.9 percent). Past 30 day use among 18-24 year olds increased from 12.8 percent in 2014 to 21.9 percent in 2018 (p<0.05) while other age groups stayed relatively stable. There was a significant increase in past 30 day e-cigarette users who reported having never smoked cigarettes; 11.7 percent in 2014 to 44.0 percent in 2018 (p<0.05). Dual use, defined as e-cig use among current smokers declined significantly from 27.3 percent in 2014 to 16.1 percent in 2018 (p<0.05). 80.2 percent of all adult regular users, and 96.7 percent of young adult regular users, reported their usual e-cigarette is flavored. **Conclusion:** These results are consistent with other studies demonstrating that e-cigarettes are appealing primarily to younger adults. Of concern is that many of those young people have never used combustible cigarettes before, exposing them to nicotine, addiction, and the risk of future combustible tobacco use. These results reinforce the need for additional regulation. Further research is needed to understand the changing profile of e-cigarette users and implications for tobacco control.

FUNDING: State

## POS5-109

### INDOOR AIR ASSESSMENT OF E-CIGARETTE USE IN AN INDOOR ENVIRONMENTAL CHAMBER

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**Significance:** In order to further elucidate the reduced risk potential of switching from smoking to e-cigarette use, it is important to assess the effects of e-cigarette vapor not only on users but also bystanders who may be exposed to exhaled vapor. The objective of this study was thus to examine the influence of e-cigarette use on indoor air quality (IAQ) in a controlled environmental chamber.

#### Methods:

E-cigarette (Logic Compact):

- a pre-filled pod system containing 1.7 mL of e-liquid
- 18 mg/mL nicotine
- tobacco flavor
- a lithium-ion battery (3.7 V, 350 mAh)

Environmental chamber:

- an internal volume of approximately 41.1 cubic meters
  - a ceiling height of 2.5 m
  - a ventilation rate of 2 air changes per hour during testing
- Per day, three 1-hour IAQ measurements were carried out:

- 1) In the environmental chamber only (Reference 1)
  - 2) In the chamber with adult volunteers (Reference 2)
  - 3) In the chamber with adult volunteers who vaped the e-cigarette ad libitum (Test)
- The number of healthy experienced sole e-cigarette users (informed consent given) changed per day (n=2 on day 1; n=4 on day 2; n=8 on day 3). For each 1-hour test, 5 parameters were continuously monitored: Temperature, Relative Humidity, Particulate Matter (PM) 2.5, Carbon monoxide and Carbon dioxide. Simultaneously, the air was also sampled in triplicate for: Total Volatile Organic Compounds (TVOCs), 4 Carbonyls, Ammonia, Glycerol, Nicotine, Propylene glycol, Phenol, 15 Polycyclic aromatic hydrocarbons, 4 Tobacco-specific nitrosamines and 17 Metals.



**Results:**

- Total e-liquid mass loss over 1 hour was 0.61, 0.53, and 1.59 grams for 2, 4, and 8 volunteers, respectively.
- The 2 and 4 volunteer test conditions had little measurable impact on indoor air quality compared to reference conditions.
- In the 8 volunteer test condition compared to reference conditions, TVOCs, nicotine, propylene glycol and PM were detected but below exposure limits.

**Conclusion:**

- E-cigarette use had minimal impact on IAQ, especially at low and medium chamber occupancy levels.
- Future standardization of IAQ testing should focus on e-liquid consumption in addition to the number of vapers.

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FUNDING: Tobacco Industry

adolescents (ages 15-17; n=1,862) at wave 1 were analyzed separately to examine patterns of peer and parental influence across different developmental phases. Results: During early and middle adolescence, parental tobacco use significantly predicted youth tobacco use at one-year follow-up ( $p < .01$ ), over and beyond the influence of peer use. Peer influence was also found significant: Peer tobacco use significantly predicted adolescents' own use in the following year, and vice versa. On the other hand, during middle and late adolescence, parental tobacco use did not predict adolescent's tobacco use in the following year. Peer influence, however, remained as a significant predictor of adolescent tobacco products use ( $p < .01$ ). Conclusions: Overall, parents and peers both may influence tobacco product use during early to middle adolescence; however, only peers remain influential during late adolescence. These findings suggest that parental tobacco use may set off the onset of adolescents' own use, but it is peers that may support continuous tobacco use, as well as the onset of use.

FUNDING: Unfunded

## POS5-110

### CHARACTERIZING REAL-TIME REPORTS OF SMOKING LAPSE - AN ECOLOGICAL MOMENTARY ASSESSMENT STUDY

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**Significance:** Research has demonstrated that smoking lapse is often preceded by environmental and psychosocial triggers. Real-time reports of smoking context could be beneficial in developing just-in-time adaptive interventions to prevent lapse. The purpose of this study is to characterize smoking lapse episodes among a sample of smokers undergoing a quit attempt. **Methods:** Participants (N=81) were adults in a three-armed randomized clinical trial of a smartphone-based smoking cessation intervention. Participants were loaned a smartphone and asked to self-initiate ecological momentary assessments (EMAs) during the 4-week post-quit period when they felt they were about to lapse, or when they smoked a cigarette. EMAs asked about environmental context, mood, smoking experience, and which coping skills, if improved, could help them stay quit in the future. **Results:** Participants were primarily male (51.2%), White (67.9%), and 49.4 years old (SD=12.2). A total of 142 lapses were recorded. A majority of lapses occurred at home (69.4%). Most participants reported having a high level of cigarette craving prior to their lapse (64.9%). Lapses were mostly unplanned, with 75.9% of participants reporting that they did not intend to smoke, and 27.1% reporting that they had no warning signs prior to their lapse. Most participants agreed that the smoking episode was pleasurable (61.7%) and satisfying (65.6%), however only 27.2% reported that the cigarette improved their mood. Following lapse, participants reported that improving skills related to coping with urges to smoke (76.1%), coping with stress (55.6%), coping with frustration/anger (43.0%), coping with depression (29.6%), coping with arguments (28.9%), and learning more about the harms of smoking (6.3%) would help them to stay quit in the future. **Conclusion:** Most reported smoking lapses occurred with little to no warning and were characterized primarily by craving rather than mood or socioenvironmental context. Future smoking cessation interventions could benefit from increased focus on improving coping skills that precede lapse.

FUNDING: Federal; State; Academic Institution

## POS5-111

### UNDERLYING MECHANISMS OF PARENTAL AND PEER INFLUENCE ON YOUTH TOBACCO PRODUCT USE

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Background: While cigarette smoking in the United States has decreased in recent years, 20% of high school and 6% of middle school students reported current use of tobacco products in 2017. Numerous studies investigating the factors related to youth tobacco use have identified peers and parents as strong predictors, however these mechanisms have rarely been examined longitudinally. In the present study, we examined how these two socialization groups interplay over time in predicting adolescent tobacco product use. **Methods:** Specifically, we compared the influences of peers and parents from early to late adolescence, expecting relatively weaker influence of parents, compared to peers, during late adolescence. The Population Assessment of Tobacco and Health (PATH) data were used in autoregressive cross-lagged panel analyses across three waves (2013-2014 through 2015-2016). Younger (ages 12-14 years; n=5,733) and older

## POS5-112

### IDENTIFYING PREDICTIVE ATTRIBUTES OF ADULT SMOKERS WHO CEASE COMBUSTIBLE SMOKING USING THE JUUL ELECTRONIC NICOTINE DELIVERY SYSTEM VIA LOGISTIC REGRESSION AND CART

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**Significance:** Prior research has shown that JUUL products may assist adult smokers in switching from combustible cigarettes, however little is known about characteristics of smokers who successfully switch from cigarettes. Using the classification and regression tree (CART) methodology of *Breiman et al*, we sought to identify attributes of similar cohorts of adult smokers no longer smoking 90 days after purchasing a JUUL starter kit. **Methods:** Data from 15,116 subjects from two longitudinal surveys of current adult smokers who bought a JUUL starter kit in the retail or e-commerce setting, and completed 90-day follow-up, were included. Thirty-six (36) attribute covariates were defined at time of purchase. The sample was divided into independent training and validation sets, and logistic regression with recursive feature elimination and CART models were used to examine predictors of successful switching. **Results:** The recursive logistic model identified the following as predictive of switching: smoked more than 100 cigarettes in lifetime, number of days smoked in month prior to purchase, gender, whether the smoker was currently trying to quit, and previous use of ENDS. The C-index of the logistic regression model was 0.75, indicating good discriminatory capability. The model performed similarly well in the validation cohort. The parsimonious CART model identified number of days smoked in month prior to JUUL purchase, lifetime years smoking, previous use of ENDS and overall physical health as key factors. Partial interactions were also revealed in the CART. The F1 score was 65% for the training sample and 66% for the validation sample, while the misclassification rates for the training and validation samples were 34% and 35%. The CART model also identified those that might benefit from additional help to switch from combustible cigarettes. **Conclusion:** This study provides information on attribute predictors of adult smokers who switch successfully from combustible cigarette use, and of those at high risk of continued smoking after initiating JUUL use. Additional research is needed to understand switching patterns among these subgroups.

FUNDING: E-cigarette Alternative Industry

## POS5-113

### ROLL DOWN ROLL YOUR OWN CIGARETTES IN HUNGARY

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**SIGNIFICANCE:** The fight against smoking became one of the most important public health priorities in Hungary after 2010. The measures implemented in this period ranged from tax increase and the introduction of combined health warnings through the restriction of smoking in public places to the reorganization and control of tobacco retail sale. These antismoking measures have resulted in decrease in the prevalence of smoking (2009: 38% vs. 2017: 27%) and tobacco consumption (2009: 23,1bn vs. 2017: 16,8bn pieces). In Hungary RYO cigarettes are taxed at a lower rate, than factory-made (FM) cigarettes. This may reduce the impact of tobacco tax increases on reducing smoking prevalence. We analyzed patterns and trends in RYO consumption in Hungary and examined taxation policy. **METHODS:** Data from the 2009 (n=1044) and 2017 (n=1053) waves of the Eurobarometer survey were used. A review of industry and retail data informed the allocation of RYO and FM products to price segments. Thanks to the new national retail



system we can gain up to date and detailed consumption data which was impossible before the regulations. **RESULTS:** In Hungary, nearly half (49%) of smokers regularly smoke RYO cigarettes. Smoking prevalence decreased from 38% in 2009 to 27% in 2017. In 2009, 12% of daily smokers declared that they had smoked RYO tobacco, compared to 44% in 2017. RYO cigarettes was taxed at a lower rate than FM cigarettes, smokers shifted from FM to RYO cigarettes to keep their addiction affordable rather than quitting. The market share of the RYO cigarette was 24% in 2009. By 2017 there had been a sharp increase up to 52%. **CONCLUSION:** Reducing tobacco use plays a major role in Hungarian efforts to achieve target 3.a of SDG 3 which refers particularly to strengthening the implementation of the WHO Framework Convention on Tobacco Control (WHO FCTC). Smoking prevalence decreased in Hungary between 2009 and 2017. However due to the impact of the tax policy there has been rapid increase in the prevalence of RYO tobacco use. Considering this growth of RYO cigarette users and the health effects of their use, policymakers should aim to implement efficient tax policies to harmonize the prices of different types of tobacco products. This is imperative to be able to harness the full benefits of smoking interventions in Hungary.

## POS5-114

### SYNERGISTIC EFFECTS OF NICOTINE AND PROPRANOLOL ON ATTENTIONAL PERFORMANCE IN HUMAN NON-SMOKERS

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**Significance:** Nicotine administration increases the output of every major neurotransmitter in the brain. In previous studies aimed at determining the secondary neurotransmitter systems mediating the attention-enhancing effects of nicotine in a rat model, the  $\beta$ -adrenoceptor antagonist propranolol antagonized the performance-enhancing effects of nicotine (Hahn and Stolerman 2005, *Psychopharmacology* 177:438-47). The purpose of the present study was to test whether this mechanism could be replicated in humans. **Methods:** 26 adult human non-smokers (ages 21-53) completed a nicotine (7 mg/24 hrs) x propranolol (40 mg p.o.) interaction study. In each of four test sessions, participants received a skin patch five hours and a capsule two hours prior to cognitive testing. In one session, both the patch and the capsule were a placebo. In another, the patch contained nicotine and the capsule was a placebo. In another, the patch was a placebo and the capsule contained propranolol. In another session, the patch contained nicotine and the capsule propranolol. The sequence of drug conditions was counter-balanced across participants. Cognitive testing included a visuospatial attention task, the Rapid Visual Information Processing Task (RVIPT), and a change detection task (CDT) testing short-term memory for one or five items. **Results:** There were no significant drug effects in the visuospatial attention task. In the RVIPT, nicotine and propranolol did not affect performance when given alone, but acted synergistically when given in combination to significantly improve hit rate and reaction time. In the CDT, propranolol enhanced accuracy and reduced reaction time independent of the presence or absence of nicotine. **Conclusions:** The results suggest that effects of downstream  $\beta$ -adrenoceptor activation by nicotine depend on task context. When task-induced arousal may interfere with performance, such as in the RVIPT, nicotine-induced  $\beta$ -adrenoceptor activation may limit nicotine's performance-enhancing effects, which were unmasked by propranolol. In contrast, the rodent paradigm of attention in which propranolol previously antagonized beneficial effects of nicotine requires behavioral activation and appears to benefit from nicotine-induced  $\beta$ -adrenoceptor activation. This work was funded by NIH grant 1R01DA035813 (B. Hahn).

FUNDING: Federal

## POS5-116

### YOUR PATIENT WANTS TO QUIT, NOW WHAT? IMPLEMENTATION OF TOBACCO CESSATION E-REFERRAL WORKFLOW IN PATIENT CARE SETTINGS

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**Introduction:** Tobacco use remains a significant public health burden. To aid in cessation efforts, the Maryland Tobacco Quitline (MDQL), a free, evidence-based cessation service has paired with a team from the Family Medicine Department at the University of Maryland (UM) to create a best practice advisory (BPA). The tobacco cessation BPA created in the EPIC electronic health record (EHR) allows providers to electronically refer (e-refer) patients to the MDQL. **Objective:** This study explores trends in the number of e-referrals made via the BPA and the impact of BPA dissemination efforts on UM Medical System (UMMS) practices. Dissemination efforts have included dispersal of

a BPA tip sheet, education of practice champions, and presentations at clinical meetings by a clinical educator. **Methods:** Data on utility of the BPA were collected through a brief 5-question survey that was sent to providers via e-link or paper surveys. MDQL reports were reviewed to obtain information on the number of e-referrals made. **Results:** The number of referring practitioners increased from 12 to 69 between January 2018 and October 2018, with the number of e-referrals rising from 38 to 156 per month during this same time period. Since launching the BPA, a total of 965 e-referrals have been made. 78% of patients referred classified as heavy tobacco users or current everyday smokers. According to survey responders (N=51), 31% heard about the BPA at clinical faculty meetings, 12% from a health educator, 18% from EHR and 34% had never heard of the BPA. Only 41% of survey responders screened for tobacco use at every visit. **Conclusion:** In conjunction with increasing usage of the tobacco BPA, it will also be important for providers to continue to educate patients on the benefits of tobacco cessation and screen all patients for tobacco use at every visit. **Future Directions:** Survey results and MDQL reports will be used to improve provider education efforts on utilization of the BPA. Ultimately results will also focus on tracking the number of patients who are tobacco free. Overall, dissemination and usage of the tobacco BPA are critical to tobacco cessation efforts.

FUNDING: State

## POS5-117

### ABSTINENCE INCENTIVES WITH COMMUNITY TREATMENT: IMPACT ON RELAPSE AMONG DISADVANTAGED SMOKERS WITH MENTAL ILLNESS

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**Background:** Relapse is common after cessation treatment ends. Abstinence incentives increase cessation among disadvantaged smokers with mental illness, but whether they protect smokers against relapse or worsen risk for relapse is unclear. We examined the impact of abstinence incentives on relapse among disadvantaged smokers with mental illness enrolled in a large community treatment study. **Methods:** 661 participants were randomly assigned to community-based cessation treatment with or without abstinence-contingent incentives for 4 weeks after a quit attempt. They were then assessed for biologically-verified abstinence at 3, 6, 9, and 12 months. This analysis focused on participants with verified abstinence at any quarterly assessment and at least 1 additional follow-up assessment during the 1-year study period (n=107; 65 incentive, 42 control). To examine intervention effect on relapse over time, longitudinal data were aligned based on initial verified abstinence. Discrete-time survival analysis was used to assess whether the risk of relapse was different between incentive and control conditions, accounting for those without relapse (censored cases). Missing observations were imputed as smoking. **Results:** Participants included 107 abstinent adults, 71 (66.4%) female, mean age 46.1  $\pm$  10.6, with: major depressive (n=29), bipolar (n=27), schizophrenia (n=22), and anxiety/other (n=29) disorders. Demographics and diagnoses did not differ between incentive and control conditions. Three months after initial abstinence, 52% of participants had relapsed. Six months after initial abstinence, almost 75% had relapsed (65.4% in the incentive condition; 80.0% in the no-incentive condition). The survival analysis indicated that those in the incentive condition were less likely to relapse (OR= 0.74), but the difference did not reach statistical significance (chi squared = .77; p=.38). **Conclusions:** In addition to improving initial outcomes, a four-week incentive intervention did not worsen relapse and may be protective. Additional research is needed to test scalable strategies to incorporate abstinence incentives into cessation treatments for disadvantaged smokers.

FUNDING: Federal; State

## POS5-118

### UNDERSTANDING UNDERAGE E-VAPOR USE: FINDINGS FROM A QUALITATIVE STUDY AND PATH WAVES 1-3

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**Significance:** In recent years, underage use of e-vapor products has increased while use of cigarettes has decreased. We report the findings of a qualitative study and cross-sectional and longitudinal analyses of Population Assessment of Tobacco and Health (PATH) data (Waves 1-3) examining factors related to e-vapor trial/use and means of e-vapor access. We provide insights about potential avenues to curtail youth e-vapor access and use. **Methods:** We conducted six focus groups with a purposive sample





of 45 young adults ages 18-20. We segmented participants into groups based on their e-vapor product use: current users (tried e-vapor prior to legal age (LA) and currently use e-vapor), previous users (tried e-vapor prior to LA  $\geq 1$  time but do not currently use any tobacco products) and never users (never tried any tobacco products). There were two focus groups for each user group. LA was 18. Study objectives included identifying factors associated with underage use and understanding how youth access e-vapor products. Our PATH analyses assessed a range of variables associated with onset of and established e-vapor use and youth e-vapor access. **Results:** Focus group results indicate that peer affiliation is an important factor for underage e-vapor trial/use. Social acceptability, ease of access and lack of underage e-vapor use prevention messaging are also relevant factors. Peers of LA are significant sources for access, followed by relatives (i.e., older siblings, parents). These findings align with our PATH Waves 1 and 2 analyses, which showed diverse factors associated with e-vapor onset and established use (use of  $>10$  e-cigarettes/cartridges), with peer use having the strongest association. Our PATH analyses also indicate that social exchange is a primary source of youth e-vapor access. Among Wave 3 past 30-day e-vapor users ages 15-17, 41% usually obtained e-vapor by asking for/being offered and 27% gave someone money to buy. **Conclusions:** Our findings suggest the need to increase the LA of purchase and develop underage e-vapor use prevention messaging that discourages social sourcing from peers/relatives and counters social acceptability of underage use.

FUNDING: Tobacco Industry

## POS5-119

### TOBACCO USE PROFILES BY ASTHMA STATUS, ADULTS AND YOUTH IN THE PATH STUDY

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**Significance:** The adult smoking prevalence has reached an historic low (14.1%), yet about 25% of U.S. adults with asthma are current cigarette smokers and may also use other tobacco products at a higher proportion than the general population. Smoking triggers asthma symptoms and exacerbates asthma-related morbidity, and recent studies indicate ENDS can trigger asthma symptoms among youth. **Methods:** Population Assessment of Tobacco and Health (PATH) study data from waves 1, 2, and 3 were combined. Separate analyses of adult and youth tobacco use by asthma status were conducted. Current tobacco use was determined by past 30-day use of at least one product at wave 3 (cigarettes, ENDS, hookah, smokeless tobacco, snus, cigars, cigarillos, or pipes). Current use groups were divided into exclusive combustible cigarette, exclusive ENDS, dual combustible cigarette and ENDS, other combustible, and combinations of poly-tobacco use. **Results:** Among 27,121 adults, 26.3% reported current use of any tobacco product at wave 3 and 13.6% reported an asthma diagnosis at any wave. Among asthmatic adults, 28.4% reported current tobacco use compared to 25.9% without asthma. Among asthmatic adults who reported current tobacco use, 57.8% were exclusive combustible cigarette users, 5.2% were exclusive ENDS users, 9.1% were dual cigarette and ENDS users, 13.4% were poly-tobacco users, and 12.3% were other combustible tobacco product users. Among 11,440 youth (ages 12-17), 7.3% reported current use of any tobacco product and 19.1% reported a current asthma diagnosis. Compared to non-asthmatic youth, a higher proportion of asthmatic youth were dual combustible cigarette and ENDS users (14.4% vs. 12.3%), poly-tobacco users (14.8% vs. 9.8%), and other combustible users (14.9% vs. 9.0%). **Conclusions:** Adults and youth with asthma reported greater tobacco product use than the general non-asthmatic population and most of that use involved combustible tobacco products. It is important for health care providers to discuss tobacco use with their asthmatic patients as part of their asthma care. **Disclaimer:** The contents of this abstract belong solely to the authors and do not represent NIH positions or policies.

FUNDING: Federal

## POS5-120

### PARAMETER ANALYSIS FOR PEDIATRIC PHYSIOLOGICALLY BASED PHARMACOKINETIC MODELS OF NICOTINE AND COTININE

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**Significance:** Nicotine exposure in neonates and infants caused by passive smoking is associated with the Sudden Infant Death Syndrome (SIDS), however our understanding of the pharmacokinetic profiles of nicotine and cotinine in very young children is poor. We aim to create a pediatric physiologically based pharmacokinetic model (p-PBPK) to simulate the time course of nicotine and cotinine in the plasma, tissue and organs of infants ( $< 1$  year old). **Methods:** The p-PBPK model was extrapolated from a nicotine metabolism model for adults, while taking into consideration the physiological and nicotine metabolism differences between neonates/infants and adults. The physiological parameters of the model e.g. the blood flow rate and compartmental volume are adopted from published p-PBPK models of other drugs, while the pharmacokinetic parameters were estimated and calibrated with published clinical data (McMartin et al 2001) where the nicotine and cotinine concentrations in the lung tissues of 44 SIDS victims were measured. The Latin hypercube method was used for parameter analysis of the differential equation system of the model. **Results:** The model was able to generate nicotine/cotinine values in plasma and lung tissue consistent with the literature (McMartin et al 2001). The parameter analysis also yielded clues for a set of model parameters that may be used in different species (e.g. the rat) where animal model results may be adopted. **Conclusion:** This first PK study for infant exposure to secondhand smoking could be the basis for incorporating more *in vivo* or *in vitro* data associated with SIDS.

FUNDING: State

## POS5-121

### CIGARETTE SMOKING TRENDS FROM WAVES 1 AND 2 OF THE POPULATION ASSESSMENT OF TOBACCO AND HEALTH (PATH) STUDY

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**Significance:** As cigarette smoking remains the largest preventable cause of death in the United States, it is imperative for researchers to study the trends of cigarette smoking to identify a national cessation, initiation, and relapse rate. **Methods:** This study had two aims: (1) characterize longitudinal cigarette smoking among adults in the Population Assessment of Tobacco and Health Study (n=32,248) and (2) examine cigarette smoking trends among Wave 1 every day and someday adult smokers and subsequent use in Wave 2 (n=13,529). **Results:** Weighted analyses showed that at baseline, most adults had never smoked cigarettes (32.9%), while 28.9% were current non-established ( $<100$  lifetime cigarettes smoked) smokers, 20.2% were former established smokers, and 18.1% were current established ( $\geq 100$  lifetime cigarettes smoked) smokers. By Wave 2, 11.7% of Wave 1 current established smokers and 6.2% of current non-established smokers became former established smokers (i.e., quit smoking). Initiation rates at Wave 2 among never smokers at Wave 1 were low compared to cessation rates; 41 (0.3%) never smokers became current established smokers, while 237 (1.9%) never smokers became current non-established smokers. Current non-established and former established smokers experienced a slight increase in smoking or relapse by becoming current established smokers by Wave 2 (4.9% and 6.2%, respectively). Current non-established smokers at Wave 1 had higher adjusted odds (aOR: 2.85; 95% CI: 2.44, 3.34) of quitting (no cigarette use in past 12 months or do not currently smoke now) (6.2%) by Wave 2 compared with established smokers (11.7%). Among both current established and current non-established smoker groups combined at Wave 1, 4.5% reported that they quit smoking by Wave 2. **Conclusion:** The results of this study indicate a national cigarette cessation rate of 4.5% among established and non-established smokers, along with a low initiation rate from 2013-2015. Non-established smokers were more likely to quit smoking, which indicates a need to further analyze and monitor this group. Monitoring cigarette smoking trends can inform policy and the potential for harm reduction tools to further decrease cigarette smoking rates.

## POS5-122

### DOES SIZE MATTER? AN EXPERIMENTAL STUDY OF DIFFERENT PICTORIAL HEALTH WARNING SIZES WITH INDONESIAN ADOLESCENTS AND ADULTS

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**Significance:** Indonesia have implemented pictorial health warning (PHW) regulation for cigarette packs since 2014. Its second round is scheduled in 2019 with five new PHWs, but the display size remains 40% of the pack. We assessed the affective and cognitive reactions to different PHW sizes among Indonesian adolescents and adults to provide policymakers with local evidence in line with WHO-FCTC recommenda-



tion to adopt larger PHWs. **Methods:** Using a between-subject design, we collected data from adolescents (smokers, N=164; nonsmokers, N=169) and adults (smokers, N=166; nonsmokers, N=167) in Jakarta and Depok cities. Participants were randomly assigned into three PHW size conditions (i.e., 40%, 75%, and 90% of the pack). Each condition has five new PHWs from the second round. Participants rated each of the five PHWs in random order for affective (i.e., frightening) and cognitive reactions (i.e., message credibility, thinking about risks, and perceived effectiveness). To adjust for correlated data due to repeated measures, linear mixed effect models were estimated separately for each outcome, regressing them on PHW size conditions, smoking status, and participants' social demographic variables (i.e., age group, sex, and educational level). **Results:** Compared to the 40% size, PHWs with 75% size were rated higher for frightening ( $\beta=0.48, p<0.05$ ), message credibility ( $\beta=0.54, p<0.05$ ), thinking about the risks of smoking ( $\beta=0.48, p<0.05$ ), perceived effectiveness ( $\beta=0.51, p<0.05$ ). PHWs with 90% size were rated higher than the 40% size only for frightening ( $\beta=0.43, p<0.05$ ) and no differences on other outcomes. Smokers rated PHWs significantly lower on all outcomes, males rated PHWs significantly lower on outcomes other than frightening, while those with lower educational level rated PHWs significantly higher on frightening and message credibility. **Conclusion:** Our study found that increasing PHW size from 40% to 75% may advance PHW's effects among Indonesian adolescents and adults, adding further support for the WHO-FCTC recommendations to adopt larger PHWs in all countries. Future studies exploring message and format characteristics for larger PHW size are warranted.

FUNDING: Non-profit grant funding entity

## POS5-123

### CONTENT ANALYSIS OF TOBACCO 21 NEWS COVERAGE, 2012-2018

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**SIGNIFICANCE:** While there has been recent and rapid diffusion of Tobacco 21 policies, little data exist on the process, content, or outcomes of Tobacco 21 laws. This study examined the discussion of Tobacco 21 laws in top-circulating print media sources in the U.S. between 2012 and 2018. **METHODS:** Systematic database searches using Access World News and Factiva identified all Tobacco 21 related news articles appearing in the top daily circulating newspaper in each state between January 2012 and mid-December 2018 (n=195 articles). Content analyses documented prevalence, types of articles and context related to framing of arguments for or against Tobacco 21 laws. **RESULTS:** Preliminary analyses showed that newspaper coverage of Tobacco 21 peaked in 2015 and 2016 (n=104, 53.3% of articles). The majority were news/features (77.9%) followed by editorials/opinions (22.1%) which largely supported Tobacco 21 laws. Nearly all the articles (99%) focused on state coverage of Tobacco 21. States most mentioned in articles were Massachusetts (8.7%), Hawaii (8.2%), Illinois (8.2%), and New Jersey (8.2%). Overall, a large proportion of articles described politicians as in favor of Tobacco 21 legislation (63.6%); however, there were a small number of articles that documented political opposition (15.4%). As well, a small number of articles delineated support from smokers (17.9%) and opposition from retailers (26.7%). Arguments supporting Tobacco 21 most frequently cited the Institute of Medicine (IOM) Report (27.1%) as evidence followed by peer reviewed articles (11.8%) and CDC reports (12.8%). **CONCLUSION:** Over the last six years, state level legislation dominated news sources in the United States, setting an agenda for what the public may view as the most critical issues related to Tobacco 21. With evolving local and state Tobacco 21 laws, it is important to continue to monitor news coverage of such laws. Content analysis of Tobacco 21 news can be a source for clues on what is most associated with policy adoption.

FUNDING: Federal

## POS5-124

### WHAT A DRAG! ANXIOUS AND DEPRESSED YOUNG ADULTS ARE MORE LIKELY TO SMOKE AND VAPE

**Sumner Sydemann, Ph.D.**, Caroline North, B.S., Paige Wiley, B.S., Jose Olais, Madeline Cripe. Northern Arizona University, Flagstaff, AZ, USA.

Previous research has identified a relationship between cigarette (Conventional Tobacco Cigarette) use with both depression (Luger, Suls, & Weg, 2014) and anxiety (Fluharty et al., 2017). Recently, depressive symptomatology are associated with electronic cigarette use in young adults (Bandiera et al., 2017). The relationship of anxiety symptoms and ENDS use appears undocumented. The first purpose of the current study was to

examine the hypothesis that current anxiety and depressive symptomatology would be associated with 30-day CTC and 30-day Electronic Nicotine Delivery System (ENDS) use. The second purpose was to examine the hypothesis that lifetime prescription for anxiety problems and/or depression would be associated with lifetime CTC and lifetime ENDS use. In a cross-sectional, convenience sample of 986 young adults (median age 19; 72.7 % female) collected in 2015 and 2016, CTC and ENDS use were assessed for past 30 days and lifetime use. Current anxiety symptoms were assessed using the GAD-2 and current depressive symptomatology using the PHQ-2. Participants were also asked in two questions if they had ever been prescribed medication for anxiety or for depression. In a series of simple logistic regression analyses, current anxiety symptoms predicted past 30-day use of both CTC ( $X^2(1) = 12.10, p = .001, OR = 1.16, CI:[1.07 - 1.26]$ ) and 30-day ENDS ( $X^2(1) = 5.77, p = .016, OR = 1.11, CI:[1.02 - 1.20]$ ). In contrast, current depressive symptoms predicted 30-day CTC use ( $X^2(1) = 17.89, p < .001, OR = 1.30, CI:[1.15 - 1.47]$ ) but not 30-day ENDS use. Prescription for anxiety predicted lifetime smoker status ( $X^2(1) = 12.48, p < .001, OR = 2.57, CI:[1.52 - 4.34]$ ) and lifetime ENDS use ( $X^2(1) = 5.65, p = .017, OR = 1.69, CI:[1.10 - 2.62]$ ). However, prescription for depression predicted lifetime smoker status ( $X^2(1) = 36.53, p < .001, OR = 4.38, CI:[2.71 - 7.06]$ ) but not lifetime ENDS use. In conclusion, current anxiety symptoms and prescription for anxiety and were consistently associated with CTC and ENDS. In contrast, current depressive symptoms and lifetime prescription for depression were associated with cigarette smoking but not ENDS use.

## POS5-125

### ADHD DIAGNOSIS PREDICTS CONVENTIONAL TOBACCO CIGARETTE USE AND ELECTRONIC NICOTINE DELIVERY SYSTEM USE IN YOUNG ADULTS

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Attention Deficit Hyperactivity Disorder (ADHD) is a neurodevelopmental disorder characterized by inattention, hyperactivity and impulsivity that causes psychosocial dysfunction (APA, 2013). ADHD symptoms in young adults have been found to be associated with conventional tobacco cigarette (CTC) use (Glass & Flory, 2012; Kollins et al., 2005). Research to date on ADHD and electronic cigarette use is limited to one published study of high schoolers that found an association between ADHD symptomatology and electronic cigarette use (Goldenson et al., 2018). The purpose of the current study was to examine the association between ADHD diagnosis and Electronic Nicotine Delivery Systems (ENDS) product use. The study hypothesized that ADHD diagnosis would be associated with CTC use and ENDS use. A cross-sectional convenience sample of 992 young adults (median age 19; 72.7% female; 57.6% non-Hispanic White) was gathered at a university in Southwestern United States in 2015 and 2016. Lifetime ADHD diagnosis, past 30-day CTC use, past 30-day ENDS use, lifetime CTC smoking status (former or current smoker), and lifetime ENDS use were assessed. The results of simple logistic regression analyses indicated that individuals diagnosed with ADHD were significantly more likely to have used a CTC in the past 30 days ( $X^2(1) = 13.79, p < .001, OR = 2.45, CI: [1.53 - 3.93]$ ), and significantly more likely to be lifetime CTC smokers ( $X^2(1) = 5.23, p = .022, OR = 2.06, CI: [1.11 - 3.81]$ ). Individuals diagnosed with ADHD were significantly more likely to be ENDS ever users ( $X^2(1) = 5.23, p = .022, OR = 1.83, CI: [1.09 - 3.07]$ ) but not more likely to have used ENDS in the past 30 days ( $X^2(1) = 0.70, p = .402, OR = 1.25, CI: [0.74 - 2.12]$ ). In conclusion, ADHD diagnosis in young adults was associated with CTC and ENDS use. The current study seems to be the first to report on the relationship between ADHD diagnosis and ENDS use in young adults. Future research should examine if severity of current ADHD symptomatology is associated with increased likelihood of ENDS use.

## POS5-126

### BIOMARKERS OF EXPOSURE IN FLAVORED VS. NON-FLAVORED U.S. ADULT CIGARILLO USERS: WAVE 1 OF THE POPULATION ASSESSMENT OF TOBACCO AND HEALTH (PATH) STUDY

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**Background.** In 2013-2014, 7.2% of US adults smoked a cigar product in the past 30 days. Cigarillos are the most predominant cigar product used, but little research has explored how flavored cigarillo use impacts exposure to toxicants. The purpose of this study is to compare biomarkers of tobacco exposure among US adult flavored and non-flavored cigarillo smokers stratified by race. **Methods:** Analyses utilized the PATH Study Wave 1 Biomarker Restricted Use Files. We compared the effects of flavored vs. non-flavored cigarillo use on exposure to urinary biomarkers including metabolites of nicotine (cotinine), tobacco specific nitrosamines (NNAL), combustion compounds (naphthalene), and volatile organic compounds (acrolein) among every day or someday users who used within the last three days (non-flavored=92; flavored=149). We calcu-



lated weighted geometric means for each biomarker and examined multivariable linear regression models to calculate weighted geometric mean ratios (GMRs) adjusted for demographic and smoking characteristics. **Results:** Flavored cigarillo users smoked similar numbers of cigarillos ( $M=2.0$  vs  $2.0$ ) and cigarettes per day ( $M=7.2$  vs  $7.4$ ) to non-flavored users in the past 3 days. 63.6% of white cigarillo users used a flavored product while 59.6% of black cigarillo users used a flavored product. After controlling for age, sex, number of cigarillos and number of cigarettes smoked in the past 3 days we found that among white flavored cigarillo users, there was less exposure to cotinine ( $GMR=0.5$ ,  $CI=0.3-0.7$ ) and naphthalene ( $GMR=0.4$ ,  $CI=0.2-0.9$ ) compared to white non-flavored users. There was a similar trend with NNAL ( $GMR=0.6$ ,  $CI=0.3-1.4$ ) and acrolein ( $GMR=0.7$ ,  $CI=0.4-1.4$ ), though not significant. Among black flavored cigarillo users, there was a similar trend toward lower exposure for all metabolites but none reached significance. **Conclusions:** After controlling for sociodemographic characteristics, analyses revealed lower levels of biomarkers of exposure among white flavored cigarillo users compared to non-flavored cigarillo users. Future research is needed to explore how brand preferences and smoking topography may further elucidate these findings.

FUNDING: Other

## POS5-127

### SMOKING CESSATION MEDICATION AND AID EFFECTIVENESS IN THE PATH WAVE 1 SAMPLE

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Evidence from RCT and effectiveness research suggests that smoking cessation medications, including nicotine replacement therapy (NRT) and varenicline, may have a differential effect on women and men, with varenicline outperforming NRT among women and having little extra benefit among men. Effectiveness research examining these differences has been limited in the breadth of control variables available for reducing potential confounding bias. We analyzed the Population Assessment of Tobacco and Health wave 1 cross-sectional survey data, using propensity score weighting and multiple imputation methods to examine gender differences in real-world smoking cessation medication and aid effectiveness. Our sample consisted of women and men reporting regular smoking at some point during their life, who smoked 12 months prior to their survey date, and who successfully quit for at least one day during the previous 12 months. Cessation was defined as self-reported 30-day abstinence from all forms of tobacco. Comparing varenicline, nicotine patch, and e-cigarette use as a cessation aid to the use of no medications or aids during a most recent quit attempt, we found only e-cigarette use to be significantly associated with 30-day abstinence for both women and men. Use of e-cigarettes (without the use of other cessation medications or aids) was associated with approximately double the likelihood of achieving 30-day abstinence for both women and men ( $p < 0.05$ ). Varenicline's association with cessation was in the expected direction among women ( $OR = 1.43$ ) but was not statistically significant. For both women and men the association between patch use and abstinence was close to null, as was the association between varenicline use and cessation among men. These analyses suggest that among this cross-sectional observational sample of lifetime regular smokers, e-cigarette use was associated with 30-day tobacco abstinence, while FDA approved medications were not significantly related to abstinence.

FUNDING: Federal

## POS5-128

### UTILITY OF AN ONLINE CONTINUING EDUCATION COURSE ON TOBACCO FOR HEALTHCARE PROVIDERS

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Tobacco use is a leading cause of preventable death in the United States, with more than 400,000 deaths attributed to smoking-related causes each year. A number of healthcare organizations—including the U.S. Preventive Services Task Force—suggest that clinicians ask and advise adults and adolescents about tobacco use. However, research indicates a gap between these recommendations and practice. This abstract reports findings from an online training course about counseling skills relating to tobacco and nicotine products and counseling skills. The comprehensive training delivers accredited Continuing Medical Education (CME) credits for healthcare providers and other professionals. Its content covers tobacco and electronic nicotine delivery systems, including traditional cigarettes, hookahs, and electronic nicotine delivery systems. This is complemented with practical ways to link patients with existing resources through the

ask, advise, refer model. Participants enrolled via a Web site and may earn up to 2.25 CME credits; those who complete a baseline, post-test, and a three-month follow-up survey may be eligible to receive \$40 compensation for participation. As of January 2019, 48 have completed the baseline and post-test. The majority (68.8%) have not received formal training for counseling patients in tobacco cessation and prevention. Overall, the participants reported high levels of satisfaction for the course content and structure. The mean score on knowledge was 75.83% ( $SD = 6.13$ ). The participants' pre- to post-test ability, confidence, intention (ACI) scores increased, as shown by a significant McNemar's test ( $p < .001$ ). Open-ended responses indicated an intention to address tobacco use with patients, refer them to existing resources (both for adolescents and adults), and to work to educate patients rather than coercing them about tobacco. The present study supports the utility of a Web-based CME course to help in equipping healthcare providers to address tobacco products and use within their practices. Based on this study's findings, this delivery method is an effective route for delivering CME content to healthcare providers and educators.

## POS5-129

### QUALITATIVE EXPERIENCE USING JUUL E-CIGARETTES AMONG AFRICAN AMERICAN SMOKERS

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**SIGNIFICANCE:** African American smokers bear a disproportionate burden of smoking related morbidity and mortality. Electronic cigarettes (e-cigs) have emerged as a harm reduction strategy for smokers who cannot or will not quit using traditional methods. African American smokers have been under-represented in most e-cig switching studies and little is known about their perceptions of the benefits and challenges of switching to e-cigs. One previous study of African American menthol smokers switching to cig-alikes for three weeks found that the majority (73%) reported an unsatisfactory experience. **METHOD:** The present study focuses on 59 daily African American smokers (54.2% female, mean age= 51.5, 19.1 years smoking cigarettes, 78.0% menthol smoker) provided JUUL e-cigs for 6 weeks as part of a larger randomized controlled trial. At study exit, participants were asked open-ended questions about what they liked about using e-cigs, what they didn't like about using e-cigs, what helped with switching to e-cigs, and what made it difficult to switch to e-cigs. **RESULTS:** The most common benefits were convenience (i.e., no lighter) and lack of smell. Other reported benefits included saving money, flavor/taste, craving reduction, and health benefits. The most common responses to the question about what participants didn't like were harshness and coughing, and "nothing." Other reported drawbacks included mechanical problems with the device or pods and having to charge the device. A small number reported issues with flavor/taste, different shape, losing the device, and learning how to puff. In response to what helped with switching, the majority who provided a specific reason reported persistence/sticking with it and practicing. The most frequent responses to what made it difficult to switch were harshness and coughing. The majority (78.2%) reported that the benefits of switching to e-cigs outweighed barriers/concerns. **CONCLUSION:** Exclusive switching from cigarettes to e-cigs is key to harm reduction. Preliminary qualitative impressions of African American smokers' experience using JUUL e-cigs appear promising and the next step is to determine rates of exclusive switching.

FUNDING: Federal

## POS5-130

### INTERPERSONAL TRAUMA AND SMOKING TRAJECTORIES IN AN UNDERGRADUATE SAMPLE

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Individuals with a history of exposure to one or more Criterion A traumatic events (i.e., exposure to actual or threatened death, serious injury, or sexual violation) are more likely to endorse ever smoking and are more likely to be nicotine dependent compared to non-trauma exposed individuals. Available research suggests that interpersonal trauma (e.g., sexual or physical assault) in particular, as opposed to accidental trauma (e.g., motor vehicle accident, natural disaster), may be associated with particularly elevated risk for smoking and nicotine dependence. Theoretical models assume that interpersonal trauma increases risk for smoking behavior by way of individuals smoking to self-medicate trauma-related distress. However, temporal associations between



new-onset interpersonal trauma exposure and changes in smoking behavior are not clear; longitudinal models of interpersonal trauma and smoking behavior would inform potential causal associations between these phenotypes. The current study examined the bidirectional associations between interpersonal trauma exposure and smoking frequency, as well as a positive PTSD screen and smoking frequency, in a sample of college students participating in a longitudinal, university-wide study of emotional and behavioral health. Individuals were assessed in the fall and spring of their first year of college, and subsequent spring semesters until graduation. Path analysis was used to estimate associations between trauma and smoking phenotypes across repeated assessments. At the first year spring semester and second year spring semester, new incidence of interpersonal trauma exposure was significantly associated with greater smoking frequency over and above preceding smoking frequency ( $\beta = -0.048$ ,  $p = 0.026$ ;  $\beta = -0.091$ ,  $p < 0.001$ , respectively). It was also found that a positive PTSD screener was predictive of smoking frequency at time two ( $\beta = 0.035$ ,  $p = 0.047$ ), above and beyond prior smoking frequency. Smoking frequency did not predict subsequent trauma exposure or PTSD. These results indicate that exposure to multiple traumas, and/or having a positive PTSD screen, precedes increases in smoking frequency in college students.

FUNDING: Federal

## POS5-131

### SMOKING AND ALCOHOL CUE REACTIVITY: EFFECTS OF SEPARATE AND COMBINED CUES ON CRAVING, DRUG-SEEKING, AND CONSUMPTION

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**Significance:** Co-use of cigarettes and alcohol is common among individuals who are dependent and nondependent on these substances, and among dual-users, co-use frequently occurs on the same occasions. Despite the frequency of co-use and relevance of drug cues to substance use, researchers have primarily examined the effects of cigarette and alcohol cues in isolation, though there is potential for cues to elicit stronger motivational responses when combined. **Method:** This study used a validated cue reactivity procedure (Choice Behavior Under Cued Conditions) to systematically disentangle the separate and joint effects of cigarette and alcohol cues on craving, drug-seeking, and consumption. Levels of use and co-use were examined as potential moderators of cue effects. Participants were 110 dual-users ( $M$  age=34.0,  $SD$ =10.8) with a broad range of cigarette smoking (66% daily smokers,  $M$  CO level=15.5,  $SD$ =16.6) and drinking levels ( $M$  drinks per occasion=5.7,  $SD$ =2.9). They were presented with multiple trials of four *in vivo* cue types: water, alcohol, cigarette, combined cigarette and alcohol. On each trial, participants rated their craving prior to receiving an opportunity to spend real money to gain access to the cue. Spending larger amounts increased the probability that the substance would be immediately available for consumption. When granted access, participants took one puff on the cigarette and/or sip of the beverage. Differences in craving, drug-seeking (spending, latency to access cue), and consumption (puff duration, alcohol consumed) across cue type and substance use levels were evaluated using hierarchical linear modeling. **Results:** Both cigarette and alcohol cues elicited cue-specific craving,  $ps < .001$ , but not craving for the alternate substance. All drug cues elicited greater spending than water cues,  $ps < .001$ . Combined cues elicited higher craving and greater spending relative to single-drug cues,  $ps \leq .02$ . Spending was also moderated by levels of co-use,  $p < .001$ . **Conclusion:** Findings indicate that combined cigarette and alcohol cues may be especially potent among dual-users, and therefore, are important to consider in treatment with individuals using multiple substances.

FUNDING: Academic Institution; Non-profit grant funding entity

## POS5-132

### DIFFERENCES AMONG SUBGROUPS OF ADULT SMOKERS USING JUUL IN SWITCHING FROM SMOKING AFTER 90 DAYS

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**Significance:** Previous studies have shown that JUUL products may be useful in assisting adult smokers in switching from combustible cigarettes, and that switching behavior may vary by age and intensity of smoking status. We conducted logistic regression with recursive feature elimination on four distinct cohorts of adult smokers to identify characteristics of those who were no longer smoking 90 days after purchasing a JUUL starter kit. **Methods:** Data were collected from two longitudinal surveys of 15,116 adult smokers in the U.S. who bought a JUUL starter kit in either the retail or ecommerce

setting and completed 90-day follow-up. Thirty-six (36) covariates identified at baseline (time of purchase) were included in the model. Respondents were divided into four cohorts based on smoking intensity (smoking  $>$  or  $<$  10 cigarettes per day at baseline) and age (those aged 21-25 vs. those above 25). The study sample was divided into independent training and validation sets, and logistic regression with recursive feature elimination was used to examine and model predictors of switching success in each cohort. **Results:** Across all four cohorts, previous use of an ENDS device decreased odds of switching by 20-40% ( $p < 0.05$  in all models). In three of the four cohorts, whether the smokers were planning to quit was predictive of success, increasing odds by 70-90% across cohorts ( $p < 0.05$  in all models). In both cohorts of heavy smokers, those who bought a JUUL starter kit with the motive of quitting smoking demonstrated higher odds of switching. In both cohorts of older smokers, the number of days smoked in the month prior to JUUL purchase was predictive. Additional unique attributes were identified to be significant by each cohort. All logistic models on the training samples performed well in the validation samples, demonstrating similar discriminatory capability in each (c-index values ranging from 0.70 - 0.75 across models). **Conclusion:** Although this research is in its early stages, identifying factors associated with successful switching among unique, similar cohorts of smokers holds significant promise as a means to develop targeted intervention programs.

FUNDING: E-cigarette Alternative Industry

## POS5-133

### CHALLENGES IN REACHING ISOLATED RURAL APPALACHIANS WITH ONLINE TOBACCO-RELATED HEALTH INFORMATION: ASSESSING DIGITAL TECHNOLOGY ACCESS AND MOTIVATION TO ADOPT

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**Background:** Health disparities exist between rural and urban Appalachians. Rural adults are more likely to smoke and are historically underserved by tobacco control programs and policies. Increased use of digital media offers opportunities for delivering effective online tobacco control interventions promoting tobacco use prevention and cessation. Rural smokers stand to benefit from increased access to quitlines, tobacco-related health information, and online support groups. However, digital reach and adoption gaps exist in isolated communities. We assessed the relationship between internet access and smoking status to understand obstacles to improving tobacco control in Appalachia. **Methods:** A rural-urban smoking analysis was conducted amongst Appalachian states using the 2014-15 Current Population Survey (CPS) Tobacco Use Supplement fused with the 2015 CPS Computer and Internet Use Supplement. Rural-urban adjusted odds ratios (OR) controlling for socioeconomic characteristics were compared to ORs controlling for these characteristics plus digital use to test whether equality in access and motivation to adopt could reduce rural-urban tobacco disparities. **Results:** Nine million rural residents reside in Appalachia versus 16 in urban; 67% of Appalachian rural adults are online versus 77% in urban. Rural Appalachians were more likely to smoke (OR = 1.07,  $p = .07$ ) compared with urban when controlling for demographics. Rural smoking matched urban (OR = 1.00,  $p = .95$ ) after controlling for digital factors. Contributing factors ( $p < .01$ ) included use of the internet, high-speed access, and respondents' belief that they do not need the internet. **Conclusions:** The digital divide between rural and urban extends to digital media often used for tobacco-related health promotion and education interventions. The limited reach into rural communities may be addressed by supporting community programs and policies to facilitate internet access and promote digital media literacy. Without higher level of access and implementation of strategies to enhance reach and engagement, the potential of the internet as a vehicle for tobacco use prevention and policy promotion will not be realized.

FUNDING: Federal

## POS5-134

### POLYTOBACCO USE PREVALENCE BY SEX, RACE/ETHNICITY, AND EDUCATION LEVEL: THE IMPORTANCE OF INTERSECTIONALITY

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**SIGNIFICANCE:** Understanding evolving patterns of polytobacco use for marginalized groups at the intersection of sex, race/ethnicity, and social class may help inform tobacco



control policy initiatives to reduce health disparities. **METHODS:** We used nationally representative data (ages 18+) from Wave 3 (2015-16) of the Population Assessment of Tobacco and Health Study to estimate polyuse prevalence by sex, race/ethnicity, (Non-Hispanic (NH) White, NH Black, NH Other, Hispanic), education level (less than college vs. college degree), and their intersections. Polyuse was defined as current use (every day or some day among established users) of more than one product: cigarettes, electronic nicotine products, cigars, tobacco pipes, hookah, pouched snus, or other smokeless tobacco. We accounted for the complex survey design in the analyses. **RESULTS:** Among the 28,148 respondents, overall polyuse prevalence was 4.3% (95% CI 4.1-4.5). Males, NH White respondents, and those without a college degree were more likely to be polyusers than females, racial/ethnic minorities, and those with a college degree, respectively. When examining sex and race/ethnicity jointly, NH White males had the highest polyuse prevalence at 6.8% (95% CI 6.4-7.3). In looking at education and race/ethnicity, there were no racial/ethnic differences in polyuse among those with a college degree, although NH White respondents had the highest polyuse among those without a college degree. At the intersection of sex, race/ethnicity, and education level, NH White males without a college degree had the highest polyuse prevalence at 8.7% (95% CI 8.1-9.3), while NH Black males without a college degree had a prevalence of 6.1% (95% CI 5.0-7.3). Females with a college degree had the lowest prevalence, near 1% for all racial/ethnic groups. Prevalence estimates were higher for respondents without a college degree compared to those with a degree, except for Hispanic females who had a polyuse prevalence of approximately 1.5% irrespective of education level. **CONCLUSION:** Examining sex, race/ethnicity, and education level separately for tobacco use patterns may mask important differences in prevalence estimates.

FUNDING: Federal

## POS5-135

### ASSOCIATIONS BETWEEN CIGARETTE SMOKING, ELECTRONIC CIGARETTE USE, AND WATERPIPE TOBACCO SMOKING WITH FRATERNITY/SORORITY MEMBERSHIP AND COLLEGE ATHLETE STATUS

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**Significance:** The use of alternative tobacco products, such as waterpipe tobacco and electronic cigarettes (ECIGs), has increased in popularity, especially among college students. However, scant research has examined whether specific college social groups are more vulnerable to alternative tobacco use. This study examined associations between cigarette, waterpipe tobacco, and ECIG use with social group membership (i.e., fraternity/sorority and college athletics). **Methods:** Data from U.S. college students who participated in the Spring 2017 National College Health Assessment-II Survey were analyzed (n=60,275). Prevalence of current (past-30 day) cigarette, waterpipe tobacco, and ECIG use was examined. Logistic regressions were conducted to examine associations between fraternity/sorority membership (yes/no) and participation in college athletics (varsity, club, or intramural sports) and self-reported cigarette, waterpipe tobacco, and ECIG use, adjusting for age, gender, and race/ethnicity. **Results:** Among all participants, 10.5% were fraternity/sorority members, 6.7% varsity athletes, 8.8% club sports athletes, and 16.0% intramural sports athletes. Fraternity and sorority members had the highest current use rates for cigarettes (14.0%), waterpipe tobacco (5.3%), and ECIGs (7.5%). Compared to non-fraternity/sorority members, fraternity/sorority members were more likely to report current cigarette (AOR=1.74, CI: 1.61-1.88), waterpipe tobacco (AOR=1.93, CI: 1.71-2.19), and ECIG use (AOR=2.00, CI: 1.80-2.22). Compared to students not participating in varsity sports, varsity athletes were less likely to report current cigarette smoking (AOR=0.64, CI: 0.56-0.73) and waterpipe tobacco smoking (AOR=0.80, CI: 0.66-0.98), but not ECIG use. **Conclusions:** Some college population social groups, such as fraternity/sorority members, may be at increased risk for all types of tobacco use. Varsity athlete status appeared protective for some forms of tobacco use, such as cigarettes and waterpipe tobacco, but not for ECIG use. These findings suggest that ECIGs may have greater appeal to groups who typically avoid other tobacco products.

FUNDING: Federal; Academic Institution

## POS5-136

### SMOKING CESSATION AMONG COMMUNITY PHARMACISTS IN JORDAN; KNOWLEDGE AND BARRIERS

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**Significance** In Western countries, community pharmacists contribute to combating tobacco use through providing effective smoking cessation services. Their role in developing countries is rarely investigated. This study assessed community pharmacists' knowledge, attitudes and practice (KAP) towards smoking cessation, and identify their perceived barriers (PB) for smoking cessation services in Jordan, where the tobacco epidemic is well established. **Methods** A cross-sectional study was conducted in community pharmacies in North of Jordan between August and November 2018. Ninety-five pharmacy locations were chosen by multistage random sampling. A structured English questionnaire, developed based on available literature, was used to collect data on four main domains; KAP and PB. The 24-question knowledge domain assessed proper usage of gum, batch, NRT, and Varenicline. Thirty questions assessed positive and negative attitudes towards providing cessation services. Practice 11 questions assessed frequency of assessing, advising, assisting, referring, following-up and counseling services. Barriers were assessed at 3 levels; pharmacist, pharmacy, and patient. KAP questions utilized a 5-point Likert scale (1 to 5) and PB utilized a yes-no approach. Mean domain, and sub-domain, scales were calculated for each subject. **Results** A total of 150 pharmacists completed the questionnaire; 77% were females and 78% were 25 years or younger. Means overall knowledge and positive attitude were around 3.8 each while negative attitude was 3.18 (0.66). Overall practice mean was 2.01 (0.64) with mean counseling of 1.89 (1.11). Mean practice positively correlated with knowledge and positive attitude (Pearson's  $r=0.2$  ( $P=0.016$ ) and  $0.41$  (0.000), respectively). Insufficient smoking cessation training and inadequate knowledge on drug therapy of cessation were identified as the main barriers towards providing service. **Conclusion** While Jordan is heavily burdened by the tobacco epidemic, levels of pharmacists' KAP are not optimal. Continuous education should be established with emphasis on updating knowledge and building confidence (self-efficacy) in smoking cessation services.

FUNDING: Unfunded

## POS5-137

### IDENTIFICATION OF CLASSES OF SUBSTANCE USERS IN CANADA USING LATENT CLASS ANALYSIS

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**Significance:** In 2017, 15% (4.6 million) of the Canadian population aged 15+ were current cigarette smokers. This was an increase from 13% (3.9 million) in 2015, which was the lowest national smoking rate ever recorded in Canada. Fifty-seven percent of daily smokers indicated they were contemplating quitting within the next six months. Yet approximately 91,000 Canadians began smoking daily in 2017 and cigarette smoking continues to be the leading preventable cause of premature death in Canada. To better understand how to prevent uptake of cigarette smoking and to support cessation efforts of current smokers in Canada, this study aims to identify classes of Canadians that reflect different substance user profiles. It is hoped that a better understanding of the different types of substance users can help to increase the effectiveness of public health communication strategies, and inform programming and policy decisions related to tobacco control in Canada. **Methods:** This study uses the 2017 Canadian Tobacco, Alcohol and Drugs Survey (CTADS), a biennial general population survey of tobacco, alcohol, and illicit drug use among Canadians aged 15 years and older. Data collection ran from February 2017 through December 2017. Telephone interviews were conducted with 16,349 respondents across all ten provinces representing a weighted total of 30.3 million Canadian residents. Latent class analysis (LCA) was used to classify respondents based on their use of substances including tobacco, e-cigarettes, alcohol, cannabis, illicit drugs, and problematic use of pharmaceutical drugs. **Results:** We identified 6 different classes of substance users: Abstainers (43%), Tobacco product dabblers (23%), All substance dabblers (14%), High risk alcohol drinkers (7%), Early experimenters (7%), and Substance users (6%). **Conclusions:** The results of this study can be used to inform future tobacco control policy and program decisions in Canada, and support strategic public health communication strategies for cessation and prevention efforts.

FUNDING: Federal



## POS5-138

### YOUNG ADULT CIGARETTE SMOKERS WHO USE ELECTRONIC CIGARETTES

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**Significance.** The Food and Drug Administration (FDA) is interested in the potential benefits of electronic cigarettes as part of a strategy to reduce harm. To understand the potential benefits and harms of electronic cigarettes, this study examined the frequency and duration of electronic cigarette use and the characteristics of concurrent users of cigarettes and electronic cigarettes. **Methods.** In August 2018, the Center for the Study of Tobacco Products administered a cross-sectional online survey to cigarette smokers aged 18-35 (n=320) who were recruited via Craigslist from randomly selected localities in the United States. Fifty-five percent of the sample reported current use of cigarettes and electronic cigarettes. **Results.** Seventy-three percent of cigarette smokers reported daily smoking and regular daily smoking in the past 12 months. Data on frequency of use of electronic cigarettes show that among concurrent cigarette and electronic cigarette users, 22% reported that they use electronic cigarettes at least once per day or less, 43% sometimes throughout the day, 23% fairly frequently, and 11% reported using electronic cigarettes most of the day. Data on duration of use show that 15% percent of cigarette smokers had used electronic cigarettes for less than one month, 34% 1-12 months, 18% 1-2 years, and 31% for more than 2 years. More than 80% of smokers used nicotine in their electronic cigarette devices, and 74% reported using nicotine concentrations ranging from 0-8mg/ml. Thirty-four percent of concurrent users reported using devices that required pods, but only 0.3% reported using 50 mg/ml, close to the amount of nicotine found in JUUL pods. Sixty-five percent of concurrent users reported using electronic cigarettes because they feel that it is really hard to quit cigarette smoking. Only 28% have ever tried to quit electronic cigarette use and 8% have tried to completely quit electronic cigarette use in the past 12 months. **Conclusion.** Although cigarette smokers are using electronic cigarettes because quitting cigarettes is difficult, our data suggest that the use of electronic cigarettes could increase the risk for long-term concurrent use of cigarette and electronic cigarettes among young adults. Studies are needed to determine the short- and long-term health effects of concurrent use.

FUNDING: Federal

## POS5-139

### NICOTINE DEPENDENCE AND SWITCHING BEHAVIORS AMONG YOUNG ADULT CIGARETTE SMOKERS

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**Significance.** There is ongoing debate on whether cigarette smokers will completely switch to electronic cigarettes, a strategy proposed to reduce harm. This study examined nicotine dependence, quitting and switching behaviors among young adult cigarette smokers. **Methods.** In August 2018, the Center for the Study of Tobacco Products administered a cross-sectional online survey to cigarette smokers aged 18-35 (n=320) who were recruited via Craigslist from randomly selected localities in the United States. **Results:** Seventy-three percent of the total sample (n=320) smoked daily and smoked 13 cigarettes per day on average in the past 30 days. Data on nicotine dependence show that 31% of cigarette smokers had a cigarette within the first 5 minutes of waking and 38% within 6-30 minutes of waking. Among smokers who used electronic cigarettes, 23% used an electronic cigarette within the first 5 minutes of waking and 24% within 6-30 minutes of waking. Data indicate that most smokers want to quit. Eighty-two percent of cigarette smokers had ever tried to quit smoking and 64% stopped smoking for one day or longer in the past 12 months. Switching behaviors are common among smokers. Among cigarette smokers who ever tried to quit, 54% tried to switch to a flavored or unflavored electronic cigarette compared to 26% of large cigar and 25% of little cigar/cigarillo users. Among cigarette smokers who tried to quit in the past 12 months, 52% tried using an electronic cigarette to quit. Data on quitting and switching intention show that among all smokers, 24% reported that they intend to quit smoking cigarettes in the next 30 days and 23% intend to completely switch from cigarettes to a flavored

or unflavored electronic cigarette in the next 30 days compared to 27% of large cigar users and 22% of little cigar/cigarillo users. **Conclusion:** Cigarette smokers want to quit smoking, but the majority show high levels of nicotine dependence. More than half of cigarette smokers have ever tried to switch to an electronic cigarette, but the majority do not intend to completely switch to flavored or unflavored electronic cigarettes. Studies are needed to investigate whether combustible tobacco users who intend to switch can successfully switch to electronic cigarettes.

FUNDING: Federal

## POS5-140

### OUTCOMES AMONG MENTHOL AND NONMENTHOL SMOKERS WHO USED PENNSYLVANIA FREE QUITLINE FOR CESSATION

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**Significance** Currently, the U.S. Food and Drug Administration (FDA) is proposing regulations on menthol cigarettes, but it is not clear if this regulation would impact the smoking cessation effort. This study aimed to examine the cessation outcomes among menthol cigarette smokers. **Methods** 1697 smokers who enrolled in PA free Quitline services, an evidence-based smoking cessation program, between January 1, 2017 and June 30, 2017 and completed the 6-month follow-up survey were included in this study. Smoking cessation status was measured in the 6-month follow-up survey after enrollment. The reach ratio was defined as the proportion of menthol smokers from Quitline callers divided by the proportion of the menthol smokers among the general smokers in Pennsylvania. **Results** Over half (53.5%) of total participants who used Quitline were menthol cigarette smokers. Compared to non-menthol smokers, menthol smokers were more likely to be younger (58.3 vs. 53.6 years), female (61.8% vs. 71.0%) and black (6.0% vs. 41.6%). The reach ratio for menthol cigarette smokers was 0.92 (95% CI: 0.89, 0.95), indicating that a lower proportion of menthol smokers were utilizing Quitline services in Pennsylvania. There is no significant difference of 6-month quit rate between menthol and non-menthol smokers (27.9% vs. 27.4%, p>0.05). Black non-menthol smokers were more likely to quit smoking at 6-month follow up than black menthol smokers (40.4% vs. 23.6%, p<0.05). **Conclusion** Cessation outcomes are comparable between menthol smokers and non-menthol smokers. However, the Quitline appears to be less likely utilized by menthol smokers in Pennsylvania. If the FDA's regulation on menthol flavor could motivate menthol smokers to quit, more resources would be needed for the Quitline to increase its service capacity for menthol smokers.

FUNDING: Federal; State

## POS5-141

### OXIDATIVE STRESS BIOMARKERS CHANGES INDUCED BY WATERPIPE SMOKING IN BLOOD LYMPHOCYTES

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**Significance:** Waterpipe tobacco smoking has been spreading to a globally, and was lately associated with multiple toxicities to human organs. In the present study, the status of oxidative stress biomarkers has been investigated in blood lymphocytes of chronic waterpipe tobacco smokers. **Methods:** Blood lymphocytes were sampled from 150 pure waterpipe smokers and 150 never-smokers from Jordan. Oxidative stress biomarkers including oxidized and reduced glutathione (GSH, and GSSG), glutathione peroxidase (GPx), catalase, superoxide dismutase (SOD), Thiobarbituric acid reactive substances (TBARS) were assessed. **Results:** Results showed a significant reduction in the levels of GSH, and the ratio of GSH to GSSG, and an increase in the levels of GSSG in blood lymphocytes of waterpipe smokers compared to non-smokers (P< 0.05). Additionally, the activities of oxidative capacity enzymes including GPx, SOD, and catalase were reduced among waterpipe smokers compared to non-smokers (P< 0.05). Finally, the levels TBARS, the biomarker for lipid peroxidation were increased in waterpipe smokers compared to non-smokers (P< 0.05) blood lymphocytes. **Conclusion:** Current results indicate that waterpipe tobacco use is associated with increased oxidative stress and lipid peroxidation along with reduction in oxidative capacity enzymes that might predispose users to several chronic non-communicable diseases. The results highlight the need for actions to discourage waterpipe smoking and can be used in cessation interventions that target this type of smoking. **Funding:** This study was supported by fund National Cancer Institute (NCI) of the National Institutes of Health (NIH) under Award Number PAR-15-55.

FUNDING: Unfunded; Federal



## POS5-142

### THE EFFECTS OF SMOKING ABSTINENCE, NICOTINE DOSE, AND NICOTINE DOSE EXPECTANCIES ON RESPONSE EXPECTANCIES AND SUBJECTIVE SMOKING OUTCOMES

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**AIM:** Drug expectancies are believed to play a role in the effects of placebos and drugs. According to expectancy theory, dose expectancies (e.g., expectancy that a cigarette contains nicotine) activate response expectancies (e.g., expected effects of nicotine), which cause placebo effects or enhance drug effects. Prior studies have manipulated dose expectancies, but few have also assessed response expectancies. Using the Balanced Placebo Design (BPD) this study evaluated nicotine dose and dose expectancy on smoking outcomes (e.g., urge, satisfaction) as well as the role of response expectancies. Smoking abstinence was also manipulated. **METHODS:** Smokers (N=219; 40% female, mean CPD = 14.3) instructed to abstain for 1 hr or 12 hrs (counterbalanced across two sessions) were randomized to one of four groups of the 2x2 BPD in which actual (0.6mg vs. 0.05mg yield) and expected nicotine dose (told nicotine vs. placebo) were manipulated. Response expectancies were assessed after the dose instructions prior to smoking. **RESULTS:** A series of mixed factorial ANOVAs were run. Greater abstinence level and smoking a nicotine cigarette each resulted in greater satisfaction, sensory stimulation, relaxation, aversion, as well as urge and withdrawal relief after smoking, independent of the other factors. Expecting nicotine resulted in greater withdrawal relief independent of the other factors. Participants reported greater beneficial response expectancies in response to greater abstinence level (main effect) and being told nicotine (main effect) with no notable interactions. Regression analyses revealed that under conditions of abstinence, greater response expectancies predicted greater smoking responses (e.g. craving relief, psychological stimulation) independent of the experimental manipulations. **CONCLUSION:** Abstinence level did not alter the effects of the BPD, which were mainly nicotine dose effects. Response expectancies (assessed prior to smoking) were altered by the abstinence and dose expectancy manipulations. The dynamic influences on response expectancies and their role in smoking outcomes deserve further research attention.

FUNDING: Federal

## POS5-143

### PREVALENCE OF TOBACCO USE AMONG PRIESTS AND THEIR WILLINGNESS TO SPREAD ANTITOBACCO MESSAGES AMONG DEVOTEES IN DELHI

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**Significance:** Tobacco use has increased in India in recent times. Hence, need for intensification of tobacco control efforts become pertinent. Tobacco cessation involves behavior change and evidence suggests that religious professionals may be helpful in community based smoking cessation programs. **Objective:** To assess the prevalence, knowledge and practices related to tobacco use among priests and their willingness to spread anti-tobacco messages among their devotees. **Methods:** It was a community based cross-sectional study conducted amongst 159 head priests of Delhi. A semi-structured interviewer based questionnaire containing items to assess socio-demographic characteristics, tobacco use behavior, their knowledge about harmful effects of tobacco and willingness to spread anti-tobacco messages among devotees, was used for data collection. **Results:** Out of the total 159 participants, 86.2% (n=137) were males. There were 61% (n=97) Hindus followed by 18.2% Muslims (n=29). Thirty seven respondents (23.3%) reported to be the current users of tobacco. Among the current tobacco users, 32 (86.5%) were using more than one form of tobacco. The most common form of tobacco being used was 'Chillum' (n=31; 83.8%). The knowledge about harmful effects of tobacco use was less among tobacco users as compared to that of nontobacco users. However, majority of them (n=152; 95.6%) expressed their willingness to spread anti-tobacco messages to their devotees irrespective of their smoking status and also desired to be trained in the same. **Conclusion:** The prevalence of tobacco use was low among the priests. Majority of them expressed their willingness to spread anti-tobacco messages. Therefore, religious leaders should be motivated through training in tobacco use prevention and helped in implementing tobacco use cessation activities

FUNDING: Unfunded

## POS5-144

### DIGITAL SMOKING CESSATION FOR HEAVY DRINKERS A PILOT RANDOMIZED CONTROLLED TRIAL

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**Significance:** This pilot randomized controlled trial examined feasibility, acceptability, and effect sizes for a digital smoking cessation program that specifically addressed heavy drinking (HD). **Methods:** Participants (N = 119; 69.7% female; 82.4% white) were daily smokers recruited from a free digital smoking cessation program (BecomeAnEX.org, "EX") who met criteria for HD: women drinking 8+ drinks/week or 4+ drinks on any day; men drinking 15+ drinks/week or 5+ drinks on any day. Participants were randomized to receive standard EX content (EX-S) or a version of EX that included content specific to HD (EX-HD). **Results:** Recruitment was completed in 7 weeks. Participants reported high satisfaction with both programs, including with the optional text messaging component. Total engagement with both EX-S and EX-HD was modest, with participants visiting the website a median of two times, and 52.9% enrolling in text messaging. Participants in both conditions showed substantial, significant reductions in drinking across 6 months of follow-up with no condition effects observed. Although smoking outcomes tended to favor EX-HD, condition effects were small and nonsignificant. A significantly smaller proportion of participants in EX-HD reported having a lapse back to smoking when drinking alcohol (16.3%) compared to those in EX-S (40.9%),  $\chi^2(1) = 6.22, p = .013$ . **Conclusions:** This pilot trial suggests delivering a digital cessation intervention tailored to HD smokers is feasible and acceptable to participants and may reduce the risk of alcohol-involved smoking lapses. Further testing of this intervention approach, including methods to increase engagement with intervention content, is warranted. **Funding Source:** This project was supported by a grant from the National Institute on Alcohol Abuse and Alcoholism, R34AA024593. Clinical Trial Registration Number: # NCT03068611

FUNDING: Federal

## POS5-145

### DO THE DESCRIPTORS TOBACCO AND WATER OR ORGANIC AFFECT A CIGARETTE BRAND'S PERCEIVED RELATIVE HARM RESULTS FROM AN ONLINE EXPERIMENT

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**SIGNIFICANCE:** In 2017, the makers of Natural American Spirit (NAS) removed the "additive-free" descriptor from their packaging and advertising after regulatory action from FDA, replacing it with "tobacco ingredients: tobacco + water." The purpose of this research was: 1) to assess the effect of "tobacco ingredients: tobacco + water" vs. "additive-free" on perceived harm in the NAS brand and in two additional cigarette brands that are unfamiliar to most US residents; and 2) to assess the effect of "organic" on perceived harm in the context of the new NAS "tobacco + water" label within the same brands. **METHODS:** We randomized 3,430 U.S. adults recruited on Amazon Mechanical Turk in November 2018 to view one of six sets of cigarette packs: 1) NAS packs with "organic" and "additive-free" vs. "organic" and "tobacco +water"; 2) NAS packs with "additive-free" vs. "tobacco +water"; 3) 2000 packs (a Canadian brand) with "organic" and "additive-free" vs "organic" and "tobacco +water"; 4) 2000 packs with "tobacco + water" vs "organic" + "tobacco +water"; 5) Native packs (an American Indian brand) with "organic" and "additive-free" vs "organic" and "tobacco +water"; or 6) Native packs with "organic" vs "organic" + "tobacco +water." **RESULTS:** The majority of participants were women (52.2%), white (77.4%), and had a college degree (51.4%), with an average age of 37; 20.1% were current smokers. When comparing packs with "additive-free" vs the same brand packs with "tobacco + water," 67-70% of participants thought that the cigarettes in the two packs were equally harmful, depending on the within-brand comparison. Comparing 2000 brand or Native brand cigarettes, nearly identical proportions (30%) thought the pack with "tobacco + water" and "organic" was less harmful than the pack with "tobacco + water" alone. **CONCLUSIONS:** The majority of participants did not perceive a difference in harm comparing otherwise identical NAS, 2000, or Native



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brand cigarette packs with "additive-free" or "tobacco + water." The addition of "organic" decreased the perceived relative harm of an otherwise identical pack of 2000 brand or Native brand cigarettes.

FUNDING: Federal

## POS5-146

### DISCUSSIONS OF NICOTINE REPLACEMENT THERAPY (NRT) IN AN ONLINE CESSATION COMMUNITY: STRUCTURAL TOPIC MODELING WITH TIME AND AUTHOR ENGAGEMENT AS METADATA

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**SIGNIFICANCE:** Smokers' beliefs about and barriers to NRT are well documented using surveys and in-depth interviews. We complement that literature with a data driven investigation of user generated content from an online cessation community. We use topic modeling, a semi-supervised method for categorizing large volumes of unlabeled text. **OBJECTIVE:** 1) Identify topics within posts about NRT and estimate their relative prevalence; 2) Investigate how users' distributions of topics change over time. **METHOD:** We examined posts written by users of BecomeAnEX, a free online cessation community, in 2008-2015. Machine-learning classification identified 16,995 posts about NRT written within 6 months of an author's registration. Structural topic models identify latent and discrete topics from the content of posts, based on co-occurrences of words across posts. Different numbers of topics K (5-15) were evaluated to optimize both coherence (internal consistency within topics) and exclusivity (separation between topics). The model included time between the date of the post and the author's registration date as metadata (days-since-registration), conceptually analogous to a covariate in a linear model. Topics were interpreted based on their most probable words and most representative posts. Topic prevalence is reported as proportional allocation, treating each post as a probabilistic blend of topics. **RESULTS:** K=7 topics. The most prevalent topics were: Social Support (22%); Cigarette Cravings (16%); Life as a Smoker (15%); and Quit Methods (14%). The proportion of posts about Quit Methods increased over six months (12% to 18%), while the proportion of posts about Cigarette Cravings decreased over six months (19% to 13%). **CONCLUSIONS:** Discussion of NRT was distributed across a range of general cessation topics. Topics were not focused on particular barriers, beliefs, or concerns about NRT. **IMPLICATIONS:** Interventions to encourage the use of NRT during a quit attempt may be more acceptable if framed within the context of general cessation topics, rather than tightly focused on NRT. Topic modeling provides a powerful tool for analyzing social content in online cessation communities.

FUNDING: Federal

## POS5-147

### SMOKELESS TOBACCO USE AND REPRODUCTIVE HEALTH AMONG FEMALE MIGRANTS: THE STUDY OF GARMENT WORKERS IN URBAN MUMBAI, INDIA

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**Introduction:** India is one of the world's largest producers and consumers of tobacco. Use of smokeless tobacco among Indian women is increasing, particularly among female migrant workers with negative consequences on health. Poor socio-economic conditions, illiteracy, unhygienic living conditions, and lack of knowledge about the hazards of smokeless tobacco use affect reproductive health. Therefore, there is need to understand the pattern of smokeless tobacco use, frequency of consumption and its effects on health in a vulnerable population, i.e. migrant garment worker. **Methods:** Mixed method approach has chosen for present study with samples of 450 female garment workers from urban Mumbai. Ten in-depth interviews conducted using interview guideline. Bivariate analysis carried out on quantitative data. **Results:** The average age of the participant is about 28.04 years with SD  $\pm$ 4.9 years. The estimated prevalence of SLT use women worker is 53.5%. Of these, more than one third reported use of more than one SLT daily. Most women reported the use of five main types of smokeless tobacco: pan with tobacco, *mishri*, *gutkha*, chewed tobacco. Among the tobacco users, 89 (76.1%) had reproductive morbidity such irregular cycles. The association of tobacco consumption with reproductive morbidity was statistically significant ( $\chi^2=5.413$ ,  $df=1$ ,  $p=0.012$ ). Around sixty-two percentages of the women workers using tobacco had dysmenorrhea and heavy bleeding problem. **Conclusion:** It is clear from the study

that tobacco consumption is highly prevalent among garment workers. Immediate intervention programs warranted to reduce the future burden of tobacco use-related morbidity among garment workers exposed to the high pollution levels in garment factories. **Funding:** None

## POS5-148

### WITHDRAWAL SYMPTOMS DURING 48-HOUR NICOTINE DEPRIVATION IN SMOKERS WITH PTSD, DEPRESSION, AND NON-DIAGNOSED CONTROLS

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**SIGNIFICANCE:** Although those with posttraumatic stress disorder (PTSD) and with major depressive disorder (MDD) frequently lapse early in a quit attempt, almost no data are available on their withdrawal symptoms during the first 48 hours of abstinence. Such information is vital for understanding motivational processes leading to relapse in smokers with mental health disorders. The goal of this experiment was to examine whether smokers with PTSD and with MDD experienced elevated withdrawal symptoms relative to non-diagnosed controls during paid 48-hour nicotine deprivation. **METHODS:** Participants were US Veterans who were regular smokers (N=125): 38 with PTSD; 43 with MDD, and 44 with no psychiatric disorder. Participants attended laboratory visits prior to quitting and at 24 and 48-hours post-quit to complete assessments and bioverify abstinence. Withdrawal symptoms were assessed via the Wisconsin Smoking Withdrawal Scale. **RESULTS:** Repeated measures ANOVA showed that smokers with PTSD and with MDD reported significantly higher withdrawal symptoms than non-diagnosed controls before and after quitting (craving, sadness, anxiety, anger, concentration difficulties, anhedonia, sleep disturbance). PTSD x time interactions ( $p's < .05$ ) indicated that PTSD (relative to controls) influenced the temporal pattern of the following withdrawal symptoms: craving, anxiety, anhedonia, and sleep. Significant MDD x time interactions also emerged ( $p's < .05$ ) for craving, sadness, anxiety, concentration difficulties, and sleep. Evaluation of temporal trends showed that non-diagnosed controls reported pre- to post-quit increases in symptoms consistent with withdrawal. However, those with MDD and with PTSD reported high, sustained symptoms across time (not due to ceiling effects) with most symptoms either not increasing, or even decreasing, from pre- to post-quit. **CONCLUSIONS:** These findings differ from smoking motivational models that suggest that stopping smoking greatly increases withdrawal-related affective distress in smokers with mental health disorders. Further research is needed to inform models of relapse for smokers with mental health disorders.

FUNDING: Federal

## POS5-149

### DIFFERENCES IN CIGARETTE PUFF TOPOGRAPHY BASED ON NIAAA GUIDELINES FOR AT RISK ALCOHOL DRINKING

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**SIGNIFICANCE:** There is a well-established association between cigarette smoking and alcohol use. Among cigarette smokers, history of Alcohol Use Disorder has been associated with higher average number of puffs smoked, total puff duration, and total puff volume during laboratory smoking. We evaluated whether a different classification of problematic drinking – National Institute on Alcohol Abuse and Alcoholism (NIAAA) guidelines for current at-risk drinking – is associated with puff topography measures during laboratory smoking. **METHODS:** Adult daily cigarette smokers [N=25; 10 with past-month at-risk drinking (ARD) and 15 without past-month at-risk drinking (Non-ARD)] enrolled in an experimental study of responses to very low nicotine cigarettes. Data here pertain to baseline *ad libitum* laboratory smoking of a single own brand cigarette. **RESULTS:** Participants, on average, were 41.9 years of age, smoked 17.6 cigarettes per day, and had Fagerström Test of Nicotine Dependence scores of 5.6; 72% were male. A significantly smaller proportion of ARD vs. Non-ARD participants smoked menthol cigarettes (30% vs. 80%), but other smoking and demographic characteristics did not differ between ARD and Non-ARD groups. As expected, past 30-day mean number of standard drinks of alcohol per day (3.1 vs. 0.4) and per drinking day (4.6 vs. 1.8) were higher in the ARD vs. Non-ARD group. ARD participants had a significantly higher number of puffs (25.3 vs. 15.0,  $p < .01$ ) and higher total puff volume (1627.6 vs. 777.7 mL,  $p < .01$ ) than Non-ARD participants. The groups did not differ in time to smoke, average puff volume, or average puff duration. **CONCLUSION:** Some, but not all, measures of smoking intensity during laboratory smoking of participants' own brand cigarettes differed based on NIAAA guidelines for at-risk drinking. The between-group differences in puff topography suggest that smokers with vs. without at-risk drinking could be at higher





risk for exposure to harmful and potentially harmful chemical components of tobacco smoke. Future research will examine whether puff topography measures when smoking very low nicotine cigarettes differ based on at-risk drinking status.

FUNDING: Federal

## POS5-150

### DIFFERENCES IN SMOKING INTENSITY AND EXPOSURE TO TOBACCO SPECIFIC NITROSAMINES IN BLACK AND WHITE SMOKERS

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Previous studies have shown that for the same number of cigarettes per day (CPD), Blacks have an elevated risk for lung cancer compared to Whites. Differences in tobacco toxicant exposure may contribute to the disparity in disease outcome between Blacks and Whites. Our objective was to examine exposure to nicotine and tobacco-specific nitrosamines overall and per cigarette smoked in Blacks and Whites using baseline data from a multisite clinical trial in adult smokers. Baseline urine among non-treatment seeking Blacks (n=373) and Whites (n=758) from a randomized clinical trial of adult smokers were analyzed for total nicotine equivalents (TNE), which is the gold standard for nicotine dose, and 4-(methylnitrosamino)-1-(3-pyridyl)-1-butanol and its glucuronides (total NNAL), a metabolite of a TSNA (tobacco-specific nitrosamine). Linear regression models were used to examine biomarkers overall and per cigarette smoked (adjusted and unadjusted analyses). Adjusted analyses included gender, age, menthol use, BMI, educational status and serum nicotine metabolite ratio (NMR). Statistical significance was considered at 0.05. Compared to Whites in unadjusted analyses, Blacks had significantly lower mean CPD (20 vs 15, respectively,  $p < 0.0001$ ), TNE (63.09 vs. 53.07 nmol/ml, respectively,  $p = 0.0008$ ) and total NNAL (1.40 vs. 1.20 pmol/ml, respectively,  $p = 0.0051$ ). Compared to Whites in unadjusted analyses, Blacks had significantly higher levels of TNE per cigarette smoked (3.99 vs 3.56 nmol/ml, respectively,  $p = 0.041$ ) and total NNAL per cigarette smoked (0.09 vs. 0.08 pmol/ml, respectively,  $p = 0.017$ ). Results were similar in adjusted analyses. In conclusion, although Blacks have lower overall levels of exposure to nicotine and TSNA, they experience higher exposure levels per cigarette smoked, which suggests greater intensity of smoking. The intensity of smoking may be contributing to the higher incidence of lung cancer observed in Blacks for the same number of cigarettes as Whites.

FUNDING: Federal

## POS5-151

### RAPID TEST

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**Significance.** Since 2017, the "Juul" e-cigarette has become the best-selling e-cigarette on the US market. Juul refill e-liquids contain the common e-liquid solvents propylene glycol (PG) and glycerol (VG), nicotine in salt form as nicotine benzoate, and flavorants. In a recent study, we showed that flavor aldehydes react during simple storage conditions with PG, and the generated acetal compounds differently activated irritant receptors in the airways than their parent compounds. The inhalational safety of such flavor aldehyde PG/VG acetals is unknown. The goal of this study was to quantify flavor aldehyde-solvent reaction products formed in the popular Juul e-liquid during storage and their delivery to the vapor, and to quantify nicotine salt and menthol and their carryover from e-liquid to vapor. **Methods.** Neat Juul e-liquid from all eight available flavors in October 2018 (classic menthol, classic tobacco, cool cucumber, cool mint, crème brûlée, fruit medley, mango, Virginia tobacco) and trapped vapor generated by a commercial Juul e-cigarette were analyzed by gas chromatography-mass spectroscopy (GC-MS) for flavor aldehydes, their reaction products with PG and VG, menthol, and nicotine benzoate. **Results.** The reaction products of vanillin with PG and VG were detected and delivered to the vapor (73% and 59%, respectively). Four of the eight flavors contained menthol ranging from 0.1-1 wt.-% and one flavor was not overtly labeled as mentholated (fruit medley). Nicotine vapor concentrations were found at similar levels as for combustible cigarettes. **Conclusion.** Juul users are exposed to the reported newly-formed compounds with

unknown inhalational safety. Further, Juul users are inhaling similar levels of nicotine and menthol as combustible cigarette and mentholated combustible cigarette smokers, respectively, whether or not they are drawn to the devices by the availability of flavors.

FUNDING: Federal; Academic Institution

## POS5-152

### SMOKELESS TOBACCO USE AND ONSET OF CIGARETTE SMOKING AMONG ADOLESCENTS: IS THERE A CAUSAL RELATIONSHIP?

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**Significance:** Smokeless tobacco (ST) use has been associated with subsequent onset of cigarette use (CU) among youth; however it is unclear whether this reflects a causal relationship. The aims of this study are (1) to provide estimates for the relationship between ST use and subsequent cigarette onset using PATH wave 3 data, and (2) to examine this relationship using two different approaches: an instrumental variable (IV) approach to assess the causality of the ST-cigarette relationship and a structural equation modeling (SEM) approach to investigate whether the ST-cigarette association is attributable to a general liability to use tobacco. **Methods:** The study population is non-institutionalized civilian adolescents 12-17 years of age living in the United States, sampled in the longitudinal PATH wave 2 and 3 surveys. Information about ever use of a range of tobacco products, including ST and cigarette, was obtained via confidential self-report. Logistic regression, IV analysis, and SEM were used for the analyses. In the IV analyses, "best friends' ST use" was used to instrumentalize the individual's ST use. **Results:** Among Wave 2 never cigarette users, ST user were more likely to start CU at wave 3 after adjusting for sex, age, and ethnicity (aOR=4.5, 95% CI=1.5, 12.8 for exclusive ST use; aOR=12.3, 95% CI=5.4, 27.8 for ST plus other tobacco use) compared to never tobacco users. Other tobacco use without ST use was also associated with the onset of CU (aOR=5.7, 95% CI=4.3, 7.7). In contrast, IV analysis shows a null association between ever ST use and CU onset after adjusting for sex, age, and ethnicity (beta=0.1,  $p = 0.906$ ). Moreover, results from the SEM show that ST use does not predict the onset of CU (beta=0.07;  $p = 0.427$ ) after accounting for the latent "common liability to use tobacco" construct, which is a robust predictor for the onset of cigarette use (beta=0.54;  $p < 0.001$ ). **Conclusion:** Findings from this study support the notion that the observed association between ST use and subsequent onset of CU does not reflect a causal relationship and is attributed to a general liability to use tobacco products.

FUNDING: Tobacco Industry

## POS5-153

### EFFECTS OF MOTIVATION AND ALCOHOL CONSUMPTION ON SMOKING REDUCTION

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**Significance:** Smoking continues to cause more deaths per year than HIV, illegal drugs, alcohol, car accidents, and firearm incidents combined, causing nearly one in five deaths. Individuals who regularly consume alcohol while attempting to reduce smoking may have a lower success rate compared to individuals who do not regularly consume alcohol. Previous research indicated that less frequent alcohol consumption is a statistically significant predictor of smoking cessation. The current study examined how motivation and alcohol consumption within the preceding 30 days effect smoking cessation success. **Methods:** Data for this study was gathered from a randomized clinical trial comparing 4 sessions of standard smoking cessation counseling to short physician advice to quit. All participants (N = 500, 67% male, M age = 37, 68% non-white) recruited from community corrections supervision received 12 weeks of bupropion. A moderation analysis was performed, controlling for demographics, where alcohol consumption within the last 30 days functioned as a moderator for motivation and smoking reduction. Smoking reduction is defined as the number of cigarettes smoked at the 3 month appointment minus the number of cigarettes smoked at baseline. **Results:** The moderation analysis revealed that individuals with high motivation displayed a greater reduction in smoking compared to those with high motivation and consumption of alcohol within the past 30 days. Participants with high motivation and no alcohol consumption within the previous 30 days exhibited the highest levels of smoking reduction. Oddly enough, individuals with low and intermediate motivation displayed lower reduction in smoking compared to those with low and intermediate motivation and consumption of alcohol within the past 30 days. **Conclusions:** Overall, individuals with high motivation to quit smoking appear to be more successful in smoking reduction than those who have high motivation and have consumed alcohol within the last 30 days. However, this



trend reverses when individuals exhibit intermediate or low motivation. Those who have consumed alcohol within the last 30 days and have intermediate or low motivation show a greater reduction in smoking compared to individuals who have not consumed alcohol within the last 30 days. **References:** 1. [https://www.cdc.gov/tobacco/data\\_statistics/fact\\_sheets/health\\_effects/effects\\_cig\\_smoking/index.htm](https://www.cdc.gov/tobacco/data_statistics/fact_sheets/health_effects/effects_cig_smoking/index.htm) 2. [https://tobaccocontrol.bmj.com/content/6/suppl\\_2/S57.short](https://tobaccocontrol.bmj.com/content/6/suppl_2/S57.short)

FUNDING: Federal

## POS5-154

### HEATED TOBACCO PRODUCTS AND E-CIGARETTE USE WITH CONVENTIONAL CIGARETTE AMONG HEALTH EXAMINEES IN KOREA

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**Significance:** Combined use of Heated tobacco product (HTP) and other tobacco products has increased recently in South Korea since the launching of IQOS (June 2017), GLO (Aug 2017) and Lil (by KT&G, Nov 2017). Such an actual behavior is unexpected. **Methods:** In a cross-sectional written survey was performed between March to May, 2018 in a health check-up in Seoul, Korea. Among 153,274 adults aged 20 or older years, a total of 4,564 (3,202 men and 1,362 women) who answered the additional questionnaires were included. Ever or current use of single, dual or triple combined pattern, and the amount of conventional cigarette, e-cigarette or HTP was described. **Results:** Ever use of HTP were reported in 18.2% in men and 1.9% in women, respectively, while current use of HTP were reported in 10.6% in men and 0.9% in women, respectively. Among the ever users, daily, intermittent and former HTP users were 10.6%, 2.9% and 4.7% in men, and they were 0.9%, 0.6% and 0.4% in women, respectively. The most frequent age group for HTP users was 20's in women, seemed to be younger than those of men users, 30's. Large segment of Korean HTP users reported IQOS purchase, but the number of local product Lil users has increased recently. The 'Current' proportion of never, e-cigarette only, HTP only, conventional cigarette only, conventional-HTP dual, conventional-e-cigarette dual, e-cigarette-HTP dual, and triple use were 60.4%, 0.7%, 1.7%, 24.0%, 2.8%, 1.4%, 1.8%, 7.2% in men, respectively, and they were 93.4%, 0.3%, 0.2%, 4.6%, 0.4%, 0.2%, 0.2%, and 0.7% in women, respectively. The proportion of triple users (Ever use: men 15.1%, women 2.5%; Current use: men 7.2%, women 0.7%) were higher than those of conventional-HTP dual users. Number of cigarettes per day among conventional cigarette only smokers were  $13.0 \pm 7.0$  (Mean $\pm$ SD) in men and  $6.7 \pm 3.4$  in women, respectively. In conventional-HTP dual users, number of cigarettes per day was  $13.0 \pm 5.8$  plus  $11.2 \pm 5.3$  HTP sticks in men, and they were  $6.6 \pm 3.2$  plus  $4.2 \pm 3.6$  in women. In triple users, number of cigarettes per day was  $13.4 \pm 5.1$  plus  $10.9 \pm 5.8$  sticks in men, and they were  $6.6 \pm 3.1$  plus  $6.5 \pm 3.2$  in women. **Conclusion:** Triple use of conventional cigarette, e-cigarette and HTP has become a considerable tobacco use pattern. Risk assessment for those who have combined use behavior of tobacco products is necessary. \*This work was supported by the Research Program funded by the Korea Medical Institute (KMI) in 2017.

FUNDING: Non-profit grant funding entity

## POS5-155

### RATIONALIZATIONS AMONG SMOKERS IN INDIA: LONGITUDINAL FINDINGS FROM THE 2010-2013 TCP INDIA SURVEYS

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**BACKGROUND** Fotuhi et al. (2013) found that smokers in four high-income countries—US, Canada, UK, Australia—reduced their cognitive dissonance through two types of rationalizations over time: risk minimizing and functional beliefs. Smokers who quit reduced their rationalizations, especially the functional beliefs. To date, however, the relation between rationalizations and smoking vs. quitting over time has not been studied in low- and middle-income countries. **OBJECTIVE** This study examines the pattern of rationalizations among smokers and their relation to quitting behavior in a longitudinal study of tobacco users in India. **METHOD** Smokers (n=1112) participating in the Tobacco Control Project (TCP) India Survey, a cohort study conducted in four states in India, part of the 29-country ITC Project, were followed across two waves—Wave 1 (2010-11) and Wave 2 (2012-13). Two types of rationalizations—risk-minimizing beliefs (e.g., “medical

evidence that smoking is harmful is exaggerated”) and functional beliefs (e.g., “smoking calms you down when stressed”) were measured at each wave. Weighted analyses using STATA 15 were conducted to assess the change in these two types of beliefs over time, comparing smokers who continued smoking to those who reported having quit at Wave 2. **RESULTS** Out of 1112 smokers at Wave 1, 78 (7%) had quit at Wave 2. At Wave 1, there was no difference in the functional beliefs of smokers who quit at Wave 2 (M=3.17) vs. those who were still smoking (M=3.29). But for smokers who quit at Wave 2, functional beliefs show a significant change at Wave 2 (p<.05) between continued smokers (M=3.31) and those who quit (M=2.96). In contrast, the risk-minimizing beliefs did not change between those who continued smoking and those who had quit. **CONCLUSION** These results suggest that smokers in India show the same kind of dissonance reduction as smokers in the US, Canada, UK, and Australia: smokers who quit reduced their rationalizations in the form of functional beliefs, but not in their level of risk-minimizing beliefs. These results are consistent with cognitive dissonance theory and points to the cross-cultural need for smokers to justify their continued smoking.

FUNDING: Federal; Non-profit grant funding entity

## POS5-156

### LONGITUDINAL PATTERNS OF CIGARETTES SMOKING AMONG MEXICAN HEALTH WORKERS WITH CHRONIC DISEASES

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**Background:** Patterns of cigarette smoking among Mexicans with chronic diseases are not well documented. A better understanding of comorbid cigarette use and chronic diseases is important in high-burden tobacco-use countries such as Mexico. With a population of 126 million, over 14.3 million adults (16.4%) are current smokers, and it is expected that 4 million Mexicans will die of tobacco-related diseases in the next decade. **Methods:** We used data from Waves 1-3 of the Health Workers Cohort Study (HWCS), a 12-year longitudinal cohort study by the Mexican Social Security Institute that followed Mexican health workers to examine different health outcomes and its association with health-related lifestyles. The HWCS had three major stages of measurement the first wave took place from 2004 - 2006 and subsequent after 6 years each. Only participants who have participated in all three waves were included in this study's analysis (n=803). Patterns of cigarettes smoking (e.g., Keep as non-smokers, change from active to former smokers and vice versa and keep as smokers during the 3 waves) were explored among HWCS participants with hypertension, diabetes and depression. Descriptive analysis was conducted and included chi-square and t-test. Statistical significant was kept at a value of p< 0.05. **Results:** Smoking prevalence among participants of the study is similar to the smoking prevalence of Mexico (11%). Interestingly, the smoking prevalence over the 12-year follow-up period was lower among participants with chronic conditions; diabetes 6.8%, hypertension 6.1% and depression 8.3%. In this cohort study, men were more likely to be smokers. Participants with hypertension and diabetes were more likely to quit smoking over 12 years, while no participants with depression changed from smoker to non-smoker during the 12 years period. **Conclusions:** Comorbid tobacco use persists throughout the study, similarly among those with diabetes, hypertension, and depression. Although, a quit behavior wasn't observed in the HWCS participants with depression along the study. Future smoking cessation interventions should target and be tailored to depressive smokers.

FUNDING: Academic Institution

## POS5-157

### CHANGES IN BIOMARKERS OF EXPOSURE ASSOCIATED WITH SWITCHING FOR 5 DAYS FROM COMBUSTED CIGARETTES TO NICOTINE SALT POD SYSTEM

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**Introduction:** This study explored whether switching from cigarettes to ENDS may potentially reduce exposure to key toxicants. Data are presented from a randomized, openlabel, parallelgroup, inpatient study of adult smokers that examined changes in primary urine and blood biomarkers of exposure (BOEs), relative to baseline, following a 5day exclusive use period of the nicotine salt pod system (“NSPS”, JUUL Labs, Inc.) with one of four flavors at 5% nicotine strength (Virginia Tobacco, Mint, Mango, Crème), abstinence, or continued use of usual brand combustible cigarettes. **Methods:** Ninety subjects were randomized into one of six cohorts: use of NSPS (n=15 for each



of the four flavors), use of usual cigarette (n=15), or abstinence (n=15). Total nicotine equivalents, and the following biomarkers were measured in 24-hour urine collections: NNN, NNAL, 3-HPMA, MHBMA, S-PMA, HMPMA, CEMA, and 1-OHP. COHb was measured in blood. **Results:** All subjects randomized to the use of NSPS (n=60 ITT) and usual cigarettes (n=15) completed the study; four subjects from the abstinence arm terminated early (n=11; 73% completion rate in-arm). Over the course of 5 days, mean total nicotine equivalents increased by 9% in the pooled NSPS group vs. 26% in the usual cigarette group (p>0.05). Decreases in the mean levels of all non-nicotine BOEs were observed in the abstinence group and four NSPS groups at Day 5 compared to baseline (Day -1); the cigarette group demonstrated increases in all BOEs except for 1-OHP and HPMA. The eight non-nicotine urine BOEs were reduced by an aggregate 85.3% in the abstinence group and 85.0% in the pooled NSPS group (99.6% relative reduction in aggregate biomarkers; p>0.05). Similar reductions were seen in the pooled NSPS and abstinence groups for each individual BOE (p>0.05 for each analyte). In the usual cigarette group, these BOEs increased by an aggregate of 14.4% (pooled NSPS vs. usual cigarette; p<0.001 for each analyte). COHb was likewise reduced by 71.8% in the pooled switching group vs. 69.1% in the abstinence group (p>0.05), while increasing by 13.3% in the usual cigarette group (p<0.001). **Conclusion:** These results support the hypothesis that complete switching from cigarettes to the NSPS may lead to meaningful reductions in multiple key, short-term biomarkers of exposure observed with combustible use. **Limitation:** Incomplete switching from cigarettes to NSPS (dual-use) was not studied. **Note:** Consistent with applicable laws and regulations, JUUL Labs does not, and cannot, promote its products as being less harmful than cigarettes.

FUNDING: E-cigarette Alternative Industry

## POS5-158

### MEDIUM, AD, AND RESULT: INTERNET USE, ONLINE ADVERTISING AND THE TRIAL AND USE OF ELECTRONIC CIGARETTES

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**Introduction:** Recent studies suggest internet use and internet advertising could influence the trial and use of e-cigarettes. We aimed to quantify the association between time of internet use, e-cigarette advertising and the trial and use of e-cigarettes in a representative sample of Mexican adolescents and adults. **Methods:** Data were analyzed from the 2016 National Survey of Drug, Alcohol and Tobacco Use (ENCODAT 2016), which surveyed 12-65-year-old persons in Mexico. The analytic samples included adolescents between 12-17 years (n=4,008) and adults between 18-65 year (n=14,672). Logistic regression models were fit for each outcome (e-cigarette trial, e-cigarette use, smoking trial and smoking use). The main independent variables were time of internet use, online exposure to e-cigarette advertising, alcohol use and drug use. Models were also adjusted by sex, age, rural/urban residence, education, wealth, and smoking status. **Results:** We found that online advertising was related to the trial of e-cigarettes in both adolescent and adults (AOR=11.1 95% CI 3.95-5.60; AOR=2.36 95% CI 1.27-4.37, respectively). It was also associated with e-cigarette use in adolescents (AOR=11.06 95% CI 3.95-31) and adults (AOR=2.36 95% CI 1.27-4.37). Time of internet use was also associated with e-cigarette trial and use, but associations became non-significant in fully adjusted models. Other markers of risk seeking behaviors, like marijuana or alcohol use were not associated with e-cigarette use. **Conclusions:** The association between internet use and e-cigarette trial and use was largely explained away by online advertising, reinforcing the evidence to support bans for internet-based e-cigarette advertising. Still, internet use maintained a trend after advertising adjustment, suggesting other processes, such as technophilia (the positive orientation towards technology) could be relevant. The lack of association with other risk markers support the theory that e-cigarettes are appealing to low and medium-risk adolescents and young adults.

FUNDING: Federal

## POS5-159

### SOCIAL FACTORS OF MENTAL HEALTH RECOVERY MEDIATE THE RELATIONSHIP BETWEEN TOBACCO USE AND PSYCHOLOGICAL DISTRESS AMONG ADULTS WITH MENTAL ILLNESS

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**Background.** Serious psychological distress (SPD) is a well-evidenced correlate of tobacco use. This relationship partly explains the tobacco-related health disparities among individuals with mental illness (MI), whose prevalence of tobacco use is greater than twice that of the general population. Mental health recovery (MH Recovery) is a holistic framework that reflects functional or quality of life factors, beyond symptoms and problems related to mental illness. This study examined whether MH recovery mediates the relationship between tobacco use and distress severity in a clinical sample of adults with MI. **Methods.** The sample (N = 314) were completers of a 12-month integrated health care program providing physical health screenings to adults receiving psychiatric care at an outpatient mental health clinic. Tobacco use was assessed by self-report of tobacco use frequency and breath carbon monoxide (CO). The Kessler Psychological Distress scale (K6) and the Recovery Assessment Scale (RAS) were administered at baseline and 12-month assessment. **Results.** Twenty-eight percent (n = 89) of patients reported tobacco use. Tobacco users were about twice as likely to present with SPD (K6 ≥ 13) at 12-months [ $\chi^2(1) = 4.88, p = 0.027$ ]. Tobacco use predicted 12-month distress severity ( $\beta = .126, t = 2.40, p = 0.042$ ). We then used mediational analyses (Barron & Kenny, 1986) to examine whether MH recovery mediated that relationship. Of the RAS subscales, Willingness to Ask for Help ( $\beta = .110, t = 1.78, p = 0.076$ ) and Reliance on Others ( $\beta = .060, t = 1.013, p = 0.312$ ) had significant mediating effects. **Conclusions.** Results extend recent research on the relationship between tobacco use and SPD (Zvolensky et al., 2018). Tobacco users with MI were more likely to present with SPD, relative to nonusers with MI. Findings support the mediating effects of MH recovery on the relationship between tobacco use and psychological distress. Taken together, results implicate the need for service programs to more seriously foster MH recovery, particularly tailored tobacco cessation interventions for adults with MI that enhance interpersonal connection and social support.

FUNDING: Federal

## POS5-160

### EFFICACY OF THE NOVEL DIGITAL ASCURE SMOKING CESSATION PROGRAM COMBINING SMARTPHONE APP AND WEB BASED MENTORING

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**SIGNIFICANCE:** "ascure" is the first Japanese online smoking cessation program developed by CureApp, Inc. This program provides an alternative solution for smokers, especially those who potentially fail to complete a standard outpatient smoking cessation program mainly due to their busy schedule. The program has 6-8 online interactive sessions in 24 weeks. In addition, participants can receive personalized guidance based on behavioral therapy in a timely manner automatically via app. Participants also use nicotine patch or nicotine gum during the program. In this study, we examined the efficacy of this novel "ascure" smoking cessation program for participants with nicotine dependence. **METHODS:** We enrolled consecutive ascure program participants from August 2017 to April 2018. We corrected baseline smoking behaviors by self-report and application usage through 24 weeks. Moreover, we performed a salivary cotinine testing at Week 12 and Week 24 for evaluating smoking status. Smoking cessation success was defined as 4-weeks point smoking cessation evaluated by both self-report and cotinine testing. We tested the associations of smoking cessation success at Week 24 with potential predictable factors (i.e. baseline characteristics and data on application usage) by multivariable logistic regression. **RESULTS:** We enrolled 145 ascure participants (84 males, 61 females) in this study (mean age, 44.3 ± 9.8 years; years of smoking, 22.2 years; the average number of cigarettes per day, 16.5; and mean TDS, 7.1). 90 participants (62%) completed the whole program. At Week 24, 70 participants (48%) successfully quit smoking using the ascure program. In multivariable analysis, the number of written diary via the app within first 12 weeks was significantly associated with smoking cessation success at 24 weeks (adjusted odds ratio, 1.008; 95% confidence interval, 1.005-1.011; p<0.0001). **CONCLUSION:** The ascure program achieved high completion rate (62%) compared to outpatient programs (30-35% in Japan). This may be due to the combination of online mentoring and concurrent use of applications.

FUNDING: Other

## POS5-161

### EVALUATING THE INFLUENCE OF U.S. E-CIGARETTE POLICIES ON SMOKING AND VAPING PREVALENCE AMONG ADULTS AND YOUTH: A MULTI-YEAR, STATE-LEVEL ANALYSIS

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**SIGNIFICANCE:** States are able to make many choices regarding the regulation of e-cigarettes; however, there is little known about the influence of those state-level policy decisions. This study examined whether or not vaping policies influenced e-cigarette use, and if so, which policies were correlated with reduced vaping. The study also investigated if there was evidence to suggest that restrictive vaping policies may have had the unintended consequence of increasing smoking rates. **METHODS:** A novel, multiyear database was created to quantify smoking and vaping prevalence for adults and youth by state. Prevalence data were collected from the Behavioral Risk Factor Surveillance System (BRFSS) and the Youth Risk Behavior Surveillance System (YRBSS) and included the number of current smokers and e-cigarette users. Vaping policies were measured by three dichotomous variables indicating whether the state: 1) required a retail license for e-cigarette vendors; 2) set a minimum age greater than 18 years to purchase e-cigarettes; and 3) collected an excise tax on e-cigarettes, e-liquids, or both. State-level controls included variables for race, age, educational attainment, and income. Using R version 3.5.1, a mixed-effects model was fit to the data. **RESULTS:** Requiring a license to sell e-cigarettes was a significant predictor of reduced vaping prevalence among youth. Specifically, when asked about their use during the past 30 days, the percentage of users who vaped daily and those who vaped 20 or more days, was lower in states that required retailers to obtain a license than in those that did not by 0.49 and 0.71 percent, respectively. Although no variables of interest were statistically significant in adult models or the smoking model for youth, the null effects represent important findings. **CONCLUSION:** If fewer stores are able to obtain the proper retail license, youth will have a more difficult time finding places to purchase e-cigarettes. The null effects, especially from the smoking prevalence models, are also important because they indicate that individuals are not “switching back” to cigarettes as a function of vaping regulation policy. However, there was a slight increase in adult smoking rates from 2016 to 2017. Researchers should continue to monitor the positive and negative effects of vaping policies.

FUNDING: Academic Institution

## POS5-162

### ACCESS TO PEN HOOKAH (E-CIGARETTE) AMONG SCHOOL GOING CHILDREN FROM SLUMS OF MUMBAI, INDIA

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**Background:** Unaware about the adverse effects of E-cigarettes, students have started trying it. Though experimentation with E-cigarettes is increasing, little is known about quantum of use, reasons for experimentation, adverse effects or cessation effects among adolescents. E-cigarettes are considered as gateway products for smoking. In India, they are easily available in shops or online at affordable prices. Youth from slums of Mumbai refer to them as “pen-hookah”. The aim of the study was to assess the prevalence of E-cigarettes among adolescent school students from slums of Mumbai. **Method:** LifeFirst, an in-school tobacco and areca-nut dependence treatment program, was implemented in 60 schools in slum areas of Mumbai in 2018-19. 3458 students of 7<sup>th</sup>-9<sup>th</sup> grades attended orientation sessions about harmful effects of tobacco and areca-nut. Students were informed about the availability of a cessation service and encouraged to register voluntarily for program. Individual and theme-based group follow up sessions will be conducted. Demographic data, tobacco/areca-nut use details and history of E-cigarette use was collected through interviewer administered questionnaires. **Result:** Of the 1132 students who enrolled for the LifeFirst cessation program, 16% (186) had ever used E-cigarettes. 7% of these were girls. 38% (71) of them belonged to 9th grade. 99% (184) of them consumed some form of tobacco or areca nut along with E-cigarettes. Among the ever e-cigarette users, 27% of them were current smokers, 11% were current smokeless users and 91% of them consumed areca nut. **Conclusion:** E-cigarettes are accessible and prevalent among school going children from slums of Mumbai and it is important to increase the knowledge about E-cigarettes among them.

FUNDING: Non-profit grant funding entity

## POS5-163

### IMPLICIT ASSOCIATIONS OF FLAVORED TOBACCO AMONG YOUNG ADULT NONTOBACCO USERS

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Flavors such as mint/menthol, fruit, and alcohol are often seen as features that increase the appeal and ease initiation of tobacco products. Tobacco industry documents discuss adding flavors to link tobacco with tastes young people already enjoy, perhaps promoting use among non-tobacco users. The US Food and Drug Administration (FDA) has proposed limiting sales or banning certain flavored tobacco products (FTPs). However, little is known about possible differences in underlying cognitive processes linking FTP descriptors to more favorable attitudes toward FTPs; processes that are often targeted by tobacco marketing. This study used an Implicit Association Task (IAT) to measure implicit appeal toward FTP vs. non-FTP (e.g., ‘tobacco’) descriptors used to market tobacco products among young adult (age 18-24) (n= 86) non-current tobacco users. Two IATs measured the speed with which participants paired FTP (*Menthol, Cherry, Wine, Clove, Candy, Sweet, and Mint*) and non-FTP (*Non-menthol, Tobacco, Bold, Smooth, Natural, Mild, and Organic*) descriptors with approach/avoid words each compared with neutral stimuli (furniture words). Analyses examined mean differences in reaction time between each IAT paradigm to determine if reaction times were significantly faster for the flavored vs unflavored IAT. Further, multivariable analyses examined the association of age, race/ethnicity, and gender to IAT scores measuring appeal for FTP descriptors. Findings indicated that 45% of the sample showed stronger appeal for FTP than for non-FTP descriptors; while 55% of the sample showed the opposite. There were no significant differences in mean reaction time scores for the FTP and non-FTP IATs; respondents were equally fast at pairing flavored and unflavored descriptors with “approach” words. No significant differences were found in multi-variable analyses and FTP IAT scores. Both FTP and non-FTP descriptors may be implicitly appealing to young adult non-tobacco users and underlying appeal does not significantly differ by demographics. Potentially bans on FTPs would still allow marketing by non-FTP descriptors that may be attractive to non-users.

FUNDING: Federal

## POS5-164

### PSYCHOLOGICAL DISTRESS AND CIGARETTE SMOKING: CONSIDERING THE ROLE OF FOOD INSECURITY

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**Background:** Psychological distress and smoking may co-occur for many reasons, including vulnerabilities associated with socioeconomic disadvantage. Food insecurity—a stressful condition due to inconsistent food access—is linked with increased psychological distress and is also an independent risk factor for smoking. We investigated the association between psychological distress and cigarette smoking, specifically examining distress occurring with or without food insecurity, and variations in the associations by socioeconomic status. **Methods:** We analyzed data from a representative U.S. sample from the 2015 Panel Study of Income Dynamics (n=9048). Weighted, adjusted logistic regression examined whether distress occurring with or without food insecurity was associated with current smoking using a 4-category variable: no distress and no food insecurity (referent); food insecurity without distress; distress without food insecurity; and distress with food insecurity. Analyses were stratified by federal poverty level. **Results:** Overall, smoking prevalence was highest among those experiencing distress with food insecurity (39%) and food insecurity without distress (33%), and lower among those experiencing distress without food insecurity (20%), and the lowest among those had no distress and no food insecurity (13%). For each category, smoking prevalence was higher among those below vs. above poverty. For below poverty, distress without food insecurity was not significantly associated with smoking, whereas food insecurity without distress (OR=2.48, 95% CI 1.91-3.23) and distress with food insecurity (OR=2.59, 95% CI 2.35-3.01) were significantly associated. Among those above poverty, distress without food insecurity was significantly associated with smoking (OR=1.58, 95% CI 1.50-1.66) as were the other categories. **Conclusions:** These findings give new insights into the associations among psychological distress, food insecurity, and smoking within the context of poverty levels. Further examining how socioeconomic stressors, such as food insecurity, intersect with psychological distress is needed to address continued socioeconomic disparities in cigarette smoking and develop effective population-based interventions.

FUNDING: Federal

## POS5-165

### ORAL SELF EXAMINATION TO PROMOTE EARLY DETECTION OF ORAL PRE-CANCERS AND CANCERS

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**Significance:** India has one of the largest numbers of tobacco consumers and resulting disorders. Tobacco use in India differs from international tobacco use model. Widespread use of various types of smokeless tobacco preparations, ingrained cultural attributes and socio cultural diversity within the country are the main reasons for this diversity. Availability of and access to existing cessation services are also limited for the population. This becomes particularly challenging for lower socio economic sections are often heavily addicted to tobacco use and develop resulting oral pre-cancers and cancers. The lack of education and awareness in this population subset compounds the problem by detection in late stages. Keeping this in view on site tobacco cessation counseling and interventions were developed along with self mouth examination technique education

**Aim:** To study the effectiveness of oral self examination techniques in promote early detection of oral pre-cancers and cancers. **Methods:** Three onsite tobacco cessation sessions were conducted in 2018. The participants in the session mainly constituted of tobacco users. Individuals with interest in education about harmful effects of tobacco or with tobacco user relatives also participated. Information about different types of harmful tobacco preparations, self examination techniques, types of disorders emerging from tobacco use and cessation methods were provided to the participants in these sessions. A total of 92 participants attended all three sessions. The intention was to promote oral self examination along the lines of breast self examination to help tobacco users in identifying mucosal changes resulting from tobacco use. Oral cancer is often detected in the late stages which results in poor prognosis. Most of the cases of tobacco related oral conditions present with pre malignant / precancerous changes. General population is often unaware of precancerous mucosal alterations and education about self examination and oral pre cancer identification will help in early detection and significant reduction of morbidity and mortality. **Results:** 28 tobacco users were able to identify oral precancers by using self examination techniques. 14 tobacco users requested for habit cessation guidance. Additional 37 participants requested detailed information about various sections elaborated in these sessions. **Conclusion:** Oral self examination can be promoted along the lines of breast self examination to promote early detection of oral pre cancers and cancers.

FUNDING: Unfunded; Academic Institution

## POS5-166

### PERCEIVED ETHNIC DISCRIMINATION AND NICOTINE DEPENDENCE IN A SAMPLE OF DIVERSE ADULT SMOKERS IN THE BRONX, NEW YORK

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**Background:** Research investigating diverse populations and smoking related behaviors continues to be scarce. Given that racial and ethnic minority smokers face the greatest health burden among all smokers, it is important for smoking cessation interventions and community research to focus on smoking related disparities. Of particular interest is perceived ethnic discrimination. Discrimination and racism have been associated with cigarette smoking, however little is known about the relationship between perceived ethnic discrimination and smoking related behaviors such as nicotine dependence in diverse samples. The purpose of this study was to examine the relationship between perceived ethnic discrimination, nicotine dependence, and cigarettes per day in a diverse sample of daily adult smokers. **Methods:** Participants (N=34) were self-identified African-American (n=21), White (n=9), Native Hawaiian /Pacific Islander (n= 1), Latino/a (n=6), and Biracial (n=3) adult daily cigarette smokers recruited in the Bronx, New York. The relationship between perceived racial discrimination and smoking behaviors were examined using Pearson correlations. Higher perceived discrimination was expected to be associated with greater nicotine dependence (FTND) and cigarettes per day (CPD). **Results:** Across the full sample, the average CPD was 20.35 (SD=7.95), and FTND was 5.79 (SD=1.83). Pearson correlations indicated that perceived ethnic discrimination was significantly associated with nicotine dependence (p=0.03) However, the relationship between perceived ethnic discrimination and self-reported CPD was not statistically significant (p=0.31). **Summary:** In a diverse sample of current adult smokers from the Bronx, greater perceived ethnic discrimination was associated with nicotine dependence. However, CPD was not associated with perceived ethnic discrimination. Elucidating disparities among adult smokers, including racial/ethnic factors, may benefit smoking cessation efforts for minority group members. Disclosures: None Grant Funding: None

## POS5-167

### PREVALENCE OF AWARENESS AND USE OF JUUL E-CIGARETTES, E-CIGARETTES AND COMBUSTIBLE CIGARETTES IN A NATIONAL PROBABILITY SAMPLE OF U.S. ADOLESCENTS AGED 13-17 YEARS

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**Significance:** In September 2018, the U.S. Food and Drug Administration (FDA) announced that e-cigarette use among U.S. youth has become an 'epidemic', and that much of the youth use of e-cigarettes is being driven by one manufacturer - JUUL. **Methods:** A cross-sectional, self-complete online survey conducted between 21 September and 3 October, 2018 assessed awareness and use of JUUL e-cigarettes, e-cigarettes and combustible cigarettes in a national probability sample of 1,015 U.S. adolescents aged 13-17 years. **Results:** Approximately 45.5% of adolescents aged 15-17 years and 29.1% of adolescents aged 13-14 years had ever seen or heard of a brand of e-cigarette called 'JUUL' before taking part in this study. Among adolescents aged 15-17 years, 7.6% have ever used a JUUL, 4.0% have used a JUUL in the past 30 days, and 0.3% have used a JUUL on 20-30 of the past 30 days. Among adolescents aged 13-14 years, 1.5% have ever used a JUUL, 0.8% have used a JUUL in the past 30 days, and 0.0% have used a JUUL on 20-30 of the past 30 days. Among adolescents aged 15-17 years, 0.7% have used 20 or more JUUL pods in their lifetime. **Conclusions:** Contrary to anecdotal reports that use of JUUL e-cigarettes is ubiquitous among U.S. youth, present estimates suggest that, in September-October 2018, the majority of adolescents aged 13-17 years had never seen or heard of JUUL e-cigarettes, the prevalence of past 30-day use was low (<5%), and frequent use of a JUUL was extremely rare (<0.3%).

FUNDING: E-cigarette Alternative Industry

## POS5-168

### CORRELATION BETWEEN SMOKING AND ACADEMIC PERFORMANCE AMONG UNDERGRADUATE STUDENTS OF A PUBLIC SECTOR UNIVERSITY ISLAMABAD

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**Background:** Prevalence of smoking is on rise its harmful effects on every organ of body are well known. Smoking is a growing concern and its association with academic performance is not well studied. **Objectives:** This study aims to assess the prevalence of smoking, correlation between smoking and academic performance and also to assess the reasons of smoking initiation among undergraduate students. **Methods:** Cross-Sectional study method was used to collect data from 500 undergraduate students. Structured questionnaire was used for collection of data. **Results:** Results of study shows that 112/500 (22.4%) students were smokers among them 93/112 (34.6%) were males and 19/112 (8.2%) were females. Prevalence of smoking was higher in students belonged rural area 23.5% to that of urban area 21.9%. High academic performance is inversely proportional to smoking; Smoking was significantly and inversely associated with students' academic performance, adjusted odds ratio was 2.5 and p < 0.000 the odds ratio indicates that smoker students were 2.5 odds more likely to report a lower GPA than that of non-smoker students. Three major reasons of smoking initiation; 25% students stated peers and friends, 21% stated easy availability while 14% said it was fun and enjoyment they started smoking. **Conclusion:** Findings of this study are meaningful to the discussion about the negative effects of smoking and academic performance. These findings also identify the important target population for intervention.

## POS5-169

### QUITLINE TREATMENT ENROLLMENT AND CESSATION OUTCOMES AMONG SMOKERS LINKED WITH TREATMENT VIA ASK-ADVISE-CONNECT: COMPARISON BETWEEN HIV+ AND NON-HIV+ SMOKERS

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Smoking cessation is a pressing healthcare need for people living with HIV (PLWH). However, there is a lack of evidence regarding the degree to which evidence-based tobacco cessation interventions are utilized by or are effective among PLWH. This



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study examined differences in treatment enrollment and abstinence at 6 months among smokers recruited from one HIV treatment clinic and 12 non-HIV clinics that were part of the same healthcare system. Analyses were based on data from a 34-month implementation project that evaluated the Ask-Advise-Connect (AAC) approach to linking smokers in primary care settings with quitlines. During the project, patients' smoking status was systematically assessed and recorded in the electronic health record (EHR). Licensed vocational nurses were trained to give all smokers brief advice to quit and to offer connection with the Texas Quitline. Quitline treatment consisted of up to 5 proactive counseling calls. Outcomes included treatment enrollment and biochemically confirmed, self-reported abstinence at 6 months. The smoking status of 218,915 unique patients was recorded in the EHR; 5,285 (2.7%) of these patients were recruited from the HIV clinic where the prevalence of smoking was 45.9% (2,675/5,825). The smoking prevalence among those recruited from the non-HIV clinics was 17.9% (38,213/213,090). Approximately 15% of smokers from both the HIV and non-HIV clinics were successfully contacted by the Quitline, and 75% of these individuals enrolled in treatment. Among patients who enrolled in treatment and agreed to follow-up, self-reported abstinence was 18.7% within the HIV+ group and 16.5% within the non-HIV+ group. Biochemically confirmed abstinence was lower at 4.2% within the HIV+ group and 4.5% within the non-HIV+ group. Treatment enrollment and abstinence rates were not statistically different among HIV+ and non HIV+ patients (all  $p > 0.05$ ). AAC resulted in Quitline treatment enrollment and cessation rates that were comparable for HIV+ and non HIV+ patients. However, given the dramatically higher prevalence of smoking among PLWH, enhanced strategies tailored to the unique needs of HIV+ smokers are needed to facilitate cessation.

FUNDING: Federal; State; Academic Institution

## POS5-170

### THE FEASIBILITY AND POTENTIAL EFFICACY OF A NOVEL WORKPLACE SMOKING CESSATION INTERVENTION TARGETING HISPANIC/LATINO CONSTRUCTION WORKERS: A PILOT CLUSTER RANDOMIZED TRIAL

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**Significance:** Smoking prevalence among U.S. Hispanic/Latino construction workers is very high (31%), and their cessation rates are lower than other groups. We tested feasibility and potential efficacy of a brief workplace smoking cessation intervention targeting these workers. **Methods:** In conjunction with lunch trucks at worksites, we recruited adult Hispanic/Latino workers who smoked  $\geq 5$  cigarettes/day for a pilot, 2-arm, cluster randomized controlled trial comparing an Enhanced Care (EC) [brief culturally adapted behavioral group counseling session + 2 phone calls + referral to tobacco quitline (QL) + 6 weeks nicotine replacement treatment (NRT)], to Standard Care (SC) [referral to QL + 6 weeks NRT] intervention, typically delivered in Spanish. Participants received two follow-ups (F/U) 3 and 6 months after enrollment. Feasibility outcomes were enrollment efficiency (number of enrolled/number of screened), 6-month F/U rates, adherence to treatment, and QL enrollment rates. Potential efficacy outcome was prolonged abstinence (no smoking, not even a puff, after a grace period of two weeks after quit date) at 3 and 6-month F/U confirmed by saliva cotinine  $< 30$  ng/ml. **Results:** Over 11 months, 17 construction sites with 134 participants were enrolled and randomly assigned to the EC (9 sites; 65 smokers), or SC (8 sites; 69 smokers). Enrollment efficiency was 86%. Six-month F/U rates were 82% and 75% in the EC and SC, respectively. In the EC, 63% received all workplace intervention, and 49% were contacted by QL, of whom, 23% received at least 2 phone calls from the QL. In the SC, 88% received all workplace intervention, and 40% were contacted by the QL, of whom, 12% received at least 2 phone calls from the QL. Prolonged abstinence rates at 3- and 6-month F/U were 44% (EC) vs 38% (SC) ( $P=0.571$ ), and 18% (EC) vs 15% (SC) ( $P=0.748$ ), respectively. **Conclusion:** The brief culturally tailored workplace smoking cessation intervention was feasible and modestly improved abstinence among Hispanic/Latinos workers. Results will inform a larger study of the effectiveness of cessation approaches that have great potential for dissemination to U.S. minority construction workers.

FUNDING: Federal; Academic Institution

## POS5-171

### TOBACCO PERCEPTION IN THE FRENCH POPULATION

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Today, cancer is the most important death cause in Europe. Many researches in Public Health (PH) have shown the role of attitudes on behaviors and that these attitudes

change over time. We sought to examine French people's attitudes about the Cancer Risks Factors and their associations with socio-demographic and perceived behavior variables. Data were collected in a random cross-sectional telephone survey of the French general population at 3 periods (2005  $n=3736$ , 2010  $n=3392$ , 2015  $n=3817$ ). The statistical analyses shown that two factors are very largely associated with cancer risk and stable in time: sun exposure and tobacco consumption. The other items shows significant differences especially concerning psychological factors (e.g. in 2005, 60.4% of the respondents felt that "having been weakened by painful experiences such as separation, unemployment" can cause cancer, vs. 64.7% in 2015). People who tend to consider these psychological factors as carcinogenic are mostly elder and women. The most important evolution concerns environmental factors, the rate had increased up to 25 points: in 2005, the perceived risk of cancer due to cellphone tower radiation correlated with gender, income levels, size of city, and sensitivity to other environmental causes of cancer. However these differences are weaker across time. This study presents many useful results in primary and secondary prevention for the decision-makers and the health care practitioner to think actions of PH which should consider the individuals' attitudes. It constitutes a resource to understand the evolution of representation and with one will be influenced by the PH policies.

FUNDING: Academic Institution

## POS5-172

### DIFFERENTIAL RETENTION BY INCOME IN A DOUBLE-BLIND CLINICAL TRIAL OF REDUCED NICOTINE CONTENT CIGARETTES IN SMOKERS WITH MOOD AND/OR ANXIETY DISORDERS

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**Significance** The disproportionate impact from smoking among vulnerable populations has been attributed to low utilization of cessation treatment services, less access to health care, and underrepresentation in clinical trials, all of which may be influenced by differences in social and economic conditions (Social Determinants of Health, SDoH). Limited research exists on the SDoH and retention in clinical trials of Reduced Nicotine Content (RNC) cigarettes. This study examined participant retention by income category in a clinical trial of switching to gradually RNC cigarettes in smokers with mood and/or anxiety disorders. **Methods** In a randomized double-blind controlled trial design, 188 adult smokers with current or lifetime unipolar mood and/or anxiety disorders and no intention to quit, were asked demographic information (e.g., gender, education, race, etc.), including total family income, at baseline. Participants were randomized to either Usual Nicotine Content cigarettes (UNC, 11.6mg/cig,  $n=94$ ) or reducing nicotine content cigarettes over 18 weeks (last dose, 6 weeks on 0.2mg/cig,  $n=94$ ). We analyzed participants' time in the trial by total family income. Income was categorized as "low" ( $\$0-\$19,999$ ), "middle" ( $\$20,999-\$59,999$ ), and "high" ( $\$60,000+$ ). Chi-square tests were used to determine differences between income levels. **Results** Of the total 188 participants randomized, 156 participants provided total family income: low, 36.5% ( $n=57/156$ ); middle, 31.4% ( $n=49/156$ ); and high, 32.1% ( $n=50/156$ ). Income did not differ by gender ( $p=.17$ ) but did differ significantly by educational attainment ( $p=.03$ ) and race ( $p<.01$ ). 76.3% of all participants ( $n=119/156$ ) completed the randomization phase of the trial. Completion rates were significantly different by income (low, 63.2%,  $n=36$ ; middle, 79.6%,  $n=39$ ; and high, 88.0%,  $n=44$ ) ( $p=.02$ ). **Conclusion** High income participants were the most likely to complete the trial. Future RNC trials should consider SDoH such as income and develop effective strategies for retention of all participants.

FUNDING: Federal

## POS5-173

### USABILITY TESTING OF A MOBILE APP FOR SMOKING CESSATION DURING PREGNANCY

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**Significance:** mHealth interventions for pregnancy smoking cessation are scarce and little is known about their acceptability and usability. The aim is to report on the usability



testing of the Smoke-Free Together smoking cessation mobile app in Romanian pregnant women. **Methods:** We conducted the user testing with 8 smoker pregnant women in December 2018 to assess the acceptability and usability of the Smoke-Free Together Android app to aid smoking cessation during pregnancy. The testing procedure was designed to account for a comprehensive set of usability issues and included a 7-task think-aloud protocol, a semi-structured debriefing interview, and an app usability survey. The user testing was conducted face to face and audio-recorded. Thematic data analysis was subsequently conducted. **Results:** The women's mean age was 30.62 (SD=4.17, range 25-38), half were in their second pregnancy trimester and had a high school education or less (4/8). Testing sessions lasted 55.8 minutes on average (SD=13.28, range 31-69). We classified the identified usability issues in 3 categories: functionality, content, and design. Regarding the functionality, women reported difficulties in setting up a quit date (5/8) and understanding the flow of the information from the app's newsfeed (3/8). Yet, they emphasized the utility of the Panic button, which can be accessed whenever the urge to smoke arises (6/8). As to the content, users appreciated the use of simple, straight-to-the-point and motivational language (6/8) and the personal relevance of the content due to the tailoring embedded in the app (5/8). Generally, users reported the app is well designed. They appreciated the vivid colors (6/8), the interplay between colors, text boxes and text (5/8), and the ease of navigation between the app's main features (8/8), but highlighted some navigation issues within some features (3/8). The app's mean score on the usability survey was XX, indicating high usability. **Conclusion:** The Smoke-Free Together app has a high acceptability and usability among the Romanian smoker pregnant women who participated in usability testing. Our results support the use of mixed-methods for usability testing.

FUNDING: Federal

## POS5-174

### TOBACCO USE IN A BINATIONAL SAMPLE OF LATINO COMMUNITY HEALTH CENTER (CHC) PATIENTS

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**SIGNIFICANCE:** Tobacco use is a large contributor to preventable death both in the US and Mexico. We examined rates and correlates of tobacco use among a binational sample of Latino primary care patients in CHCs near the US-Mexico border (East Los Angeles and Tijuana). **METHODS:** In 2013, 6660 adult patients in 8 clinic waiting rooms anonymously self-administered a computerized version of the WHO ASSIST. **RESULTS:** Mean age 41.8 years; 97% Latino, 27% male; 65% Mexico clinics; 35% US clinics. US had higher rates of tobacco use than Mexico in lifetime (52% vs 47%), past 3 months (21% vs 14%), weekly to daily use (10% vs 8%) ( $p < .001$ ). Tobacco users were more likely to have concurrent use of every other substance (alcohol and all drug types). Among the 589 (9%) current frequent tobacco users (weekly-to-daily in the past 3 months), 74% used near-daily or daily, 60% did not see their tobacco use as problematic, 44% a friend or relative recently expressed concern about their use, 55% had tried and failed to reduce tobacco use. Odds were higher for weekly-to-daily tobacco use for males (AOR = 3.19, CI 2.67-3.80); aged 35-45 and 46-60 vs 18-25 year-olds (AOR = 1.60, CI 1.20 - 2.12 and AOR 1.70, CI 1.29 - 2.23, respectively); and Mexico born had lower odds than US born (AOR = 0.70, CI 0.55 - 0.91). **CONCLUSIONS:** One-fifth of US Latino CHC patients have current tobacco use (past 3 months), similar to the general population (NSDUH, past month); most had concurrent use of other substances. Our findings suggest benefit of tobacco screening and counseling in US and Mexico CHCs. A positive screening should prompt screening for other substance use. The majority have contemplated or attempted quitting, identifying an opportunity for primary care and community interventions to decrease Latinos' tobacco use.

FUNDING: Federal

## POS5-175

### RECRUITING DIVERSE SMOKERS INTO SMOKING CESSATION TRIAL: RACIAL/ETHNIC DIFFERENCES IN ENROLLMENT YIELD AND EFFICIENCY BY RECRUITMENT SOURCE

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**Introduction:** Racial and ethnic minorities have been historically under represented in smoking cessation trials and their recruitment was always a challenge for researchers. The current study aimed at identifying effective ways to recruit diverse smokers in a smoking cessation trial. **Methods:** As part of a dual-site, behavioral smoking cessation trial designed to recruit an equal sample of African Americans, Hispanics, and non-Hispanic Whites, we implemented a 4 year recruitment campaign utilizing proactive (direct invitations), and reactive strategies in the Miami and Tampa Bay metropolitan areas. Reactive recruitment strategies were word-of-mouth, newspaper ads (Miami New Times, Sun Sentinel, Tampa Bay Times), flyers (Metrorail, public transportation), community partnerships (health centers, local businesses), radio/television announcements (CBS, Pop, Country Western), and online advertisements (Craigslist, Facebook). The current study examined racial/ethnic differences in (1) overall recruitment yield by source, and (2) enrollment efficiency (ratio of number enrolled to number screened) by recruitment source. **Results:** All respondents who completed the initial screening, self-reported how they learned of the study, and identified as African American, Hispanic, or White were included in the study ( $n=1,307$ ; 41.4% African Americans, 32.7% Whites, 25.9% Hispanics). Reactive recruitment strategies produced higher enrollment yields than proactive strategies (95.6% vs. 4.4%). The top source of enrollment was word-of-mouth among African Americans (36%), flyers among Hispanics (34%), and online advertisement among Whites (44%). Enrollment efficiency was the highest in proactive recruitment among African Americans, flyers among Hispanics, and online advertisement and word-of-mouth among Whites ( $P < .05$  for all). **Conclusion:** Our findings highlight the value of using multiple recruitment strategies including proactive contact, word-of-mouth, and other media such newspaper and online advertisement to obtain a diverse sample of smokers. The study was extremely successful in recruiting African Americans. Word-of-mouth and flyers were especially useful to recruit minority smokers.

FUNDING: Federal; State

## POS5-176

### FRENCH REPRESENTATIONS ON TOBACCO CONSUMPTION AND CANCER RISK

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Tobacco is a leading cause of cancer worldwide with around 25% cancer cases in 2015 linked to exposure to tobacco smoke. The French National Cancer Institute & the French national public health agency conducted a study on tobacco consumption and risk factors representations attributed to it. We would like to answer the following question: who think that smoking does not increase cancer risk? By answering to this question, we can propose targeted health promotion programs. A national survey ("Baromètre Cancer") was conducted in 2015 to investigate French citizens' representations on tobacco and its consumption linked to cancer risk. Logistic regressions were realized to identify the sociodemographic characteristics of people who believe smoking does not increase cancer risk. In total, 4139 persons were interrogated, and among them, 32% are smokers. Around 75% of the participants believe smoking increase certainly the cancer risk, but no significant differences were observed on participant's representations of tobacco consumption and cancer risk when considering smoking status. However, participants representations of tobacco use increase cancer risk' is linked to age, diploma, income, the fear to have a cancer linked to tobacco and the belief that cancer risk is linked to smoking a lot. Surprisingly, no significant differences were observed when considering the sex and the socio-professional status. In 2015, people less perceiving cancer risk attributed to tobacco use are still youngers and people with lower economic and diploma level. To target these people, tobacco policies were developed in France (neutral packaging and price increase). The evaluations on these policies are in progress. Furthermore, health policies should also propose prevention strategies targeting teenagers.

## POS5-177

### TRANSCENDING THE BARRIERS TO SCREENING FOR ADOLESCENT TOBACCO AND ELECTRONIC CIGARETTE USE IN THE REAL WORLD

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**Significance:** The prevalence of adolescent tobacco use in California (all products, including vapes) is about 22%. In contrast, reports from a Southern California health plan population of 269,799 adolescents showed only a 0.2% prevalence. We set out to examine the reasons behind the underreporting and present a plan to improve it in



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phases. Methods: In phase 1, we surveyed and held focus groups with all 13 pediatric practices serving the plan's population about their tobacco screening process. We also surveyed 10 pediatric department chiefs. Results: Amongst 63 pediatricians who completed the surveys, 57% were not confident that their back-office staff were asking adolescents: "Do you smoke?" and 71% agreed that "there is a need for back office staff training on documenting tobacco use". The focus group discussions identified the following gaps: 'inconsistent tobacco use documentation in the electronic record section used for data extraction'; 'providers were not using the same codes as those sought by the data extractors; and vaping was not specifically asked about at all. Amongst the department chiefs, 100% were in favor of: 'training back office staff on tobacco use documentation'; 'using tobacco product images to aid in screening'; and 'entering the tobacco use status in the electronic record section used for data extraction'; while 82% were in favor of limiting tobacco diagnosis codes to those used by the data extractors. In phase 2, we developed an adolescent tobacco use survey with 13 questions to differentiate between the most popular products (e.g. vapes, JUUL). It was tested on a teen advisory group within the health plan who gave the following recommendations: offer both electronic and paper surveys and offer incentives for completing them. Conclusions: Phases 1 & 2 were successfully completed, paving the way for testing the survey anonymously on 300 adolescents from different health plan practices (to compare to health plan extracted data) and for addressing the identified gaps.

## POS5-178

### YOUTH PERCEPTIONS OF ADDICTION POTENTIAL AND ADDICTIVENESS ACROSS TOBACCO PRODUCTS

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**SIGNIFICANCE:** With the recent increase in youth use of non-cigarette tobacco products such as e-cigarettes and hookah, a better understanding of the psychosocial forces driving initiation and continued tobacco use is imperative. While research shows that perceptions of cigarette-related risks including addiction are related to cigarette use, such studies have not been expanded to include perceptions of non-cigarette addictive potential. This project aims to examine perceived addictive potential of various tobacco products to help craft effective tobacco control messaging. **METHODS:** Data were collected from a prospective longitudinal study of California high school students (N=722). Online surveys assessed baseline demographics, usage of e-cigarettes, chew or dip tobacco, cigarettes, cigars, pipe tobacco or hookah, and youth perceptions of the following domains of addiction for each product: addictiveness, likelihood of becoming addicted, duration of usage required to confer addiction, ability to quit, and the number of quit attempts required to be successful. **RESULTS:** The mean computed score for perceived addictiveness of cigarettes (4.2) was higher than that of e-cigarettes (2.8) and hookah (3.1) ( $p < 0.01$ ). The mean score for perceived likelihood of becoming addicted with daily use was higher for cigarettes (78.1%) when compared e-cigarettes (57.4%) and hookah (52%) ( $p < 0.01$ ). The perceived likelihood of continued usage at 5 years was higher for cigarettes (64.6%) than hookah (45.3%) and e-cigarettes (50.6%) ( $p < 0.01$ ). Mean computed scores for duration of usage required to portend addiction were higher for e-cigarettes (3.4) and hookah (3.4) than cigarettes (2.9) ( $p < 0.01$ ). Perceived percent likelihood of ability to quit with daily use was higher for e-cigarettes (53.7%) and hookah (55.8%) than cigarettes (39.3%). Finally, the perceived number of quit attempts before successfully quitting were lower for e-cigarettes (9.3) and hookah (8.9) than cigarettes (17.2), cigars (11.1) and chew (11.8) ( $p < 0.01$ ). **CONCLUSIONS:** These findings demonstrate that California adolescents perceive cigarettes to be more addictive across all domains when compared to e-cigarettes and hookah - the two products most commonly used by youth. Foundational behavioral health research has shown that youth who perceive lower risk of addiction are more likely to use. Thus, addressing the differential perceptions of addictive potential may represent an important means to augment current tobacco control messaging geared towards youth.

FUNDING: Federal

## POS5-179

### APPROACH AVOIDANCE MODIFICATION AS AN ADD ON IN SMOKING CESSATION: A RANDOMIZED CONTROLLED STUDY

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Biases in information processing are attributed an important role to the maintenance of tobacco dependence. As these biases are not sufficiently taken into account in current treatments, the aim of the present study was to investigate whether clinical outcome can

be improved by combining treatment-as-usual (TAU) with approach-avoidance modification training (AAMT). A two-group parallel (1:1) randomized-controlled single-blind study with adult smokers (N = 105) was conducted (DRKS00011406). Participants received three sessions of TAU and either six sessions of AAMT or Sham training. During AAMT, participants were trained to implicitly avoid all smoking-related and to approach all smoking-unrelated pictures, while the contingency was 50:50 in Sham training. Participants were assessed after the intervention and 6 months later. Primary outcome was daily cigarette consumption at follow-up. Participants receiving TAU + AAMT did not show a significantly greater reduction of daily cigarette consumption at follow-up compared to TAU + Sham (per-protocol: 95% CI: -2.56-4.89,  $p = .608$ ; intention-to-treat: CI: -3.11-2.96,  $p = .968$ ). Using an implicit AAMT (vs. Sham) as an add-on to TAU did not improve clinical outcome. However, no consistent evidence for a change of bias was found. It is important for future research to explore the effectiveness of optimized training versions (e.g., explicit instructions).

FUNDING: Academic Institution

## POS5-180

### TOXICANT AND CARCINOGEN EXPOSURE AMONG OPIATE AND TOBACCO USERS IN GOLESTAN COHORT STUDY

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**Significance:** Over 19.5 million people use natural opiates, such as opium-derived products common in Central Asia and Middle East; many of them also smoke cigarettes. There is little information on the exposure of opiate users to carcinogens and other toxicants, and the contribution of opiate vs. tobacco use. **Methods:** From participants of Golestan Cohort Study in Northeast Iran, we randomly selected 4 groups based on self-reported opiate and tobacco use: 60 never users of any tobacco or opiates, 35 exclusive cigarette smokers, 30 exclusive opiate users, and 30 opiate users who smoked cigarettes (dual users; 9 of them opiate eaters). We measured concentrations of 39 biomarkers of exposure in three chemical classes in spot urine samples: tobacco alkaloids, polycyclic aromatic hydrocarbons (PAHs), and volatile organic compounds (VOCs). Total nicotine equivalent (TNE) was used as a measure of nicotine dose. To parse out the share of opiate and nicotine dose on the biomarker concentrations, we used Oaxaca-Blinder decomposition. **Results:** Exclusive opiate users, as well as exclusive cigarette smokers, had high concentrations of all biomarkers compared to opiate non-users who did not smoke cigarettes, but dual users had the highest concentrations of all biomarkers across all groups. Decomposition analysis showed that PAHs came from both opiate use and TNE, but opiates contributed a larger part, and the sum of 2 and 3 hydroxyphenanthrene ( $\Sigma_{2,3}$ -phe) was almost completely (92%) from opiate use. Among the VOCs, most of the biomarker differences were explained by both TNE and opiate use, but TNE contributed more. Two Acrylamide metabolites (AAMA: 90%, GAMA: 91%), the 1,3-butadiene metabolite (DHBM: 73%), and the dimethylformamide metabolite (AMCA: 72%) were more strongly explained by opiate use.  $\Sigma_{2,3}$ -phe and Acrylamide metabolites were significantly higher in opiate smokers than opiate eaters, but other biomarkers were increased in opiate users regardless of route of intake. **Conclusion:** Both opiate users and cigarette smokers are exposed to high levels of toxicants and carcinogens. Increases in some exposure biomarkers (particularly PAHs) seemed to be mainly from opiate use. Most biomarkers in opiate users were independent of the route of use, but a few were more strongly associated with opiate smoking. As opiates are widely used worldwide, exposure to PAHs and VOCs from their use may have substantial global public health impact.

FUNDING: Federal

## POS5-181

### PARENTS' VIEWS AND EXPERIENCES OF VAPING AT HOME: A RAPID REVIEW AND MIXED-METHODS SYNTHESIS

**Laura Jones**, James Hodgkinson, Amanda Farley. University of Birmingham, Birmingham, United Kingdom.

**SIGNIFICANCE:** Electronic cigarettes (ECs) may be effective in helping parents to reduce tobacco cigarette consumption and quit smoking therefore decreasing the risks associated with smoking for parents and their children. **OBJECTIVES:** To undertake a rapid review and mixed-methods synthesis of parents' views and experiences of vaping





in homes with children. **METHODS:** Six electronic databases were searched for relevant evidence published up to November 2018 supplemented with citation searching. A segregated approach was used involving independent syntheses of the quantitative and qualitative data followed by a mixed-methods synthesis. **RESULTS:** Two quantitative and five qualitative studies, reporting six studies from the USA, Singapore and the UK, published between 2015 and 2018, were included in the review. Three interlinked themes were interpreted within the mixed-methods synthesis: (a) awareness of ECs, (b) reasoning and rationale for EC use, and (c) knowledge and perceptions of risks of ECs. Awareness around ECs has increased over time with the majority of parents reporting that they had heard of ECs. Only a minority of respondents reported vaping in the home. Reasons for using ECs including to: cut down/quit smoking; protect others from secondhand smoke exposure; prevent negative role modelling; manage smoking in places where smoking was banned; maintain a smoke-free home, and as a cheaper alternative to tobacco. Parents' rationale for vaping (or not) around their children was framed within their knowledge of perceived risks of using ECs. Parents who vaped around their children justified this choice within the context of their belief that ECs were a "safer" alternative to smoking and that exposure to secondhand vapor was safer than exposure to secondhand smoke. However, other parents articulated "concerns" about their home vaping behaviors. These concerns focused on a "lack of evidence on the risks" but some parents felt that these risks were outweighed by the perceived benefits of vaping. **CONCLUSIONS:** Parents are likely to benefit from provision of evidence informed information to support decision making around home vaping behaviors.

**FUNDING:** Non-profit grant funding entity

## POS5-182

### A MIXED-METHODS EXPLORATION OF PARENTS' VIEWS AND EXPERIENCES OF VAPING AT HOME

**Laura Jones,** James Hodgkinson, Emma Danks, Amanda Farley. University of Birmingham, Birmingham, United Kingdom.

**SIGNIFICANCE:** Evidence suggests that electronic cigarettes (ECs) are less harmful than tobacco cigarettes and that exposure to secondhand vapor (SHV) poses a lower risk compared to exposure to secondhand smoke (SHS). ECs have therefore been advocated as an alternative to smoking in situations where the risk of exposure to SHS is high, such as in homes. **OBJECTIVES:** To explore parents' views and experiences of vaping at home. **METHODS:** Mixed-methods approach using a 51 item survey and semi-structured interviews. The survey and interviews explored parent's knowledge and understanding of ECs; reasons for vaping; knowledge around SHV and SHS, and their home vaping and smoking behaviors. Data were collected between December 2016 and December 2017. Survey data were analysed descriptively and interview data analysed thematically. **RESULTS:** 526 vaping parents completed the survey and 22 were interviewed. The survey sample were male (74%); White (95%); married (49%); employed or self-employed (77%), and on average 35 years old. The demographics of the interview sample were similar to those of the survey. Participants lived across the UK. Main reasons for vaping included to help quit smoking (96%) and reduce risk to others from exposure to SHS (92%). Respondents agreed that ECs were a safer alternative to smoking (97%) but interviewees were able to recognize that ideally they would not be smoking nor vaping. 90% of the sample were former regular smokers with 8% current smokers. Of those who reported smoking, 17% smoked in the home. In contrast, 87% of current vapers reported vaping in the home. Interviewees reflected that they had less strict rules about vaping compared to smoking in the home. 99% agreed that exposure to SHS was more dangerous than SHV. Some parents expressed concerns around role modelling of vaping behaviors. Interviewees reported that ECs might be a useful "tool" for parents who wanted to make their homes smoke-free and/or stop smoking. **CONCLUSIONS:** This study provides novel insight into UK parental home vaping behaviors and is an important starting point to inform future work that could help to support parental home smoking behavior change.

**FUNDING:** Non-profit grant funding entity



