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RAPID RESPONSE ABSTRACTS
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Rapid Session 1: Pre-Clinical

POD26-1
Change in Free Base Nicotine Delivery as Function of Flavor and E-Cig Battery Power Output
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Introduction: Recent studies have shown nicotine salts, which yield protonated nicotine, gave higher plasma nicotine concentrations than free base (unprotonated) nicotine. Although the reason behind it is not well understood, it is important to classify e-liquids based on their free base or protonated nicotine yield in pre and post vaporization. Here, we report a study establishing correlation using variables of flavor and battery power. Methods: An aerosol generating model was developed using a syringe pump based vaporizing machine. The model was validated using CORESTA guidelines (N°81). Control e-liquids of five pHs (4-11), unflavored, with nicotine concentration 50mg/mL in PG:VG (70:30 v/v) were used for establishing a standard correlation between pre and post vaporization yield of free base nicotine. Using n=15 puffs at power settings (90W, 203°C) and 0.25Ω coil, nicotine was collected using a Cambridge filter. Impact of flavor and battery power on free base nicotine yield was tested using mango flavor and two different battery power settings. Pre and post vaporization free base nicotine determination was carried out using a Henderson Hasselbalch method of the dilution approach. Results: The model passed CORESTA guidelines’ criteria with standard square puff profile. Puff flow 18.32±0.72 mL/sec, puff duration 3.05±0.1 sec and puff volume 55.16±3.3 mL. Filter entrapment efficiency of nicotine was found to be 97.88±4.72%. Control e-liquids showed positive correlation (Pearson r=0.994), between pre and post vaporization yield of free base nicotine. Mango flavor was found to deviate from the standard correlation and showed lower free base nicotine yield in post vaporization (94.77% pre vs 88.83±4.12% post). Higher power settings (120W, 303°C) further decreased free base nicotine yield in post vaporization (94.77% pre vs 80.97±4.15%, t-test, p=0.03). Conclusions: The mango flavor e-liquid was found to lower post vaporization free base nicotine yield. Similarly, increase in battery power settings found to decrease the post vaporization yield free base nicotine. Future study will be carried out with more flavors, nicotine salts and additional battery power settings.

Funding Statement: The study is supported by Virginia Youth Tobacco Projects Small Grants Program for research funding and the Central Virginia Center on Drug Abuse Research (5P30DA033934-05).

Funding: Federal; Nonprofit grant funding entity

POD26-2
Alpha Conotoxin MII-Sensitive Nicotinic Acetylcholine Receptors in the IPN Support Somatic Withdrawal in Long Evans Rats
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Significance: a conotoxin MII (cCTXMII)-sensitive receptors include the δβ² and δβ³ nicotinic acetylcholine receptors (nAChRs); “indicates possible assembly with α4 and β3). The δβ² nAChR are enriched in the mesolimbic dopamine pathway where they support nicotine reinforcement and reward as well as in the interpeduncular nucleus (IPN) where they are co-expressed with δβ³ nAChR. The IPN has been implicated in regulation of nicotine withdrawal. The purpose of these studies was to locally and selectively antagonize cCTXMII-sensitive nAChRs within the IPN to determine their contributions to nicotine withdrawal behavior. Methods: Rats were tested during spontaneous withdrawal 24 hr following removal of implanted minipump (6 mg/kg/day subcutaneous nicotine or 0.9% saline vehicle over 2 weeks) or 24 hr following removal of Nicotine (25 µg/mL nicotine in 2% saccharin solution) or 2% saccharin alone in their homecages for 7+ weeks of exposure. All orally dosed rats received 1 hour/day access to water with overnight access to water in place of nicotine & saccharin prior to withdrawal measures. Under both conditions, nicotine exposed rats showed significantly greater somatic withdrawal than vehicle controls. Gently restrained rats received IPN infusion of sterile ACSF (vehicle) or 10 pmol cCTXMII in ACSF through implanted guide canula immediately prior to placement in a 20” x 9” x 18” open chamber for measurement of somatic withdrawal signs. Guide canulae were surgically implanted prior to any nicotine exposure. Results: Nicotine rats infused with vehicle into the IPN showed elevated somatic withdrawal signs independent of route of nicotine exposure, suggesting that the procedures and surgery did not confound observation of withdrawal measures. Local IPN infusion of cCTXMII significantly attenuated withdrawal as measured by a reduction in somatic signs compared to nicotine withdrawn rats infused with vehicle in the IPN. Conclusions: The observation of this novel finding using two independent models of nicotine withdrawal suggests that δβ² nAChR and/or δβ³ nAChR contribute to this measure of nicotine dependence and may be effective targets to promote nicotine cessation in individuals who vape or smoke. This work was funded in part by the Virginia Commonwealth University School of Medicine, Massey Cancer Center and NIH grants DA042749 and CA16059.

Funding: Federal; Academic Institution

POD26-3
A Role for Secondhand Smoke in the Epigenetic Regulation of Hepatic Genes and Liver Disease Development
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Significance: Accumulating evidence shows that exposure to environmental pollutants, including secondhand smoke (SHS), contributes to the development of chronic fatty liver disease through generation of reactive oxygen species (ROS) and increased burden of oxidative stress. Impalces in the redox state of the cells are known to cause alterations in the patterns of 5-hydroxymethylcytocine (5mC), the oxidative product of 5-methylcytosine (5mC), and histone modifications, thus affecting the epigenetic reprograming and transcriptional regulation of genes involved in lipid metabolism and/or oxidative stress response. Aberrant expression of these genes can induce hepatic steatosis and exacerbate liver injury, thus promoting progression to advanced forms of chronic liver disease. Methods: To investigate the impact of SHS on the liver epigenome, we analyzed the relative gene expression of key epigenetic regulators, including DNA methyltransferases (DNMTs), ten-eleven translocation (TET) proteins, and histone deacetylases (HDACs) in the liver of mice subchronically exposed to SHS, using quantitative real-time PCR. Furthermore, we quantified the global levels of over eighty histone marks in SHS-treated mice and controls by mass spectrometry. Induction of oxidative stress was also assessed using a glutathione fluorescent detection protocol. Results: We observed significant SHS-induced changes in the relative expression of Tet3, a major dioxygenase that catalyzes the oxidation of 5mC to 5hmC. Similarly, we detected aberrant expression of Dnmt1 and Dnmt3a, and Hdac1, in the SHS-exposed mice relative to controls. Dysregulation of Hdac1 is consistent with changes in acetylation observed at lysine residues in position K27 and K36, which is often associated with gene inactivation. Depletion of glutathione (p<0.05), a biomarker of oxidative stress and a primary mechanism of ROS-induced toxicity in liver cells, was also confirmed in SHS-exposed mice. Conclusion: Our findings show that SHS can influence key components of the epigenetic machinery, which are involved in hepatic gene regulation, thus suggesting a role for SHS in the development of chronic liver disease.

Funding Statement: The study is supported by Virginia Youth Tobacco Projects Small Grants Program for research funding and the Central Virginia Center on Drug Abuse Research (5P30DA033934-05).

Funding: Federal; Nonprofit grant funding entity

POD26-4
Vaping Associated Alterations in the Lung Lipidome
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Rationale: E-cigarette or vaping product use-associated lung injury (EVALI) is characterized by diffuse pneumonia, lipid laden macrophages, shortness of breath and gastrointestinal symptoms. Of note, altered lipids are associated with several types of lung disease including chronic obstructive pulmonary disease, pneumonia and lung cancer. Since the underlying etiology is poorly understood, we hypothesized that lipid and lipido-associated surfactant proteins may be altered in e-cigarette user’s lungs. Methods: Research bronchoscopy was performed on healthy subjects to collect bronchoalveolar lavage (BAL) samples from the three groups, namely non-smokers, smokers and e-cigarette users (vapers). Lipidome composition in the BAL fluid samples were analysed using gas chromatography-mass spectrometry (GC-MS). We also measured the levels of surfactant proteins (SP) by Western blotting, and used Oil Red O staining to detect lipid deposition in BAL macrophages.
Results: BAL fluid lipidome analysis by GC-MS exhibited markedly different profiles amongst the three groups. Oil Red O staining of BAL macrophages showed that lipid deposition was increased in both smokers and vapers compared to the non-smokers. Among the surfactant proteins (SP) evaluated, SP-A and -D were decreased in both smokers and vapers. However, SP-B showed opposite trend and was increased in both groups compared to non-smokers. Conclusions: The observations indicate altered lipidome profile and surfactant protein levels in smokers and vapers compared to non-smokers. This identification may facilitate better comprehension of EVALI pathophysiology and to identify biomarkers and therapeutic strategies in patients. Acknowledgements: Funded by NIH/FDA HL120100 and HL135642.

FUNDING: Federal

POD26-5

MATERNAL VAPING DURING PREGNANCY INCREASES ARTERIAL STIFFNESS IN ADOLESCENT OFFSPRING

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Significance: Little is known about the effects of perinatal Ecig use on cardiovascular health of the progeny. Arterial stiffness is an index of vascular function and a predictor of long-term cardiovascular and other chronic disease. We hypothesized if vaping Ecigs during pregnancy is safe then arterial stiffness in the offspring (as measured by pulse-wave velocity) would not be different compared to offspring without maternal vaping during pregnancy. Methods: Pregnant Sprague-Dawley rats were exposed to either nicotine-free (Ecig0) or nicotine-containing Ecig aerosol (18 mg/ml, Ecig18) or ambient air (control). Ecig exposed dams received either 20 puffs/day (lower dose) or 60 puffs/day (higher dose), over a 1-hour period, 5 days/week using Joyetech eGrip OLED (with 5-sec puffs @17.5 W). Dams began on gestational day 2 and continued until pups were weaned (postnatal day 21). Pups were never directly exposed. Left common carotid arteries (LCCA) of 4-month old pups were noninvasively imaged using Vevo2100 high frequency microultrasound (VisualSonics Inc, Toronto, ON, Canada). PWV was measured using the regional transit-time method (PWV=Δd/Δt). Measurements for each animal were repeated 3 times and averaged. Results: At the lower exposure, PWV in the Ecig0 and Ecig18 offspring were both significantly higher than controls (6.6 ± 2.1 and 4.8 ± 1.3 vs. 3.2 ± 0.7 m/s, respectively, p<0.05, mean ± SD). Similarly, at the higher exposure, PWV in Ecig0 and Ecig18 groups were both higher than controls (7.5 ± 2.8 and 7.5 ± 2.5 vs 3.2 ± 0.5 m/s, respectively, p<0.01). Conclusions: Maternal Ecig exposure (with and without nicotine) results in higher PWV than controls, indicating stiffer arteries and an increased risk for cardiovascular disease in adolescent pups that have never been directly exposed. The effect may be dose-dependent for Ecig aerosol containing nicotine, as Ecig18 had increases in PWV with maternal exposure at 60 puffs/day than to 20 puffs/day. Vaping Ecigs during pregnancy should not be considered safe and likely poses long-term health risks for offspring later in life.

FUNDING: Academic Institution

POD26-6

NON-TARGETED ANALYSIS OF E-CIGARETTE AEROSOLS FOR THE IDENTIFICATION OF POTENTIALLY TOXIC COMPOUNDS

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Significance: Aerosols generated from e-cigarette liquids (e-liquids) have been shown to contain a wide variety of compounds, some of which are known human toxicants. These compounds may originate from several sources, including flavorants and humectants in e-liquids, the device itself, and transformation processes during aerosolization. Most of the studies of e-liquid and aerosol composition to date have measured known compounds in e-liquids, the device itself, and transformation processes during aerosolization. Most of the studies of e-liquid and aerosol composition to date have measured known substances selectively. However, given the prevalence of e-cigarette use, the complexity of e-cigarette exposure, and growing concerns about black market products and proprietary formulations, a non-targeted approach can provide valuable information about potentially toxic substances in these products that would otherwise be missed or remain unknown. Methods: Commercial and in-house e-cigarette aerosol samples were analyzed using a non-targeted high-resolution mass spectrometry approach. Compounds were separated by liquid chromatography and then analyzed by electrospray ionization mass spectrometry in both positive and negative modes. Detected chemicals were identified based on accurate mass and MS/MS information which was aided by the use of online database searches. Results: In tobacco flavored Juul e-liquids, over 300 compounds were detected and identified using online database matching. Of these, more than 10% had signal intensities at least 100-fold higher than an in-house preparation of a polypropylene glycol (PG) and vegetable glycerol (VG) mixture. The most abundant compounds included flavoring agents and compounds possibly derived from benzoic acid, a known additive in Juul e-liquids that is used in the production of nicotine salts (e.g., vanillin, 4-hydroxybenzoic acid, and 4-hydroxybenzaldehyde). Conclusions: These results demonstrate the potential of a non-targeted approach for characterizing the chemical contents of e-cigarette products and predicting possible toxic effects.

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FUNDING: Federal
Significance: Countries such as the United States, England, Canada, and Australia have proposed or shown interest in reducing nicotine levels in combustible cigarettes or e-cigarettes to little or no nicotine. Very low nicotine cigarettes (VLNC) have been shown to reduce nicotine dependence. The current study aims to examine support for nicotine reduction in cigarettes and e-cigarettes. 

Methods: Data were drawn from the 2016 and 2018 ITC Four Country Smoking and Vaping survey conducted in Australia, Canada, England, and the United States. The analytic sample was restricted to adult smokers, vapers, and former smokers who reported their support for a law that limits nicotine levels in cigarettes (n = 12,087 in 2016) and in e-cigarettes or e-liquid (n = 24,914 in 2016 and 2018), as well as their perceptions of the harmfulness of nicotine. In logistic models, support for each law was regressed on socio-demographics, country, smoking and vaping status, and perceived harm of nicotine, adjusting for sampling weights.

Results: More than half of respondents supported nicotine reduction in cigarettes (US = 54%, England = 54%, Canada = 70%, Australia = 64%). Fewer, but still a majority of respondents supported nicotine reduction in e-cigarettes (US = 47%, England = 54%, Canada = 68%, Australia = 47%). Those who perceived nicotine as more harmful were more likely to support nicotine reduction in cigarettes (e.g., AOR=4.3 for extremely vs. not at all harmful), as well as e-cigarettes/e-liquids (e.g., AOR=4.6 for extremely vs. not at all harmful). Compared to exclusive smokers, concurrent users were more likely to support nicotine reduction in cigarettes (AOR=1.1), as were exclusive vapers (AOR=1.3) and former smokers (AOR=1.3). Former smokers were more likely (AOR=2.1), but exclusive vapers (AOR=0.8) and concurrent users (AOR=0.9) were less likely, than exclusive smokers, to support the law to reduce nicotine in e-cigarettes. 

Conclusions: Most tobacco product users support laws limiting nicotine levels in cigarettes and e-cigarettes. These results should be considered in future regulations regarding nicotine reduction in tobacco products.

FUNDING: Federal

**POD27-2**

**THE EFFECTS OF TRADITIONAL CIGARETTE AND E-CIGARETTE TAXES ON ADULT TOBACCO PRODUCT USE**

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Significance: As of Sept. 15, 2019, 20 states have enacted e-cigarette taxes. Congress is also considering enacting a federal e-cigarette tax. Economic theory predicts that e-cigarette taxes should raise the price of e-cigarette products, and hence reduce the purchase and use of e-cigarettes. Additionally, e-cigarette taxes could either increase or decrease the use of cigarettes depending on whether e-cigarettes and cigarettes are economic substitutes or complements. Our study is among the first to estimate the extent to which adults are responsive to e-cigarette taxes.

Methods: We estimate the effects of e-cigarette and cigarette taxes on adult e-cigarette and cigarette use using Behavioral Risk Factor Surveillance System (BRFSS) and National Health Interview Survey (NHIS) data from 2014-2018. The 2018 data only recently became available. We have e-cigarette use responses from approximately 1.3 million individuals over this time. We evaluate the data at a Census Research Data Center to obtain state and county of residence information to study e-cigarette taxes occurring in 10 states and 2 major counties by the end of 2018. We use difference-in-difference-like regression modelling that controls for state fixed effects, year-by-quarter fixed effects, other tobacco control policies, and demographics. We developed a novel methodology to standardize e-cigarette ad valorem taxes into an excise tax equivalency, which is our primary independent variable of interest.

Results: A $1 increase in standardized e-cigarette taxes reduces any past 30-day adult e-cigarette use by 0.3 percentage points (p<0.05). A $1 increase in e-cigarette taxes meanwhile increases adult every day cigarette use by 0.3 percentage points (p<0.05). We find larger e-cigarette tax responsiveness for younger adults. We also find that higher cigarette taxes reduce adult cigarette use and increase adult e-cigarette use. 

Conclusion: Our results suggest that future e-cigarette taxes, including a currently debated national e-cigarette tax, will have the possible intended effect of reducing adult e-cigarette use, but also the unintended effect of raising adult cigarette use.

FUNDING: Federal

**POD27-3**

**HEALTH AND COST OUTCOMES OF THE ACA’S “NO COST-SHARING” POLICY FOR SMOKING CESSATION SERVICES AMONG US WORKING-AGE ADULTS**

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Significance: Determine how the ACA’s “no cost-sharing” policy for smoking cessation services impacts health outcomes and lifetime costs of working-age (18-64) adults insured by private insurance. 

Methods: Markov modeling compared the “no cost-sharing” policy to cost-sharing with copayment. Smokers start in the “currently smoking” health state and may make a quit attempt on their own, with behavioral counseling, using nicotine replacement therapy (NRT), or both. The model starts smokers at their baseline smoking status, which may vary by demographics. We simulated the impact of MPLs ranging from $8.00-$13.00 per pack on lifetime quit rates and smoking status. We estimate the impact of a MPL on cigarette and little cigar/cigarillo consumption. We estimate the impact of a MPL on cigarette and little cigar/cigarillo consumption. We estimate the impact of a MPL on cigarette and little cigar/cigarillo consumption. 

Results: Preliminary estimates show that the approximately 15 million working-age females currently smoking gain 72 days of life expectancy or 25 quality-adjusted days per-person and a total of almost 3 million life-years saved or almost 1 million QALYs gained with the “no cost-sharing” policy. The policy leads to $3,003 in lifetime societal costs saved per-male and a total of $170 billion. From the insurer’s perspective, the policy leads to $2,123 saved per-person and a total of $23 billion. The approximately 18.5 million working-age males currently smoking gain 67 days of life expectancy or 25 quality-adjusted days per-person and a total of almost 3.2 million life-years saved or about 1.3 million QALYs gained with the “no cost-sharing” policy. The policy also leads to $3,191 in lifetime societal costs saved per-male and a total of $170 billion. From the insurer’s perspective, the policy leads to $2,252 saved per-male and a total of $55 billion. 

Conclusion: The “no cost-sharing” policy for smoking cessation services results in a significant increase in life expectancy and QALYs while also decreasing the lifetime costs for smokers. Therefore, private insurance companies should maintain the “no cost-sharing” policy even if legislative changes once again allow cost-sharing.

FUNDING: Federal

**POD27-4**

**ESTIMATING THE EFFECTS OF A TOBACCO MINIMUM PRICE LAW IN OAKLAND, CALIFORNIA - A STATIC MICROSIMULATION MODEL**

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Significance: Tobacco minimum price laws (MPLs) set a level below which products cannot be sold, thereby raising prices. A growing number of local jurisdictions have recently proposed or implemented MPLs, however, little is known about their effects on tobacco consumption. We estimate the impact of a MPL on cigarette and little cigar/cigarillo use in Oakland, California (population 375,000) using a static microsimulation model. 

Methods: We used individual-level data collected between 2015-2017 from the California Behavioral Risk Factor Surveillance System and the National Youth Tobacco Survey. We expanded the combined dataset and generated equally sized subgroups based on age, sex, race and poverty status. Simulated individuals were pulled from these subgroups with a weighting consistent with Oakland’s demographics. We simulated the impact of MPLs ranging from $3.00-$13.00 per 20 units by using published price elasticity estimates and assuming 7% evasion.

Results: Mean cigarette pack price was estimated to increase from $7.77 without a MPL to $8.56 with an $8.00 MPL, $10.35 with a $10.50 MPL, and $12.61 with a
$13.00 MPL. These changes led to cigarette smoking prevalence dropping from 11.2% to 11.0%, 10.7% and 10.4%, respectively. The greatest reductions in cigarette smoking prevalence were seen among those living below the federal poverty line (FPL), aged 12 to 24-years-old, and of non-Hispanic black race (Figure 1). The mean price paid for 20 little cigars/cigarillos was estimated to increase from $5.79 without a MPL to $7.96 with an $8.00 MPL. $9.76 with a $10.50 MPL, and $11.19 with a $13.00 MPL. These changes led to little cigar/cigarillo smoking prevalence dropping from 9.0% to 6.0%, 4.0% and 2.5%, respectively. The most substantial reductions in little cigar/cigarillo smoking prevalence were seen in males and those of non-Hispanic white race, aged greater than 24-years-old, and living above the FPL (Figure 2).

**Conclusion:** A MPL in Oakland would substantially increase the mean price paid for cigarettes and little cigars/cigarillos. This could reduce cigarette smoking prevalence by as much as 0.8% and little cigars/cigarillo smoking prevalence by as much as 6.5%. A cigarette MPL would effectively target several of Oakland’s minority populations.

**FUNDING:** Other

**POD27-5**

**ASSOCIATION OF A LOCAL FLAVORED NON-CIGARETTE TOBACCO SALES RESTRICTION AND PROLIFERATION OF CONCEPT-NAMED FLAVORED CIGARILLOS**

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**BACKGROUND.** Local non-cigareted flavored tobacco sales restrictions affect consumer purchases, with studies documenting reductions in sales of explicit-named flavored products (e.g., Fruit cigarillos) but increases in sales of concept-named flavored products (e.g., Jazz cigarillos). These findings could reflect changes in the retail availability and variety of concept-named products. We used retail scanner data to assess the association between implementation of a restriction on sales of non-cigarette characterized flavoring tobacco products (except mint and menthol) in Providence, RI (enforced as of January 3, 2013) and changes in the number and proportion of unique cigarillo UPCs available for sale in that city and a rest-of-state (ROS) comparison area. METHODS: We acquired weekly scanner sales data from The Nielsen Company for convenience stores and other outlets in RI for January 2012-December 2016. Using established methods, we categorized each unique cigarillo Universal Product Code (UPC) as having a concept or explicit flavor name; tobacco; or menthol/mint flavor name. We calculated weekly counts and proportion of available cigarillo UPCs and used difference-in-difference regressions to assess changes in available UPCs pre- to post-policy in Providence relative to ROS by flavor-name category. RESULTS: Relative to ROS, implementation of the Providence policy was associated with a decrease in total available cigarillo UPCs (-29+6), but an increase in the number (6+2) and proportion of unique cigarillo UPCs available for sale in that city and a rest-of-state (ROS) comparison area. METHODS: We acquired weekly scanner sales data from The Nielsen Company for convenience stores and other outlets in RI for January 2012-December 2016. Using established methods, we categorized each unique cigarillo Universal Product Code (UPC) as having a concept or explicit flavor name; tobacco; or menthol/mint flavor name. We calculated weekly counts and proportion of available cigarillo UPCs and used difference-in-difference regressions to assess changes in available UPCs pre- to post-policy in Providence relative to ROS by flavor-name category. RESULTS: Relative to ROS, implementation of the Providence policy was associated with a decrease in total available cigarillo UPCs (-29+6), but an increase in the number (6+2) and proportion of unique cigarillo UPCs available for sale in that city and a rest-of-state (ROS) comparison area. CONCLUSIONS: Policy implementation, Providence consumers were exposed to fewer cigarillo UPCs in the retail marketplace, but a greater variety and proportion of concept-named flavored cigarillos. Availability of concept-named flavored cigarillos may hinder enforcement of flavored sales policies and underscores the importance of product availability surveillance. **FUNDING:** Federal

**POD27-6**

**THE IMPACT OF INCLUDING CESSATION RESOURCE INFORMATION ON HEALTH WARNINGS ON STANDARDISED TOBACCO PACKAGING ON AWARENESS AND USE**

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**Significance:** Warnings on tobacco packaging are an inexpensive means of communicating the risks of smoking and also cessation information. However, the impact of the inclusion of cessation resource information (e.g., a cessation website) on warnings is not well understood. Since May 2017, cigarettes and rolling tobacco in the UK must be sold in standardised packaging with pictorial warnings displaying a cessation website. Prior to this, cessation resource information was not required on all warnings. We add to the literature by exploring whether the inclusion of a cessation website on warnings on standardised packaging has any impact on awareness and use.

**Methods:** We used an online panel to follow a cohort of smokers and ex-smokers in the UK pre- and post-standardised packaging. There have been three waves: W1 in April-May 2016 (n=6234), W2 in October-November 2017 (n=4294), 5-6 months post-standardised packaging, and W3 in May-June 2019 (n=3716), 24-25 months post-standardised packaging. We explore any change in citing warnings as a source of a cessation website, and whether awareness was associated with use, pre- and post-standardised packaging. As the cessation website is more prominent on packs of rolling tobacco than on packs of cigarettes, given that packs of rolling tobacco are larger, we also explore any differences in awareness of a cessation website among exclusive cigarette smokers (W1=3142, W2=1884, W3=1249) and exclusive rolling tobacco smokers (W1=2047, W2=1200, W3=815).

**Results:** Noticing any information about a cessation website in the last six months declined across the three waves (14.1% W1, 14.0% W2, 11.8% W3). Among those noticing information, citing warnings as a source of information about a cessation website increased among exclusive rolling tobacco smokers, from 15.5% at W1 to 26.1% at W2 and 31.3% at W3, while for exclusive cigarette smokers it increased from 10.4% at W1 to 22.4% at W2 but declined to 19.2% at W3. The relative increase (W1-W3) in awareness from warnings was significantly greater for exclusive rolling tobacco smokers than for exclusive cigarette smokers (OR for interaction 7.65, 95% CI 3.81-15.1).

**Conclusions:** Warnings on packs are an important source of cessation information. Making the cessation resource information more prominent on warnings may help sustain awareness.

**FUNDING:** Nonprofit grant funding entity
Rapid Session 3: Public Health

Pod 35.1

Reaction to ENDS Prevention Messages-Results from a Second Wave of Qualitative Research to Inform FDA’s Youth ENDS Prevention Campaign

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Background: Youth electronic nicotine delivery system (ENDS) use is a major public health concern. Large-scale tobacco public education efforts have been a proven strategy to prevent tobacco use. There is a gap in understanding what types of ENDS prevention messages are most effective. This study addresses this gap by reporting youth reactions to creative concepts aimed at preventing ENDS use.

Methods: In the Summer of 2019, 24 focus groups were conducted with 159 teens (12-17) at-risk for or experimenting with ENDS in four cities across the United States. During focus groups, youth answered questions about their knowledge and perceptions of ENDS. They also responded to creative concepts dealing with: 1) ENDS may contain harmful and potentially harmful chemicals 2) the addictive nature of ENDS 3) nicotine cravings can distract you, and 4) youth who use ENDS are more likely to use cigarettes. Transcripts were analyzed using a thematic analysis approach.

Results: Key takeaways during the knowledge and perceptions discussion included: 1) youth were most familiar with the brand Juul, but other products such as Suorin and Blu were also popular 2) youth described being able to get ENDS on-line, in stores, or at school from older youth 3) vaping among peers felt ubiquitous as even “valedictorians vape”, and 4) youth described instances in which peers exhibited signs of addiction to ENDS.

During the discussion of creative concepts, youth responded favorably to concepts focusing on harms of ENDS, particularly potentially inhaling metal particles into the lungs. Youth also responded favorably to concepts framing addiction as loss of control and related feelings of regret. Youth did not find the distancing effects of addiction compelling. Additionally, care needs to be taken when messaging on escalation from ENDS to cigarettes to ensure this message doesn’t detract from risks of ENDS use alone.

Conclusions: These focus groups aided in our understanding of what types of ENDS prevention messages could be most persuasive to teens. As public perceptions and knowledge of ENDS are constantly changing, it is important to regularly assess what types of ads may be most persuasive to youth.

Funding: Unfunded

Pod 35.2

Impact of Cigarette Filter Ventilation on Biomarkers of Tobacco-related Exposure and Biological Effect and Perceptions of Harm

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Background: Cigarette filter ventilation, which was introduced by cigarette manufacturers in the 1960s as a means to lower machine-measured cigarette tar/nicotine yields, is a design feature that may contribute to greater public health harm than benefit. We examined relationships between extent of cigarette filter ventilation and a comprehensive panel of biomarkers of smoke exposure and biological effect and perceptions of harm in a U.S. representative sample of adult cigarette smokers.

Methods: Filter ventilation of popular cigarette brands was assessed using standard procedures and then merged with Wave 1 Population Assessment of Tobacco Use and Health (PATH) study. Data were restricted to daily smokers who had a usual cigarette brand, were not regular users of other tobacco products, and had biomarker and filter ventilation data. Associations between filter ventilation, biomarkers, and harm perceptions were examined in weighted analyses with adjustment for potential confounders (age, sex, race, mental status, education, quit effort). Further adjustment for total nicotine equivalents (TNE) was examined. Significance was considered at a p-value <0.05.

Results: Cigarette filter ventilation ranged from 0.2% to 61.1% with a median value of 23.4% (n=1,503). The degree of cigarette filter ventilation was not associated with the majority of biomarkers of exposure including tobacco specific nitrosamines, volatile organic compounds, and polycyclic aromatic hydrocarbons or with most biomarkers of biological effects (e.g., inflammation and oxidative stress). Direction and significance of the results did not change with further adjustment for TNE. Increased filter ventilation was associated with an increased odds of perceiving one’s own cigarette brand as being less harmful than other brands.

Discussion: The results from this cross-sectional study suggest that filter ventilation is not associated with a reduction in biomarkers of exposure or indicators of harm. This is concerning since smokers of higher ventilated cigarettes inaccurately perceived their cigarettes to be less harmful compared to other brands. Cigarette manufacturers should be required to demonstrate to regulators that there is a health benefit from adding filter vents to their filter designs.

Funding: Federal

Pod 35.3

Using Simulation Modeling to Examine Gateway vs. Diversion Accounts of Electronic Cigarettes

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Background: The impact of electronic cigarettes (ECs) on overall nicotine use trends remains controversial. Some fear that ECs act as a gateway to cigarette smoking; on the other hand, ECs may act as a harm reduction mechanism through smoking cessation or reduction. A critical, yet understudied, question is whether ECs divert adolescents from conventional smoking.

Methods: System dynamics simulation modeling was used to replicate observed trends in exclusive cigarette use, exclusive EC use, and dual use. The model was calibrated to data from the National Youth Tobacco Survey (NYTS). First, a base model was created which replicated cigarette trends from 2000-2010 (pre-ECs) and projected trends through 2018. Next, the “gateway” hypothesis was simulated by including a positive causal effect between EC use and dual use, and simulated data were compared with actual data on cigarette and/or EC use. The “diversion” hypothesis was simulated by including a negative causal effect between EC use and exclusive cigarette use, and simulated data were compared with actual data. Finally, the size of the diversion effect was estimated via parameter optimization to achieve best fit.

Results: The simulation model closely replicated observed trends in cigarette and/or EC use. Simulations of the gateway scenario are consistent with the observed trends in dual use, but substantially overestimate total nicotine use, due to lower-than-projected trends in exclusive cigarette smoking. Simulations of the diversion hypothesis are consistent with observed trends in both exclusive cigarette use and total nicotine use. The best fit between simulated and observed data as achieved by a diversion effect of 0.74 fewer cigarette users for every EC user. This is equivalent to a 35% lower odds of smoking conventional cigarettes under the diversion scenario vs. the base scenario.

Conclusions: Simulations show that the gateway hypothesis is inconsistent with trends in total nicotine use. Instead, the diversion hypothesis better explains observed trends in exclusive cigarette and total nicotine use. This is the first study to empirically estimate the potential of ECs to divert from cigarette use.

Funding: Federal
THE IMPACT OF ENDS USE ON SMOKING PROGRESSION OR REDUCTION ONE YEAR LATER AMONG YOUNG ADULTS AND YOUNG SMOKERS: RESULTS FROM WAVES 1-3 (2013-2016) OF THE POPULATION ASSESSMENT OF TOBACCO AND HEALTH STUDY

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SIGNIFICANCE: Little is known about whether ENDS use (electronic nicotine delivery systems, including e-cigarettes) is associated with cigarette smoking among young adults (YA). This study examines whether ENDS use frequency is associated with cigarette smoking progression or reduction among U.S. YA across three waves of data from 2013-2016. METHODS: Data are drawn from the Population Assessment of Tobacco and Health (PATH) Study. Analyses focus on 1,096 ENDS-naive ever smoking YAs (18-24) at Wave 1 (W1) who participated in Wave 2 (W2) and Wave 3 (W3). We used unweighted 1.5 propensity score matching to match on risk factors for ENDS use at W2 (defined as never ENDS use, any past 30-day [P30D] use, 1-5 days use in the P30D, and 6+ days use in the P30D) and examined changes in smoking between W2 and W3. We examined both smoking frequency (the number of smoking days in the P30D at W2 vs W3) and smoking intensity (the number of smoking days in the P30D by the average number of cigarettes consumed on smoking days at W2 vs W3). RESULTS: At W2, 27.8% had used ENDS in the P30D, of whom 69.3% used ENDS 1-5 days and 30.7% used 6+ days in the P30D. After propensity score matching and regression, there were no statistically significant relationships between any definition of W2 P30D ENDS use and changes in either the frequency or intensity of cigarette smoking at W3. CONCLUSIONS: ENDS use was not associated with either progression or reduction in cigarette smoking over a one-year period in this sample of U.S. YA ever smokers.

FUNDING: Federal; Academic Institution

DISCUSSIONS ABOUT NICOTINE VAPING PRODUCTS WITH HEALTH PROFESSIONALS AND TRANSITIONS IN SMOKING AND VAPING STATUS: LONGITUDINAL FINDINGS FROM THE ITC FOUR COUNTRY SMOKING AND VAPING SURVEY 2016-2018

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Background. Nicotine vaping products (NVPs) may help smoking cessation, yet the role of health professionals (HPs) in the uptake and use of NVPs among smokers is largely unknown. We examined whether HP discussions and recommendations for NVP use increased over time and whether NVP discussions are associated with transitions in smoking and vaping status. Methods. Data were collected from adult smokers who participated in the 2016 (n=5,555) and 2018 (n=7,188) ITC Four Country Smoking and Vaping Surveys from Australia (AU), Canada (CA), England (EN), and the US and visited an HP in the past 12 months or during the 18-month follow-up. Smokers reported: 1) if they discussed NVPs with a HP; 2) who initiated the discussions; 3) if HP recommended NVP use. For the 2,649 exclusive smokers and 810 concurrent users who were followed up at Wave 2 (47% retention), weighted regression models examined if NVP discussions were associated with transitions in smoking and vaping status. The models were stratified by baseline smoking and vaping status and adjusted for smoking-related covariates such as quit intentions. Results. The prevalence of NVP discussions with HPs did not change over time in AU (1.8% to 2.9%, p=0.05), increased in EN (6.7% to 8.4%, p=0.02) and decreased in US (8.9% to 6.1%, p=0.01) and CA (8.3% to 4.6%, p=0.01). Across countries and waves, HPs initiated 49.0% of the discussions. The prevalence of HP recommendations of NVPs did not change over time in AU (13.1% to 19.1%), CA (32.4% to 34.2%) and EN (33.2% to 39.3%), but decreased in US (38.4% to 23.7%, p=0.03). Exclusive smokers at Wave 1 were more likely to become exclusive vapers or concurrent users by Wave 2 if they reported NVP discussions with HPs (Adjusted risk ratio [ARR]=2.94). Wave 1 concurrent users were less likely to become exclusive smokers by Wave 2 (ARR=0.28) if they reported NVP discussions with HPs (ARR=0.28). Conclusion. Among smokers, NVP discussions with an HP were low overall, but their occurrence was associated with NVP uptake and continued use, regardless of whether HPs recommended NVP use and who initiated NVP discussions. HPs may have an important role in facilitating smokers switching to NVPs.

FUNDING: Federal; Academic Institution
FUNDING: Federal

In social support networks that contribute to individual and group behavior change. 

POD36-1

SOCIAL BROKERAGE IN TWITTER-ENABLED SOCIAL SUPPORT NETWORKS PREDICTS SUSTAINED ABSTINENCE

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Significance: Social media-based tobacco cessation interventions harnessing social support networks have shown promise. Study of social network mechanisms of change is needed. We examined the effect of social brokerage on smoking abstinence in private social support networks in a Twitter-enabled tobacco cessation intervention called Tweet2Quit. Social brokers communicate with other group participants who do not themselves engage in direct communication. We hypothesized that by communicating with a wide range of otherwise disconnected participants in the Tweet2Quit support networks, social brokers (1) foster communication coordination and emotional support necessary to initiate and maintain tobacco abstinence, and (2) likely gain a status as informal leaders, helping them to achieve abstinence.

Methods: We analyzed directed network data from the 3-month Tweet2Quit intervention comprising of 36 support groups with 20 adult smokers randomly assigned to each group (N=720). At the participants’ level, we used betweenness centrality to identify social brokers for each respective support network. At the network level, we measured modularity as indicators of network integration. Our primary outcome was 6-month sustained abstinence, self-reported or biochemically assessed.

Findings: Participants abstinent at 6-months had higher betweenness centrality (F=4.96, p=0.026, n=675) than continued smokers. None of the model covariates (baseline smoking, age, gender, education) had a statistically significant effect on abstinence. Among participants achieving 6-month abstinence (n=106), those biochemically verified (n=52) also exhibited higher betweenness centrality (F=4.52, p=0.034). At the network level (F=36), fragmentation, as indicated by greater modularity scores, negatively correlated with abstinence (r=−0.28), although the test was underpowered (p=0.10).

Conclusion: Social brokers in Tweet2Quit were more likely to sustain abstinence and contribute to network integration, the effects of which translated to other participants’ quit-smoking behavior. This study identified mechanisms in social support networks that contribute to individual and group behavior change.

FUNDING: Federal

POD36-2

SMOKING CESSATION INDUCED BY DEEP MAGNETIC STIMULATION. A DOUBLE BLIND SHAM CONTROLLED MULTI CENTER STUDY

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Background: Tobacco smoking is the leading cause of preventable death in developed countries. Previous studies in animal models and humans suggest that repeated activation of cue-induced craving networks followed by electromagnetic stimulation of the prefrontal cortex (PFC) can cause lasting reductions in drug craving and consumption. This double-blind sham-controlled multicenter study evaluated effectiveness of a specific brain stimulation protocol previously reported to induce smoking cessation by deep transcranial magnetic stimulation (dTMS) of the PFC and insula bilaterally. Methods: 262 chronic smokers who failed previous quitting attempts were recruited in 14 clinical centers. Participants were randomized to receive 15 daily sessions of high-frequency active or sham stimulation following presentation of smoking cues. Deep TMS was administered using an H4-coil targeting the lateral PFC and insula bilaterally. Cigarette consumption was evaluated by cotinine urine measures and recording participants’ self-reports in diaries. Following 3 weeks of the daily treatment phase, participants provided diaries and urine samples for additional 3 weeks. The primary endpoint of the study was a comparison between the two groups of the four-week continuous quit rate (CQR). Those who quit smoking were followed for additional 10 weeks.

Results: Of the 168 participants in the study who completed three weeks of H4 Deep TMS or sham treatment and three weeks of follow-up (reaching the six-week endpoint), the CQR was 28.4% and 11.7% in the active and sham groups, respectively (p=0.0063).

Conclusion: This study further implicates the lateral PFC and insula in nicotine addiction and establishes a treatment protocol inducing smoking cessation.

FUNDING: Federal

POD36-3

SUCCESSFUL TREATMENT OF TOBACCO DEPENDENCE TREATMENT IN THE EMERGENCY DEPARTMENT USING THE MULTIPHASE OPTIMIZATION STRATEGY

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Significance: Tobacco dependence treatment begun in the hospital emergency department (ED) is effective. Treatment interventions typically involve multiple components, making it difficult to identify specific components that are effective or estimate interactions between components. The Multiphase Optimization Strategy (MOST) allows investigators to identify these effects. Methods: We conducted a full-factorial, 2x2x2x2 (16-condition) optimization trial in a busy hospital ED of 4 tobacco dependence components: a brief negotiation interview (BNI), delivered by a research assistant; 6 weeks of nicotine replacement therapy (NRT), in the form of patches and gum, with the first dose delivered in the ED; automatic referral to a telephone quitline; and enrollment in SmokefreeTXT, a free short-messaging service text program developed by the National Cancer Institute. We modified SmokefreeTXT slightly, by eliminating the 2-week module of pre-quit date messages, retaining the 6 weeks of post-quit messages and adding several ED-specific messages. Study data were analyzed with a novel mixed methods design to assess clinical efficacy, cost-effectiveness, and qualitative participant feedback. The primary endpoint was tobacco abstinence at 3 months, verified by participants’ exhaled carbon monoxide. Results: Between February 2017 and May 2019, we enrolled 1056 adult smokers visiting the ED. Biochemically confirmed abstinence rates at 3 months for each component vs. control were: BNI, 13.5% vs. 8.9% (P=0.02); NRT, 14.4% vs. 8.0% (P=0.001); quitline, 12.4% vs. 10.1% (P=0.24); SmokefreeTXT, 11.6% vs. 10.8% (P=0.70). There were no statistically significant interactions among components. Economic and qualitative data, presented elsewhere, support the cost effectiveness and feasibility of these components. Conclusion: The BNI and NRT were efficacious in this MOST trial, which is the first to identify components of ED-initiated tobacco dependence treatment that are individually effective. Future work will focus on enhancing scalability, by testing provider-delivered BNIIs, offering NRT prescriptions rather than distribution of 6 weeks of NRT, and disseminating a toolkit for ED treatment.

POD36-4

COMBINATION OF VARENICLINE AND NALTREXONE FOR SMOKING CESSATION AND DRINKING REDUCTION - A RANDOMIZED CLINICAL TRIAL

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Significance: The use of tobacco and alcohol account for significant morbidity and mortality. Further, cigarette and alcohol co-use is thought to have synergistic pharmacological effects that impact treatment response. Varenicline and naltrexone have each demonstrated efficacy for the treatment of alcohol use disorder and have been tested as smoking cessation aids. Methods: Towards building a more robust pharmacological treatment for smoking cessation and drinking reduction, this randomized clinical trial (NCT02698215) combined varenicline and naltrexone. A sample of 165 chronic smokers who failed smoking cessation attempts were randomly assigned to either (1) varenicline or (2) naltrexone. A sample of 165 chronic smokers who failed smoking cessation attempts were randomly assigned to either (1) varenicline or (2) naltrexone. A sample of 165 chronic smokers who failed smoking cessation attempts were randomly assigned to either (1) varenicline or (2) naltrexone.

Results: Analyses of the a-priori outcome of 7-day point prevalence of cessation verified by a cotinine urine measure and participants’ self-reports in diaries and urine samples for additional 3 weeks. The primary endpoint of the study was a comparison between the two groups of the four-week continuous quit rate (CQR). Those who quit smoking were followed for additional 10 weeks.

Results: Of the 168 participants in the study who completed three weeks of H4 Deep TMS or sham treatment and three weeks of follow-up (reaching the six-week endpoint), the CQR was 28.4% and 11.7% in the active and sham groups, respectively (p=0.0063).

Conclusion: This study further implicates the lateral PFC and insula in nicotine addiction and establishes a treatment protocol inducing smoking cessation.

FUNDING: Federal
the full range of nicotine concentrations, are often not well liked by participants.

Research by our research team and others have found that these cigarettes, across nicotine content ranging from very low to similar to conventional cigarettes. Previous investigational 'Spectrum' cigarettes available to researchers with varying levels of rule, the FDA, in conjunction with the National Institutes of Health, has made in combustible cigarettes to a very low level. To facilitate research on this proposed Notice of Proposed Rulemaking describing the intent to reduce the nicotine content.

Significance: The Food and Drug Administration (FDA) has released an Advanced Paper Sessions

Methods: The goal of the present experiment was to compare participant ratings and behavioral economic demand for high- (15.6 mg/g) and low-nicotine (0.4 mg/g) Spectrum cigarettes to a non-preferred commercially available brand (Eagle 20 kings). Participants (n=10) consumed two double-blind puffs of each cigarette in a randomized order in a laboratory setting, and then completed subjective rating scales for that cigarette and behavioral economic demand tasks.

Results: Compared to the non-preferred brand, both high- and low-nicotine Spectrum research cigarettes were rated as less satisfying and less pleasant. Ratings of 'tastes like own brand' and 'feels like own brand' were the only categories that significantly differentiated high- and low-nicotine Spectrum cigarettes. 60% and 40% of participants also indicated they would pay to avoid Spectrum low- and high-nicotine cigarettes, respectively, compared to 20% for non-preferred brand.

Demand curves corresponded to these subjective ratings, with both Spectrum cigarette concentrations associated with lower demand compared to usual brand cigarettes and intermediate demand compared to non-preferred cigarettes.

Conclusions: These results suggest that participant dissatisfaction with Spectrum research cigarettes is not only related to nicotine content and these poorly rated cigarettes dominating research into the FDA’s proposed rulemaking may make it difficult to fully understand how such a regulation would impact consumer behavior.

FUNDING: Federal
PS1-133
ENFORCEMENT PRACTICES AND PENALTY GUIDELINES WITHIN LOCAL TOBACCO 21 POLICIES IN THE US

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Introduction: Tobacco 21, a policy that raises the minimum legal sales age (MLSA) of tobacco products to 21 years, has gained national attention throughout the US. Although initial literature has examined the policy components of state Tobacco 21 laws, no studies have yet examined the elements of local policies. It is the purpose of this study to examine the local Tobacco 21 policy language for the inclusion of enforcement practices, including tobacco retail license (TRL), inspections and compliance checks, penalty structures, and retailer density restrictions. Methods: A recently developed Tobacco 21 Policy Assessment Tool was used to examine components among a sample of 354 local Tobacco 21 policies that were passed before July 1, 2019. Using the instrument, eight coders were paired in teams of two coders, where they independently coded a subset of policies; each policy was coded twice. Next, a third coder checked for discrepancies and established final consensus. During the frequency analysis, researchers examined language used within different policies to compare enforcement and penalty practices among different Tobacco 21 policies. Results: Overall, 63.6% of the coded local policies stated routine inspections and/or underage decoy compliance checks were required for retailers; however, 1.4% (n=5) policies identified a mandatory number of inspections per retailer annually, and 4.8% (n=17) policies identified a minimum number of compliance checks. Overall, 74% of the coded local policies included a TRL; however, 67.2% of the local TRL policies were within the state of Massachusetts. Additionally, 67.5% of the local policies included suspension and 55.9% of the policies included revocation of the license for repeated violator. The median number of violations required before a retailer’s TRL would be suspended and revoked was two and four violations, respectively. One fourth (24.9%) of the coded local policies included density restrictions. Discussion: Inclusion of a TRL, minimum number of annual inspections/compliance checks, steep penalties, and density restrictions may encourage retailers to enforce Tobacco 21 policies; however, restrictions may not be effective if the policy does not provide foundational accountability or substantive penalties for the retailer. Policies guidelines for implementation practices and enforcement strategies should be considered when assessing policy compliance. By holding retailers accountable, public health policies may be able to reduce tobacco use among young populations.

FUNDING: Unfunded; Academic Institution

PS1-134
ADOPTION OF TOBACCO 21: A CROSS CASE ANALYSIS OF TEN STATES

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SIGNIFICANCE: Tobacco 21 (T21), a legislative tobacco control policy focused on reducing youth tobacco initiation, passed in 19 states and was introduced at the national level. There is limited systematic data that explores challenges and facilitators associated with adoption of T21 laws. METHODS: We conducted case studies of 10 states that passed T21 (AR, CA, CT, MA, NJ, TX, UT, VT, VA, WA), resulting in 70 semi-structured telephone interviews with key informants ranging from state and local legislative policy makers, health advocates and community based organizations. A snowball sample was constructed. Data analyses used grounded theory incorporating an iterative process of summarizing verbatim interview transcripts. Three coders independently open coded transcripts for themes and met regularly to resolve any issues by consensus. RESULTS: There were a number of common challenges. Lack of prioritization of T21 as a core issue by policy makers and some advocates, initially, was commonly described. Controversy over conceptualization and phrasing of the bill presented challenges for T21 passage (i.e., inclusion of preemption; possession, use, purchase laws; and grandfathering implementation). As well, the political climate of the state influenced the extent to which the bill gained traction with states that had minimal bipartisanism describing more challenges than others. Additional barriers included arguments focused around issues of military exemptions (e.g., if one can serve in the military at 18, one should have a right to use tobacco), concerns over state tax revenue loss from reduced tobacco sales, and opposition from convenience store owners. A number of facilitators that were critical in overcoming these challenges emerged in the interviews. Across the states, strong legislative champions, seasoned lobbyists, and coalitions of cohesive advocate groups, who had organized to champion a unified T21 message, were noted as important. Youth advocates were also identified in several recent states that adopted T21 such as WA and MA as playing a critical role in educating legislators about the severity of the electronic cigarette epidemic in schools. The recent growth in youth e-cigarette prevalence seemed to help T21 gain traction and serve as a tipping point for raising T21’s visibility as a legislative priority. CONCLUSION: These data suggest that supporting strong coalitions and leveraging the involvement of youth to educate legislators on ways to curb youth use are important points of leverage for the adoption of T21 legislation.

FUNDING: State; Academic Institution; Other

PS1-135
IN VITRO COMPARISON OF RESPIRATORY NICOTINE DELIVERY WITH PROTONATED NICOTINE SALT VS FREE BASE NICOTINE E-LIQUIDS

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Introduction: Predicting the extrathoracic (mouth-throat) nicotine entrapment and corresponding respiratory nicotine delivery to the lower airways is helpful for regulating agencies to evaluate the risk or relative safety of e-cigarettes. There are studies claiming higher plasma nicotine concentrations with nicotine salts in e-liquids compared to free base (unprotonated) nicotine while others show the opposite. Thus, we aimed to investigate the respiratory delivery of nicotine with e-liquids containing free base and protonated nicotine as a percentage of post-vaporization nicotine yield in an anatomically-accurate 3D printed mouth-throat model. Methods: The mouth-throat model of an 18 year-old male, which was previously developed using CT scans, recorded during inhalation of 12 L/min representing the typical average inhalation flow rate during resting activity level, was adapted to be used for testing common e-cigarettes. A syringe pump based vaporizing machine was used to generate the standard rectangular puff profile. The puff topography parameters were puff flow rate, 18.89 mL/sec, puff duration, 3 sec, and puff volume, 56.65 mL. Two e-liquids containing 50 mg/mL nicotine and PG/VG (70:30 v/v) at two PH levels of 4 and 11, representing the protonated and free base nicotine, respectively, were used. A single puff was generated at 90 W with a 0.2 Ω coil set at 203°C, and nicotine was collected on a Cambridge filter positioned at the end of the mouth-throat model. Results: The nicotine yield was equal to 2.72±0.00 mg and 1.43±0.15 mg for the protonated and free base e-liquid, respectively. The filter entrapment, calculated as a percentage of nicotine yield, was 38.37±4.36% and 43.05±8.47% for the protonated and free base nicotine e-liquids, respectively. Conclusions: The PH 4 e-liquid resulted in significantly higher, 89.47%, post vaporization nicotine yield compared to the PH 11 (p-value=0.0004). This higher yield when using protonated nicotine salt also resulted in a 64.22% increase in the mass of nicotine reaching the filter at the end of the mouth-throat model (p-value=0.002).

FUNDING: Federal
without these policies. To estimate the counterfactual, we matched pre-reform covariates and outcomes between California and other states to construct a synthetic California. The control states included those that did not introduce an under-21 restriction on tobacco sales or a tax on cigarettes during the study period. Cigarette pack prices and sales for 2017 and 2018 were compared between California and synthetic California. Statistical significance was assessed using standardized p-values and permutation testing. Results The mean squared prediction error was 0.0006 for our price model and 0.0115 for our sales model indicating our synthetic control groups were an excellent fit for the 2011-2016 California data. Compared with our synthetic control group, cigarette prices in California increased $1.89 ($7.86 versus $5.97, standardized p<0.01) and cigarette sales decreased 16.8% (19.9 versus 16.6 packs per capita, standardized p<0.01) (see Figure). Permutation testing indicated that none of the 30 potential control states had a price trend or sales trend that diverged as much from their synthetic control as California’s. We estimate that the decline in sales between 2017-2018 equaled to 154.0 million fewer packs being sold in California. Conclusions The Proposition 56 tax on cigarettes has largely been passed on to consumers. Combined with T21, this has led to a rapid and substantial reduction in cigarette consumption in California. Funding No specific funding was received for this study.

FUNDING: Unfunded

PS1-137

NO BUTTS ON THE BEACH - AQUATIC ECO-TOXICITY OF CIGARETTE BUTT LEACHATE CHEMICALS

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Cigarette butts are one of the most littered items in the world and cigarette butt litter is a source of toxic pollutants that are hazardous to marine and freshwater organisms. FDA Center for Tobacco Products is required to assess the environmental impact of its tobacco regulatory actions per the National Environmental Policy Act and rules in the Code of Federal Regulations Title 21 Part 25. Understanding the environmental impacts of cigarette butt litter is a key aspect of this assessment pertaining to disposal portion of the cigarette life-cycle. While many studies demonstrate the toxicity of discarded cigarette butts to marine and freshwater species, they focus on the cigarette butt in its entirety and do not identify the specific chemical constituents and their associated ecotoxicity. To address this gap, we characterized and quantified the chemical composition of leachate from discarded cigarette butts using standardized methods from ASTM and U.S. Environmental Protection Agency to identify chemical hazards. Chemical analyses identified 34 main constituents including heavy metals, volatile organic compounds, aldehydes, and glycols. We compiled ecotoxicity data across trophic levels (acute aquatic toxicity) from existing regulatory agency databases (U.S. Environmental Protection Agency’s ECOTOX and European Chemicals Agency’s REACH) for the chemicals. We then modeled species sensitivity distributions, which are cumulative probability distributions of toxicity values for multiple species and calculated the HC₅ (50% hazard concentration value at which 5% of the species may be affected) for 19 chemicals. Our results help characterize the ecological hazard posed by cigarette butt leachate and identify gaps in ecotoxicity information for key leachate constituents, aiding our evaluation of the environmental impacts of tobacco products. Further steps involve modeling the fate and transport of these constituents in different environmental matrices. When combined with the species sensitivity data we present here, fate and transport information will allow us to assess the environmental risk of cigarette butt leachate.

FUNDING: Federal

PS1-138

RANDOMIZED CLINICAL TRIAL EXAMINING REDUCED NICOTINE CONTENT CIGARETTES AMONG SMOKERS WITH PSYCHIATRIC CONDITIONS OR SOCIOECONOMIC DISADVANTAGE

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BACKGROUND: Reducing the nicotine content of cigarettes among relatively healthy, adult smokers decreases the number of cigarettes smoked per day (CPD) and nicotine-dependence severity without increasing compensatory smoking. The present study examined the generalizability of these effects to adults in populations highly vulnerable to smoking and dependence. METHODS: This was a 12-week, double blind, randomized clinical trial conducted at three sites between October 2016 and September 2019. Participants were 75 adult smokers from one of three vulnerable populations (i.e., smokers with comorbid affective disorders [n=258], opioid use disorder [n=260], or socioeconomically disadvantaged women [n=257]) not currently planning to quit. Participants were assigned to smoke one of three research cigarettes (15.8, 2.4, 0.4 mg nicotine/g of tobacco) for the study duration. Cigarettes were provided weekly at no cost to participants. The primary outcome was total CPD at 12 weeks. Outcomes were analyzed using Analysis of Covariance, controlling for the baseline levels of the outcome of interest. RESULTS: Across populations, reducing nicotine content decreased total CPD at 12 weeks (F[2,572]=28.25, p<0.001), with both lower doses differing from the 15.8 mg/g dose but not each other. Reducing nicotine content also decreased Fagerstrom Test for Cigarette Dependence total scores (F[2,621]=14.66, p<0.001), with both lower doses differing from the 15.8 mg/g dose but not each other. Reducing nicotine content had no effects on expired carbon monoxide levels (F(2,622)=2.46, p=0.09) or total puff volume (F[2,413]=0.04, p=0.96) suggestive of compensatory smoking either overall or within populations. CONCLUSIONS: The burden of cigarette smoking disproportionately impacts smokers with psychiatric conditions and socioeconomic disadvantage. These results suggest that a national policy that reduces the nicotine content of cigarettes has the potential to reduce cigarette smoking rates and addiction potential even among these highly vulnerable populations.

FUNDING: State
SIGNIFICANCE: Smoking patterns (smoking frequency and smoking intensity) differ between non-Hispanic African Americans (AA) and non-Hispanic Whites (Whites). Little is known about whether tobacco taxation policies have differential impacts on smoking patterns for AA and Whites. This study compares the price responsiveness of cigarette participation, daily smoking, nondaily smoking, and smoking intensity among daily or nondaily smokers for AA and Whites. Methods: We analyzed pooled, cross-sectional data from the 2009-2014 National Adult Tobacco Surveys (n=254,006 adults aged 18+). State-level cigarette retail price data was from the Tax Burden on Tobacco report. For each racial/ethnic group, we used a three-part econometric model to examine the impacts of cigarette price on cigarette smoking participation, daily and nondaily smoking participation conditional on current smoking, and smoking intensity (cigarettes smoked per day or CPD) conditional on being daily or nondaily smokers. In the three-part model, we controlled for sociodemographic characteristics, state-level anti-smoking sentiment, state-level smoke-free air laws, and year. Results: In the study period, current smoking prevalence was 20.4% in AA adults and 17.7% in White adults. Among current smokers, 70.2% of AA smokers were daily smokers while 81.4% of White smokers smoked daily; and on average, AA smokers consumed 9.9 CPD, whereas White smokers smoked 14.8 CPD. After controlling for other confounders, cigarette price showed a significantly negative association with smoking participation (price elasticity was -0.16) for Whites, but not for AA. Conditional on current smoking, cigarette price was not associated with daily or nondaily smoking among either AA or White smokers. Among AA current daily smokers, cigarette price had a negative impact on smoking intensity (price elasticity was -0.29). We did not find any significant association between cigarette price and smoking intensity among AA nondaily smokers, White daily smokers, or White nondaily smoker. Conclusion: Price increases had differential impacts on smoking participation and smoking intensity of daily smoking for AA compared to Whites.

FUNDING: State
non-government corruption, not currently included in this analysis, is a potential driver of the differences seen.

FUNDING: Nonprofit grant funding entity

PS1-144

USE OF HEATED TOBACCO PRODUCTS AMONG MIDDLE AND HIGH SCHOOL STUDENTS IN GUATEMALA CITY, GUATEMALA

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Background: Heated tobacco products (HTPs) are increasingly marketed worldwide, including in Guatemala, a country with weak tobacco control policies. This study evaluated HTP awareness, susceptibility and use amongst Guatemala youth. Methods: Middle- and high-school students from 10 private schools in Guatemala City (n=2670) were surveyed using standard measures of susceptibility, ever use, and current (past 30 days) use of cigarettes, electronic cigarettes (e-cigs), and HTPs. Last month use of alcohol and marijuana, exposure to tobacco advertising, sensation-seeking tendencies, family and friend use of tobacco products, parental education, and family affluence were also evaluated. Logistic regression models estimated associations between study variables and the following outcomes: HTP awareness, susceptibility, ever use, and current use.

Results: Of respondents, 52.4% were aware of HTPs. 52.4% were susceptible to future use, 8.4% had ever tried them, and 2.9% were current users. Awareness was more likely among current smokers (AOR=1.5), e-cigs users (AOR=2.1) and alcohol users (AOR=1.8); students with a family member who smoked (AOR=1.3), used HTPs (AOR=1.6), or had a friend who used HTPs (AOR=4.1); and more frequent exposure (mostly/always) to internet ads (AOR=1.7). Susceptibility to use HTPs was higher among current smokers (AOR=10.5), e-cigs users (AOR=21.8), alcohol users (AOR=1.4) and marijuana users (AOR=3.4), as well as students who had a friend used HTPs (AOR=1.83). Ever use was more likely for current smokers (AOR=6.6), e-cig users (AOR=10.4) and marijuana users (AOR=2.2), as well as students with family a member who smoked (AOR=1.7) or a friend who used HTPs (7.2). Similarly, current HTP use was more likely among current smokers (AOR=6.1) and e-cig users (AOR=84.9), and students with a family member who smoked (AOR=32) or a friend who used HTPs (44.7).

Conclusions: More than half of Guatemalan adolescents were aware of HTPs, more than a quarter were susceptible to future use, and less than 3% were current users. HTP awareness and use were associated with current smoking and other tobacco use.

FUNDING: Federal

PS1-145

THE IMPACT OF TOBACCO 21 ON TOBACCO SALES IN CALIFORNIA

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Significance: The age of legal tobacco sales in California increased from 18 to 21 on June 9, 2016 when the Tobacco 21 (T21) law was implemented. By preventing young adults from buying tobacco products, it is hoped that T21 will prevent many of them from ever starting to use tobacco and will help reduce tobacco use over time. However, some have been expressed concerns that T21 might hurt retail tobacco vendors. This study examines whether T21 has had an impact on retail tobacco vendors by reducing tobacco sales.

Methods: We examined weekly Nielsen Retail Scanner data on California sales revenue ($) for 2012-2017 for all tobacco products for four types of store: drug stores, convenience stores/gas stations, food stores, and mass merchandisers. We also analyzed data on cigarette sales volume (number of packs) from the California Department of Tax and Fee Administration (CDTFA) for 2010-2018. Linear regression models of tobacco sales revenue (in 2017 dollars) and cigarette sales volume were estimated, controlling for time trend, seasonality, T21 implementation, and the Proposition 56 tobacco tax increase implemented in April 2017.

Results: The Nielsen Retail Scanner data showed no statistically significant impact of T21 on total tobacco sales revenue but did show statistically significant increases for convenience stores/gas stations and decreases for mass merchandisers. The DCTFA model indicated that T21 did not have a statistically significant impact on cigarette sales volume.

Conclusions: The implementation of Tobacco 21 in California was not associated with a change in total tobacco sales revenues or cigarette sales volume in the state in the early years after it was implemented. However, there was a shift in sales from mass merchandisers to convenience stores/gas stations. There was also a large impact on both total tobacco sales and convenience store/gas stations associated with the Proposition 56 tax increase, which make it challenging to determine the independent impact of T21 after April 2017. Our findings indicate that T21 may have had a positive impact on some retail tobacco vendors but a negative impact on others.

FUNDING: Federal

PS1-146

DO MODIFIED RISK TOBACCO PRODUCT CLAIM FEATURES AFFECT CONSUMER RESPONSES?

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Background: To encourage cigarette smokers to transition to less harmful nicotine sources, the Tobacco Control Act created a structured process for FDA to review and authorize modified risk tobacco product (MRTP) claims. In order to inform MRTP regulatory decisions, we evaluated how MRTP claim features (i.e., specificity and type) affect consumer responses. Methods: Participants were a convenience sample of 3,161 US adults who were current cigarette smokers. We conducted an online 2×2 between-subjects experiment with an independent control. The first factor, MRTP claim specificity, manipulated whether participants saw claims that were general (e.g., reduces risk of smoking-caused diseases) or specific (e.g., reduces risk of lung cancer). The second factor, MRTP claim type, manipulated whether participants viewed claims about risk (e.g., reduces risk of lung cancer) or exposure (e.g., reduces exposure to carbon monoxide).

All claims described potential risk or exposure benefits of completely switching from cigarettes to IQOS. Outcomes included risk and exposure beliefs, message believability, ease of understanding, relevance, and willingness to try IQOS. Results: General MRTP claims elicited lower perceived risk (d=0.13) and exposure beliefs (d=0.16), compared to those viewing specific claims (p<0.05). MRTP claim type was unrelated to risk and exposure beliefs (p>0.05). Participants viewing general claims reported greater message relevance (p=0.02), for which the mean difference between specific risk and specific exposure (d=0.12) was greater than mean difference between general risk and general exposure (d=0.07). Conclusions: General MRTP claims reduced risk and exposure beliefs more than specific MRTP claims, while risk and exposure modifications were interpreted similarly. Moreover, claim features did not affect willingness to try IQOS.

FUNDING: Federal

PS1-147

USE OF AND SUSCEPTIBILITY TO USE ELECTRONIC CIGARETTES AMONG ADOLESCENTS IN GUATEMALA

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Background: Use of electronic nicotine delivery systems (ENDS) among adolescents has increased rapidly in high income countries, where most ENDS research has been conducted. This study assessed the prevalence and correlates of susceptibility to and current ENDS use among adolescents in Guatemala, a middle-income country with no ENDS regulations.

Methods: In the summer of 2019, 2,861 students in grades 8-12th completed a survey on tobacco product perceptions and behaviors. Susceptibility to future, ever (yes, but not in the last 30 days), and current (last 30 days) ENDS use were assessed using standard measures. Covariates included: age, sex, current substance use (i.e., cigarettes, alcohol, marijuana), family and friend smoking and ENDS use, parental education, family affluence, and exposure to tobacco product and ENDS advertising. Logistic models regressed ENDS susceptibility (among non-current ENDS users only) and current use (entire sample) on covariates.

Results: Of the 72% of students who did not currently use ENDS, 60% were susceptible to future use, and, of the entire sample, 25% currently used ENDS. Susceptibility to ENDS use was significantly higher among current smokers (AOR=11.86) and alcohol users (AOR=3.23), students with friends (AOR= 2.82) or

FUNDING: Nonprofit grant funding entity
family (AOR=1.63) who used ENDS, and students with higher exposure to ENDS ads (AOR=2.01). Similarly, current ENDS use was higher among never smokers who were susceptible to smoke (AOR=3.19), current smokers (AOR=21.93) and alcohol users (AOR=3.83), students with friends (AOR=4.74) or family (AOR=2.20) who used ENDS, and those frequently exposed to ENDS ads (OR=2.21).

Conclusions: As in high-income countries, ENDS susceptibility and use is high among Guatemalan adolescents and is associated with cigarette and alcohol use, as well as with potential peer, family and advertising influences. Policies are needed to reduce ENDS use in this country with weak tobacco control.

FUNDING: Federal

PS1-148
TOBACCO TAXATION AND ITS IMPACT ON DISPARITIES IN SMOKING INITIATION OVER TIME AMONG YOUNG ADULTS

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Background: Almost 95% of smokers start smoking before age 21, and tobacco taxation is one of the most effective tobacco control tools for reducing smoking. However, there is a dearth of research on how tobacco taxes impact smoking initiation over time during the critical ages when nearly all smokers start smoking. Moreover, tobacco-related disparities are pressing public health priorities, yet limited research exists on taxes and initiation over time across key demographic groups. This project examines how tobacco taxes affect smoking initiation over time among a national sample of young adults, and the extent to which this relationship differs by key sociodemographic characteristics.

Methods: Data came from the longitudinal arm of the Monitoring the Future (MTF) project (2000-2017). MTF is a national study of drug use behaviors and related attitudes, with nationally-representative samples of 12th graders recruited annually. Subsamples of 12th graders are followed longitudinally into adulthood. We examined four follow-ups (ages 19/20, 21/22, 23/24, 25/26) and 30-day use of cigarettes. MTF attrition weights were used. We used logistic regression to examine the association between state-level price per cigarette pack, in constant dollars, and smoking at follow-up among all nonsmokers at baseline. Interaction terms were used to assess differences across sociodemographic groups, including parents’ education, race/ethnicity, and sex.

Results: We found that for each dollar increase in price at baseline the odds of smoking at follow-up 1 were reduced by 14% (AOR=0.86; 95% CI=0.82, 0.91). A similar pattern was found for smoking at follow-ups 2 and 3. There was a statistically significant interaction between baseline tobacco prices and sex for smoking at follow-up 1 (AOR=1.15; 95% CI=1.02, 1.28), such that the negative relationship between tobacco price and smoking at follow-up 1 was stronger for females than males. Conclusions: Cigarette prices reduce smoking initiation among young adults over time, and the buffering effect of pack price is stronger for females relative to males. Taxation is a key population-level strategy for preventing smoking during critical ages.

FUNDING: Federal

PS1-149
BELIEFS AROUND THE ENVIRONMENTAL IMPACT OF E-CIGARETTE LITTER AND RELATED BEHAVIORS AMONG ADOLESCENTS AND YOUNG ADULTS AGED 15-34

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In 2015, nearly 60 million e-cigarette products were sold at point-of-sale locations in the US. Nearly one-third of these products (19.2 million), were marketed as disposable, creating a new source of e-waste: micro-plastic pollutants, heavy metals, and toxic chemicals, which can leach into soil and ground-water when disposed. With little research to date on this issue, this study, aimed to assess knowledge, attitudes, beliefs, and behaviors around e-cigarette related waste (ERW) (i.e. discarded devices, refills and e-liquids) among adolescents and young adults. An online, opt-in panel was used to conduct a cross-sectional, national survey of 15-34-year-olds (n=2049; October 2019) to ask about e-cigarette litter, perceptions of e-cigarette toxicity, environmental impact of ERW, and facilitators/barriers impacting decisions to recycle. Summary statistics, cross-tabulations with Pearson's chi-squared statistic and Fisher’s exact tests were completed for items asked of all participants. Significant differences between never-vapers (n=966) and ever-vapers (n=1,083) were seen in whether they identified ERW as a type of litter (81.5% vs. 80.3%, p=0.002); believed ERW to be dangerous to throw into the trash (72.6% vs. 65.8%, p<0.001); and believed that it contained toxic substances (61.8% vs. 76.9%, p<0.001). Device owners (n=544) felt that they lacked information about (48.5%) or found it inconvenient (53.9%) to dispose of ERW responsibly. Currently, no standardized processes for disposing of the millions of e-cigarette devices, refills and e-liquids exist, leaving consumers to guess at how best to dispose of these items. Our study shows that in a convenience sample of youth and young adults the negative environmental impact of ERW is largely understood. There were high degrees of uncertainty, however, about how to best dispose of ERW. This research highlights the need for consistent standards for waste management for e-cigarettes with corresponding consumer guidance on responsible disposal.

FUNDING: Nonprofit grant funding entity

PS1-150
THE RISE OF WILD WILD WEST STYLE ROBBERIES OF CONVENIENCE STORES FOR TOBACCO IN NEW ZEALAND 2009-2018. ANALYSIS OF NEWS REPORTS.

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Annual hikes in tobacco excise tax coupled with minimum pack sizes (20 sticks/30gms of loose tobacco) has resulted in New Zealand (NZ) tobacco being the highest priced relative to income in the world. At $NZ232 ($US21) a pack (of 20), NZ cigarettes have been likened to “gold”. A low duty-free allowance (50gm) and thorough border control effectively dampens cross border smuggling. A reduction in growing for personal use from 15 to 5kg/y has likely further limited access to cheaper, though illegal to sell, home grown tobacco. One harmful consequence was a sudden upsurge in robberies, often aggravated, of convenience stores and petrol stations for tobacco. Content analysis of 2009-2018 online news articles identified 575 unique robberies mostly targeting the iconic NZ “dairy” (corner store) (58%) a pivotal cultural space of engagement in small communities. Also hit were petrol stations (22%) and liquor stores (9%). There was an exponential increase from 41 robberies in 2015 to 198 in 2017. Robberies were more likely to be reported in colder versus warmer months (p=0.014) and on Saturday to Monday versus Tuesday to Friday. Physical injury was inflicted in 100 incidences. Injuries ranged from minor scratches to a fractured eye socket and a broken jaw. Stolen vehicles were used in 86 robberies. Of 318 articles providing some information about offenders, “men” or “man” was the most frequent description. An increase in demand for illicit tobacco is indicated. This phenomenon will likely increase the negative health and social effects of participation in crime, such as imprisonment, especially for lower socioeconomic groups, the indigenous Maori and mental health consumers, among whom smoking prevalence is disproportionately concentrated and it is not reducing as rapidly as tax policies promised. There is a dearth of research on tobacco robberies to enable across country comparison. Store robberies in NZ are likely higher due to our geographical distance from neighbouring countries preventing easier smuggling across land borders or via short boat trips. Without more effective cessation aid Wild-Wild-West style heists may blight NZ culture for some time.

FUNDING: Nonprofit grant funding entity

PS1-152
ARE SOUTH AFRICAN SMOKERS SOFTENING OR HARDENING? A CROSS-SECTIONAL ANALYSIS OF THE SOUTH AFRICAN SOCIAL ATTITUDES SURVEY BETWEEN 2007 AND 2018

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Significance: Recent studies have shown softening among smokers in different countries and in different population subgroups, i.e. as smoking prevalence declined remaining smokers made more quit attempts and smoked fewer cigarettes per day (CPD), as opposed to hardening. Methods: We examined tobacco use-related cross-sectional data from five waves of the South African Social Attitudes Survey (SASAS 2007-2018, 2011-2013, 2014, 2016, 2018). We developed a previously-validated subjective norm index for quitting smoking. The null hypothesis was that the subjective norm index would be higher for smokers than non-smokers. For items assessing smoking较多的用法和意思。
Institute at Truth Initiative, Washington, DC, USA, 18 2020 Poster Session 1 • Thursday, March 12, 2020, 11:30 am - 1:00 pm

Ayodeji J. Awopegba, DMD, MPH
PS1-154
prevalence in South Africa. Cessation interventions are needed to achieve a significant decrease in smoking cessation over the period of the study. Stronger tobacco control policies and better-tailored smoking prevention methods that CPD, especially among South African women, has been declining significantly over the past 10 years. Conclusion: Although South African smokers do not show significant softening overall, we found that CPD, especially among South African women, has been declining significantly over the past 10 years. In the adjusted models CPD declined by 0.12 cigarettes per year (p=0.14). However, additional analyses showed that among women, CPD declined significantly by 0.33 cigarettes per year (p<0.01). Conclusion: Although South African smokers do not show significant softening overall, we found that CPD, especially among South African women, has been declining significantly over the past 10 years. Conclusion: Although South African smokers do not show significant softening overall, we found that CPD, especially among South African women, has been declining significantly over the past 10 years. In the adjusted models CPD declined by 0.12 cigarettes per year (p=0.14). However, additional analyses showed that among women, CPD declined significantly by 0.33 cigarettes per year (p<0.01). Conclusion: Although South African smokers do not show significant softening overall, we found that CPD, especially among South African women, has been declining significantly over the past 10 years.

FUNDING: Unfunded

PS1-153
DIFFERENCES IN TOBACCO RETAIL DENSITY AMONG LOCALITIES WITH STRONG VERSUS WEAK FLAVORED TOBACCO RESTRICTIONS
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Flavored tobacco products (FTPs) increase rates of initiation and progression to established product use. In addition, we know menthol smokers try to quit smoking at higher rates than non-menthol smokers, but with less success. FTP policies restricting sales are one way to reduce access to these products, but policy strength varies. Strong policies regulate all products and all flavors, including menthol cigarettes, and are not restricted to only youth-oriented areas, such as schools. To understand how retail availability differs with policy context, we conducted a cross-sectional exploratory study examining differences in tobacco retailer density between localities based on FTP policy strength. We constructed a database of sub-state level FTP policies through June 2019 (n=213). FTP policies were dichotomized as strong (n=42) and weak (n=171). FTP retailers (n=310,090) were estimated: 1) using a 2019 national specialty vape shop directory (n=13,374) and 10 retailer codes in a 2018 national business directory (n=296,716), and 2) by specialty vape stores alone (n=14,230). FTP retailer density was calculated and stratified by locality urbanicity using USDA Rural Urban Continuum Codes (RUCU). Density differences were compared using Wilcoxon rank-sum tests, adjusted for multiple comparisons. Median density for all FTP retailers was 78.3% higher in localities with strong policies compared to weak policies (p < 0.001). Density for specialty vape retailers alone was 65.6% higher in strong policy localities, though this difference was not statistically significant (p=0.1272). Stratifying by urbanicity, strong policies accounted for 25% (n=34/137) of policies in metro areas, 10% (n=660) in micropolitan, 0% (n=0) in suburban areas. Using Tobacco Watcher (TW), an method to identify changes in tobacco-related access to stores, our study identified changes in retailer density that occurred in response to changes in policy. These results can inform future research to examine changes in retail density and FTP access over time as a result of these policies is needed.

FUNDING: Academic Institution; Other

PS1-155
TOBACCO TREATMENT TRIAL PARTICIPATION AMONG AFRICAN-AMERICAN SMOokers SEEKING LUNG CANCER SCREENING
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Significance: Although African-American smokers report desire to quit smoking, they are less likely to participate in tobacco treatment trials. Lung cancer screening presents an opportunity to offer evidence-based tobacco treatment to African-American and other high-risk smokers. Identifying factors that are associated with variation in participation rates of African-Americans could improve tobacco treatment trial engagement. Thus, we examined rates and factors associated with lack of referral and refusal of African-Americans in a tobacco treatment trial conducted at low-dose computed tomography lung cancer screening sites (LDCT- LCS). Methods: Ethnic differences (African-American vs. Caucasian) in participant referral and refusal rates were examined in a multi-site tobacco treatment trial (Cessation and Screening to Save Lives-CASTL) -open to accrual at 8 LDCT-LCS across the U.S. Results: To date, there have been a total of 196 African-American and 1,435 Caucasian smokers with LDCT appointments were not referred to the CASTL trial by LDCT-LCS Site Coordinators whereas only 12% of Caucasian smokers were not referred (X^2 (3, N=1629) = 103.5, p < .01). However, the trial refusal rate for eligible smokers was lower for African-American smokers (n= 19, 8% than Caucasians (n=531, 37%). Prominent reasons for refusal were no time, passive refusal, not interested, prefer to quit on own, and not ready to quit. Conclusion: Previous work has identified multilevel factors at the provider and patient level as potential contributors to the historically lower enrollment rates of ethnic minorities in tobacco treatment trials. These results support that these factors should also be explored in tobacco treatment trials conducted in LDCT-LCS. Encouragingly, our results underscore that African-American smokers seeking lung cancer screening who are approached for participation may be open to enrolling in a tobacco treatment trial.

FUNDING: Federal

PS1-156
A 114% Cigarette Tax hike was prospectively associated with alcohol consumption among adult smokers: FINDINGS FROM NATIONALLY REPRESENTATIVE LONGITUDINAL PANEL DATA IN SOUTH KOREA
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Significance: Tobacco control efforts in India, home to a quarter of the world’s tobacco users, are critical to impact global rates of tobacco use. On September 18, 2019, India’s Finance Minister announced a ban on the sale of e-cigarettes. This study investigates media reporting related to the ban. Methods: Using Tobacco Watcher (TW), an automatically and publicly available media analysis engine that collates news from over 368,000 sources in 16 languages, we plotted trends in news stories mentioning the following: “bans”, “e-cigarette”, “ENDS”, “vaping” and “India” between Sept 1 and Nov 30, 2019. Themes were examined to describe major events surrounding the announcement of the ban. Results: There was global coverage of the e-cigarette sales ban. We observed three notable spikes in the time period. The first spike (Sept 11) was on announcement of an impending ban. The second spike was the announcement of the ban (Sept 20). News in the third spike (Sept 27-30) was on legal opposition to, as well as strategic implications of, the ban. Further investigation using TW’s smart history feature, which chronologically displays related articles, revealed the following: banning e-cigarettes had been identified as a priority by the Prime Minister; the Indian Council of Medical Research released a white paper late May 2019 recommending banning e-cigarettes on their potential to addict nonsmokers and become a gateway to smoking. This report further bolstered the government’s argument despite opposition by certain public health experts who proposed regulating, rather than banning, e-cigarettes; a circular by the Ministry of Health required prior approval for research and workshops related to e-cigarettes; there were existing e-cigarette bans in 12 states, in line with a May 2018 advisory by the Ministry of Health; and the Sept 18 ordinance was approved by both houses and passed into law (month date). Conclusions: Events leading up to the announcement of the ban were favorable to the ban: existing subnational bans, scientific reports supporting the policy and political will to pass the policy. Media coverage following the ban included both favorable and unfavorable reactions.

FUNDING: Other
**PS1-157**

**THE PUBLIC HEALTH STANDARD IN ACTION—EVIDENCE FROM THE IQOS REVIEW**

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Pursuant to a court order, e-cigarette companies will be required to submit premarket applications to the FDA by May 2020. If these applications do not demonstrate to the FDA’s satisfaction that the use of a given e-cigarette product is “appropriate for the protection of the public health,” the FDA will not authorize its continued sale. These reviews present the FDA with a critical opportunity to protect public health by weighing the harms of e-cigarette products against the potential benefits they offer to current smokers. In conducting these reviews, how will the FDA determine what is “appropriate for the protection of the public health” (the “public health standard”)?

One of the few data points available is the FDA’s recent decision to authorize the sale of IQOS, a heat-not-burn product manufactured by Philip Morris. The FDA determined in April that allowing the sale of IQOS would be “appropriate for the protection for the public health,” and the first few U.S. IQOS stores are now open. This presentation critically reviews how the FDA applied the public health standard in authorizing the sale of IQOS, and it suggests potential process modifications the FDA should consider before its review of e-cigarette applications begins. We focus on three main concerns. First, the FDA did not present its interpretation of the public health standard, thereby leaving it unclear what the IQOS application was being measured against. Though not stated explicitly, the IQOS review suggests that, in the FDA’s view, a product will satisfy the public health standards if it less harmful than a conventional cigarette. We explain why such an approach conflicts with the language of the Tobacco Control Act. Second, the IQOS review relied heavily on industry data and representations without any discussion of sponsorship bias or the tobacco industry’s history of research misconduct. Such reliance is deeply troubling given the strong financial incentive of applicants to minimize the harms of their products. Finally, the IQOS review did not utilize the risk assessment methodologies developed by the National Research Council (NRC) and numerous federal agencies. Thus, it was not able to present any quantitative assessment of the potential impact of IQOS sales on public health. We present a risk assessment framework designed to characterize the anticipated effects of a new tobacco product on public health. The framework builds upon the four-part risk assessment framework developed by the NRC, but includes modifications to account for some of the salient features of tobacco use and regulation.

**FUNDING:** Other

**PS1-159**

**EFFECT OF AN E-CIGARETTE TAX ON ITS PERCEIVED RISK AND BENEFIT AMONG INDONESIAN ADULT USERS**

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**Significance:** In October 2018, Indonesia implemented a new, substantial e-cigarette tax. We investigated how the tax affected perceived affordability, perceived harm, and perceived benefit.

**Methods:** We conducted online surveys with a convenience sample of Indonesian adult e-cigarette users. For Wave 1, respondents were recruited via ads on Facebook and Instagram in September 2018 (n=1,322). Participants were recontacted in November-December 2018 for Wave 2 (n=1,039). We asked participants the price paid for their most recent e-liquid purchase. We assessed the dependent variable of perceived harm by asking “how harmful are e-cigarettes to your health?” with response options 1 (not at all) to 4 (extremely). We assessed perceived benefit via agreement with a statement that e-cigarettes are an effective way to quit smoking, with response options 1 (strongly disagree) to 5 (strongly agree). Our independent variables were perceived affordability, vaping status (vape only vs vape and smoke cigarettes), and social support (having a close friend who vapes). Multiple linear regression models estimated the effects of the independent variables on each of the dependent variables, controlling for sociodemographic variables.

**Results:** Although e-liquid prices rose an average of 9% due after tax, perceived affordability of e-cigarettes was unchanged (β=1.43, p<0.154). However, perceived harm (β=-3.55, p<0.001) and perceived benefit increased (β=-20.18, p<0.001). Perceived harm was negatively associated with perceived affordability (β=-0.1, SE=0.03, p<0.001) and positively associated with vaping status (β=0.22, SE=0.07, p<0.001). Perceived benefit was positively associated with perceived affordability (β=0.05, SE=0.02, p=0.006) and job status (β=0.11, SE=0.04, p=0.0015).

**Conclusion:** The tax regulation was associated with increased perceived harm and increased perception that e-cigarettes are useful for cessation. Thus, the tax may have affected key beliefs relevant to public health. It may be helpful to monitor these beliefs in the implementation of taxes in other countries.

**FUNDING:** Academic Institution
THE NEED FOR A TOBACCO CONTROL POLICY IMPLEMENTATION MODEL - AN ANALYSIS OF IMPLEMENTATION SCIENCE MODELS

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Significance: While tobacco control policies have been adopted across the globe, effective implementation continues to be a major challenge, particularly in low- and middle-income countries. In order to fully realize the public health benefit from FCTC policies, effective implementation is required. Implementation science is the study of methods to promote the systematic uptake of evidence-based programs and policies. The National Institutes of Health recommends 61 models for the study of dissemination and implementation as published in Tabak et al (2012). The primary aim of this study is to critically assess these 61 models to determine their applicability for understanding tobacco control policy implementation. Methods: A literature review was conducted on the 61 dissemination and implementation models whereby data relevant to the focus of the model, level at which it operates, and key constructs were extracted and compared to existing literature on tobacco control policy implementation. Results: Results showed that of the 61 models, 11 concerned dissemination only, 36 were related to both dissemination and implementation, and 12 models concerned implementation only. Of these 12 models, none were specific to policy implementation, and none included a construct relevant to industry interference - one of the most commonly cited barriers to tobacco control policy implementation around the world. In fact, most articles focused solely on the positive aspect of engaging stakeholders without taking into account opposition from key stakeholders. Conclusion: Given the importance of industry interference to tobacco control policy implementation and the inherent difference between program and policy implementation, there is an urgent need for the tobacco control community to develop a policy implementation model that can help advocates better manage the policy implementation process, uncover weak areas of implementation, and leverage associated strengths and opportunities. Studies can also be undertaken to test and refine the model, thereby contributing to actionable knowledge.

FUNDING: Unfunded

THE INFLUENCE OF CIGARETTE PACKAGING ON CANADIAN SMOKERS’ INTERACTIONS WITH CESSION MESSAGES

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Significance: Since 2000, Canada has required cigarette packages to include Health Information Messages (HIMs), which complement health warnings by communicating positive, cessation-related messages to smokers. The placement of HIMs differs depending on the type of cigarette package (slide-and-shell (S/S), flip-top (F/T)), which may impact their effectiveness. The current study examined whether the type of cigarette package most commonly used by Canadian smokers influenced their likelihood of noticing and reading HIMs.

Methods: An online survey was conducted between January 28 and March 5, 2019 with 3,000 Canadians smokers aged 16 years or older. Participants were asked about the frequency with which they noticed and read HIMs in the past month. Logistic regression models were used to examine whether the frequency of noticing and reading HIMs varied by cigarette package type, while adjusting for covariates.

Results: While most participants (90.3%) reported noticing HIMs in the past month, this varied by cigarette package type: 85.5% among S/S users vs. 92.3% among F/T users (p<0.001). Regression analysis indicated that the likelihood of noticing HIMs was significantly lower among smokers who used S/S packages (aOR=0.56, p<0.001). Of those who noticed HIMs, 77.3% reported reading them. The proportion of smokers who reported reading HIMs also varied by package type: 89.5% among S/S users vs. 72.7% among F/T users (p<0.001). Package type was significantly associated with reading HIMs, with smokers using S/S packages significantly more likely to report reading HIMs (aOR=3.47, p<0.001).

Conclusion: Smokers’ interactions with HIMs varied by cigarette package type: while the likelihood of noticing HIMs was greater among F/T users, smokers who used S/S packages were significantly more likely to report reading these messages. These differences may be due to the placement of HIMs, as those printed on inserts placed inside F/T packages may be discarded, while those printed on the inner slide of S/S packages remain intact within the package. These findings underscore the importance of product packaging considerations in the implementation of tobacco labelling and communications interventions.

FUNDING: Federal

EFFECTS OF AN 80% CIGARETTE PRICE INCREASE ON QUIT ATTEMPTS, SUCCESSFUL QUitting, AND SMOKING INTENSITY AMONG KOREAN ADULT SMOKERS: RESULTS FROM NATIONALLY REPRESENTATIVE LONGITUDINAL PANEL DATA

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Significance: South Korea implemented an unprecedented 114% cigarette tax increase in 2015, raising its cigarette price by 80%. This study evaluated the extent to which the cigarette tax increase affected Korean adult smokers in terms of quit attempts, successful quitting, and smoking intensity.

Methods: Data were drawn from a nationally representative longitudinal study, the Korean Welfare Panel Study (Waves 9-12, 2014-2017). Korean adults who smoked before the 2015 cigarette tax increase comprised the sample (N=2,114). We used the multiple logistic regressions to examine factors of quit attempts and successful quitting and the generalized estimating equations to estimate changes in smoking intensity among continued smokers.

Results: After the cigarette tax increase, 60.9% of smokers attempted to quit and 34.7% of the attempters continued to oppose through MoIB, weakened the rules and delayed implementation which ruled that regulations violated constitutional freedoms of speech and trade. On September 2005, the Ministry of Health (MoH) notified a complete ban on tobacco imagery in movies and an increase in exposure to anti-tobacco messages. Although age-based rating for such movies was dropped inside F/T packages were significantly more likely to report reading these messages. These differences may be due to the placement of HIMs, as those printed on inserts placed inside F/T packages may be discarded, while those printed on the inner slide of S/S packages remain intact within the package. These findings underscore the importance of product packaging considerations in the implementation of tobacco labelling and communications interventions.

FUNDING: Unfunded

DEVELOPMENT AND IMPLEMENTATION OF TOBACCO-FREE MOVIES RULES IN INDIA

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Introduction: India releases the largest number of movies in the world. In 2004-05, 89% of Bollywood movies had tobacco imagery. Method: Comprehensive review of legislation, judicial decisions, Bollywood trade publications and news articles. Results: In 2005, the Ministry of Health (MoH) notified a complete ban on tobacco imagery in movies with support from WHO and NGOs. Filmmakers and the Ministry of Information and Broadcasting (MoIB) opposed the regulations. A filmmaker challenged the rules in court, which ruled that regulations violated constitutional freedoms of speech and trade. On appeal by MoH, the Supreme Court allowed the rules to go into effect. The film industry continued to oppose through MoIB, weakened the rules and delayed implementation to 2012. Even so, in a world first, the rules required all films with tobacco imagery to a) provide a strong editorial justification to the film certification board; b) display 100 seconds of anti-tobacco messages (before the film and at the intermission) produced by the MoH and c) an anti-tobacco static health warning at the bottom of screen during display of a tobacco product or its use. In 2015, three years after the rules took effect, about 50% of movies had tobacco imagery. 27% of smoking films had full compliance with all three rules and 99% complied with at least one. The cumulative exposure of the 100 seconds of anti-tobacco advertising amounted to about 245 hours of anti-tobacco advertising per year in theaters. Although age-based rating for such movies was dropped in a compromise with filmmakers and MoIB, filmmakers continued to challenge the rules.

Conclusions: India implemented a comprehensive set of regulation to restrict tobacco imagery in films. Opposition from filmmakers led to several modifications over 7 years before the rules got implemented, but it led to a substantial drop in tobacco presentation in films and an increase in exposure to anti-tobacco messages.

FUNDING: Federal
PS1-164

HOW NEW ZEALAND VAPERS MIGHT RESPOND TO E-LIQUID FLAVOR BANS, INTEREST IN VAPING CANNABINOIDS IF LEGALIZED AND CURRENT USE OF ORAL NICOTINE POUCHES. A SURVEY OF VAPE EXPO ATTENDEES.

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Deaths due to vaping oil-contaminated cannabinoid liquid and resulting vaping product bans in some US states led the New Zealand (NZ) government to reconsider how to regulate e-cigarettes and vaping. A legalising cannabis referendum was also slated for late 2020. To inform the debate we added questions to an anonymous IPad-based survey assessing the potential for enrolling regular vapers who had hardly ever smoked into a cohort study. Questions covered flavors used, likely behavior if flavors were limited, awareness/use of oral tobacco/nicotine pouches, cannabis smoking and interest in vaping cannabinoid liquid if legalized. Recruitment occurred at the Auckland Vape Expo 7-8 December 2019. Results: 340 vapers (30% female) took part; 1/3 were Maori or Pacific; 80 had never smoked more than 1000 cigarettes and almost all were interested in being part of a vaping health effects study – of whom 52 lived in/near NZ’s largest city Auckland. Of all vapers only 6% regularly vaped tobacco, menthol or mint. Only 10% of people who vaped other flavors said they would comply with a hypothetical flavor ban and switch to allowed flavors. The rest predicted they would instead buy from overseas or illicit markets, mix their own, and/or smoke. Almost none predicted they would try to quit vaping. Results were similar for under 25yr olds (n=85). Of NZ vapers, 40% had tried, 14% already used and 22% had never heard of pouched tobacco/nicotine products. Among NZ residents there was substantial interest in vaping legalized cannabinoid liquid: 34% said they maybe would and 37% said they almost certainly would. Of current cannabis smokers, half had vaped cannabinoids; they weren’t asked). Of current cannabis smokers, half had vaped cannabinoid liquids, mostly in NZ. These results were similar for under 25yr olds. A substantial black market in cannabinoid vaping products is indicated. Alike to previous research a nicotine-e liquid flavor ban would likely drive people to make/seek unregulated nicotine liquids. Promisingly, Auckland likely has enough virtually never-smoked vapers to warrant being part of a multi-country study.

FUNDING: Unfunded

PS1-167

ASSOCIATION BETWEEN MACHINE-MEASUREMENT CONSTITUENT YIELDS IN CIGARETTE SMOKE AND URINARY BIOMARKERS OF EXPOSURE IN SMOKERS.

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Background: The U.S. Food and Drug Administration has the authority to set limits on the levels of harmful constituents in cigarette smoke with the goal of protecting public health. However, machine-based ‘per cigarette’ constituent yields are widely recognized to be inadequate for the prediction of human exposures. Our goal was to determine whether levels of constituents expressed per milligram of nicotine are better correlated with human exposures, potentially offering a better regulatory tool. Methods: We recruited 66 adult smokers who smoked the same cigarette brand and the same brand of the car. To investigate the genes of these we collected urine and used LC-MS/MS, and the associations between the biomarkers and constituent yields were examined. Urinary 1-HOP, a biomarker of exposure to polycyclic aromatic hydrocarbons (PAH) was also analyzed, and relationships among biomarkers were analyzed. Results: Levels of TNE did not correlate with the machine-measured nicotine yields. Urinary total NNAL and total NNK ranged from 0.245 to 5.795 pmol/mL and from 0.037 to 0.936 pmol/mL, respectively. Total NNAL correlated with NNK per milligram nicotine yields measured under low-intensity and high-intensity smoking conditions (r=0.43 and r=0.36, respectively). Similar association was observed for per-cigarette yields. Urinary total NNK only weakly correlated with the machine-measured NNK yields, independent of smoking intensity or the way yields were expressed. Urinary 1-HOP positively correlated with urinary NNAL (r=0.48), suggesting that lower levels of NNK in cigarette smoke do not result in higher exposures to PAH. Conclusions: Smoking-machine-measured NNK yields are predictive of human exposures to this carcinogen, while exposure to NNK may be affected by additional factors, such as endogenous formation from nornicotine. Additional analyses after adjustment for confounders such as demographics, smoking history, and TNE will be presented and discussed.

FUNDING: Unfunded

PS1-165

EFFECTS OF NICOTINE CONTAINING E-CIGARETTE VAPOR ON CONDITIONED PLACE PREFERENCE IN ADULT AND ADOLESCENT RATS USING A NOVEL, OPEN SOURCE VAPOR EXPOSURE APPARATUS.

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Significance: Adolescent nicotine exposure is a continued concern due to the growing use of electronic cigarettes (e-cigarettes) and their largely unknown health risks, especially in special populations such as adolescents. In order to improve the translational efficacy of preclinical research investigating such risks, we designed an affordable, open source apparatus for exposing rodents to nicotine vapor directly from e-cigarettes. Methods: In order to validate this design, adult (n=16) and adolescent (n=24; post-natal day 30-39) rats were exposed to nicotine at various doses (determined by puff duration) compared to vehicle-exposed controls. Results: Both adult and adolescent rats showed significant increases in place preference for the nicotine-paired side, with adolescents displaying significant increases in place preference even at lower doses that do not produce preference in adults. This enhanced adolescent susceptibility to the rewarding effects of nicotine have also been observed in previous studies, further validating the efficacy of the proposed apparatus. These results support the notion that adolescence is a period that is more sensitive to the rewarding effects of nicotine, underscoring the need for more research into the short- and long-term effects of adolescent e-cigarette consumption. Conclusion: Given that currently available commercial instruments for vapor administration are prohibitively expensive and require proprietary software and hardware to operate, the proposed open source design provides an affordable, customizable, and accessible route for investigating the health consequences of vaporized nicotine (and other drugs).

FUNDING: Federal; Academic Institution

PS1-168

GENOMIC RESPONSES IN WHOLE-BLOOD FOLLOWING SMOKING A HIGH, MEDIUM OR LOW NICOTINE-CONTENT SPECTRUM CIGARETTE.

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Changes in gene expression occur within minutes of smoking a cigarette. These changes are a useful tool to characterize mechanistic processes underlying physiological and behavioral responses to tobacco smoke. Studies using reduced nicotine-content Spectrum cigarettes have reported decreased biomarkers of exposure. However, little is known about how smoking these cigarettes alters gene expression. Twelve daily smokers attended 3 separate sessions. Blood was drawn at the beginning of each session (12 h overnight abstinence) and 30 min after smoking either a high (10.9 mg/ cig), medium (3.2 mg/cig) or very low (0.2 mg/cig) nicotine-content Spectrum cigarette, in a counter-balanced order. Craving (Q-SUB) and withdrawal symptoms (MWS) were assessed at both time points. Differentially expressed genes (DEG) were identified using DESeq2, q<0.05 (FDR corrected). Analysis of gene expression, withdrawal, and craving symptoms revealed nicotine dose-dependent effects. High nicotine-content Spectrum cigarette provided greater withdrawal relief (F1,21=4.07; p<0.05) and decreased craving (F1,21=3.16; p<0.05) compared to the other cigarettes. Dose-dependent responses were also observed with gene expression. Very low and medium Spectrum cigarettes induced similar transcriptomic profiles at 30 min, compared to the high-nicotine content cigarette. We identified DEG associated with cell function (FGF20, GAS1, RARB), cardiovascular and connective tissue integrity and repair (MFPAP5, LRC3B), inflammation (CLEC14A), immune response (CLEC14A, DU8P5, ULBP1), transcription (TBX3, NRR4A3), nervous
system development (GDNF, RELN, ADGRRG1), endocrine function (PCSK2, RARB), metabolism (SULT1C2, CYP19A1), and oxidative stress (NOS2). Importantly, DEG detected were sex-specific. Our results suggest that smoking a single Spectrum cigarette induces gene expression alterations in a nicotine dose- and sex-specific manner. Further, even the very low nicotine-content cigarette can induce expression changes in genes whose alterations have been associated with smoking-related diseases. The long-term impact of these alterations requires exploration in future studies.

FUNDING: Federal; Academic Institution

**PS1-169**

**ELECTRONIC CIGARETTES GENERATE TOXIC ALDEHYDE COMPOUNDS AND ALTER THE ENZYMES ASSOCIATED WITH PROLINE-GLYCINE-PROLINE GENERATION**

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**Significance:** The popularity of electronic cigarettes (e-cigarettes) has risen sharply in the past decade. While their use was initially viewed as safer than cigarette smoking, recent cases of severe lung injury have been attributed to the devices. Aldehydes (e.g., acrolein) and acetaldehyde are produced during smoking and implicated in promoting a proteolytic environment in the lung by encouraging neutrophil (PMN) chemotaxis and enhancing protease expression. A proteolytic cascade exists in response to cigarette smoke that leads to the generation of proline-glycine-proline (PGP), a matrix that sustains pulmonary inflammation through PMN recruitment and activation. Still, it remains unclear whether e-cigarettes generate noxious aldehydes and encourage matrix degradation in a manner similar to cigarette smoke. **Methods & Results:** To characterize the composition and proteolytic potential of e-cigarette vapor, vapor extracts from 3 brands of e-liquids were analyzed using 2 popular electronic cigarettes. Levels of formaldehyde, acrolein, and acetaldehyde were determined from both vapor extracts and e-liquids using mass spectrometry. The toxic aldehydes were detected in both vaporized and non-vaporized forms of the e-liquids. We next assessed immuno-physiological relevance of the aldehydes on the PGP pathway. Activity of prolyl endopeptidase, a critical enzyme for the generation of PGP fragments, was enhanced in cultures treated with vapor-derived extracts. Moreover, LTA₄, a strong inactivator of PGP-mediated inflammation, was decreased in the presence of vapor extracts in a manner similar to that of cigarette controls, suggesting an important negative regulator of PGP is suppressed in response to the vapor components. **Conclusions:** These preliminary data suggest e-cigarette vapor may encourage a similar cycle of PGP-driven proteolysis in the lung as observed with conventional smoking. We now seek a deeper characterization of the PGP pathway in the context of a vapor-exposed animal model and assess a greater variety of popular e-cigarettes. Results derived from such experiments could uncover novel pathogenic mechanisms behind the lung injury associated with chronic vaping.

FUNDING: Federal

**PS1-170**

**EXPLORING THE RELATIONSHIP BETWEEN LONELINESS AND SUBSTANCE USE WITH MENDELIAN RANDOMISATION**

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**Aims:** Loneliness and social isolation are associated with cigarette smoking and problematic alcohol use. Observational evidence suggests these associations arise because loneliness increases substance use, however there is potential for reverse causation (problematic drinking causing damage to social networks, leading to loneliness). With conventional epidemiological methods, controlling for (residual) confounding and reverse causality is difficult. In this study, we apply Mendelian randomisation (MR) to assess bi-directional causal effects between loneliness on the one hand and smoking behaviour and alcohol (ab)use on the other.

**Design:** We applied bi-directional MR using summary-level data of the largest genomewide association studies of loneliness (n=511,280), smoking (initiation (n=249,171), cigarettes-per-day (n=249,171) and cessation (n=143,852)), alcoholic drinks-per-week (n=226,223) and alcohol dependence (n=46,586), using independent samples. For each relationship, we selected genetic variants predictive of the exposure variable as instruments and tested their association with the outcome variable. Effect estimates for individual variants were combined with inverse-variance weighted regression (gene-outcome/exposure association) and the robustness of these findings was assessed with five different sensitivity methods.

**Findings:** There was weak evidence of increased loneliness leading to higher likelihood of initiating smoking and smoking more cigarettes, and a lower likelihood of quitting smoking. Additionally, there was evidence that initiating smoking increases loneliness. We found no evidence of a causal effect between loneliness and alcohol (ab)use.

**Conclusions:** We report tentative evidence for causal, bidirectional, increasing effects between loneliness and cigarette smoking. These findings improve our understanding of the interrelatedness of smoking and loneliness, however, replication with better powered genetic instruments is recommended.

FUNDING: Academic Institution; Nonprofit grant funding entity; Other

**PS1-171**

**INVESTIGATING THE REPRODUCTIVE EFFECTS OF SECONDHAND SMOKE EXPOSURE IN MICE BY INTERROGATING THE TESTIS TRANSCRIPTOME AND GENOME**

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**Significance:** Despite the considerable progress made in protecting the general population from exposure to secondhand smoke (SHS) in the developed- and some developing countries, 93% of the world’s population still lives in low- and middle-income countries with non-existent or poorly enforced clean indoor air laws. The toxic and carcinogenic effects of SHS exposure have been investigated in various organs/tissues of SHS-exposed individuals. However, the effects of SHS exposure on male reproductive system, particularly on the regulation of genes and molecular pathways that govern sperm production, maturation, and functions, remain highly understudied. **Methods:** We have used RNA-sequencing and advanced bioinformatics analysis to investigate, for the first time, the effects of SHS exposure on the whole transcriptome and genome in the testis of mice. Using a microprocessor-controlled smoking machine, we have sub-chronically exposed mice to SHS, and subsequently performed: (1) global gene expression analysis to identify differentially expressed genes; (2) gene ontology analysis to elucidate the affected molecular pathways and functional networks; and (3) variant calling and association analysis to detect genetic variants in the testis of SHS-exposed mice. In addition, we have validated the results, at the single gene level, by quantitative reverse-transcription polymerase chain reaction analysis. **Results:** Whole transcriptome analysis in the testis of SHS-exposed mice revealed significant deregulation of functionally important genes and associated molecular pathways and gene networks, of which many are involved in male reproductive functions. Furthermore, variant detection and association analysis showed a significant number of genetic variations, including a frameshift mutation in a key gene responsible for semen production, motility and other important functions. **Conclusion:** We demonstrate that sub-chronic exposure of mice to SHS causes profound and unique changes in the testis transcriptome and genome that may lead to adverse functional consequences in the reproductive system. Our findings warrant further investigation into the reproductive effects of SHS exposure in humans.

FUNDING: Federal; State

**PS1-172**

**THE INFLUENCE OF TOBACCO SMOKE/NICOTINE ON CYP2A EXPRESSION IN HUMAN AND MONKEY LUNG**

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**Background:** NNK and NN is tobacco-derived nitrosamine procarcinogens implicated in smoking-related lung cancer risk. They undergo bioactivation to carcinogenic metabolites by enzymes including CYP2A6 and CYP2A13. Genetic studies indicate that reduced function variants in CYP2A6 and CYP2A13 are associated with lower lung cancer risk. Chronic nicotine exposure can reduce the expression of CYP2A6 and CYP2A13 enzymes in the liver. As CYP2A6 and CYP2A13 are also expressed in the lung, we investigated whether smoking and/or nicotine regulates CYP2A6 and CYP2A13 in the lung (which could alter the local activation of NNK and NN). **Approach:** Using the Gene Expression Omnibus datasets (GSE40384 & GSE108134), we examined CYP2A6 and CYP2A13 mRNA levels in the lung small airway epithelium from human
smokers and non-smokers to test if smoking was associated with reduced transcript level. We then assessed whether African Green Monkeys treated for 21 days (N=6/group) with nicotine (0.3 mg/kg in saline, subcutaneous twice daily) vs. saline had altered lung CYP2A protein levels. Results: Smokers had lower levels of lung CYP2A6 mRNA (4.9% decrease, p < 0.05) and CYP2A13 mRNA (7.3% decrease, p < 0.001) compared to non-smokers; this was observed consistently in both online QGE datasets. As expected CYP1A1 mRNA was higher (p < 0.05) in smokers vs. non-smokers in these datasets. Monkeys treated with nicotine had lower levels of lung CYP2A protein (300% decrease, p < 0.05) compared to controls, in both upper and lower lung. Conclusion: Smoking (versus not smoking) was associated with a decrease in lung CYP2A6 and CYP2A13 mRNA, and the levels observed for nicotine (versus saline) had reduced levels of lung CYP2A protein. Together, this suggests that nicotine down-regulates these enzymes in the lung, which may result in reduced local activation of the procarcinogens NNK and NNN. Additionally, nicotine is present in products used for vaping and nicotine replacement therapy which may mean individuals using these nicotine products may also have lower levels of lung CYP2A13 and CYP2A6.

FUNDING: Federal; Academic Institution

PS1-174

NEUROPATHIC PAIN IMPACTS NICOTINE DEPENDENCE IN MICE.

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Clinical studies have shown a high co-occurrence of chronic pain and smoking dependence. There is also evidence that nicotine can cause state of acute analgesia, and that nicotine abstinence/withdrawal can induce hyperalgesia. Recently, evidence from Ditre and Brandon (2008) suggested that pain can be a potent motivator of smoking. Nonetheless, preclinical investigations modelling this interaction between nicotine dependence and pain are lacking, thus providing a major obstacle to study the mechanisms of pain-related nicotine dependence. To address this deficit in preclinical models, we hypothesized that chronic neuropathic pain states alter nicotine dependence aspects, and the present study examines nicotine withdrawal and reward using the conditioned place preference (CPP) test in two mouse models of chronic neuropathic pain: chemotherapy-induced peripheral neuropathy (paclitaxel-induced neuropathy) and HIV-induced neuropathy (mice conditionally expressing HIV Tat1-86 protein) mice. Nicotine withdrawal somatic and affective signs increased in intensity in both models of neuropathy. In addition, nicotine CPP was reduced in paclitaxel-induced neuropathy model in a time-dependent manner. Plasma nicotine and cotinine levels were not significantly changed in these models of neuropathy. Taken together, these findings showed that mice are more susceptible to nicotine withdrawal and less sensitive to nicotine conditioned reward. These changes suggest increase susceptibility to nicotine dependence in chronic neuropathic pain. This work was supported by NIH (P30 DA033934 and NCI [R01 CA206028]) grants. Key words: Withdrawal Symptoms, tobacco addicts.

FUNDING: Federal; Academic Institution; Other

PS1-175

MENTHOL AS A DIFFERENTIAL MODULATOR OF THE NICOTINE STIMULUS IN MALE AND FEMALE RATS

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Significance: Menthol is a widely used tobacco constituent that has shown to enhance nicotine's reinforcing effects by altering nicotine-mediated dopamine neurotransmission and nicotine self-administration in rodents. As such, we hypothesized that injected menthol may also alter nicotine's discriminative stimulus effects. Methods: 57 adult Sprague-Dawley rats (28M, 29F) received 40 days of discrimination training (20 positive and 20 negative days, intermixed). On positive days, rats received a group-specific menthol (M) and nicotine (NIC) injection (VEH+0.1NIC, 1M+0.1NIC, 5M+0.1NIC, VEH+0.4NIC, VEH+0.4NIC, 5M+0.4NIC). Withdrawal was assessed in an 18-chamber placement, rats were placed in an eight 15-sec cue light presentations (conditioned stimulus; CS), each followed by 4-s sec sucrose access in a dipper receptacle. Negative days were identical to positive days except that all rats received a vehicle (50% DMSO/H2O, v/v) and saline injection and CS presentations were not paired with sucrose. After training, rats underwent generalization testing with 30-dose combinations of menthol and nicotine. During testing sessions, rats received one non-reinforced CS presentation. The change in drug-mediated anticipatory goal tracking during the CS calculated as a difference score (pre-CS minus CS responding) was used as the primary dependent measure. Results: All groups readily acquired a drug discrimination. However, difference scores for the 5M+0.1NIC group were lower for females than for males. Interestingly, females had lower responding on 0.05, 0.1, and 0.4 mg/kg nicotine tests. The lowest nicotine dose discriminable from saline was 0.0125 mg/kg for males but 0.025 mg/kg for females. Co-administration with 5 or 10 mg/kg menthol weakened discrimination performance between 0.1 and 0.4 mg/kg and between 0.1 and 0.05 mg/kg nicotine for 0.1 mg/kg nicotine treatment groups. Conclusions: Female rats that were trained with 0.1 mg/kg nicotine were more sensitive to menthol's modulatory effects on nicotine while male rats were more sensitive to nicotine's stimulus effects. This highlights importance of taking sex differences and training dose into account when evaluating the interoceptive stimulus effects of nicotine and menthol. FUNDING: Federal

PS1-176

CONDITIONED PLACE PREFERENCE TO NICOTINE IN SCHMIDTIA MEDITERRANEA

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Significance: Planarians are a lower system of invertebrates who show addictive like behaviors, meaning that they can be used for behavioral testing in response to various drugs. Conditioned place preference (CPP) is used to measure effects of experiences or objects, this case being the drug reward expectation. CPP is often used in other animal models such as mice. For humans, this can occur when a person frequents one place to use drugs, typically methamphetamine and heroin, due to high reward involved. However, the forgotten drugs such as alcohol, nicotine and caffeine, which are popular during college, are not as well studied. The significance of this study is to determine if the reward of these drugs is enough to condition planarians to their non preferred side of a petri dish. Methods: Schmidtea meditatione were housed and cared for in lab. Twenty planarians were selected for each group and placed in a petri dish that has a red lens to filter out light on one half and contain light on the other half. Baseline times spent in the light were recorded for each planarian over five minutes. Once preference was observed (150 seconds), the planarian was conditioned in the non-preferred side. Conditioning environments included alcohol, nicotine, or caffeine. Mixtures of two or three were also used. All planarians were tested individually. The concentrations used for solutions were Ethanol: 0.5%, Nicotine: 0.01 mM, and Caffeine: 1mM. Mixtures of the drugs were made to contain the same concentrations as they were singularly. After conditioning, planaria were kept in a separated dish and allowed for a twenty four hour wash out period to ensure no withdrawal effects were seen. The planarians were then retested for preference and these times were recorded. If the post testing showed longer times than the pre-tests, then conditioning is implied due to preference being shifted from the baseline testing. Results: All planarians tested preferred the dark (< 150 seconds) during pre-tests. Planarians were conditioned in the light (non-preferred side). Conditioning was seen in 80% of worms tested (17/19) for nicotine. Statistical testing using a paired t-test shows that there is significance between baseline and post exposure times spent in the non-preferred side. Nicotine (p < 0.0120 **), Nicotine and Caffeine (p < 0.0053 **), and Nicotine and Ethanol (p < 0.001 ***). Conclusion: CPP was achieved in 80% of samples. There is a statistical significance between before and after exposure to nicotine or nicotine mixtures. This shows that nicotine may play a role in place preference. FUNDING: Academic Institution

PS1-177

DOES LEVEL OF TOBACCO DEPENDENCE SEVERITY IMPACT ACUTE RESPONSES TO REDUCED NICOTINE CONTENT CIGARETTES?

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Background: Reducing cigarette nicotine content to non-addictive levels may facilitate smoking cessation, however highly dependent smokers may be at risk for increased smoking quantity when using reduced nicotine content cigarettes (RNCCs).

Aim: Examine whether level of dependence moderates acute RNCC effects on subjective craving and withdrawal, and laboratory indices of smoking lapse behaviour.

Method: 31 overnight abstinent dependent smokers smoked a 0.05mg nicotine RNCC during one session and took sham puffs on a RNCC during another session in randomized, counterbalanced order. Craving and withdrawal were assessed
Participants will be instructed to increase their NicoBloc usage by one drop per week so that by week 3, 99% of the tar and nicotine in each cigarette they smoke will be blocked. Participants in the nicotine lozenge group will have their NRT usage scaled based on how soon they smoke after waking and will similarly test their product usage in session. At session four, all participants discuss any problems they experienced making a quit attempt in the previous week. After the four week intervention, participants will be given an additional 8 weeks of medication (NicoBloc or Lozenge) in four week allotments to use for a sustained quit attempt. Thus, both groups will receive the medication for 12 weeks total to make a quit attempt. As this is the first pilot trial assessing the use of NicoBloc, a detailed protocol review as well as intervention feasibility, participant adherence, and any reported adverse effects will be discussed.

FUNDING: Unfunded

CHARACTERIZATION OF ON!® NICOTINE POUCHES - PART 2: NICOTINE DISSOLUTION RELEASE PROFILES

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on!® is an oral, tobacco-derived nicotine pouch product containing ingredients that are either pharmaceutical grade or used in food and do not contain cut or ground tobacco leaf. In order to issue market authorization, FDA must determine whether the on!® products are appropriate for the protection of public health (APPH). We characterize the nicotine release profiles for the portfolio of on!® products to inform the determination of APPH. Evaluating nicotine release profiles through dissolution testing is valued for product assessment and for product-to-product comparisons. We used a robust dissolution method to study the in vitro release of nicotine from on!® products into artificial saliva using the U.S. Pharmacopeia flow-through cell dissolution apparatus 4 (USP-4). Additionally, we developed and validated a sensitive UPLC-UV method for the accurate quantification of nicotine in dissolution fractions. Nicotine release profiles were compared by calculating the difference factor (f1) and similarity factor (f2) by adopting methodology referenced in Guidance for Industry from FDA’s Center for Drug Evaluation and Research (CDER). on!® nicotine pouches are marketed in a variety of flavors and nicotine strengths. Dissolution results will be presented for one flavor variant produced at five nicotine strengths and for seven flavor variants produced at one nicotine strength. Nicotine release rates, based on percent released, were comparable across nicotine strength and flavor variants. Furthermore, nicotine release rate for on!® was found to be equivalent to Skoal Bandit® (a traditional pouched moist smokeless tobacco product) based on FDA’s criteria.

FUNDING: Tobacco Industry

CHARACTERIZATION OF ON!® NICOTINE POUCHES - PART 1: HPHCs

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on!® is an oral, tobacco-derived nicotine pouch product containing ingredients that are either pharmaceutical grade or used in food and do not contain cut or ground tobacco leaf. In order to issue market authorization, FDA must determine whether the on!® products are appropriate for the protection of public health (APPH). We characterize the levels of harmful and potentially harmful constituents (HPHCs) for the portfolio of on!® products to inform the determination of APPH. FDA has not issued specific guidance for reporting HPHCs for oral tobacco-derived nicotine products, such as on!®. Absent specific guidance from FDA, we measured the abbreviated list of HPHCs in on!® according to the guidance for smokeless tobacco products, recognizing that these products do not meet the statutory definition of a smokeless tobacco product. The HPHCs evaluated included nicotine, NNN, NNK, B[a]P, acetaldehyde, formaldehyde, crotonaldehyde, cadmium and arsenic. The objective of this work was to determine HPHCs in on!® and compare those results to commercially available tobacco products such as cigarettes, smokeless tobacco including snus, and an oral nicotine replacement therapy (NRT) product. Except for nicotine, we observe no detectable levels or significant reductions in HPHCs when compared to traditional combustible and smokeless tobacco products, including snus, and comparable relative to the NRT.

FUNDING: Tobacco Industry

A PROTOCOL REVIEW OF A PILOT TRIAL COMPARING NICOBLOC TO NICOTINE LOZENGES

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NicoBloc is a fluid-based smoking cessation device comprised of FDA approved food-grade ingredients. This fluid-based solution is applied to the filter end of a conventional cigarette and each drop successively blocks 33% of tar and nicotine when the cigarette is smoked. In this manner, up to 99% of tar and nicotine can be blocked without smokers noticing. NicoBloc is a fluid-based smoking cessation device comprised of FDA approved food-grade ingredients. The fluid-based solution is applied to the filter end of a conventional cigarette and each drop successively blocks 33% of tar and nicotine when the cigarette is smoked. In this manner, up to 99% of tar and nicotine can be blocked without smokers noticing. In this study, Fifty (n=50) participants will be randomized to one of two dependence and product did not interact to impact outcome measures. RNCCs reduced craving and withdrawal, and curbed subsequent smoking lapse behavior irrespective of level of dependence.

FUNDING: Federal; Academic Institution
enhanced nicotine sensitivity to locomotion, hypothermia, antinociception, anxiety-like behaviors and acute reward in the B6J compared to B6N. In the repeated administration paradigm, we observed no sensitization of locomotor responses in either substrain at the doses tested. Furthermore, we find that nicotine metabolism and kinetics do not differ between both substrains after acute administration of nicotine.

**Conclusion:** This study provides evidence for substrain differences in nicotine pharmacological responses of the closely related C57BL/6J strains after acute and repeated administration. The heritable differences in nicotine response lend themselves to genetic mapping using a reduced complexity cross strategy. Such a strategy has been successful in quantitative trait locus mapping for behavior, immunity, and physiological phenotypes; suggesting that the B6 mouse substrains may be useful for genetic studies to elucidate some of the genetic differences involved in tobacco dependence and addiction.

**FUNDING:** Federal
PS2-210

YOUTH VAPING FLAVOR PREFERENCES, HARM PERCEPTIONS, AND REPORTED USE OF NICOTINE AND MARIJUANA: A REPEATED CROSS-SECTIONAL STUDY OF NEW YORK YOUTH VAPERS IN 2017 AND 2019

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BACKGROUND. The prevalence of youth vaping has increased markedly in the past 3 years. We surveyed youth vapers in 2017 and 2019 to understand potential changes in vaping behaviors and perceptions over time. METHODS. We conducted two cross-sectional online surveys. We advertised on social media to recruit New York youth vapers in August-November 2017 (n=298) and again in May-July 2019 (n=286). For both surveys, eligible youth had to be aged 15-17 years and have vaped in the past 30 days. The surveys addressed vaping behaviors, flavor preferences, and perceptions of social norms and harm. We calibrated the survey data to approximate the sample characteristics of New York youth vapers aged 15-17, using data from the 2016 and 2018 New York Youth Tobacco Survey. We assessed differences between 2017 and 2019 responses using post-estimation Adjusted Wald tests. RESULTS. Youth vapers’ reports of vaping nicotine increased from 60.4% in 2017 to 83.5% in 2019 (p < 0.05). JUUL was the most popular brand both years, but the proportion of respondents who reported using JUUL increased from 57.7% to 80.6% (p < 0.05). Fruit flavors were the most popular flavoring in 2017 and 2019, with an increase from 19.9% to 32.3% in 2019. Menthol/mint flavors were the next most preferred with an increase from 19.9% in 2017 to 34.1% in 2019 (p < 0.05). In 2019, nearly half of respondents rated menthol/mint-flavored e-liquid as less harmful than they rated tobacco-flavored e-liquid. In 2019, most respondents (82.0%) had heard of vaping marijuana, and 74.0% of those who had heard of it reported having tried it. CONCLUSIONS. The increase in preference for menthol/mint-flavored vapes from 2017 to 2019 and the lower perceived harm of menthol/mint compared with tobacco flavors are concerning, given that some potential flavor restrictions may not apply to menthol/mint. The high prevalence of youth marijuana vaping is also concerning. These findings can inform policy and public education activities related to youth vaping, and future studies can use these estimates for comparison.

FUNDING: State

PS2-211

ELECTRONIC CIGARETTE USE AMONG COLLEGE STUDENTS IN A HISPANIC SERVING INSTITUTION: LINKS TO GENDER, RACE/ETHNICITY, SMOKING, MARIJUANA USE AND ALCOHOL CONSUMPTION

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Background: A sizable minority of college students are now using nicotine products in various forms. Prior research has shown associations between alcohol use and tobacco initiation as well as with alcohol and race/ethnicity. Objectives: The purpose of this study was to examine nicotine use—including e-cigarette use—and the relation of such use to race/ethnicity, smoking, marijuana use, alcohol consumption, and gender in a sample of college students. A secondary objective of this study was to provide descriptive statistics of e-cigarette users in a Hispanic Serving Institution (HSI) Methods: A total of 665 graduate and undergraduate students attending a large urban university in the southwestern region of the United States were contacted via email to participate in an Internet study. This sample was surveyed using questions from the National College Health Assessment (NCHA) to assess the habits and behaviors which pertain to students’ physical and mental health. Results: Logistic regression analysis indicated a significant association between e-cigarette use and alcohol consumption controlling for history or marijuana use, age and gender. Conclusions and Scientific Significance: These results may suggest that recent nicotine use including e-cigarette use, is associated with race/ethnicity and alcohol consumption in college students at a Hispanic Serving Institution. Additional research is needed to determine the specific mechanisms that may potentially explain this relationship.

FUNDING: Unfunded

PS2-212

RETAILER OPINIONS TOWARDS E-CIGARETTES AND POTENTIAL RESTRICTIONS ON FLAVORED E-CIGARETTES

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Significance: Tobacco retailers serve as frontline consumer educators, and favorable opinions towards tobacco control policies can contribute to retailer compliance. To date, little research exists about opinions among retailers towards potential new restrictions on e-cigarettes, such as restricting candy and fruit flavored e-cigarettes. Thus, we examined retailer opinions towards the safety of e-cigarettes, potential new restrictions on flavored e-cigarettes, and associations of such opinions with in-store availability of flavored e-cigarettes. Methods: We conducted interviews of 700 tobacco retailers in multiple racial/ethnic neighborhoods (Black/African American, N=200; Hispanic/Latino, N=200; non-Hispanic White, N=200; Korean American, N=100) in Los Angeles County. We conducted analyses examining retailer perceptions associated with e-cigarette availability using maximum likelihood estimation (MLE) controlling for individual, store, and neighborhood factors. Results: Interview respondents were predominantly male (64.0%), store clerks (33.9%), managers (33.3%) or owners (30.5%). Smoking prevalence among respondents (some day or everyday) was 21.9%, higher than the 11.3 % smoking rate in California in 2017. The predominant store type was convenience stores with or without gas stations (35.9%). Stores in predominantly White neighborhoods had more than three times higher odds of selling flavored e-cigarettes (OR=3.23; 95% CI=1.83-5.70 vs. non-White). Availability of flavored e-cigarettes was significantly (p<0.001) associated with low perceived e-cigarette harm (OR=0.63; 95% CI=0.48-0.82) and opposition to flavor restrictions (OR=1.45; 95% CI=1.2-1.75). Controlling for individual, store, and racial/ethnic neighborhood factors, availability of flavored e-cigarettes was significantly (p<0.10) associated with low perceived e-cigarette harm (p=0.001; OR=0.63; 95% CI=0.48-0.82). Discussion: This investigation is one of the first to examine tobacco retailer opinions towards e-cigarettes, potential new restrictions on flavored e-cigarettes, and factors associated with such opinions. The results have implications for policymakers and tobacco control advocates, including communication campaigns targeted at retailers to encourage support for and compliance with new policies.

FUNDING: Federal

PS2-213

DIFFERENCES IN PRENATAL NICOTINE CESSATION BETWEEN SMOKERS, VAPERS, AND DUAL USERS

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Introduction: Prenatal nicotine exposure causes an array of adverse outcomes. Still, 1 in 14 pregnant women report smoking during pregnancy, and e-cigarette use (“vaping”) is increasingly common. The public health impact of these habits will depend on whether pregnant vapers are more likely to quit. To clarify this, we test (1) if baseline product choice—exclusive smoking, exclusive vaping, or dual use in the 12 weeks pre-conception—is differentially associated with continued prenatal nicotine use across trimesters; and, (2) if baseline vapers’ flavor preferences predict cessation. Methods: Data come from waves 1-4 of the Population Assessment of Tobacco and Health Study, a nationally representative, longitudinal survey of US tobacco use collected from 2013-2018. Analyses consider women in their 2nd or 3rd trimesters , who reported tobacco use in the 12 weeks before conception. Sample-weighted means estimate the proportion who quit nicotine before the end of their first and second trimester by baseline product choice and, among baseline vapers, by flavored vs. unflavored e-cigarette use. Multivariate logistic regressions test how product choice relates to nicotine use at each trimester, controlling for demographics. Results: Dual users were the least likely to quit nicotine by the end of their first trimester (43.9% quit, vs. 55.2% of exclusive smokers and 73.3% of exclusive vapers; P = 0.019), with similar results for the second trimester (51.5%, 84.3%, and 75.6%; P=0.022). Regressions concur: relative to dual users, both exclusive vapers and exclusive smokers were less likely to use nicotine at the end of their first trimester.
(AOR_{exclusivevapor}=0.22; 95%CI: 0.07, 0.71; P=0.01; AOR_{exclusivecigarettes}=0.64; 95%CI, 0.39, 1.05; P=0.08). At the end of the second trimester, those who exclusively vaped at baseline were less likely to use nicotine than dual users and exclusive smokers. Prenatal nicotine cessation did not differ by e-cigarette flavor choice.

**Conclusions.** Exclusive vaping was more strongly associated with first and second trimester nicotine cessation than dual use or exclusive smoking. Prenatal cessation did not seem to differ by flavor choice.

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**FUNDING:** Federal; Academic Institution
PS3-158

PILOT TRIAL OF QUITBET - A DIGITAL SOCIAL GAME THAT PAYS YOU TO STOP SMOKING

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Significance: Providing financial incentives for abstinence is among the most effective behavioral intervention approaches for smoking cessation but has rarely been implemented in real-world settings. We developed and pilot tested QuitBet, a commercial, digital social game for smoking cessation administered via a smartphone application. Game players earned financial incentives for abstinence verified via remote breath carbon monoxide (CO) testing. Methods: QuitBet was modeled on the company’s established games targeting weight loss and physical activity. All games include: 1) an activity board with social media features (players can post and respond to messages, photos, and videos) and 2) entirely player-funded financial incentives in the form of a deposit contract (the “bet”). QuitBet had a bet of $30 and lasted for 28 days. After a week for preparation, the quit day was day 8. Between day 9-28 (a 20-day period), players earned back $1 of their $30 bet for each day of CO-verified abstinence. Remaining bet money was pooled into a “grand prize” pot. Players who were abstinent on at least 19 of the 20 days (1 day lapse allowed) were declared “winners” and split the grand prize pot equally. A game host posted daily messages containing education about smoking cessation and behavior change strategies (e.g., coping with cravings) and moderated the discussion. Results: Players (N = 50 U.S. adults who smoked at least 10 cigarettes per day, 78% female, Mage = 40.4) were recruited online in Oct-Nov 2019. The online screening survey was completed 687 times, of which 235 were eligible; 106 signed the online consent form; 77 completed the baseline survey; and 50 paid their bet and joined a game (23 players in Game 1; 27 players in Game 2). Twenty-eight (28) players (56%) were abstinent on day 9 and 21 (42%) were abstinent for at least 7 consecutive days. Conclusion: These results suggest that QuitBet is feasible and has potential for significant positive impact on public health. Next steps include conducting a randomized trial to establish efficacy and a sustainable business model and to determine if playing multiple consecutive games is effective for preventing relapse.

FUNDING: Federal; Other

PS3-159

DISTRESS TOLERANCE AS A MECHANISM OF SMOKING cessation treatment

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SIGNIFICANCE: Distress intolerance (DI) appears to be both a cause and consequence of smoking, however, very little work has examined DI as a mediator of smoking cessation treatment. The objective of the current study was to test whether a novel smoking cessation treatment reduced DI, and whether this reduction was, in turn, associated with an increased likelihood of smoking abstinence. METHODS: Adult smokers (N = 80) were randomized to one of two conditions: 1) Withdrawal Exposure with Relaxation Control (RE+RC) training, which included the development and application of individualized withdrawal regulation strategies over four separate sessions that spanned the first four hours of abstinence; or 2) Relaxation Control (RC) training, which was designed to increase exposure to and regulation of withdrawal distress, may insufficient statistical power. CONCLUSIONS: Results indicate that the WT intervention, which was designed to increase exposure to and regulation of withdrawal distress, may promote long-term decreases in DI. Future research should continue to examine its effect on reduction in DI and the extent to which changes in DI promote changes in smoking behavior, as well as changes in the general ability to manage distress. Such an approach may be particularly beneficial for the larger portion of smokers affected by anxiety and mood disorders.

FUNDING: Federal

PS3-160

IMPACT OF NICOTINIC RECEPTOR ALPHA-5 SUBUNIT GENE POLYMORPHISM ON HEAVINESS OF SMOKING IS INSENSITIVE TO NICOTINE CONTENT IN CIGARETTES

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SIGNIFICANCE: GWAS studies have indicated that the nicotinic receptor alpha-5 subunit gene SNP rs16969968 has a significant but modest impact on number of cigarettes smoked per day (CPD). It is unclear whether the SNP risk allele carriers have blunted smoking behavior compensation in response to nicotine manipulation. METHODS: Sixty-nine adult smokers (19 females; 10+ CPD at screening; 28 risk allele carriers) underwent up to 6 two-week study phases during which they smoked exclusively one of three types of Spectrum nicotine research cigarettes (NRC) varying in nicotine yield (Low, Medium, and High: FTC nicotine yield 0.27, 0.75, and 1.53 mg, respectively), their own usual brand cigarettes, or their own usual brand cigarettes while wearing a 24 mg nicotine patch. They were asked to log CPDs and record smoking topography via a CrēSS portable device. Blood was drawn for rs16969968 genotyping. RESULTS: 13 tests revealed no significant differences between risk allele (AA/AG) carrier and control (GG) group in smoking compensation indices based on total smoked volume per cigarette (TSVPC) or per day (TSVPD) for the switch from Medium to High NRCs, or the switch from Medium to Low NRCs. However, ANOVA showed higher TSVPD in the risk group than controls regardless of whether Medium or High NRCs were smoked (P = 0.034). The risk group tended to have larger TSVPD across the switch from Medium to Low NRCs (P = 0.068). There were no significant effects of nicotine patch, genotype or genotype × patch interaction on TSVPC while participants were smoking their usual brand cigarettes alone and subsequently smoking the same type of cigarettes while on the nicotine patch. However, average CPDs were 37% to 47% higher in the risk vs. control group at screening and each of the smoking phases differing in nicotine content in NRCs and patch use. Overall, these genotype differences in CPDs remain significant after correction for sex, age, race, and menthol preference. CONCLUSION: The association of the rs16969968 SNP with number of cigarettes smoked per day in dependent smokers is more pronounced than previously found in general smoker populations. The impact of this SNP on heaviness of smoking appears insensitive to cigarette nicotine content.

FUNDING: Federal

PS3-161

BLACK SMOKERS MORE LIKELY THAN WHITE SMOKERS TO CHOOSE REFERRAL TO QUITLINE IN HOSPITAL-BASED PROGRAM

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Significance: Black smokers are less likely to successfully quit smoking, and more likely to die from smoking-related illnesses, than White smokers. However, a small number of studies show that in health system contexts, where equitable access to cessation treatments is provided, Black and White smokers have comparable cessation rates. In this hospital-based study, we examined the uptake of quitline referral among Black and White smokers who received a high or low exposure intervention. Methods: Delaware (DE) smokers admitted to a large community hospital were enrolled in the program. Level of exposure was defined as high [bedside visit by a tobacco treatment specialist (TTS)], low (no bedside visit, but responded to follow-up calls) or none. In the high
exposure group, the bedside TTS used the “5 As” model (ASK-AVISE-ASSESS-ASSIST-ARRANGE) with inpatient smokers. Ready-to-quit smokers were offered e-referral (activated on discharge) to the quilter. All admitted smokers were called via an interactive voice response (IVR) system at post-discharge days 3, 14, 30, and offered quilter referral. The DE quilter provides free phone or in-person counseling and one FDA-approved quitter medication. Results: Between Sept. 2017-Aug. 2018, 3565 smokers were identified on admission. The sample was 54% male, 73% White, 24% Black; mean age was 53.5 years (SD=14.7). There were two main effects: exposure (high vs. low) and race (Black vs. White). Interpretation of these main effects is qualified by a significant exposure x race interaction. In adjusted models, smokers in the high exposure group (n=1318) had 2.6 times (95% CI: 2.1-3.2) the odds of choosing quilter referral compared to the low exposure group (n=1136). Black smokers had 1.4 times (95% CI: 1.0-1.8) and 2.1 times (95% CI: 1.0-1.8) the odds of choosing quilter referral compared to White smokers, in the high and low exposure groups, respectively. Conclusion: A bedside intervention versus IVR alone increases the odds of smokers choosing quilter referral. This is especially true for Black smokers, who may benefit more from having bedside counseling about free comprehensive treatment available post discharge.

FUNDING: Unfunded; Federal; Academic Institution

PS3-162
DISTRESS TOLERANCE AND TRAIT MINDFULNESS PREDICT SHORT TERM SMOKING ABSTINENCE SUCCESS
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Smokers often experience cravings and other negative physical and emotional symptoms during quit attempts. The ability to tolerate distress is posited to be an important variable underlying substance dependence vulnerability and cessation success. Research shows that distress tolerance (DT) predicts smoking abstinence. Trait mindfulness (TM) also predicts tobacco dependence severity and abstinence. It has been suggested that greater TM may engender less of a need to use substances to avoid unpleasant emotional experiences. The link between TM and DT has been explored but is not fully understood. The present study examined the relationship between DT and TM among smokers (n=415) and tested DT and TM as predictors of short-term abstinence success. Participants (40% female, 76% African American, mean of 14 cigarettes/day for 18 yrs) completed the following measures: abstinence self-efficacy, Fagerström Test of Nicotine Dependence (FTND), Five Facet Mindfulness Questionnaire (FFMQ), and DT (i.e., time spent on a difficult computerized mirror tracing task). Participants then received smoking cessation counseling and attempted abstinence for 4 days with monetary incentives ($20 per day, biologically verified). Fifty-two percent of participants lapsed by day 4. There were significant associations between DT and TM (r = .172, p < .001), and TM and nicotine dependence (r = .123, p = .013). Multivariate logistic regression revealed that both DT (Wald = 7.39, p < .001, OR = 1.74, CI = 1.17-2.59) and TM (Wald = 5.46, p = .019, OR = 1.13, CI = 1.01-1.22) predicted abstinence. Furthermore, DT and TM remained significant even after controlling for FTND, income, gender, self-efficacy and mental preference. An examination of individual FFMQ factors revealed that only TM remained significant even after controlling for FTND, income, gender, self-efficacy and mental preference. What DT and TM are related constructs, each appears to contribute unique information to the prediction of nicotine dependence and smoking abstinence. A greater understanding of these important risk factors could inform the development of novel prevention and intervention efforts to combat nicotine and tobacco dependence.

FUNDING: Federal

PS3-164
THE EFFECTS OF SMARTPHONE-DELIVERED ATTENTIONAL BIAS MODIFICATION TRAINING ON SMOKERS' ATTENTION TO SMOKING CUES
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Long-term (6 month) abstinence rate with the first-line cessation pharmacotherapies has been modest (~25%). Thus, researchers have been examining the possibility of developing alternative and complementary cessation therapies, including neurocognitive training-based interventions. One possible working strategy pertains to the attention domain. After years of smoking, smokers develop attentional bias (AB) towards smoking cues, which are strong motivational triggers for continued smoking. Notably, AB is modifiable through attentional bias modification (ABM) training by shifting AB away from the stimuli of interest. With its success in treating anxiety and alcohol disorders, ABM training is presumed to work in smokers by reducing their AB towards smoking cues such that relapse can be prevented. In the current study, 212 community treatment-seeking smokers were randomly assigned to two groups with one receiving active ABM training and the other sham ABM training. They completed 13 daily sessions (~20 minutes each) of smartphone-delivered ABM training using the Modified Dot Probe (MDP) task to train their attention away from smoking cues. Participants also attended a laboratory visit before and after their training. During the lab visit, they completed the MDP task with their electroencephalogram recorded to derive the N2pc component — a validated electrophysiological index for AB. We found that after training, the active ABM group had significantly less reaction time difference between smoking and neutral conditions compared to the sham ABM group, suggesting that the active ABM training reduced AB towards smoking cues. However, the two groups did not differ in their N2pc amplitudes between the two visits. Interestingly, participants had increased N2pc amplitudes after their training, suggesting that both groups had similar AB towards the stimuli, regardless of the cue condition. In conclusion, despite some inconsistency between the behavioral and electrophysiological data, these preliminary results suggest that ABM is feasible for reducing smokers' AB towards smoking cues.

FUNDING: Federal

PS3-163
PUFF TOPOGRAPHY AMONG NON-SMOKING ELECTRONIC CIGARETTE USERS DURING THREE HOURS OF AD LIBITUM USE
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Significance: Electronic cigarettes (ECIGs) are not used over discrete time periods like combusted cigarettes, making puffing patterns more difficult to characterize. Despite developments in research to characterize ECIG puff topography, there is no consensus on the best definition of an ECIG use bout. This study sought to examine ECIG puffing patterns using previously defined criteria. Methods: Twelve non-smoking ECIG users (M = 20.8, 58% female, 75% white) completed two within-subject, randomly ordered conditions that differed by ECIG use: ad lib use or abstinence. In the former condition, participants used their own ECIG for a 10-puff directed bout followed by 3 hours of puffing ad lib. Using video-based measurement, puff clusters were defined as the number of puffs with interpuff intervals (IPI) ≤ 60 sec: small (2-5 puffs), medium (6-10), large (11+). Results: Participant characteristics included: average ECIG use duration of 1.6 years (SD = 0.5); average Penn State ECIG Dependence Index score of 12.8 (SD = 3.5); 100% met DSM criteria for tobacco dependence; 75% preferred pod-style devices; and average lifetime number of cigarettes of 6.4 (SD = 7.8). Participants took an average of 45.9 puffs (SD = 21.4) with an average puff duration of 3.1 sec (SD = 1.8) and IPI of 269.5 sec (SD = 140.1). 40.6% of puffs were single puffs, 48.9% were in small clusters, 10.3% were in medium clusters, and 0% were in large clusters. There were 1.6 (SD = 1.0) puffs between clusters on average. Large individual variability was observed, with a range of 16-77 puffs, 1.1 to 7.7 sec durations, and 132.1 to 529.0 sec IPIs. Conclusion: Findings are similar to (40.9% small clusters) and different from (11.9% single puffs, 44.3% medium-large clusters) previous work with largely 2nd generation ECIG users. Cross-study differences may be due not only to the type of ECIG used, but also study design features (ad lib use period duration; pre-session abstinence requirements). Future work should continue to explore or adapt these definitions while considering individual differences to best categorize puffing patterns of ECIG users.

FUNDING: Federal; Academic Institution

PS3-165
BOTH REDUCING CIGARETTES PER DAY AND TRANSITIONING TO VERY LOW NICOTINE CONTENT CIGARETTES DECREASE DEMAND FOR USUAL-BRAND CIGARETTES
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Background: Both reducing cigarettes per day (CPD) and transitioning to very low nicotine content (VLNC) cigarettes appear to decrease nicotine dependence. Another
both interventions appear to have similar effects in reducing CPT demand for usual-brand cigarettes. Thus, conclusions: Although other CPT indices showed a similar trend, none differed significantly.

**Methods:** This was a secondary analysis of a five-week two-arm unblinded randomized trial, in which participants were instructed to gradually reduce to 70%, 35%, 15% and 0% of the baseline session and again at a one-month follow-up survey. Results: Demand was significantly reduced for participants’ usual-brand cigarettes in both the CPD group (t (18) = 7.65, p < 0.0001) and the VLNC group (t (18) = 7.39, p < 0.0001) from pre- to post-intervention. Additionally, Demand Intensity, or maximum consumption at zero price, and Omax, or maximum expenditure, were reduced significantly for both the CPD group (t (16) = 3.23, p = 0.005; t (16) = 3.71, p = 0.002, respectively) and the VLNC group (t (22) = 3.62, p = 0.002; t (22) = 3.14, p = 0.005, respectively) pre-to-post-intervention. Although other CPT indices showed a similar trend, none differed significantly (p > 0.5).

**Conclusions:** Reducing CPD and switching to VLNC cigarettes were associated with reductions of a similar magnitude in CPT demand for usual-brand cigarettes. Thus, despite the different mechanisms by which the value of cigarettes is manipulated, both interventions appear to have similar effects in reducing nicotine vs smoking behavior per se.

**FUNDING:** Federal

**PS3-166**

**USING A TOBACCO PURCHASE TASK TO ASSESS THE ROLES OF CIGARETTE AND ELECTRONIC CIGARETTE UPTAKE AND SUBSTITUTION IN ADULT SMOKERS**

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**SIGNIFICANCE:** Following the rise in popularity of electronic cigarettes (ECs), there has been a debate over whether the introduction of these devices is sufficient to decrease cigarette use in adults or whether more stringent regulations on cigarettes (e.g., lowering nicotine concentrations or increasing taxes) is also necessary to increase the number of smokers completely switching to ECs. Behavioral economics tools, such as the purchase task, can help quantify the value of different tobacco products through assessing the sensitivity to price on self-reported consumption. This study determined the extent to which behavioral economic demand of cigarettes and ECs differentially affected the ability of non-treatment-seeking smokers to successfully abstain from cigarettes. METHODS: Adult cigarette smokers (N=58) interested in quitting were asked to completely substitute their cigarette smoking with an EC (Vuse V2) for 8 weeks. At week 2, cigarette (CPT) and EC (ECPT) purchase tasks were completed. A Poisson regression examined whether empirical demand intensity (consumption at zero price), breakpoint (lowest price at which consumption is zero), and Omax (maximum financial expenditure per day on product) were associated with smoke-free days, EC puffs, and cigarettes smoked between weeks 6 and 8 after adjustment for potential confounders. A logistic regression examined the relationship between demand intensity, breakpoint, and Omax with exhaled carbon monoxide (CO) verified 7-day abstinence at week 8 after adjustment of potential confounders. P-values were adjusted for multiple testing using the Holm’s method. RESULTS: EC demand intensity was associated with increased EC use (p<0.05). No ECPT measures were associated with 7-day abstinence, smoke-free days, or cigarette use. Cigarette Omax was associated with decreased smoke-free days (p<0.01) and demand intensity, breakpoint, and Omax were associated with increased cigarette use (p<0.05). However, no CPT measures were associated with 7-day abstinence or EC use following p-value adjustment. CONCLUSIONS: CPT measures were more related to outcome measures than ECPT measures, which may suggest that the value of cigarettes is a larger driver of switching behavior than the value of ECs. This further suggests that for ECs to be a disruptive technology for cigarette smoking, regulatory agencies must focus on making cigarettes less appealing in tandem with EC regulation.

**FUNDING:** Unfunded; Academic Institution

**PS3-167**

**THE INFLUENCE OF HORMONAL CONTRACEPTIVE USE ON SMOKING, ANXIETY, AND CESSATION ATTEMPTS IN COLLEGE FEMALES**

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**Significance:** Generally, women are more likely to smoke for relief of negative affect, including anxiety, than their male counterparts and exogenous/endogenous female sex hormones have been shown to influence nicotine self-administration. Evidence suggests that estrogen, as well as progesterone, may have anxiolytic properties; however, scant research has explored the relationship between these hormones, smoking behaviors, and anxiety. METHODS: In the present study, college females using hormonal contraceptives (HC) were compared to those not using HC to determine the potential influence on current smoking patterns, mood, and cessation attempts. Participants completed an online survey including questions regarding type of HC they were currently using (e.g., monophasic, biphasic, progestin only, such as intrauterine device), smoking patterns, cessation attempts, and trait level anxiety (as measured by the Spielberger State/Trait Anxiety Inventory). RESULTS: There were 1,144 participants, who were predominantly Caucasian (78.7%), female college students, with a mean age of 19.98 (SD = 1.99). Fifty-three percent reported current HC use, and 13.9% (n = 160) endorsed current smoking. Among those endorsing current smoking, 34.4% (n = 55) endorsed smoking daily and reported a mean smoking rate of 6.60 (SD = 5.05) cigarettes per day (CPD), endorsing low levels of nicotine dependence (Fagerström Test for Nicotine Dependence; M= 1.72; SD = 1.98). Additionally, among those endorsing nondaily smoking (n = 105), they reported smoking an average of 2.05 (SD = 3.05) cigarettes per week. Women currently using HC were significantly more likely to be smoking (16.2%) as compared to women currently not using HC (11.3%), p = 0.02. There was also a significant HC use by smoking status interaction, such that smokers using HC reported experiencing less trait anxiety as compared to smokers not using HC. RESULTS showed that significantly more participants who were using HC (54.0%) than those not using HC (46.0%) were making a current attempt to quit smoking, p = 0.05, and there was a trend (p = 0.06) for smokers using HC to be more likely to report a past quit attempt. CONCLUSIONS: These findings indicate that use of HC may impact smoking patterns, and cessation among college students and thus warrant further exploration.

**FUNDING:** Unfunded; Academic Institution

**PS3-168**

**A RANDOMIZED CONTROLLED TRIAL ON DELIVERY OF A NICOTINE REPLACEMENT THERAPY SAMPLE AT OUTDOOR SMOKING HOTSPOTS FOR PROMOTING QUIT ATTEMPTS**

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**Significance** Outdoor smoking hotspots are convenient venues for promoting smoking cessation. This randomized controlled trial (RCT) aimed to obtain proof-of-concept evidence of the feasibility and preliminary effectiveness on quit attempts of delivering a 1-week free nicotine replacement therapy sample (NRTS) to smokers. METHODS This pilot parallel, single-blinded, 2-group (1:1) RCT proactively recruited adult smokers in outdoor smoking hotspots in Hong Kong. Smokers consuming ≥10 cigarettes per day and fit for NRT use were individually randomized to receive either a 1-week NRT gum/packet and brief advice lasting 10 minutes (NRTS, n=50), or receive only brief advice (control, n=50). The primary outcomes were any self-reported quit attempts (stop smoking for at least 24 hours) at 1- and 3-month telephone follow-up. Risk ratios from log-binomial regression models were used to assess the associations. RESULTS The NRTS increased quit attempts at 1-month (14% versus 10%; adjusted risk ratio (ARR) = 1.25, 95% CI 0.43-3.61) and 3-month follow-up (26% versus 12%; ARR = 2.17, 95% CI 0.89-5.27), but the differences were not significant. Trial participation rate was about 81.3%. Around 54% of the intervention group participants used the NRT sample by the first month. The NRT users reported generally positive feedback about the usefulness of NRT sample for smoking cessation. Major factors of not using NRT included bad gum taste and their perception that NRT was not useful. CONCLUSIONS Delivering NRTS to smokers in outdoor smoking hotspots was feasible and NRT use. Additional support to sustain the use of NRT and cessation services is needed. Smokers at outdoor smoking hotspots can be approached for a brief smoking cessation intervention including an onsite delivery of NRTS. Delivering NRTS and a brief advice on using NRT to these smokers was feasible and efficacious to increase NRT use. A larger trial on the benefits on quit attempts and long-term abstinence is warranted.
**PS3-169**

**USABILITY AND ACCEPTABILITY OF THE NCI’S SMOKING CESSATION APPS FOR YOUNG PEOPLE IN COMMUNITY MENTAL HEALTH CARE**

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**Significance:** Young adults with severe mental illness (SMI) are over twice as likely to smoke than the general population, and are less likely to seek treatment and to achieve abstinence. Scalable interventions such as smartphone apps created with evidence-based content by the National Cancer Institute (NCI: QuitGuide - QG, or quitSTART - QS) could increase access to potentially appealing treatment for this group, but have yet to be tested.

**Methods:** We conducted QG and QS app usability and acceptability testing among participants with SMI, aged 25-35, who were stable in community mental health treatment in 2019. Participants were randomly assigned to use QG or QS on their smartphone. Evaluation included a laboratory task-completion protocol, the System Usability Scale (SUS), and semi-structured interviews at baseline and 2-week follow-up. Qualitative analysis and descriptive statistics were completed.

**Results:** Participants were 12 daily smokers, mean age 30.5 years old (SD 3.5), 41.7 percent female, 91.7 percent White, and 41.7 percent with psychotic disorders. On average, participants smoked 17 cigarettes per day (SD 7.31). Over 80 percent of participants use smartphone apps at least twice per day. While task completion rates were similarly high for QG at both Visit 1 and Visit 2, SUS scores decreased from 66 to 60. Task completion rates for QS improved from Visit 1 to Visit 2, with correspondingly improved SUS scores: 55 to 64. Qualitative feedback supported the SUS scores: initial interest in QG diminished by the second visit; initial difficulty navigating Q5 resolved by V2. Four tasks challenged participants using both apps at both visits: setting a quit date; tracking cigarettes per day; connecting to social media; and uploading a photo. In both apps, accessing each of these tasks required multiple clicks from the home screen, except for uploading a photo in QuitGuide, which required a double-click on the home screen. While participants agreed that setting a quit date and personalizing the app were important, during semi-structured interviews, they particularly stressed the importance of tracking daily cigarette use to their ongoing interest in the apps.

**Conclusions:** Both NCI apps demonstrate moderate to high usability in young adults with SMI. QG’s diminishing appeal over time may limit its use in this population, whereas Q5’s lower initial usability but growing appeal suggests that reducing initial barriers through coaching may promote later engagement with the app.

**FUNDING:** Federal; Academic Institution

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**PS3-170**

**NEEDS AND PREFERENCES OF SMOKERS AND RECENT EX-SMOKERS REGARDING STOP SMOKING SMARTPHONE APPS: A SYNTHESIS OF FINDINGS FROM THREE QUALITATIVE STUDIES**

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**Significance:** Smartphone-based interventions can deliver behavioural support to smokers at low cost per additional user. Understanding what content and design features smokers would find beneficial, acceptable, and desirable in such interventions is likely to be important for user engagement. In line with user-centred design approaches, this study aimed to identify the needs, preferences and expectations of potential users of smoking cessation apps.

**Methods:** As part of three separate projects which aimed to develop and evaluate different smoking cessation apps, we conducted 52 qualitative semi-structured interviews with adult, UK-based smokers and recent ex-smokers. The interviews explored participants’ experiences, preferences, and views on apps or app prototypes, and their needs for smoking cessation support. We were particularly interested in issues around craving management, use of nicotine replacement therapy (NRT), and assessment of carbon monoxide (CO) levels with personal, smartphone-enabled devices. Interviews were analysed using inductive thematic analysis, and findings across the projects were synthesised under a unifying coding framework.

**Results:** The analyses identified several core themes relevant to the development of smoking cessation apps: (1) Factual content (e.g. information, advice); (2) Core functionality (e.g. monitoring, feedback, craving management); (3) Functionality related to the specific focus of apps (e.g. video demonstrations of CO testing or NRT use); (4) Supportive features (e.g. reminders, tailoring, diary); (5) Auxiliary support (e.g. peer, expert); (6) Information architecture and user journeys (e.g. location and timing of advice); and (7) Underlying needs and expectations (e.g. motivation, usability, perceived personal relevance). Some user expectations, such as a high degree of personalisation and ad-libitum app use, may conflict with current research, clinical and technical priorities/infrastructure.

**Conclusion:** Smokers interested in using apps to support them to quit have a wide range of needs and preferences. These findings will help inform app design and tailoring of content to better align with users’ needs, and highlight areas that may pose challenges for researchers and developers.

**FUNDING:** Nonprofit grant funding entity

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**PS3-171**

**NICOTINE DEPENDENCE LEVEL PREDICTS CHANGES IN DEPRESSION DURING A SMOKING CESSATION TRIAL**

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**Significance:** While some research suggests that depression precedes smoking, other research suggests that smoking precedes depression. Studies have suggested that depression symptoms increase during early phases of a quit attempt (e.g., quit-date), but return to baseline as cessation progresses. This study examines whether baseline nicotine level predicts changes in depression in adult smokers during a smoking cessation trial.

**Methods:** This study was part of a 13-week pilot randomized controlled trial that compared three smoking cessation interventions (in person counseling, NCI QuitGuide app, and Smart-T2 app). Participants received combination nicotine replacement therapy (i.e., nicotine patches and gum) and completed assessments on smartphones. Participants reported demographic information and nicotine dependence (HSI) at baseline, HSI was dichotomized: high [≥5] vs. low/moderate [≤5]. Participants reported depression symptoms (CES-D) at baseline, quit-day, and 4-weeks post-quit. A repeated measures analysis with fixed effects examined whether depression symptoms differed by HSI level across the first 5-weeks.

**Results:** Participants (N=81) were male (51.2%), White (67.5%), and 49.4 years old (SD=12.2). Baseline depression symptoms were significantly lower among smokers with low/moderate HSI compared to smokers with high HSI (p=0.0002). Compared to smokers with low/moderate HSI, whose depression symptoms were consistent across time (M=6.5), smokers with high HSI were significantly more likely to experience changes in depression symptoms (p=0.046) that generally decreased over time (baseline M=12.8; quit-day M=8.5; 4-weeks post-quit M=10.0). This relationship remained significant after accounting for treatment group, sex, ethnicity, education, and 7-day biochemically confirmed abstinence at 4-weeks post-quit (p=0.04).

**Conclusions:** Compared to those with low/moderate nicotine dependence, highly dependent smokers had higher levels of baseline depression and experienced a reduction in depression symptoms during the smoking cessation trial. Smoking cessation interventions may benefit from tailoring treatment based on depression history and nicotine dependence level.

**FUNDING:** Federal; State

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**PS3-172**

**CHARACTERIZATION OF NICOTINE PHARMACOKINETICS FROM ON!® NICOTINE POUCHES IN ADULT SMOKERS**

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**Significance:** on!® nicotine pouches are oral tobacco-derived nicotine products available in multiple nicotine strengths and flavors. **Methods:** A randomized seven-way crossover study with adult smokers was used to characterize the nicotine pharmacokinetics (PK) of 4 mg nicotine pouches using six flavor variants (Berry, Cinnamon, Citrus, Coffee, Original, and Wintergreen) relative to subject’s own brand cigarettes. Prior to the in-clinic stay, qualified adult smokers were supplied 1 pack (20 pouches) of each of the six flavors for a three-day ad libitum product trial. During the clinic visit, n=42 adult smokers (17 female) were randomly assigned to one of seven product use sequences. Each product was used for 4 hours ad libitum the afternoon before PK assessments on a
single product use (one pouch for 30 minutes or one cigarette smoked in 5 minutes).

Results: Plasma nicotine maximum concentration (Cmax, Geometric Least Square Mean [LSM], ng/mL) for the pouch products ranged from approximately 9.1 to 11.5 and were statistically significantly lower than the cigarette (~16.3). The median time (minutes) to maximum plasma nicotine concentration ranged from approximately 30.1 to 34.9 for the pouches compared to 7.5 for the cigarette. The area under the curve (AUC, LSM, ng/min/ml) for the pouch products ranged from approximately 860 to 1118 compared to 1008 for the cigarette. Conclusion: We conclude that based on the nicotine PK parameters, under the study conditions, the 4 mg on!® nicotine pouch products may have lower abuse potential than cigarettes.

FUNDING: Tobacco Industry

PS3-173

TOBACCO QUIT SUCCESS AMONG AN ALASKA NATIVE POPULATION: A LOOK AT PHENOTYPES AND TOBACCO CESSATION THERAPY

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Background: Rates of tobacco use are higher in the Alaska Native (AN) community than any other US ethnic group. AN smoking prevalence is 40%, more than twice that of non-Native American people (17%). Genetic testing and biomarkers of smoking metabolites can help individualize cessation aid selection. We identify sociodemographic, clinical, and genetic factors related to tobacco use and cessation interventions to improve quit rates among AN smokers. This was supported by U261HS0079-02. Methods: This observational study of 150 AN people assessed sociodemographic, clinical, and genetic factors with quit success. Descriptive statistics were calculated. Quit success was defined by self-reported smoking abstinence confirmed with carbon monoxide and urine nicotine metabolites. Cross-tabulations showed concordance of categorized phenotype nicotine metabolism and recommended cessation aid when smokers given choice of aids. Logistic regression was used to test for factors that aid quit success. Results: Of the 150 AN participants who intended to quit smoking, about half were female (58%), average age was 44 (sd=12), with an average smoking onset at 17 years. The median number of cigarettes per day was 10 (IQR=7-15); but over half reported low nicotine dependence. Tobacco cessation aids were used as follows: 65% of participants used nicotine replacement therapies, 25% used varenicline, 21% used bupropion, and 14% used no aids. 30% were slow nicotine metabolizers and 70% normal. At 6 weeks, 34/86 (40%) quit smoking. Two factors, slow nicotine metabolism and varenicline use increased quit success (OR 2.1 and 4.0, respectively), but were not associated with quitting after controlling for other variables. Conclusion: Our pharmacogenomics research identifies factors contributing to quit success. Overall, 40% quit at 6 weeks and being a slow metabolizer or using varenicline as a cessation aid were associated with quit success whereas using nicotine replacement therapies hindered quit attempts. This research holds promise to provide individualized cessation aids to AN people trying to quit smoking, in turn increasing quit rates and promoting health equity for AN people.

FUNDING: Federal

PS3-174

IN VIVO DNA DAMAGE: EVALUATING ELECTRONIC CIGARETTES AS A HARM REDUCTION TOOL

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Background and Significance: Electronic cigarettes (ECs) are used by over 30% of adult tobacco smokers (dual users). While ECs are often perceived as a safer alternative to tobacco smoking, available data suggest they might have unforeseen health consequences. In vitro, EC aerosols can cause DNA damage, reduce DNA repair and increase the metabolism of pro-carcinogens into carcinogens. Research examining the impact of real world, in vivo, EC use on DNA damage and associated potential cancer risk is urgently needed.

Aims: (1) To measure the levels of DNA damage in the oral mucosa of dual users over time; (2) To determine whether the levels of DNA damage vary in function of demographic and clinical variables such as age, sex, EC and other tobacco product characteristics and user behaviors.

Methods: Adult smokers, naive to EC use, not planning to quit in the next 3 months, were randomized to usual brand cigarette (UBC), 2nd generation ECs (G2), or 3rd generation ECs (G3) and followed up for 62 weeks. Tobacco and EC user patterns, blood, saliva and oral cells were collected at each visit. DNA damage was quantified using q-PADDA, a novel DNA damage detection assay with high sensitivity. Data was analyzed using ANOVA models.

Results: A total of 263 participants have been enrolled. Of these, oral mucosa DNA damage has been quantified for at least three time points (week 0, 4 and 12) in 106 participants: 40 UBC, 33 G2 and 33 G3 users. Dual users of tobacco cigarettes and EC G2 showed a significant reduction in the levels of oral mucosa DNA damage over time (2-6 fold; p<0.01). No significant reduction of DNA damage was observed for smokers (UBC) or dual users of tobacco cigarettes and EC G3.

Conclusion: The use of ECs by tobacco smokers leads to a significant smoking reduction. Our preliminary data shows that smoking reduction with a G2 device significantly reduces DNA damage, suggesting that G2 devices are more effective than G3 in reducing tobacco-associated cancer risk. These, and studies examining DNA damage levels after complete switching, are urgently needed to fully assess the potential of ECs as a harm reduction tool.

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FUNDING: Federal; Nonprofit grant funding entity

PS3-175

CAN BRAIN REACTIVITY TO SMOKING CUES PREDICT ABSTINENCE - A REPLICATION ANALYSIS

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Background: Studies have shown that after years of smoking, smokers often exhibit greater brain reactivity to smoking cues. We have previously identified an event-related potential (ERP) biomarker predicting smoking abstinence that differentiated smokers based on their Late-Positive Potential (LPP) response to intrinsically pleasant vs. cigarette-related cues. We found that the P>C group (greater response to pleasant vs. cigarette cues) had higher abstinence rates than the C>P (greater response to cigarette vs. pleasant cues) group. In the current smoking cessation study, we sought to replicate this ERP biomarker and its predictive utility. Methods: We enrolled 194 treatment-seeking smokers to determine whether in-home smartphone-delivered attentional bias modification training could be used as an adjunct therapy for 8 weeks of nicotine replacement therapy and counseling. Before they started to receive the cognitive training and pharmacotherapy, participants attended a baseline laboratory session, during which we measured their ERP responses to neutral, pleasant, unpleasant, and cigarette-related pictures. The LPP values (400-700 ms post picture onset) from the four categories of pictures were used to produce the two clusters with the k-means clustering method. We measured their ERP biomarker and its predictive utility. Results: Consistent with previous research, we found greater LPP values to pleasant, unpleasant, and cigarette-related images than neutral images. Using a cluster analytic method, T2 were assigned to the C>P group and T2 to the P>C group. These two groups exhibited the expected differential responses to pleasant and cigarette-related images. However, the cluster-determined groups did not predict the EOT abstention. Thus, we did not replicate this ERP biomarker’s utility as a predictor of smoking cessation success.

FUNDING: Federal

PS3-176

DECREASE IN RESTING HEART RATE MEASURED USING FREELY AVAILABLE SMARTPHONE APPS TO VERIFY ABSTINENCE FROM SMOKING. AN PILOT STUDY.

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Significance: Verifying self-reports of smoking abstinence is challenging in studies that involve remote data collection. Resting heart rate (HR) decreases during smoking
abstinence, this study assessed whether a decrease in resting HR measured using freely available smartphone apps could potentially be used to verify smoking abstinence. 

**Methods:** This study involved a repeated measures experimental design, with data collection in natural setting. Participants were 18 adult, daily smokers. They recorded resting HR in beats per minute (bpm) using freely available smartphone apps during five time points (two in the morning and three post-noon) on each of three days. The outcome measure was the mean of the post-noon HR recordings. The experimental condition for each of the three days (counterbalanced order) was: 1) smoking as usual, 2) not smoking without nicotine replacement therapy (NRT), or 3) not smoking but using NRT. Abstinence was verified using expired-air carbon monoxide (CO) concentration.

**Results:** Compared with the smoking as usual condition, mean HR was 13.4 bpm lower (95% CI=5.4-21.4, p=0.001) in the not smoking without NRT condition and 10.4 bpm lower (95% CI=3.1-17.8, p=0.004) in the not smoking with NRT condition. There was no statistically significant difference in HR between the two not smoking conditions (p=0.39). Abstinence was verified by CO in 18/18 and 16/18 participants on not smoking days without, and with, NRT, respectively.

**Conclusion:** Self-recording of resting heart rate in natural setting using smartphone apps shows a reliable decrease in response to smoking abstinence and may provide a basis for remote verification in smoking cessation studies.

**FUNDING:** Other

### PS3-179

**DEJA DE FUMAR PASO A PASO POST CESSATIONWEIGHT GAIN**

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**SIGNIFICANCE:** Despite the success of smoking cessation interventions, overweight and obesity are frequently overlooked. Few smoking cessation clinical trials have addressed weight gain with physical activity or healthy eating interventions. Trials are hampered by methodological limitations including small sample sizes, lack of long-term follow-up, and low representation of minorities. The aim of this research was to describe weight change among Latinos participating in an ongoing text message smoking cessation mobile randomized trial.

**METHODS:** Participants (N=111) were drawn from Decidetexto, an ongoing mobile smoking cessation clinical trial for Latinos in the U.S. Weight and BMI changes were assessed between baseline and 6 months.

**RESULTS:** Participants’ mean age was 47.7 (SD=9.0) and approximately two thirds were male. This sample of Latino smokers was very diverse - 21 Latin American countries were represented. Spanish was the preferred language for most participants (76%). Approximately half of participants had health insurance (54.1%). Depression was the most prevalent comorbidity (27.8%), followed by hypertension (25.5%) and high cholesterol levels (25.5%). At baseline, an overwhelming number of participants were overweight or obese (79.3%) with a mean BMI of 29.4 (SD 5.5). Interestingly, 53.6% of participants gained weight between baseline and 6 months, while 42.7% lost weight and four participants did not change their weight. Weight and BMI change did not vary by gender. Out of 712 possible text messages, 10.9% addressed nutrition or exercise as coping strategies to deal with cravings and withdraw.

**CONCLUSION:** Despite the overall premise that participants gained weight during a smoking cessation attempt, preliminary results show that approximately half of Latinos participating in a mobile smoking cessation clinical trial lost weight. Future studies should examine the role of mobile intervention on weight change and energy balance in the context of cessation to guide the development of interventions on multiple behaviors.

**FUNDING:** Federal

### PS3-177

**DOES RACIAL DISCRIMINATION AFFECT CRAVINGS, CESSATION SELF EFFICACY, AND LATENCY TO SMOKE AMONG BLACK SMOKERS? A LABORATORY SIMULATION**

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**Significance:** Black smokers are more likely to report both racial discrimination and smoking motivation and behavior among Black smokers.

**Results:** Sixty-nine Black smokers were recruited. Results showed that participants in the socially excluded conditions reported lower craving self-efficacy than those in the included conditions, F (1, 63) = 5.84, p< .05, r2 = .085. Additionally, participants in the outgroup conditions had lower craving self-efficacy and shortest latency to smoke compared to other conditions. Results: Sixty-nine Black smokers were recruited. Results showed that participants in the socially excluded conditions reported lower craving self-efficacy than those in the included conditions, F (1, 63) = 5.84, p< .05, r2 = .085. Additionally, participants in the outgroup conditions had shorter latency to smoke (9.96 sec) compared to those in the ingroup conditions (14.52 sec), F (1, 61) = 4.60, p< .05, r2 = .070. There were no main effects of social inclusion on cravings or latency to smoke and no interactions between social inclusion x group membership. Conclusion: This laboratory simulation of racial discrimination adds to previous correlational data by providing evidence of a causal relationship between factors associated with perceived discrimination (social exclusion and outgroup membership) and smoking motivation and behavior among Black smokers.

**FUNDING:** Academic Institution

### PS3-178

**MEASURING DEMAND FOR CIGARETTES WITH TIME AS A COST.**

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Addiction can be characterized as an overvaluation of drug reinforcers over non-drug reinforcers. The value of a reinforcing drug can be measured with demand functions, which describe the consumption of a reinforcing drug as a function of its cost. While cost is often framed in terms of money, time is also an important cost determining the consumption of a reinforcer. Yet, there is a lack of research investigating demand for a reinforcer with time as a cost. The present study tested this time as a cost in demand for cigarettes. In Experiment 1, N=50 smokers (50% female, M=17.3 cigs per day) completed the Cigarette Purchase Task (CPT), which assessed hypothetical consumption of cigarettes at various prices, and a modified CPT which assessed hypothetical likelihood of consumption of cigarettes at various prices (CPT-P). The tasks were framed such that cigarettes were available only after a delay (0h, 1h, 3h). Demand intensity in both versions of the CPT decreased as delays increased (p<.05). In Experiment 2, N=50 smokers (44% female, M=12.6 cigs per day) completed the CPT-P, and the Cigarette Purchase Task-Time (CPT-T), which assessed hypothesized likelihood of consumption of cigarettes across various delays. The CPT-T was framed such that cigarettes were available at three prices (5c, 25c, 50c per cig). Demand intensity in the CPT-P decreased as delays increased, replicating results from Experiment 1 (p<.001). Similarly, demand intensity in the CPT-T decreased as the price of a cigarette increased (p<.002). Finally, in Experiment 3, N=100 participants (37% female, 50% non-smokers) completed the CPT-T for three commodities: potato chips, cigarettes, and toilet paper. Demand intensity and breakpoints for cigarettes were higher among smokers compared to non-smokers (p<.001), while no differences between groups were found for potato chips and toilet paper. These results suggest that time acts as a cost in the demand for cigarettes, and factors that modify the temporal cost of smoking (e.g. indoor smoking policies, designated smoking areas) can reduce the demand for cigarettes. Future research should consider temporal costs to better understand smokers’ decision-making processes.

**FUNDING:** Other
cocaine, alcohol, and opioid use disorders at sub-anesthetic doses. However, its effects on tobacco use disorder have not yet been tested. Thus, this exploratory study piloted the tolerability and initial response to a single ketamine infusion among smokers. Methods: Up to 12 male and female cigarette smokers (>10 cigarettes/day) will complete measures of cigarette craving, tobacco withdrawal, lab-based smoking latency, and 7-day smoking frequency prior to and 1 day after infusion with either ketamine (0.5 mg/kg) or placebo. Participants expressed no interest in quitting smoking at the time of the study. Results: Thus far, 2 participants have received ketamine infusions and completed the study. One subject reported reduced cigarette cravings (<19 points Questionnaire of Smoking Urges) and withdrawal symptoms (4 points Minnesota Withdrawal Scale) the day after the infusion. The other subject reported no changes. Smoking latency and frequency were not affected. Some side effects were reported during the infusion (e.g., dizziness and vision problems), but severity decreased during the following week. There were no adverse events. Conclusions: Ultimately, this work could impact the field of tobacco addiction research by providing evidence of an innovative pharmacologic mechanism that promotes smoking cessation. Even short-term smoking cessation can have a large impact on patient outcomes following surgery, including reduced complications and improved wound healing.

FUNDING: Academic Institution

**PS3-181**

ASSESSING THE IMPACT OF SENSORIMOTOR STIMULUS AND NICOTINE ON OUTCOMES OF E-CIGARETTE USE

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**Significance:** As e-cigarette use continues to rise, especially among cigarette smokers, there is concern that “dual use” may increase dependence and hinder cessation. Conversely, emerging evidence suggests clinical efficacy of e-cigarettes for smoking cessation. These effects may reflect both pharmacological (nicotine delivery) and non-pharmacologic influences (expectancies, sensorimotor stimuli). Sensorimotor stimuli associated with nicotine delivery have been demonstrated to produce cigarette and e-cigarette craving reduction among smokers, even in the absence of nicotine. The purpose of the present study was to parse the influences of nicotine and sensorimotor stimuli on various outcomes of e-cigarette use among dual users, including reductions in cravings to smoke and vape. **Methods:** In this design, drug dosage (open label nicotine or non-nicotine e-cigarettes) was crossed with sensorimotor manipulation (natural delivery or sensorimotor deprivation). Dual users (N=128) completed an experimental visit including an ad-lib vaping session with either a standard e-cigarette or a modified stationary apparatus. We hypothesized that the sensorimotor manipulation would primarily affect subjective, psychosocial outcomes, whereas nicotine delivery would primarily influence the objective, physiological outcomes. **Results:** Drug X sensorimotor X sex ANCOVAs were used to analyze results. We found main effects of both drug dosage (ps<.01) and sensorimotor (ps<.05) manipulations on both craving measures, such that cravings declined most among participants receiving nicotine as well as those in the sensorimotor deprivation condition. Ratings of satisfaction and reward were higher among those receiving nicotine (ps<.05). A nicotine X delivery interaction was found on negative affect (ps<.05). **Conclusions:** In summary, nicotine delivery was found to be the main driver of various subjective outcomes, which may reflect both pharmacological and expectancy effects. The effect of sensorimotor stimulation on craving reduction was counter to hypotheses, perhaps reflecting the novelty of our stationary delivery apparatus. Theoretical and clinical implications will be discussed.

FUNDING: Federal; Academic Institution

**PS3-182**

ADOLESCENT JUUL USE IN SCHOOLS IN MASSACHUSETTS

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**Background:** An increase in adolescent experimentation with electronic nicotine delivery devices (ENDS), particularly JUUL, has caused public health concern, but little is known about rates of regular use, persistence of use, and associations with other substance use. **Methods:** Students at two high schools in greater Boston (N=1,626) were surveyed on lifetime and current tobacco use (combustible tobacco, oral tobacco products, JUUL, and other ENDS), demographic information, past three-month cannabis and alcohol use, and . **Results:** Lifetime, past month, and daily JUUL use was endorsed by 29%, 21%, and 6% of students while 4%, 2% and 1%, respectively, endorsed combustible tobacco use. Sixty-nine percent of students who used any tobacco product initiated use with vaped tobacco while 31% initiated with combustible tobacco (p<0.0001); however, 83% of current smokers initiated tobacco use with combustible tobacco. Regular smoking (at least weekly) was more common among lifetime smokers (28%) than lifetime JUUL users (9%; p<0.0006). Ever-regular tobacco users were more likely to transition from smoking to JUUL (65%) than vice versa (20%; p<0.0001). However, the smoking rate among JUUL users was 3 times that in the overall sample of students who used tobacco (p<0.0001). Additionally, those with lifetime daily ENDS use were more likely to still be current daily users (57-65%) than lifetime daily combustible and/or oral tobacco users (17%; p<0.0004). Persistence of use, as a marker of dependence potential, was comparable between JUUL and other ECs, but JUUL use was twice as frequent. Additionally, current frequent tobacco use was strongly associated with frequent cannabis and alcohol use (ORs=23.5-40; p<0.0001). The likelihood that ENDS users engaged in frequent cannabis and/or alcohol use was not different from combustible tobacco users. **Conclusion:** Combustible tobacco use is uncommon among adolescents. In contrast, ENDS use is prevalent, may carry potential for dependence, and associated with alcohol and marijuana substance use. Longitudinal studies in adolescents are needed to better understand addictive patterns of ENDS use and smoking prevalence over time.

FUNDING: Federal; Academic Institution

**PS3-183**

ACUTE EFFECTS OF JUUL USE ON VASCULAR FUNCTION AND BLOOD PRESSURE

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**Significance:** The use of JUUL, a pod-based electronic cigarette, has increased dramatically among youth and young adults. JUUL devices produce a level and pattern of nicotine delivery that may result in distinct cardiovascular effects. **Methods:** We conducted the JUUL Impact on Vascular Effects (JIVE) study that enrolled 58 young, healthy adults (ages 18-40) in 3 groups: JUUL users (N=22), traditional cigarette users (N=17), and tobacco nonusers (N=19) to assess the acute and chronic effects of JUUL use on endothelial function and blood pressure (BP). **Results:** JUUL users were younger with fewer women and 58% exclusive JUUL users. Baseline brachial artery flow-mediated dilation mean (SD) was similar across the 3 use groups (P=0.34). JUUL users and traditional cigarette users had higher systolic and diastolic BPs as compared to non-users (P<0.01). After baseline measurement, each participant completed a 10 minute structured use of their own product (or nonuse) followed by BP measurement at 10 minutes post-use and flow-mediated dilation assessment at 30 minutes post-use. Dual users of JUUL and traditional tobacco product users used JUUL for the acute exposure. Mint flavor was vaped by 73% of JUUL users. JUUL use acutely decreased flow-mediated dilation by 3.8 (SD=3.2%), which was greater than the effect of nonuse 0.2 (SD=2.3%), P<0.0001, and similar to the effect of traditional cigarette use 2.4 (SD=2.3%), P=0.37 vs JUUL. Differences between JUUL and nonuse persisted in models adjusted for age, sex, and flavor and did not differ between those who were exclusive or dual JUUL users. Similarly, JUUL use induced an acute rise in systolic BP of 7 (SD=6) mmHg that was greater than in nonusers 0.7 (SD=5) mmHg, P=0.008 but was similar to traditional cigarette use 8 (SD=7) mmHg, P=1.0 vs JUUL. **Conclusion:** The content is solely the responsibility of the authors and does not necessarily represent the official views of the NIH, the Food and Drug Administration or the American Heart Association.

FUNDING: Federal; Academic Institution

**PS3-184**

ASSESSING THE IMPACT OF SENSORIMOTOR STIMULUS AND NICOTINE ON OUTCOMES OF E-CIGARETTE USE

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**Significance:** As e-cigarette use continues to rise, especially among cigarette smokers, there is concern that “dual use” may increase dependence and hinder cessation. Conversely, emerging evidence suggests clinical efficacy of e-cigarettes for smoking cessation. These effects may reflect both pharmacological (nicotine delivery) and non-pharmacologic influences (expectancies, sensorimotor stimuli). Sensorimotor stimuli associated with nicotine delivery have been demonstrated to produce cigarette and e-cigarette craving reduction among smokers, even in the absence of nicotine. The purpose of the present study was to parse the influences of nicotine and sensorimotor stimuli on various outcomes of e-cigarette use among dual users, including reductions in cravings to smoke and vape. **Methods:** In this design, drug dosage (open label nicotine or non-nicotine e-cigarettes) was crossed with sensorimotor manipulation (natural delivery or sensorimotor deprivation). Dual users (N=128) completed an experimental visit including an ad-lib vaping session with either a standard e-cigarette or a modified stationary apparatus. We hypothesized that the sensorimotor manipulation would primarily affect subjective, psychosocial outcomes, whereas nicotine delivery would primarily influence the objective, physiological outcomes. **Results:** Drug X sensorimotor X sex ANCOVAs were used to analyze results. We found main effects of both drug dosage (ps<.01) and sensorimotor (ps<.05) manipulations on both craving measures, such that cravings declined most among participants receiving nicotine as well as those in the sensorimotor deprivation condition. Ratings of satisfaction and reward were higher among those receiving nicotine (ps<.05). A nicotine X delivery interaction was found on negative affect (ps<.05). **Conclusions:** In summary, nicotine delivery was found to be the main driver of various subjective outcomes, which may reflect both pharmacological and expectancy effects. The effect of sensorimotor stimulation on craving reduction was counter to hypotheses, perhaps reflecting the novelty of our stationary delivery apparatus. Theoretical and clinical implications will be discussed.

FUNDING: Federal; Academic Institution
**PS3-184**

**PARENTS PRIORITIZATION OF MESSAGES FROM PEDIATRICIANS PROMPTING INITIATION OF SMOKING CESSATION TREATMENT**

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**Significance:** Insights from behavioral economics suggests that the effectiveness of health messages depends upon how a message is framed. Gain-framed messages, those that emphasize potential benefits of quitting smoking versus harms of continuing, enhance smoking cessation in adult healthcare settings. Smoking cessation message framing has not been studied in pediatric settings, in which the parent is the recipient of a health message that potentially benefits both the parent and child. **Objective:** To assess parent’s perceptions regarding the relative importance of distinct message framings to promote their smoking cessation. **Methods:** A cross-sectional discrete choice experiment in which parent smokers rated the relative importance of 26 messages designed to encourage them to begin cessation treatment. They responded to: “Which message would make you most likely accept a referral to a free Quitline or a medication prescription today?” Messages varied on who was featured (child, parent, or family), whether the message was gain- or loss-framed, and what outcome was included (general health, cancer, respiratory illnesses, child becoming a smoker, or financial impact). **Setting:** 4 pediatric primary care sites in varied settings. **Participants:** 180 parent smokers attending pediatric primary care visits with their children. **Main Outcome(s) and Measure(s):** The importance of smoking cessation messages based on who was featured, gain or loss-framing, and the outcome emphasized. **Results:** Parent smokers were majority female (66.1%), displayed adequate health literacy (51.7%), and had low (40.0%) or low to moderate (28.9%) nicotine dependence. Parent smokers highly prioritized cessation messages emphasizing the impact of the message on their child versus parent or family. Messages focusing on respiratory illness, cancer or general health outcomes consistently ranked highest, while messages focused on the financial benefits of quitting ranked lowest. Gain versus loss framing did not meaningfully influence rankings. **Conclusions:** Parent smokers identified smoking cessation messages that emphasized the impact on their child, with outcomes focused on respiratory health, cancer, or general health, as most important. Known differences in adult smokers’ preference for gain- over loss-framed messages do not appear to be as salient in the pediatric setting. The clinical impact of these messages should be tested in future research.

**FUNDING:** Federal; Academic Institution; Nonprofit grant funding entity

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**PS3-185**

**SMOKE FREE KP: CESSATION OUTCOMES OF A TEXT MESSAGING PROGRAM FOR SMOKING CESSATION**

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**Background:** There is strong evidence that text messaging interventions can reduce smoking behavior while increasing access to cessation interventions. Kaiser Permanente Southern California (KPSC) designed Smoke Free KP—a theory and evidence-based, 90-day text messaging program that promotes encouragement and strategies to quit smoking. Content themes included benefits and barriers to quitting, milestones, tools for cravings, slips, and relapses, stress management, and support systems. The timing of the messages provided support during key nicotine withdrawal time points; texts decreased as the need for support decreased. Daily message frequency: days 1-30 = 3; days 31-60 = 2; days 61-90 = 1. The program was free to participants. English speaking adults identified as active smokers by our electronic medical record were invited to participate via text. Interested members were enrolled in April 2019. The aim of this study was to assess the outcomes of this program. **Methods:** We reviewed the program outcomes from texting data (self-reported quit status and program completion) 3 months after the start date of the program and via analysis of electronic medical record data 8 months after the start date. Program funding was provided by KPSC. **Results:** 108,558 members met the inclusion criteria and were invited. 17,206 (16%) responded, 10,652 confirmed their active smoking status and 976 enrolled in the program. 125 were lost to follow up, 800 (61%) completed the program. 98 (11%) were quit (3-5 months post program). Of those, 34 may have quit prior to enrollment or did not have a quit date on file. 23 were enrolled in additional behavioral cessation programs and 72 received a cessation medication (before, during, or after the texting program). The program cost was $19,490. The cost per quit was between $200-300. **Conclusion:** Smoke Free KP proved to be a valuable cessation modality with a low cost. Limitations included the number lost to follow up and the lack of a control group.

**FUNDING:** Other

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**PS3-186**

**EVALUATION OF A CLINIC-DELIVERED DECISION AID FOR SMOKING CESSATION THAT INTEGRATES E-CIGARETTE INFORMATION**

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**Significance:** Smokers increasingly use e-cigarettes for smoking cessation, yet physicians report discomfort discussing e-cigarettes given uncertainties around their potential harm and utility for smoking cessation. This study evaluated an iPad-delivered decision aid (DA) for smoking cessation that includes information about potential benefits and harms of e-cigarettes, while also integrating motivational interviewing strategies. **Methods:** A pre/post study was conducted in three primary care clinics with patients who smoke (n=90 usual care; n=92 DA). The DA was based on interviews with physicians and smokers, which suggested targeting three smoker types: 1. exclusive smokers who intend to quit, who receive only information about FDA-approved cessation methods; 2. dual users who intend to quit, who receive information about approved methods and about e-cigarettes for cessation; 3. smokers who do not intend to quit, who receive information about e-cigarettes for harm reduction. Adjusted logistic and linear regression models assessed differences between usual care and DA phases for: discussing cessation with their physician; discussion content; and patient satisfaction with and decisional conflict about these discussions. **Results:** Smokers in the usual care and DA phases did not differ key characteristics. Those in the DA phase were more likely to report discussing with their physician their readiness to quit (89% vs. 67%, p<0.001) and methods to quit (81% vs. 48%, p<0.001) especially NRT (55% vs. 26%, p<0.001) and prescription meds (26% vs. 12%, p<0.001). Among smokers who discussed cessation with their physician, satisfaction was higher (4.7 vs. 4.0, p=0.007) and decisional conflict was lower (4.0 vs. 4.25, p=0.02) in the DA phase. These results were statistically significant after adjusting for sociodemographics and tobacco use variables. **Conclusions:** The DA appears to increase physician discussions of cessation methods, although discussion of e-cigarettes did not significantly change. Research with stronger study designs and longer followup is needed to evaluate intervention effectiveness.

**FUNDING:** Unfunded; Academic Institution

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**PS3-187**

**NICOTINIC RECEPTOR ALPHA 5 SUBUNIT GENE POLYMORPHISM AND SMOKING INTENSITY OF THE FIRST CIGARETTE OF THE DAY**

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**Significance:** Animal and human data have suggested that the nicotinic receptor alpha 5 subunit gene SNP rs16969968 risk allele may convey a nicotine aversion-attenuating predisposition leading to heavier smoking. This study aimed to further assess this premise by assessing the association of the SNP with smoking intensity of the first cigarette of the day when the nicotine-aversion effect may strongly manifest among smokers. **Method:** Sixty-nine adult smokers underwent two 2-week study phases during which they smoked nicotine research cigarettes (NRC) varying in nicotine yield (Medium, and High: FTC nicotine yield 0.75 and 1.53 mg, respectively). Subjects were asked to log CPDs and record smoking topography via a CRESS portable device. Of these 69 smokers, 35 (13 risk allele carriers and 22 controls) and 29 (9 risk allele carriers and 20 controls) had suitable data to determine the first cigarette of the day during the Medium and High NRC smoking phase, respectively. **Results:** Mean ± SEM total smoked volume per cigarette (TSVPC) for the first cigarette of the day during the Medium and High NRC smoking phase, respectively. **Conclusion:** Smoke Free KP.
29 mL and 705 ± 43 mL for risk allele carriers, 665 ± 43 mL and 659 ± 41 mL for controls, respectively. Repeated measures ANOVA with participant sex, age, race, and menthol preference as covariates revealed no significant effects of SNP (risk vs control), cigarette (first vs others), or their interaction (all P > 0.14) for the Medium NRC phase. During the High NRC phase, mean TSVPC for the first vs. other cigarettes of the day were 625 ± 67 mL and 701 ± 90 mL for risk allele carriers, 777 ± 92 mL and 773 ± 89 mL for controls. ANOVA showed no significant effects of SNP, cigarette, or their interaction (all P > 0.13) for the High NRC phase. Additionally, t-tests revealed no significant SNP (risk vs control) effect in the TSVPC differences (other cigarettes minus first) for Medium (36.6 ± 28.7 mL vs. -6.3 ± 19.7 mL) or High (75.4 ± 40.0 mL vs. -4.5 ± 40.2 mL) NRC smoking phase. Conclusion: There is no clear association between the rs16969658 SNP and smoking intensity of the first cigarette of the day.

FUNDING: Federal

PS3-188
FEASIBILITY STUDY OF HELPERS STAY QUIT TRAINING FOR SMOKING RELAPSE PREVENTION
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Most people relapse from a smoking quit attempt, and interventions focused on relapse prevention are lacking. Helpers Stay Quit ( Helpers SQ) is a novel behavioral relapse prevention intervention that teaches those who have recently quit smoking how to offer a “helping conversation” (HC) to others to encourage quitting without nagging or confrontation. Design: Working with a state quitline, we conducted a pre-post intervention, pilot feasibility study of Helpers SQ with participants who were ≥14 days abstinent. Measures collected at study baseline, 3- and 6-months included: self-reported smoking status, offering of HCs, motivation to quit, and vulnerability to relapse. Primary outcomes: self-reported 7-day and 30-day point prevalence abstinence; offering of HCs; and feasibility outcomes (recruitment, retention, intervention completion). Cox models explored association of HCs with relapse. Exploratory analysis using propensity score matching compared the quit rates of quitting clients with study sample at 6-7 months. Results: Participants (N=104) were a mean age of 53 years (SD 13.9 years), 48.1% male, 84% non-Hispanic white, cigarettes smoked per day of 16.2 (SD 9.7), mean Fagerström test of nicotine dependence score of 4.7 (SD 2.1). Compared to participants who remained abstinent (n=82), those who relapsed (n=22) had fewer HCs over 6 months (2.6 vs. 7.2 (95% CI: 1.4, 7.8, p = 0.006). Using adjusted Cox regression, the hazard ratio of relapse for each HC was 0.85 (95% CI: 0.74, 0.99, p = 0.03). Compared to quitting clients not participating in the study, study participants had a 49% greater likelihood of reporting no smoking over 30 days and quitline 7-day follow-up (95% CI: 40%, 59%, p<0.001). Conclusions: Helpers SQ, delivered after standard quitline treatment, to those who are newly abstinent from cigarette smoking, was associated with less self-reported relapse. These promising preliminary study results warrant a fully-powered randomized clinical trial to evaluate Helpers SQ as a novel behavioral intervention to prevent smoking relapse.

FUNDING: Federal

PS3-190
SMOKING BEHAVIORS, INTERNALIZED STIGMA, AND DISTRESS TOLERANCE IN A SAMPLE OF PEOPLE LIVING WITH HIV/AIDS
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INTRODUCTION: People living with HIV/AIDS (PLWHA) smoke cigarettes at a much higher prevalence than the U.S. general population. Little is known about the relationship of smoking to internalized HIV stigma, associated with negative physical and psychological outcomes, or distress tolerance, which may be associated with stress-related coping mechanisms such as cigarette smoking. This study is the first to examine stigma, distress tolerance, and smoking behaviors among PLWHA. METHODS: Participants were 285 PLWHA at the Montefiore Center for Positive Living (Bronx, NY; 140 current cigarette smokers, 89 former smokers; 55.4% male, 50.9% Black, 46% Latino/a). Participants completed measures of stigma (Internalized AIDS-Related Stigma Scale, IARSS), distress tolerance (Distress Tolerance Scale, DTS), nicotine dependence (Fagerström Test for Nicotine Dependence), and motivation to quit smoking (Contemplation Ladder). The relationships between stigma, distress tolerance, and smoking were examined with ANOVAs, t-tests, and Pearson correlations. RESULTS: Current smokers reported lower DTS appraisal scores than former and never smokers (current smokers M=19.46, former smokers M=19.11, never-smokers M=19.46, p<0.039). Among current smokers, higher stigma was associated with lower distress tolerance overall (low stigma M=49.86, high stigma M=41.95, p<0.001) and on DTS subscales: tolerance (low M=9.41, high M=7.61, p<0.001), appraisal (low M=18.82, high M=15.69, p=0.002), and absorption (low M=10.12, high M=8.52, p=0.004). Former smokers demonstrated a similar pattern to current smokers with regard to overall distress tolerance and the DTS subscales (ps<0.001) while never smokers demonstrated no difference in distress tolerance by stigma category (ps>0.05). No relationships were found between stigma or distress tolerance and nicotine dependence or motivation to quit smoking. CONCLUSION: Current and former smokers with higher internalized HIV stigma reported lower distress tolerance while there were no differences for never smokers. Stigma and distress tolerance did not differ by nicotine dependence or motivation to quit smoking. Studying the relationships between internalized stigma regarding HIV/AIDS, distress tolerance, and cigarette smoking may lead to a new area of potential intervention for smokers that targets reducing internalized stigma regarding HIV/AIDS and increasing levels of distress tolerance.

FUNDING: Federal, Academic Institution

PS3-189
BASELINE HEALTH STATUS AND ADHERENCE TO SMOKING CESSATION PROGRAM DURING PREGNANCY
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Significance: As an important indicator of quitting smoking successfully and program sustainability, adherence to smoking cessation intervention could be influenced by baseline health status, which remains understudied in previous research. We aimed to examine the roles of both physical and mental health at baseline in predicting adherence to our smoking cessation program for pregnant women. Methods: We analyzed data of 114 daily smoking pregnant women in Buffalo, NY enrolled within the UB Pregnancy and Smoking Cessation Study (2015-2019). Baseline health status was assessed through examinations, screening and pre-test surveys. Physical health indicators included pain symptoms (PHQ), pre-pregnancy weight status, chronic diseases, previous pregnancy-related diagnoses, and perceived pregnancy risk. Mental health indicators included sleep (PSQI), depression (PHQ-9), anxiety (PHQ), and panic disorder (PHQ). Adherence to smoking cessation intervention was defined as completing milestone visits: lab screening, pre-test, initial intervention, and last intervention (8 weeks after self-chosen quit date). We conducted Fisher’s exact tests, ANOVA, and Kaplan-Meier survival analysis (# of days staying in our program) to examine the associations between baseline health indicators and adherence to smoking cessation intervention. Results: The adherence to our smoking cessation program gradually decreased with time: 86.8% for lab screening, 74.8% for pre-test, 51.8% for initial intervention, and 27.2% for last intervention visit. Pregnant women who did not receive initial intervention had higher mean subjective sleep score (1.64 [SD, 0.95] vs 1.24 [0.65]; p=0.048) at pre-test than those who received initial intervention. Women who did not complete 8-week intervention had higher mean subjective sleep score (1.54 [0.81] vs 1.08 [0.63]; p=0.006) and daytime dysfunction score (1.05 [0.84] vs 0.58 [0.50]; p<0.002) at pre-test than those who completed intervention. Women bothered by pain were much less likely (5.0% vs. 31.9%, p=0.013) to complete 8-week intervention than those not bothered by pain. Other baseline health status indicators were not significantly associated with adherence. Conclusion: Pain and poor sleep predict low adherence to completion of smoking cessation intervention visits among pregnant women. These two baseline health indicators warrant screening and additional intervention.

FUNDING: Federal, Academic Institution

PS3-191
THE EFFECT OF DELAY ON OBJECTIVE AND SUBJECTIVE SMOKING REWARD FOLLOWING A SOCIAL STRESSOR
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The effect of delay on objective and subjective smoking reward following a social stressor. Significance: Stress-precipitated smoking is frequently cited as a risk factor for smoking relapse and poor cessation outcomes. However, whether smokers who are more likely
to smoke following stress experience differences in subjective and objective smoking reward compared to those who are able to delay use remained understudied. Methods: The current study investigated whether time to delay smoking following a modified trier social stress test predicted subjective and objective smoking reward. We hypothesized that individuals willing to delay smoking for monetary compensation would exhibit less subjective and objective smoking reward. Sixty adult daily smokers (61.7% male; \( M_{\text{age}} = 34.57, \text{SD}=7.05; M_{\text{years}} = 14.05, \text{SD}=4.93 \)) were randomized to receive non-verbal positive or negative feedback while delivering an impromptu speech to confederate evaluators. Participants were then able to smoke a cigarette of their preferred brand or delay for compensation. To measure subjective reward (e.g., satisfaction, arousal, craving reduction, physiological reward, and enjoyment of respiratory sensations), we used the modified cigarette evaluation questionnaire, and to measure objective reward, we used puff topography (e.g., volume, duration, inter-puff-interval, and velocity) Results: Results of linear regression analyses indicated that delay time in minutes, controlling for randomization condition and nicotine dependence, predicted average puff volume (\( F(1,52)=4.14, p=0.047; b=0.27, p=0.047 \)), subjective satisfaction (\( F(1,51)=5.19, p=0.03; b=0.30, p=0.03 \)), and subjective enjoyment of respiratory tract sensations (\( F(1,53)=5.66, p=0.02; b=0.31, p=0.02 \)). Conclusion: Individuals who delayed smoking for a longer period of time following a social stressor, regardless of negative or positive feedback, exhibited reduced puff volume and reduced satisfaction and enjoyment of respiratory tract sensations from smoking. Altering time to smoke in the context of stress may affect the reinforcing properties of cigarettes.

FUNDING: Federal

**PS3-192**

DAILY USE OF NICOTINE REPLACEMENT MEDICATIONS IS RELATED TO DAILY SMOKING STATUS- AN ECOLOGICAL MOMENTARY ASSESSMENT STUDY

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Significance: Research has shown that nicotine replacement therapy (NRT) can help people quit smoking when used consistently. Yet, few studies have examined how medication adherence may impact abstinence from day to day. The purpose of this study was to examine the association between daily smoking status and adherence to NRT. Methods: Data from a pilot randomized clinical trial of a smartphone-based smoking cessation intervention among adults were used. Participants completed ecological momentary assessments (EMAs) daily. EMAs assessed adherence to NRT, smoking status, and reasons why participants didn’t take the medications (i.e., side effects, forgot, medication not working/do not need anymore, decided not to quit smoking, did not start the medication, ran out/requested more, other). Multilevel models were used to examine the relationship between use of NRT on a given day and same-day smoking status (i.e., abstinent versus non-abstinent). Self-reported reasons for medication non-adherence were also examined. Results: Participants (n=77) were White (66.2%), female (50.6%), 50.4 years old (SD=11.6) and smoked 21.8 cigarettes per day (SD=11.0) at baseline. On average, participants reported chewing 5.1 pieces of gum (SD = 2.5, range = 0-8 or more), and wearing a nicotine patch for an average of 19.4 hours each day (SD = 5.6, range = 0-23). The likelihood of smoking was significantly lower on days when only the patch was used (\( p<0.001 \)) or both the patch and gum were used (\( p<0.001 \)) compared to days when no medication was used. However, there was no difference in the likelihood of smoking on days when only gum or no medication was used. On days when both the patch and gum were used, the likelihood of smoking on that day was 16% lower for each additional piece of gum used. The most commonly cited reason for not using the patch or gum was “other” (43.3%), followed by “side effects” (27.1%), and “forgot” (18.9%). Conclusion: Daily use of the patch or both the patch and gum was associated with lower risk of daily smoking. Low levels of nicotine gum use alone may not be an effective cessation strategy. Future studies should further explore reasons for NRT non-adherence.

FUNDING: Federal; State; Academic Institution

**PS3-193**

SMOKING CESSATION INTERVENTIONS FOR SMOKERS WITH TYPE 2 DIABETES. NEW EVIDENCE FROM A SYSTEMATIC REVIEW AND META-ANALYSIS

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Significance: Smoking increases the risk of developing type 2 diabetes (T2D) and has been shown to enhance the risk of morbidity and mortality in this group of patients. There are several factors that are specific to smokers with T2D that might make cessation difficult including difficulties coping with the expected changes in their lifestyle, diabetes distress and concerns about weight gain and blood sugar management. This systematic review aims to assess for the first time the evidence of smoking cessation interventions for smokers living with T2D compared to usual care. Methods: Electronic databases including Medline, Embase, PsycINFO and CINAHL were systematically searched to identify RCTs that assess the impact of smoking cessation interventions in smokers with T2D. The primary outcome was risk ratio for biochemically verified smoking cessation. When the article reported combined cessation outcomes for Type 1 (T1D) and T2D authors were contacted to provide separate data for this sub-group. Study quality was appraised using the Cochrane risk of bias tool for randomised trials. Review Manager 5.3 was used to perform a random-effects meta-analysis. Heterogeneity was quantified using I^2 and Q statistics. Results: The search retrieved 6,242 articles, 49 RCTs were identified to meet inclusion criteria including a total of 1,178 participants. Three of the interventions combined behavioural and pharmaceutical support and one assessed brief advice. All trials had 6 months follow up. The risk ratio of biochemically verified smoking cessation was 2.24 (95% CI 0.69 to 7.32) for the more intensive interventions compared to usual care, although significant heterogeneity was found (I^2=76%). Conclusions: Very few studies exist that test the efficacy of smoking cessation interventions for adults with T2D. Meta-analysis of RCTs indicate no statistically significant effect. Further research with longer follow up is needed to test the impact of a more tailored intervention for this population. FUNDING: King’s – Duke Advancement of Nursing Science Pilot Research Program

FUNDING: Academic Institution

**PS3-194**

PROACTIVE AND REACTIVE APPROACHES TO RECRUITING LATINOS INTO A MOBILE SMOKING CESSATION CLINICAL TRIAL

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INTRODUCTION: Latinos are strikingly underrepresented in smoking cessation studies, hindering our ability to address smoking-related health disparities. OBJECTIVE: To describe accrual rates from an ongoing text-message based smoking cessation trial, Decidirsmoke, in relation to different recruitment strategies and time of enrollment (best month of the year and week of the month). METHODS: Between October 2018 and November 2019 in New Jersey and Kansas, our experienced, bilingual, research-trained team used multiple proactive (e.g., in-person appeals, phone calls to hospital patient lists) and reactive (e.g., referrals from friends/family/participants, advertisements such as flyers, radio, television, and newspaper) recruitment methods. We assessed the rate of enrolled smokers by recruitment method and identified best month and week for enrollment. RESULTS: A total of 674 Latino smokers were eligible. Of these, 618 (91.7%) were scheduled appointments for enrollment. The no show rate for enrollment was 44.6% (n=276). Of the participants who completed enrollment (n=342), their mean age was 48.1 (SD=11.1). Most were male (56%), had health insurance (63.1%), and spoke primarily Spanish (71.9%). Among participants completing enrollment, the most effective recruitment method was calling patient smokers from hospital lists (52.4%), followed by hosting tables at community based organizations (17.2%), festivals and health fairs (12.0%), advertising (9.2%), and referrals (9.2%). Proactive recruitment methods yielded the highest enrollment rate (81.6%). From the 342 enrolled, the best months for enrollment were August (n=43; 12.6%) and April (n=37; 10.8%) while June was the worst (n=15; 4.4%). On average, the 4th week of the month yielded significantly higher enrollment rates (n=100; 30.0%) compared to the rest of the month (p<0.047). CONCLUSION: A variety of recruitment methods for a mobile smoking cessation clinical trial were effective, particularly in-person appeals and direct phone calls. The last week of the month yields higher enrollment rates. These findings may be useful for recruiting more Latinos into clinical trials.
BASELINE CHARACTERISTICS AND INDIVIDUALIZED CESSATION PLANS OF PUERTO RICAN SMOKERS ENROLLED IN A SMOKING CESSATION M-HEALTH PILOT STUDY IN PUERTO RICO

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INTRODUCTION: Puerto Ricans in Puerto Rico (PR) constitute a Latino group that, despite their U.S. citizenship status, experience sociodemographic disadvantages, including access to smoking cessation resources. OBJECTIVE: To describe baseline characteristics and cessation plans of participants enrolled in an ongoing smoking cessation single-arm pilot study in Puerto Rico. METHODS: Participants (N=21) were enrolled in Decidetexto-PR, a mobile smoking cessation intervention. Decidetexto-PR incorporates three integrated components: 1) a tablet-based software that collects smoking-related information to develop an individualized quit plan; 2) a 24-hour text messaging counseling program with interactive capabilities; and 3) pharmacotherapy support (NRT). We assessed sociodemographic characteristics and smoking behaviors at baseline. RESULTS: Average age of the participants was 47.7 years (SD 13.5). Approximately half of the participants were male (52.3%) and had at least one college degree (47.6%). All participants smoked daily, and 90.4% were heavy smokers (>10 CPD) and had high nicotine dependence. Approximately half of the participants smoked menthol cigarettes (52.3%) and had not made a quit attempt in the past year (57.1%). Almost half of participants had used pharmacotherapy to quit (42.8%), however, only two (9.5%) had used counseling resources. One third of participants (33.3%) had used e-cigarettes to quit smoking. The two primary reasons for quitting were family and health (57.1% and 38.0%). The two primary smoking triggers were meals and stress/anger (30.9% and 23.8%). Chewing gum and going for a walk were the two main strategies selected to manage smoking triggers (21.4% and 19.0%). All participants selected a quit date and requested pharmacotherapy. DISCUSSION: Puerto Ricans in PR have unique smoking behaviors, different from other Latino groups. The ongoing study will assess the feasibility, acceptability, and preliminary abstinence rate at Month 6 of Decidetexto-PR among Puerto Ricans in PR. A comparative study among Puerto Rican smokers in the U.S. and PR could examine if differences in smoking behaviors exist and identify mechanisms underlying these differences.

FUNDING: Unfunded

PS3-196

TOBACCO CESSATION EXPERIENCES AND PREFERENCES AMONG FORMER AND CURRENT SMOKERS WITH CANCER

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Introduction: Cigarette smoking has a well-established connection with increased risk of developing head, neck, or lung cancer with further emerging evidence linking smoking to the development of other cancers including prostate, bladder, and breast. Continued smoking through oncology treatment leads to increased risk of adverse events including reduced effectiveness of treatment, recurrence of additional malignancies, and reduced survival rates. Despite these known risks of continued smoking, it is unclear how oncology health care providers can best address these issues with their patients based on patient preferences. Methods: The present study surveyed oncology patients from Birmingham, AL classified as either former (n=174) or current smokers (n=81) to identify their perceptions regarding the role of oncology health care providers in their smoking cessation efforts. Results: Current smokers were more likely to be younger, received their cancer diagnosis within the past 3 years, and have a cancer diagnosis with high smoking-related public awareness (i.e., head, neck, or lung) compared to former smokers. Additionally, 81% of current smokers reported experiencing smoking cessation discussions with their oncology health care providers with the most prominent recommendations being use of nicotine replacement therapies (46.9%) and medication (35.8%). These smoking cessation experiences align with patient preferences. However, despite the frequency of smoking cessation discussions, current smokers demonstrated an ambivalence for understanding the risks of continued smoking during their medical treatment regimen. Overall, this study highlights the important role of oncology health care providers on implementing smoking cessation intervention for their patients who continue to smoke. Funding: This project was funded through the Department of Psychiatry at the University of Alabama at Birmingham.

FUNDING: Academic Institution

PS3-197

THE EFFECT OF SMOKER STRESS APPRAISAL ON SUBJECTIVE AFFECT AND NON-SUBJECTIVE SMOKING FACTORS

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Significance: Stress is implicated in the onset and maintenance of smoking, presumably due to increases in negative affect. However, stress is not always bad; instead, how smokers cope with or regulate stress may explain changes in affect and smoking behavior in the context of stress. Methods: Using a novel experimental paradigm, the current study aims to further discern the unique effects of stress appraisal on subjective affect and smoking factors, including withdrawal symptoms and urge to smoke, in smokers following a socioevaluative challenge. The challenge involved giving an impromptu speech to a panel of judges (i.e., Tier Social Stress Test). To manipulate stress appraisal, participants were randomized to a panel who responded favorably or unfavorably to their speech, using non-verbal body language, only. Sixty adult daily smokers (61.7% male; Mage=34.57, SD=7.05; M_app=14.05, SD=4.93) underwent the challenge and completed assessments of negative affect (NA), withdrawal, smoking urge, and stress appraisal pre- and post-challenge. Appraisals for how demanding the challenge was perceived to be in relation to coping resources were used to compute a stress appraisal index. Results: Linear regression analysis, covarying for sex and baseline NA, showed that poorer stress appraisal predicted higher post-challenge NA (F(3, 56)=7.95, p<.01, R2=.29), with appraisal accounting for 9.3% of the observed variance (β=.31, p<.01). While a marginal effect of stress appraisal on withdrawal was observed (F(2,57)= 7.58, p=.05, R2=.21), this diminished once accounting for baseline withdrawal symptoms (β=.21, p>.07), and no effect of stress appraisal on smoking urge was found (β=.10, p>.33). Conclusion: Findings suggest that smokers with a less adaptive stress appraisal may be at increased risk for experiencing subjective distress, irrespective of smoking withdrawal and urge. Stress management interventions attending to changes in smoker NA following stress may serve to augment smoking cessation outcomes beyond interventions that solely address non-subjective symptoms of withdrawal and urge.

FUNDING: Federal

PS3-198

THE REPORTED EFFECTS OF FOODS AND BEVERAGES ON CIGARETTE PALATABILITY: AN EXAMINATION OF MENTHOL PREFERENCE AND RACIAL DIFFERENCES

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Cigarette taste plays a role in smoking pleasure. Thus, factors that alter cigarette taste may affect smoking behavior. Research in this area is quite limited. In an open-ended survey by McClernon et al. (2006) smokers indicated foods that made cigarettes taste worse (e.g., dairy) or better (e.g., alcohol). Menthol smokers generally reported less of an impact of foods on cigarette taste. However, menthol was confounded with race and food consumption frequency was not assessed. In the current laboratory study, daily smokers completed a newly developed 25-item Taste Sensitivity Questionnaire. Participants (N = 100, 42% female, 54% menthol, 44% Black) rated the effects that different foods have on cigarette taste using a 5 point scale (1 = makes cigarettes taste much worse, 3 = does not affect the taste, 5 = makes cigarettes taste much better). Participants also rated their frequency of consumption (0 -7 days per week). Some food types were combined for analyses due to high correlations (e.g., milk and dairy). Cigarette taste “made worse” (value of 1 or 2) was reported by 66% of smokers for milk/dairy, 31% for fruits, and 27% for vegetables. Taste “made better” (value of 4 or 5) was reported by 74% for alcoholic beverages and 77% for coffee. A series of 2 (race) by 2 (menthol) ANOVAs were run using scores (1-5) for each of the food types with frequency as a covariate. Non-menthol smokers reported greater taste enhancement from alcoholic beverages and greater taste worsening from fruits than menthol smokers (all p values <.05, all partial eta squared >.04). There were significant racial differences for dairy, vegetables, fruit, chocolate, pizza, and meats. For example, while both groups on average reported a worsening of cigarette taste from dairy, fruits, and vegetables, Blacks reported greater worsening (all p values <.05, all partial eta squared >.04). Additional research on the influence of foods and other factors (e.g., other drugs) on cigarette taste is warranted. Future studies should investigate if cigarette smoking shifts dietary consumption and if prescribed dietary changes could decrease cigarette enjoyment and facilitate smoking cessation.

FUNDING: Academic Institution
PS3-199

ELECTRONIC CIGARETTE CESSION AMONG ADOLESCENTS AND YOUNG ADULTS: WHERE IS THE SCIENCE?

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Objective: The U.S. Surgeon General has declared electronic cigarette (e-cig) use among youth a public health crisis. Rates of e-cig use continue to rise with a 78% increase among high school students from 2017 to 2018. Public health efforts have focused largely on prevention of e-cig initiation and only recently have resources become available to support e-cig cessation among this vulnerable group. To date, no published study has investigated interest in e-cig cessation among youth, nor which methods of cessation may be most relevant for this population. In the current study, we evaluated interest in e-cig cessation, e-cig cessation attempts, and desired e-cig cessation methods among young e-cig users.

Methods: Youth (N = 212; 51% female; mean age = 16, range = 14-24 years) living in the U.S. who reported current, regular (i.e., ≥6 days during the past month) e-cig use were recruited via social media to participate in an online, anonymous, brief survey on e-cigs. Eligible participants were surveyed about their e-cig quit history, e-cig quit motivation, and interest in e-cig cessation methods. As an incentive for participation, participants were randomly selected to receive one of ten $25 gift cards for their participation. Informed assent/consent was obtained from all participants.

Results: More than half (52%) of the participants reported at least one serious e-cig quit attempt. Among those who had a quit attempt, the average number of past quit attempts was 2.92 (SD = 3.93). Of the 83 (74%) participants who indicated they were interested in quitting e-cigs, 49.7% of endorsed health risks as their primary reason for wanting to quit e-cigs. The most desired (22.3%) intervention method to aid in e-cig cessation among this vulnerable group. To date, no published study has investigated interest in e-cig cessation among youth, nor which methods of cessation may be most relevant for this population. In the current study, we evaluated interest in e-cig cessation, e-cig cessation attempts, and desired e-cig cessation methods among young e-cig users. We hypothesized that diagnostic categories (i.e., tobacco dependent vs. non-dependent) would be related to treatment attendance. The purpose of the present analysis was to examine whether AS dimensions are related to session’s attendance at a cognitive-behavioral intervention to quit smoking. Methods: The sample consisted of 210 smokers enrolled in a smoking cessation treatment (62.1% women; M_w = 45.2; SD = 11.0). The Anxiety Sensitivity Index-3, which assesses cognitive, physical, and social AS dimensions and the Fagerström Test Cigarette Dependence (FTCD) were used. Participants were defined as completers when they attended to more than 85% of treatment (7-8 sessions).

Results: Completers showed significant lower pretreatment AS physical dimension (t = 2.69; p < .01; Cohen’s d = .34); while no differences were found in AS cognitive, and in AS social dimensions. Completers also showed a higher likelihood of being non-dependent (χ²= 5.58; p < .05; Cramer’s V = 16). Tobacco dependent participants showed significant higher scores in physical (t = 2.47; p < .01; Cohen’s d = .34); social (t = 1.96; p < .05; Cohen’s d = .27); and cognitive (t = 2.25; p < .05; Cohen’s d = .31) AS dimensions. Logistic regression analysis showed that those participants with higher physical AS scores had a significant lower likelihood of attending to 7-8 sessions (OR = 0.92) (odds ratio [OR], 95% confidence interval [CI], 0.86 - 0.97). A similar result was obtained after adjusting the model by the following covariates: sex, age, education level, FTCD; and treatment condition (Adjusted OR= .92; 95% CI: .86 - .98).

Discussion: Findings suggest that, although the three AS dimensions are related to smoking dependence, only the physical AS dimension is related to a higher probability of attending less intervention sessions. These findings have clinical implications due to the relevance of treatment attendance in terms of abstinence outcomes.

FUNDING: Federal

PS3-201

ANXIETY SENSITIVITY DIMENSIONS AND SMOKING CESSATION TREATMENT ATTENDANCE

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Background: Attendance is a relevant predictor of abstinence outcomes in smoking cessation treatment. Previous research shows that anxiety sensitivity (AS) is related with smoking-related variables, as tobacco dependence, but also to smoking cessation outcomes. However, scarce research has examined the impact of AS on smoking cessation treatment attendance. Therefore, the aim of this study was to examine whether AS dimensions are related to session’s attendance at a cognitive-behavioral intervention to quit smoking.

Methods: The sample consisted of 210 smokers enrolled in a smoking cessation treatment (62.1% women; M_w = 45.2; SD = 11.0). The Anxiety Sensitivity Index 3, which assesses cognitive, physical, and social AS dimensions and the Fagertõm Test Cigarette Dependence (FTCD) were used. Participants were defined as completers when they attended to more than 85% of treatment (7-8 sessions). 

Results: Completers showed significant lower pretreatment AS physical dimension (t = 2.69; p < .01; Cohen’s d = .34). While no differences were found in AS cognitive, and in AS social dimensions. Completers also showed a higher likelihood of being non-dependent (χ²= 5.58; p < .05; Cramer’s V = 16). Tobacco dependent participants showed significant higher scores in physical (t = 2.47; p < .01; Cohen’s d = .34); social (t = 1.96; p < .05; Cohen’s d = .27); and cognitive (t = 2.25; p < .05; Cohen’s d = .31) AS dimensions. Logistic regression analysis showed that those participants with higher physical AS scores had a significant lower likelihood of attending to 7-8 sessions (OR = 0.92) (odds ratio [OR], 95% confidence interval [CI], 0.86 - 0.97). A similar result was obtained after adjusting the model by the following covariates: sex, age, education level, FTCD; and treatment condition (Adjusted OR = .92; 95% CI: .86 - .98).

Discussion: Findings suggest that, although the three AS dimensions are related to smoking dependence, only the physical AS dimension is related to a higher probability of attending less intervention sessions. These findings have clinical implications due to the relevance of treatment attendance in terms of abstinence outcomes.

FUNDING: Other

PS3-200

QUALITATIVE EXPERIENCE USING JUUL E-CIGARETTES AMONG LATINX SMOKERS

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SIGNIFICANCE: Latinx/Latina (Latinx) smokers experience significant tobacco-related health disparities. Electronic cigarettes (e-cigs) have emerged as a harm reduction strategy for smokers who cannot or will not quit using traditional methods. Latinx smokers have been under-represented in e-cig switching studies and little is known about their perceptions of the benefits and challenges of switching to e-cigs.

METHOD: The present study focuses on 63 daily Latinx smokers (73% male, mean age = 37.4, 15.7 years smoking age) who used JUUL e-cigs and encouraged to switch for 6 weeks as part of a randomized controlled trial. At 8-week study exit, participants were asked open-ended questions about what they liked about using e-cigs, what they didn’t like, what helped with switching, and what made it difficult to switch. Two independent coders classified responses into emergent themes and a third individual reconciled differences. Participants were also asked to evaluate the tradeoff of benefits to barriers/concerns of switching (yes, benefits outweigh barriers/concerns; no, benefits do not outweigh barriers/concerns; benefits and barriers are equal).

RESULTS: The majority (90%) reported that the benefits of switching to e-cigs outweighed barriers or concerns. Coder theme agreements ranged from 88% to 91% before reconciliation. The most common benefits were lack of smell, convenience, taste, and ability to use anywhere. The most common responses to what participants didn’t like were “nothing,” followed by mechanical issues with the battery. The leading responses to what helped with switching were motivation and convenience. The most frequent response to what made it difficult to switch was “nothing.” Other reported barriers included issues with comparability/habit and craving for cigarettes.

CONCLUSION: Exclusive switching from cigarettes to e-cigs is key to harm reduction. Preliminary qualitative impressions of Latinx smokers’ experience using JUUL e-cigs is promising. The next step is to determine whether the generally positive experience with e-cigarettes connects with exclusive switching.

FUNDING: Federal

PS3-202

DIFFERENCES IN CLINICAL OUTCOMES AMONG HOSPITALIZED SMOKERS WITH AND WITHOUT CANCER DIAGNOSES

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SIGNIFICANCE: Diagnosis of a chronic illness, or experiencing another significant health event, is thought to be a “teachable moment” for health behavior changes, such as smoking cessation. The nature of the health condition may also impact motivation for a quit attempt following diagnosis. For instance, cancer patients who believe their disease to be smoking-related, or caused by smoking (e.g., head and neck and lung cancers), are more likely to make a quit attempt and stay quit as compared to other types of cancers that are not perceived to be related to smoking. Tobacco treatment services integrated into hospital inpatient treatment protocols have the unique opportunity to capitalize on this teachable moment to encourage smoking cessation. The purpose of the present analysis is to assess the influence of diagnostic category on these smoking cessation outcomes in a sample of hospitalized smokers. We hypothesize that diagnostic categories (i.e., cancer or non-cancer) may influence factors related to smoking cessation success, such as motivation to quit, willingness to accept medication, and making a successful quit attempt following a hospital stay.

Methods: Chart review was conducted on 1980 inpatients who accepted treatment by a tobacco treatment counselor from July 2014 to December 2019. Results: Of those, 64 patients had a cancer diagnosis. At time of inpatient assessment, those with a cancer diagnosis were significantly more likely to endorse importance to quit (45% vs 30%, p = 0.113) and commitment to maintain
a quit attempt (17% vs 9%, p=0.0298) than those without a cancer diagnosis. Those with a cancer diagnosis were not significantly more willing to accept a medication at discharge (52% vs 89%, p=0.2400). Follow-up analyses showed cancer diagnosis was not significantly associated with abstinence at the 30 day follow-up after discharge (9.4% vs 16.2%, p=0.1412), but enrollment in Quitline or counseling services was (6.3% vs 2%, p=0.0299).

Conclusion: These results provide insight into differences between cancer and non-cancer inpatients in clinically-relevant outcomes during the time of a teachable moment, which can inform intervention development. FUNDING: Unfunded

PS3-203

OLFACTORY AND GUSTATORY FUNCTION IN COLLEGE STUDENTS WHO VAPE DAILY

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Daily cigarette smoking is known to impair olfactory function. Anecdotal evidence suggests that chronic vaping may similarly impact olfaction and gustation, resulting in a phenomenon described as “vaper’s tongue.” The present study evaluated smell and taste abilities amongst a sample of college students who either reported vaping daily or no current vaping. Participants were excluded from either group if they reported 1) a history of daily cigarette smoking 2) current cigarette smoking (biochemically verified; breath CO > 25 ppm) or 3) any history of physical conditions impacting olfaction. Only participants who reported owning a vaping device and use of the device on 25 or more of the past 30 days were included in the daily vaping group. Conversely, participants were included in the control group if they reported no history of owning a vaping device and no vaping within the past year. All participants were tested on a validated assay of gustation (Burghart taste strips) and olfaction (Sniffin’ Sticks Smell identification, threshold, and discrimination tests). Contrary to expectations, individuals who reported daily vaping demonstrated superior olfactory sensitivity, as measured by the threshold test, relative to the non-vaping group, F(1,24)=4.53, p<0.05. Yet, those vaping on a daily basis reported greater olfactory dysfunction on an Assessment of Self-reported Olfactory Function (ASOF), F(1,24)=7.30, p<0.05. These data suggest that either 1) daily vaping may serve to sensitize olfactory acuity or 2) individuals with higher olfactory acuity are more likely to adopt daily vaping behavior. FUNDING: Unfunded

PS3-204

UNSAFE AT ANY VOLUME - ALCOHOL CAN INCREASE SMOKING URGES AMONG ALL TYPES OF DRINKERS

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Significance: Tobacco and alcohol use are among the most important risk factors contributing to the global burden of disease. There is considerable overlap between tobacco and alcohol use; however, the majority of smokers who drink are light or moderate drinkers with few or no symptoms of alcohol use disorder (AUD). Methods: We studied the interaction between alcohol and smoking in a population of smokers (≥10 cigarettes per day) who drink (≥1 drink in 30 days) but do not have severe AUD. Three scales of the nicotine and other substances interaction expectancy (NOSIE) questionnaire were administered: Scale 1 (“Substances increase tobacco use and urges”), Scale 2 (“Smoking increases substance use urges”), and Scale 3 (“Smoking to cope with substance urges”). Participants rated the frequency of interactions on a 5-point scale (1=never, 2=some of the time, 3=half of the time, 4=most of the time, 5=always). Alcohol and tobacco use were assessed using 30-day timeline follow back (TLFB). Mean number of drinks per week, days with any alcohol, and maximum drinks in any day were calculated. Results: Participants (N=42) averaged 6.3 alcohol drinks per week and 12.2 (9.8) days with alcohol use in past 30 days. Scores on the NOSIE scales were 4.0 (0.8), 1.7 (1.0), and 1.7 (0.7) for scales 1, 2, and 3, respectively. Mean scores on NOSIE scales did not vary significantly with mean number of drinks per day, days with any alcohol, or maximum number of drinks. Conclusion: This study provides evidence that NOSIE scores do not vary with alcohol use patterns among drinkers without severe AUD. Furthermore, participants in this study reported that alcohol increased tobacco use and urges almost as strongly as in a study of treatment-seeking substance users: 4.0 (0.8) vs. 4.7 (0.6). However, unlike for treatment-seeking patients, the interaction was unidirectional and light-to-moderate drinkers rarely reported using nicotine to cope with alcohol or other substance urges. Our findings suggest that any level or type of alcohol use has the potential to increase smoking cravings and negatively impact cessation. FUNDING: Federal

PS3-205

TOBACCO TREATMENT SPECIALIST TRAINING: NOVEL LEARNING MODALITY IMPROVES CLIENT ENGAGEMENT IN THE REAL WORLD

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Mayo Clinic provides a Tobacco Treatment Specialist Training Program that is accredited through the Council for Tobacco Treatment Training Programs. Between May, 2005 and March 2018 the program trained 2, 454 health care providers. The 30 hour training curriculum was delivered in-person over five days, predominately using a lecture format. Program evaluations indicated the need for more skills practice and interactive learning. The faculty decided to revamp the program to deliver more case based learning, practice sessions, and feedback. Because online education methods are likely to be as effective as face to face training of health care professionals the faculty committee decided to develop a blended learning format. Didactic lecture content, deemed important, was reformat ted for on line learning and delivered using video, reading assignments, and knowledge checks. Simulated client scenarios were developed to provide the participants, in small groups, opportunities to practice motivational interviewing, assessment skills and treatment planning communication strategies. In the small groups a faculty member plays illustrative patient scenarios and the students take turns employing counseling skills. A group discussion is then used to highlight learning and provide both peer and faculty feedback to the student.

METHODS: The new course delivery was evaluated using 1.) post-course evaluation of both the online and on-site components, 2.) A brief survey of participants 3-6 months post training was sent and was designed to focus on a few key things: Utility of the small group sessions and role play activities, perceived changes in practice, perceived improvement in patient interaction patient, and perceived improvement in patient outcomes. RESULTS: The authors found no difference in knowledge test scores or overall program evaluation and rating between the older in-person course and the new blended learning course. 64 / 182 participants responded to the 3-6 month survey. CONCLUSION: Online learning in this training program provided knowledge gains and satisfaction ratings similar to or better than in person lectures. Small group, role play activities are rated as helpful to practice by nearly all of the participants, and most perceived these activities as improving skills, practice and outcomes. - The group activities were consistent with best practices for adults in helping to clarify understanding, practice and implement learned skills, and seemed to improve application of these skills to the workplace. FUNDING: Unfunded

PS3-206

A RANDOMIZED CONTROLLED TRIAL ON BRIEF HANDGRIP AND ISOMETRIC EXERCISE INTERVENTION FOR SMOKING CESSATION

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Significance: Isometric exercises reduce craving, negative affect, and withdrawal symptoms during smoking cessation. This randomized controlled trial (RCT) was the first to test if a brief intervention using a handgrip and isometric exercises including hand pushing was feasible and efficacious to increase tobacco abstinence at 6-month. Methods: This was a single-blinded, 2-arm pilot RCT in 6 community-based smoking cessation clinics in Hong Kong. Smokers who consumed 10 or more cigarettes a day and were receiving cessation services were randomized to the exercise group (n=108) who received a free handgrip and a leaflet about handgrip exercise, and watched a 5-minute video, or to the healthy-diet group (n=100) who receive a similar dosage of intervention on healthy diet. The primary outcome was self-reported abstinence in the previous 4 weeks at 6-month follow-up. Results: In the exercise group, about 36% reported doing the exercises when craving at 2-month follow-up. No significant difference in quit rate was found between groups (34% vs. 39%, OR = 0.80, P = 0.40). A posteriori analysis on
the exercise group showed that self-reported exercises when craving (49% vs. 26%, OR = 2.69, 1.18-6.15, P = 0.02) and total adherence (including doing the exercises when craving, once a day, and/or for 2 weeks) (53% vs. 23%, OR = 3.70, 1.15-11.92, P = 0.03) were significantly associated with self-reported abstinence. Conclusions: The brief handgrip/isometric exercise intervention was feasible and achieved modest adherence without offering incentives or mandatory reminders. Preliminary evidence of benefits was observed in the intervention group if the exercises were done when craving. Our study indicates that a brief exercise intervention, including a free handgrip and educational video, was feasible for smokers receiving smoking cessation treatment. It was particularly efficacious in increasing tobacco abstinence when exercise adherence was high.

Funding: This study was supported by Tung Wah Group of Hospitals.

Funding: Nonprofit grant funding entity

PS3-207

ASSOCIATIONS BETWEEN SELF-REPORTED DEPRESSION, IMPULSIVITY, AND MEMORY IN MEN AND WOMEN WHO SMOKE

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Significance: Increased impulsivity and recall deficits have been associated with current and remitted depression. This study aims to further investigate these cognitive differences among smokers who have current or past depression. We hypothesized that individuals with either current or past depression will have greater impulsivity and poorer memory compared to those without, regardless of sex. Methods: This data was collected during a screening visit as part of a trial examining the influence of sex hormones on smoking cessation. Participants self-reported past depression on a medical history questionnaire and/or on an intake form and current major depressive disorder via the Structured Clinical Interview for DSM-IV (SCID). Participants then completed the immediate and delayed memory tasks (IMT and DMT). Linear regression models were used to estimate differences in impulsivity and memory between those with and without depression, adjusted for sex and age. Results: Participants (n=210; 59% white; 47% women) were on average, 37 years old and smoked 14 cigarettes per day. Fifty participants had past depression and 43 had current depression. The association between DMT impulsivity and past depression varied by sex (p=0.02). Men with past depression had 46% higher DMT impulsivity scores (95% CI: 6-102% higher) than men without; women with past depression had 17% lower DMT impulsivity scores (95% CI: 43% lower to 20% higher) than women without. Regardless of sex, participants with current depression had DMT memory scores that were, on average, 5.5 points higher than for those without (95% CI: 1:2-9.9 points higher; p=0.01). We found no significant associations between IMT impulsivity or memory and depression. Conclusion: Men with past or current depression were more impulsive and had lower memory than non-depressed counterparts; this trend was absent in women. Contrary to our hypothesis, participants of both sexes with current depression showed better memory than those without. Additional studies with a more in-depth assessment of current and past depression as they relate to cognitive outcomes are needed to better understand these relationships in men and women who smoke.

Funding: Federal

PS3-208

“THE ONLY REASON WHY I FEEL LIKE I SMOKE IS BECAUSE OF STRESS”: TARGETING CESSATION CONTENT FOR SOCIOECONOMICALLY-DISADVANTAGED YOUNG ADULT SMOKERS

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Objectives: Socioeconomically-disadvantaged young adults (SDYAs) have a higher smoking prevalence compared to young adults who are not disadvantaged. In addition, young adult smokers in general experience more failed quit attempts compared to older adult smokers. This study used qualitative data from focus groups of SDYA smokers with the goal of identifying relevant cessation content and approaches for this vulnerable population. Methods: Thirty-six SDYA smokers aged 18-29 participated in focus groups in Burlington, VT evaluating reasons for smoking, cessation barriers, and smoking intervention content and strategies. Using the Framework Method and NVivo software (QSR international), three coders reviewed transcripts to develop a coding structure while one coder then used this structure to code all of the transcripts. Results: Stress emerged as a prominent theme in the focus group discussions and was repeatedly identified as a reason for smoking (e.g., “The only reason why I feel like I smoke is because of stress”) and a barrier to quitting. Participants described the utility of a cigarette break to remove themselves from stressful interpersonal situations. Some described reduced income and time as impediments to engaging in enjoyable activities that would distract from or reduce stress. Many participants expressed concern about how to handle stress during a quit attempt, describing cigarettes as a “crutch” or coping strategy and the loss of this approach for coping and lack of viable alternatives as a barrier to cessation. Recommendations for smoking intervention content that may address smoking-related stresses included self-monitoring, identifying triggers, providing distraction techniques (e.g., games, puzzles), reminding participants of personal reasons for quitting, and engaging with others for social support. Discussion: Stress plays a central role in the maintenance of smoking in SDYAs. Cessation approaches that directly address the relationship between stress and smoking and provide alternative cost and time effective strategies for stress management may improve self-efficacy to quit in this population.

Funding: Federal

PS3-209

INTENSIVE LONGITUDINAL DATA COLLECTION OF VARENICLINE ADHERENCE AND SIDE EFFECTS AS PART OF A RANDOMIZED CONTROLLED TRIAL

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Introduction: Use of varenicline results in the highest quit rates of any cessation medication mono therapy. After multiple studies, the evidence is clear that varenicline adverse events are no worse than current over the counter (OTC) nicotine replacement therapy (NRT) products. Given these data, the time has come to explore varenicline as a safe and effective OTC medication. The objective of this research was to examine the feasibility of applying intensive longitudinal methods to gathering self-reports of varenicline medication adherence and side effects. Data are from a substudy as part of a large smoking cessation randomized controlled trial (RCT) testing whether varenicline is a solid candidate for switching from prescription to OTC, and whether a dose lower than currently approved is as effective as an OTC environment. METHODS: We are in the process of randomizing 75 participants to the intensive longitudinal substudy. We are using an automated text message system that sends Quatratics survey links to participants’ smartphones to collect morning diaries (1 per day), evening diaries (1 per day), and random assessments (6 per day). Assessments capture medication adherence, sleep disturbance, nausea, etc. Participants report intensive longitudinal data during the first two weeks of their varenicline use and receive incentives for complying with the reporting protocol. RESULTS: So far, we have recruited 48 individuals to the substudy, yielding 672 days of data. Over the 2-week protocol, participants have completed 80.6% (n=2454) of the random assessments, 70.8% (n=446) of the morning diaries, and 75.2% (n=463) of the evening diaries. Participants have reported any nausea on 19% of days (>2% of days with “a lot” or “extreme” nausea) and sleep quality of “bad” or worse on 11% of reported nights. CONCLUSIONS: Participant compliance with the intensive longitudinal is high, despite minimal contact with study personnel. With over 50% of the sample recruited, this approach appears to be a feasible manner to collect data on mechanisms explaining how and when OTC varenicline might affect cessation outcomes.

Funding: Federal

PS3-210

EVALUATING EFFECTS OF IN UTERO NICOTINE EXPOSURE ON INFANT HYPOGLYCEMIA AFTER BIRTH

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Significance: In utero nicotine exposure is underexplored as a potential contributor to infant hypoglycemia after birth. Rat studies have shown that in utero nicotine exposure can be associated with a reduction in pancreatic beta cell mass leading to glucose dysregulation. Hypoglycemia in neonates is common and contributes to 4.0-5.8% of NICU admissions. We analyzed the odds of developing hypoglycemia after birth in a sample of nicotine-exposed infants admitted to a NICU with a retrospective case-
control design. We hypothesized that infants exposed to nicotine in utero were more likely to be hypoglycemic (i.e., blood glucose < 45 mg/dl) compared to non-exposed infants. **Methods:** We augmented an existing dataset of neonates with in utero nicotine exposure (n=360) by selecting case controls (n=360) and completing a retrospective chart review (N=720). We abstracted gestational age, growth parameters, congenital anomalies, maternal history of diabetes, and glucose levels in the first three hours of life. Non-exposed infants were selected from parents who screened negative for household smoking, were born within a 6-month timeframe, and were within 50 grams of a nicotine-exposed infant. **Results:** Over half the sample was male (n=362; 54.8%) and 76.6% (n=462) were from a racial/ethnic minority. Bayesian logistic regression modeled hypoglycemia in the first three hours of life as a function of infants’ home environment (smoking, non-smoking). Infants with in utero nicotine exposure had 29.4% higher odds of being hypoglycemic (OR=1.294, 95% CI=[0.941, 1.773]; posterior probability [PP]=94.4%). The odds for hypoglycemia increased to 38.2% when small-for-gestational-age, intrauterine growth-restricted infants and infants born to diabetic mothers were excluded (OR=1.382, 95% CI=[0.934-2.072]; PP=94.4%). Analyses among infants from smoking households also explored magnitude of nicotine exposure in utero (e.g., total household cigarettes/day) and glucose levels. **Conclusions:** Nicotine-exposed infants have greater odds for developing hypoglycemia after birth requiring immediate intervention. Mechanisms of action should be explored and pregnant women should be warned of nicotine exposure risks.

**FUNDING:** Federal

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**PS3-211**

**SMOKING OUTCOME EXPECTANCES DIFFER AMONG AFRICAN AMERICAN AND WHITE SMOKERS**

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Beliefs about the effects of smoking, or smoking outcome expectancies, have been shown to predict smoking initiation, nicotine dependence, and cessation outcomes. Differences have been reported among African American (AA) and White smokers in smoking behavior, nicotine dependence, and cessation outcomes. However, there has been little research investigating smoking outcome expectancies among AA smokers. The 55-item Smoking Consequences Questionnaire-Adult (SCQ-A) is a widely used measure of smoking outcome expectancies but has not been adequately validated among a large sample of AA smokers. The present investigation assessed the factor structure of the SCQ-A using a sample of 323 AA smokers (44% male, 41% Female, M = 14 cigs/day, Mage = 31.53 years) and provided complete data. Results: Mediation tests revealed a significant indirect effect of intensity through past quit challenges on barriers to cessation (ab = .16, SE = .06, 95%CI: .04-.28), expectancies for smoking to relieve negative affect (ab = .009, SE = .006, 95%CI: .001-.02), and negative affect reduction smoking motives (ab = .06, SE = .03, 95%CI: .01-.12); alternative models, except expectancies, were non-significant. The indirect effects of Omin and elasticity on outcomes via past quit challenges were non-significant. **Conclusions:** Findings suggest that intensity has an indirect effect on cognitive-based smoking processes through past quit challenges. Importantly, the observed effect was only evident for intensity, which is characterized by volumetric cigarette use in the absence of cost or consequences, highlighting the uniqueness of this metric relative to Omax and elasticity. Additional work is needed to replicate these results in an independent sample of non-treatment seeking smokers.

**FUNDING:** Federal

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**PS3-212**

**APPLYING A BEHAVIORAL ECONOMIC APPROACH TO UNDERSTANDING SMOKING PROCESSES, THE MEDIATED ROLE OF PAST QUIT EXPERIENCES**

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**Objective:** Extensive work supports relations among indices of cigarette demand, smoking dependence, and abstinence. Less work has evaluated how demand relates to cognitive processes that interfere with smoking cessation (e.g., perceived barriers, expectancies, and motives). Little is understood about variables that may explain relations between demand and cognitive smoking processes, such as problems experienced during past quit attempts. We evaluated the indirect effect of cigarette demand, via intensity (i.e., consumption at zero cost), Omin (i.e., maximum expenditure across prices), and elasticity (i.e., sensitivity of demand to increases in costs), on perceived cessation barriers, smoking expectancies, and smoking motives through difficulties experienced during past quit attempts. **Methods:** Adult daily cigarette smokers (n=101; 70.3% male; Mage (SD) = 45.39 (10.97) years) were recruited from the community to participate in a randomized controlled pilot smoking cessation treatment trial. Analyses are based on baseline data (pre-treatment) from participants who reported smoking for at least a year, current (past week) smoking, a past cigarette quit attempt, and provided complete data. Results: Mediation tests revealed a significant indirect effect of intensity through past quit challenges on barriers to cessation (ab = .16, SE = .06, 95%CI: .04-.28), expectancies for smoking to relieve negative affect (ab = .009, SE = .006, 95%CI: .001-.02), and negative affect reduction smoking motives (ab = .06, SE = .03, 95%CI: .01-.12); alternative models, except expectancies, were non-significant. The indirect effects of Omin and elasticity on outcomes via past quit challenges were non-significant. **Conclusions:** Findings suggest that intensity has an indirect effect on cognitive-based smoking processes through past quit challenges. Importantly, the observed effect was only evident for intensity, which is characterized by volumetric cigarette use in the absence of cost or consequences, highlighting the uniqueness of this metric relative to Omax and elasticity. Additional work is needed to replicate these results in an independent sample of non-treatment seeking smokers.

**FUNDING:** Federal

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**PS3-213**

**TOBACCO USE TRAJECTORIES AMONG AMERICAN INDIAN ADOLESCENTS AND YOUNG ADULTS**

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**Significance:** Despite overall decreases in U.S. smoking rates over the past 50 years, American Indians (AIs) exhibit some of the highest smoking rates of all ethnic/racial groups.1,2 After examining tobacco use by age, 18.7% of Al high school students currently smoke, which is the highest smoking prevalence rate among high school students across ethnicity/race.3 Quit rates are lower in this population compared to other ethnic/racial groups, which may be due to earlier smoking initiation among AI youth.4,5 Explanations for earlier smoking initiation among AI youth include parental tobacco use (i.e., intergenerational transmission of tobacco use) and personal mental health symptoms.6,7 The present study aims to longitudinally examine tobacco use trajectories among Al youth and adolescents.

**Methods:** Data was from the National Longitudinal Study of Adolescent Health (Add Health), and included 338 Al youth and young adults, ages 11-17 to 26-34 over four waves. Smoking was characterized as an ordinal variable: never smoked; smoked, but not in the past month; smoked in the past month, but not daily; and daily past month smoking. Growth mixture model was used to examine smoking trajectories and account for the complex study design.

**Results:** Results revealed three classes of longitudinal patterned smoking among AIs: a light smoking class (71.75%), a reducing smoking class (21.48%), and a young adult onset smoking class (6.77%). The light smoking class demonstrated low levels of smoking across development. The reducing smoking class smoked among adolescence and peaked to daily smoking in young adulthood, but then reduced smoking during adulthood. The young adult onset class were nonsmokers during adolescence, began smoking in young adulthood, and became daily smokers by adulthood.

**Conclusions:** Findings add to literature on the developmental trajectory of smoking among AIs, an underserved population at increased risks for tobacco related cancers and mortality. These patterns of smoking onset and duration, as well as smoking abstinence, in AI adolescents and young adults inform existing, as well as future, culturally-relevant smoking cessation interventions for AIs.

**FUNDING:** Academic Institution
PS3-214
THE RELATIONSHIP BETWEEN PSYCHOSOCIAL STRESSORS AND CIGARETTE SMOKING AMONG AFRICAN AMERICAN AND LATINO/A ADULTS WITH PSYCHIATRIC ILLNESS.
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Significance: While the overall smoking prevalence among adults in the United States has decreased, smoking disparities persist for certain groups, such as individuals with psychiatric disorders and individuals who identify as racial/ethnic minorities. These groups also experience higher levels of psychosocial stress. Little is known about the relationship of stress and smoking for adults with psychiatric disorders and who identify as racial/ethnic minorities. This study was the first to examine the relationship between psychosocial and psychotropic-related stressors and cigarette smoking status in a sample of African American and Hispanic adults with psychiatric illness.
Methods: Participants were recruited from the Adult Outpatient Psychiatric Clinic at Lincoln Medical Center in the Bronx, New York. Participants self-reported their psychiatric diagnosis which was verified by a review of medical records. Participants completed measures of demographics, smoking behaviors (e.g., smoking status), psychosocial and psychiatric-related stress. Participants were excluded if they were pregnant, had a smoking disorder, or refused to participate. A total of 305 participants were included in the study. Results: The overall sample (n=95; 36.85% current cigarette smokers) was 46.24 years old and the majority identified as female (n=66; 69.45%) and Latina (n=50; 52.63%). The predominant psychiatric diagnoses were schizophrenia spectrum and other psychotic disorders (n=32; 33%), depressive disorders (n=31; 32%), and bipolar disorders (n=18; 18.6%). Compared to those who reported lower levels of stress, participants who reported higher levels of stress associated with friend strain (OR = 1.29, CI 95% [1.01, 1.65]), lifetime discrimination (OR = 1.54, CI 95% [1.11, 2.15]), and attending appointments to secure psychiatric medication (OR = 1.99, CI 95% [1.04, 3.83]) were significantly more likely to be current cigarette smokers. Significance: Electronic cigarettes (EC) heat liquids to produce an inhalable aerosol. Some liquids (such as the liquids in JUUL) contain protonated nicotine (“nicotine salt”) and these, among other components of tobacco smoke, affect homeostasis. Aims of this study: Electronic cigarettes (EC) heat liquids to produce an inhalable aerosol. Some liquids (such as the liquids in JUUL) contain protonated nicotine (“nicotine salt”), and among other components of tobacco smoke, affect homeostasis. Aims of this study were to examine the relationship between psychosocial and psychotropic-related stressors and cigarette smoking status in a sample of African American and Hispanic adults with psychiatric illness. Results: The overall sample (n=95; 36.85% current cigarette smokers) was 46.24 years old and the majority identified as female (n=66; 69.45%) and Latina (n=50; 52.63%). The predominant psychiatric diagnoses were schizophrenia spectrum and other psychotic disorders (n=32; 33%), depressive disorders (n=31; 32%), and bipolar disorders (n=18; 18.6%). Compared to those who reported lower levels of stress, participants who reported higher levels of stress associated with friend strain (OR = 1.29, CI 95% [1.01, 1.65]), lifetime discrimination (OR = 1.54, CI 95% [1.11, 2.15]), and attending appointments to secure psychiatric medication (OR = 1.99, CI 95% [1.04, 3.83]) were significantly more likely to be current cigarette smokers. Conclusions: Among African American and Hispanic adults with psychiatric illness, stress associated with friend strain, lifetime discrimination, and appointments with clinicians for psychotropic medication management were associated with cigarette smoking. Results highlight specific psychosocial stressors that could be targeted by mental health clinicians to facilitate smoking cessation.
FUNDING: Academic Institution

PS3-215
SMOKING AND THE CLOCK
Andrea Rabenstein, PhD. University Hospital for Psychiatry and Psychotherapy, Munich, Germany.
Background: Light-dark structure of the environment, influences daily life significantly: from work, social life, to individual health. It is essentially dependent on environmental influences (especially light exposure), genetic factors, age and gender. Many people suffer from “social jetlag”, the discrepancy between individual indoor life and social outside time. This arises, for example, when a later chronotype, must get up early on working days and therefore interrupts its biological sleep times with the help of an alarm clock. In Germany, between 25 and 30% of the population smoke. The dependency-generating substance, nicotine, is a centrally acting chemical compound that has several effects. Of this potent substance, smokers ingest several milligrams every day and these, among other components of tobacco smoke, affect homeostasis. Aims of the Study: How does tobacco use affect the internal clock? Does the chronotype favor tobacco dependence or is it tobacco use that influences the chronotype? Methods: We offered a standardized smoking cessation course to a group of participants, to see if there are differences in chronotype between, before and after cessation? We also wanted to know, if there are differences between the ones that do and the ones that do not manage to quit? Measurements were: Actimetry, questionnaires. Results: 51 participants (34 women, 17 men) took part in the study, age was between 23 to 69 years. One important possibility to see what kind of chronotype we are ist o measure the centre of gravity (COG) with actimetry. Investigating COGs of sufficiently complete days of actimetry: Participants of the successful group showed earlier COG than the not successful group before and after cessation when comparing daily averages. Smoking fewer cigarettes was not associated with earlier COGs when comparing the individual weekly consumption derived from the NUI questionnaire to the individual weekly COG. Conclusion: Successful participants showed earlier daily avg. COG.< than not successful participants, which might be a predictive value for successful cessation but needs further investigation. Successful and not successful participants do not show significant differences in their results from actimetry, the MCTQ or sleep related questionnaires after cessation, pointing to the possibility that smoking does not make you later, but that smoking might rather be a response to stress/social jetlag.

PS3-216
EFFECTS OF PROTONATED NICOTINE (“NICOTINE SALT”) LIQUIDS ON CIGARETTE SMOKERS
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Significance: Electronic cigarettes (EC) heat liquids to produce an inhalable aerosol. Some liquids (such as the liquids in JUUL) contain protonated nicotine (“nicotine salt”) and among other components of tobacco smoke, affect homeostasis.
Methods: A randomised, controlled, multicentre acceptability and feasibility trial
Participants: recruited from the Adult Outpatient Psychiatric Clinic at Lincoln Medical Center in the Bronx, New York. Participants self-reported their psychiatric diagnosis which was verified by a review of medical records. Participants completed measures of demographics, smoking behaviors (e.g., smoking status), psychosocial and psychiatric-related stress. Participants were excluded if they were pregnant, had a smoking disorder, or refused to participate. A total of 305 participants were included in the study. Results: The overall sample (n=95; 36.85% current cigarette smokers) was 46.24 years old and the majority identified as female (n=66; 69.45%) and Latina (n=50; 52.63%). The predominant psychiatric diagnoses were schizophrenia spectrum and other psychotic disorders (n=32; 33%), depressive disorders (n=31; 32%), and bipolar disorders (n=18; 18.6%). Compared to those who reported lower levels of stress, participants who reported higher levels of stress associated with friend strain (OR = 1.29, CI 95% [1.01, 1.65]), lifetime discrimination (OR = 1.54, CI 95% [1.11, 2.15]), and attending appointments to secure psychiatric medication (OR = 1.99, CI 95% [1.04, 3.83]) were significantly more likely to be current cigarette smokers. Conclusions: Among African American and Hispanic adults with psychiatric illness, stress associated with friend strain, lifetime discrimination, and appointments with clinicians for psychotropic medication management were associated with cigarette smoking. Results highlight specific psychosocial stressors that could be targeted by mental health clinicians to facilitate smoking cessation.
FUNDING: Federal, Academic Institution

PS3-217
INTEGRATING SMOKING CESSATION TREATMENT AS PART OF USUAL PSYCHOCARE: A MULTICENTRE, ACCEPTABILITY, FEASIBILITY AND IMPLEMENTATION TRIAL
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Background: People with depression/anxiety are twice as likely to smoke as the general population. In England, people with depression/anxiety can access psychological services known as IAPT, which could offer smoking cessation treatment as part of usual care (UC) but currently do not. We aim to examine if it is possible to offer smoking cessation treatment alongside UC. Results: As of November 2019, we have recruited 69/157 participants, final follow-up is due July 2020. In the treatment arm 6.7% (2/30) of participants have discontinued participation in the trial, and 3.3% (1/30) in the control arm have
discontinued. Of those followed-up at 3-months, 25% (4/16) of participants in the treatment arm reported having quit smoking for ≥7-days and passed bio-verification (exhaled CO <10ppm), 0% (0/18) of participants in the control arm reported quitting smoking for ≥7 days. Interview data suggest that the intervention is acceptable to clinicians and participants. Data will be updated in August 2020.

Conclusion: Preliminary data suggest that the intervention and trial procedures are accepted and feasible. We will seek to conduct an RCT to examine whether the intervention increases smoking abstinence and improves depression/anxiety more than UC.

FUNDING: Nonprofit grant funding entity

PS3-218
EVALUATING RELATIONSHIP OF CO-OCCURRING CANNABIS & TOBACCO USE IN VETERANS
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Significance: Cannabis use has been rising in the United States, and preliminary research suggests high rates of concurrent use of cannabis in tobacco users. Limited data on smoking cessation outcomes among clinical samples of cigarette and cannabis co-users are available. Given lack of understanding and more readily availability of cannabis, it is imperative to explore influences of cannabis on Veteran smokers. Methods: This pilot project is designed as a preliminary analysis to compare baseline characteristics in co-occurring users of cannabis and cigarettes vs cigarette only users, presenting to a Pharmacist Managed Telephone Tobacco Cessation Clinic (PMTTCC). This observational study enrolled Veterans who completed a consult with the PMTTCC. All participants received monthly phone counseling as part of the PMTTCC and access to multiple forms of nicotine replacement therapy. Participants completed baseline assessments prior to the initial telephone treatment session. Descriptive statistics will be utilized for baseline demographics. Independent-t tests and Pearson chi-squared were used where appropriate. Results: Thirty-six completed baseline assessments with 23 cigarette only users vs 13 co users. Average age for both groups was 53 and 17.39% identified as female for the cigarette only group vs 30.77% for the co user group. The co users had lower employment measures: years of full time employment (15.5 years in cigarette only vs 10.5 years in co users), days paid in the last 30 days (10.9 days in cigarette only vs 6.2 days in co users) and mean annual salary ($38,265 in cigarette only vs $33,700 in co users), however none were statistically significant. 39% used alcohol in the cigarette only group and 45% used alcohol in the co user group vs (p = 0.681). Co-users had trends of higher average days of alcohol use within the last 30 days of 18.7 days vs 10.1 days (p = 0.203) in the cigarette only group. Conclusion: There were no statistical significant differences identified. However, some interesting trends were identified regarding alcohol use and employment measures. With a larger sample, we may be able to draw better conclusions.

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

PS3-220
HIGH BURDEN OF CHRONIC PAIN AMONG METHADONE-MAINTAINED SMOKERS
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Significance: Persons with opioid use disorder (OUD) have a high prevalence of tobacco use and low cessation rates compared to smokers without OUD, and also commonly suffer with chronic pain. Among persons without OUD, pain intensity is associated with nicotine withdrawal, distress intolerance, negative affect, and urges to smoke. Though chronic pain and OUD are highly co-morbid, the impact of pain on tobacco use behavior among persons with OUD remains unclear. Methods: Participants were persons with OUD enrolled in methadone maintenance treatment in the Bronx, NY, screened for inclusion in a smoking cessation trial. Participants were recruited in clinic waiting areas and through staff referral. Participants were asked about current tobacco use behavior, chronic pain (defined as a pain condition that causes pain on most days, lasting for three months or more), and interest in smoking cessation. Descriptive statistics were calculated for variables related to smoking behavior and pain prevalence. We assessed the relationship between chronic pain, interest in quitting smoking, and cigarettes smoked per day using chi-square tests of independence and point-biserial correlation coefficients. Results: Of 320 current smokers with OUD, 69.4% (n=222) reported chronic pain. Among smokers reporting chronic pain, 55.9% (n=124) identified as Latinx, 38.3% (n=89) Black, and 53.1% female. The median age was 55. The median number of self-reported cigarettes per day was 10, and 94.1% (n=209) reported interest in quitting smoking in the next 30 days. Chronic pain was not significantly associated with interest in quitting smoking or with cigarettes smoked per day. Conclusion: In this sample of methadone-maintained smokers, interest in quitting among participants who reported chronic pain was nearly ubiquitous. Given the high prevalence of chronic pain and high interest in quitting among smokers with OUD, it is important to understand whether pain impedes smoking cessation efforts.

FUNDING: Federal; Pharmaceutical Industry

PS3-219
GENETIC VULNERABILITY FOR SMOKING OR PSYCHOSIS AND CROSS VULNERABILITY OUTCOMES IN PATIENTS, SIBLINGS AND CONTROLS
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Significance: Smoking is very common in individuals with psychosis, and this co-occurrence has been postulated to arise from common genetic risks. However, it is yet unknown whether the genetic factors for schizophrenia and smoking are associated co-occurring phenotypic symptoms of psychosis and smoking behavior. Methods: Genotype and phenotype data were collected from patients with psychosis (n=710), un-affected siblings of patients (n=731), and healthy controls (n=369 in a prospective cohort study of six years). Polygenic risk scores obtained for smoking initiation, cigarettes per day and schizophrenia for a range of p-value thresholds (p). Smoking behavior and self-rated psychotic symptoms were measured at three assessment times using validated questionnaires. Cross-phenotype associations were explored using linear mixed-effect models and results were adjusted for false discovery rates.

Results: In healthy controls, polygenic risk scores for smoking initiation were positively associated with subclinical positive symptoms (estimate $p$-value threshold 5x10\(^{-8}\) = $0.07$-$0.02$; SE $0.03$-$0.01$; $R^2$ $0.05$-$0.07$) and subclinical negative symptoms (estimate $p$-value threshold 5x10\(^{-8}\) = $0.38$-$0.03$; SE $0.18$-$0.01$;

FUNDING: Federal; Pharmaceutical Industry

PS3-221
THE EFFECT OF PICTORIAL HEALTH WARNING LABELS ON THE ENDS DEVICE ON YOUNG USERS’ EXPERIENCE, EXPOSURE AND INTENTION TO USE: A PILOT STUDY
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Objective: The use of electronic nicotine delivery systems (ENDS; e-cigarettes) has reached epidemic levels among young people in the US. This pilot proof-of-concept study aims to evaluate the effect of placing pictorial health warning labels (HWLs) on the ENDS device on use experience, puffing patterns, harm perception, nicotine exposure, and intention to quit or use in the future. Methods: JUUL users (n=19; age 18-24 years; 56% male; 79% Hispanics) were recruited to complete two 60 min ad libitum sessions that differed by...
HWL on the device (HWL vs. no-HWL control) in a crossover clinical lab study.

**Results:** Compared to control, using JUUL with pictorial HWL on the device was significantly associated with lower product enjoyment, interest to use in the future even if it was the only product on the market. Trends towards reduced puffing behavior and nicotine boost were also noted among those exposed to the HWL, compared to control.

**Conclusions:** This pilot study shows that placing pictorial HWL on the ENDS device is an effective and promising strategy for research and policy aiming at reducing ENDS use among young people.

FUNDING: Academic Institution
greater perception of harm for 29 statements (all statistically significant, p<0.05). The average percentage of youth agreement with these 29 statements changed 6.5 percentage points from baseline to first follow-up. There was no change in agreement levels for 6 items. One item shifted in the opposite direction.

CONCLUSIONS. Our findings indicate that youth beliefs about vaping are shifting toward greater perceptions of harm in a short period of time. Given the current public health concerns with use of vapes, researchers should focus on identifying and changing specific risk perceptions that can potentially reduce vape initiation among youth who are at greatest risk.

FUNDING: Federal

PS5-3
EYE TRACKING RESPONSES TOWARDS GRAPHIC TOBACCO WARNING LABELS
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Background: A critique of graphic warning labels has been their potential to elicit avoidance where smokers reject or avoid engaging with fear-based messages subsequently. There are no studies, so far, that objectively measure how smokers visually engage with high vs low avoidance warning labels. This study aims to understand visual engagement with warning labels among smokers using eye-tracking measures.

Methods: A total of 321 daily smokers (39.7% female; cigarettes/day: M=15.3, SD=7.1) were randomized to a high or a low avoidance label. 5 warning labels depicting images of disease and disability caused by tobacco use were categorized as high avoidance and the remaining 4 as low avoidance labels. The participants attended 4 laboratory sessions over a period of 10 days. During each session, eye movements were recorded while viewing the warning labels for 20 seconds. Areas of interest (AOI) for each warning label consist of the image (AOI image) and the text warning (AOI text). For each AOI, total fixation duration, fixation during the first 7 seconds and latency (time to first viewing) were assessed in seconds. We present the results from warning label viewing on the first day.

Results: The latency for AOI image on first viewing is not significantly different between high (M=2.50, SD=5.55) and low avoidance labels (M=2.81, SD=4.53), however, latency for AOI text is significantly higher in high avoidance group (M=6.75, SD=7.50) as compared to low avoidance group (M=4.04, SD=6.73, t (275)=-3.12, p<0.01). The total fixation duration on the image among smokers viewing the high avoidance labels (M=9.24, SD=4.57) is significantly higher than low avoidance labels (M=6.41, SD=4.12, t (263)=-5.23, p<.0001). The total fixation duration on the text for high avoidance labels (M=2.34, SD=2.19) is significantly lower than low avoidance labels (M=4.29, SD=3.30, t (230) = 5.38, p<.0001). Conclusion/Discussion: Objective data from this study collectively show that graphic high avoidance images gain attention just as quickly as low avoidance images and hold attention significantly longer than low avoidance images. The results suggest that the labels with grotesque imagery of disease and death caused by tobacco use are not necessarily avoided by smokers.

FUNDING: Federal
PS5-5
DAILY SLEEP DURATION AS A POSSIBLE PREDICTOR OF SMOKING RELAPSE
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Significance: Overall, smokers get fewer hours of sleep per night than non-smokers and former smokers. Further, clinic based research indicates that longer sleep duration is correlated with greater likelihood of cessation at post-quit follow-up visits. Ecological momentary assessment (EMA) may enable researchers to examine the day-to-day relation between sleep duration and smoking status. This study aimed to examine the association between daily self-reported sleep duration and next-day abstinence during the early phase of a quit attempt.

Methods: Data from a pilot three-armed randomized clinical trial of a smartphone-based smoking cessation intervention among adults (N=81) were used to examine mechanisms linking hours of sleep and smoking status the next day. Participants were loaned a smartphone and asked to complete EMAs during the first 4-weeks following a scheduled quit attempt. EMAs assessed daily sleep and wake times and daily smoking status. Multilevel models were conducted to estimate the associations between sleep duration and daily smoking status controlling for age, sex, education, race (White, non-White), intervention group, history of depression, and heaviness of smoking at baseline.

Results: Participants were primarily male (51.2%), White (67.9%), 49.4 years old (SD=12.2), and completed 1133 daily diary EMAs during the 4-week post-quit period. Results indicated that participants who slept fewer hours during a particular night were more likely to smoke the next day (β=-0.22, p=.01). Conclusion: Results indicate that shorter duration of sleep during a smoking cessation attempt may increase the risk for next-day smoking lapse. Smoking cessation interventions that incorporate empirically validated sleep therapy may increase successful cessation attempts.

FUNDING: Federal; State; Academic Institution

PS5-6
CESSATION BEHAVIORS AMONG SMOKERS OF MENTHOL AND FLAVOURED CIGARETTES FOLLOWING THE IMPLEMENTATION OF THE EU TOBACCO PRODUCTS DIRECTIVE. FINDINGS FROM THE EUREST-PLUS ICT EUROPE SURVEYS.

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Background: In light of recent accusations of deliberate advertising to children, multiple cigarette and e-cigarette companies have released corporate social responsibility statements (CSR) committing to keeping all nicotine and tobacco products away from children and deterring non-smokers from vaping. However, in light of recent news that 1 in 4 high school students has tried e-cigarettes in the past 30 days, it is likely that awareness of this information would influence the effectiveness of such statements. Methods: An online experiment (N = 344) current and former smokers were given an online experiment to a statement of a company’s CSR or a simple product description from an unspecified source. Participants aware of the prevalence of youth vaping were compared to those unaware. All then responded to a series of beliefs in two forms: harms in comparison to cigarettes (cigarette risk) or harms to self in absolute terms (self risk). Differences in

FUNDING: Federal; State; Academic Institution; Nonprofit grant funding entity
Background: IQOS, a new heated tobacco product by Phillip Morris, uses an electronic heating system to create nicotine-containing aerosol from processed tobacco sticks ("HeatSticks"). It was launched in Atlanta, GA in October 2019. We investigated how young adults with experience using multiple tobacco products reacted to the IQOS device, packaging, and marketing materials. Methods: This study was part of a longitudinal study of young adult poly-tobacco users in California (Fall 2019). 26 interviewees unboxed and discussed the IQOS device, HeatSticks, and marketing materials from Canada and Korea. We audio-video recorded and transcribed the interviews, developed a coding scheme, and conducted thematic analysis. Results: Prior to the interview, seven participants had heard of or seen IQOS. One of them owned it. Participants often noted similarity between the packaging and device of IQOS and Apple. Descriptors ranged from "sleek," "modern," and "luxurious" to "weird," "bulky," and "too complicated." Participants were intrigued by the promise of "no smoke." 12 participants expressed interest in trying or buying IQOS; 18 expressed at least some susceptibility. Participants drew analogies between IQOS and other tobacco products and cannabis flower vaporizers, often classifying IQOS as "in between" a cigarette and e-cigarette. Similarity between using IQOS and smoking cigarettes led participants to suggest that IQOS is more appropriate for smokers (especially those trying to quit) than for e-cigarette users. Some participants made explicit and implicit statements that IQOS is less harmful than cigarettes. Others thought it would be equally harmful. Some said it would be more harmful than vaping, others said it would be less harmful. Conclusion: Understanding the product appeal of IQOS to young adults can inform regulatory and behavioral interventions as heated tobacco products enter the US market. Even without a reduced risk or cessation claim, and with warning labels, some participants inferred that IQOS use is healthier than cigarette smoking. This perception, and IQOS' sleek packaging and advertised lack of smoke, might increase susceptibility for young people.

FUNDING: Federal

PS5-11

A SMOKEFREE HOME POLICY INTERVENTION IN A NORTHERN PLAINS TRIBAL COMMUNITY A COMMUNITY ENGAGED QUALITATIVE RESEARCH APPROACH TO INTERVENTION DEVELOPMENT

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Background: Although national legislation has greatly decreased the amount of second-hand smoke (SHS) exposure in public spaces, national regulation of SHS inside the home is lacking. American Indians in the Northern Plains use commercial tobacco products at a rate two times that of the general population, consequently, this population experiences a heavy burden of respiratory illnesses including asthma, and disproportionate cancer rates. National rules establishing smoke-free policies in public housing do not include housing on American Indian land. The lack of regulation on in-home smoking has left vulnerable populations including children and other non-smoking family members exposed to high levels of SHS. Objectives: The NIH-funded “Cheyenne River Sioux Smoke-Free Home (SFH) Project” aims to decrease SHS exposure in the home through a community-based participatory research approach in which Lakota values are central to every aspect of prevention. To identify strategies and challenges to creating a SFH, a bicultural team of researchers used key informant interviews to develop a Lakota values-based intervention that seeks to decrease the amount of SHS in Northern Plains tribal homes. Methods: The research team conducted key informant interviews among Northern Plains tribal members (N=12) about their experience making a SFH. Through collaborative analysis, which weighs scientific and cultural ways of knowing equally, Lakota values that guided the creation of a SFH emerged from the data. Results: Qualitative themes (Lakota values) were used to guide intervention materials included the following: compassion and generosity for family and friends; Humility, love, honor, respect, and sacrifice for the next generation; acknowledging the truth about SHS impacts through generations; and fortitude and perseverance in the face of struggles. Conclusions: This qualitative research study revealed important and culturally relevant information that was used to create an intervention to assist Northern Plains Tribal members to create a Smoke-Free Home

FUNDING: Federal

PS5-13

ELECTRONIC CIGARETTES AS A METHOD OF HARM REDUCTION AT THE POPULATION LEVEL

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Background and Aims: Recent nicotine use trends raise concerns that electronic cigarettes (ECs) may be targeting adolescents and acting as a gateway to cigarettes. The aims of this study are to examine prevalence trends of exclusive EC use, exclusive cigarette use, and dual use (ECs + cigarettes), as well as to determine the ages of initiation for each user group, and investigate hypothetical trends in total nicotine use and cigarette use in the absence of ECs. Design: Data from the National Youth
Tobacco Survey (NYTS) were used to statistically model trends in the prevalence ratios for each user group, and their initiation ages. Projections from counterfactual models based on data from 1999-2009 (before EC introduction) were compared to actual trends based on data from 1999-2018. Rigorous error analyses were applied, including Theil proportions. Setting: USA. Participants: Adolescents aged 12-17 years who are established exclusive cigarette users (>100 cigarettes smoked AND >100 days vaped), established exclusive EC users (<100 cigarettes smoked AND >100 days vaped), and established dual users (>100 cigarettes smoked AND >100 days vaped).

Results: Exclusive cigarette use prevalence declined from 1999-2018, while exclusive EC use and dual use prevalences increased since their introduction in 2009. The age of cigarette initiation began a slight increase after 2014, whereas the higher ages for EC and dual use remained approximately constant, and slightly declined, respectively. The counterfactual comparison results were consistent with ECs not increasing the number of adolescent nicotine users, and in fact diverting adolescents from cigarettes.

FUNDING: Federal

PS5-14
COMBUSTIBLE TOBACCO WARNINGS WORLDWIDE
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Significance: 118 Countries around the world have adopted prominent pictorial warnings for cigarettes, yet no systematic research has evaluated the dominant characteristics of the warnings that have been implemented. We have compiled a library of English combustible tobacco warnings from around the world to assess what health risks are covered, whether warnings include a marker word (ex: WARNING), as well as other warning characteristics. Methods: Warnings for combustible tobacco were compiled from countries that have English as an official or de facto language and abstracted into a database. Warnings were coded for a variety of characteristics, including marker word, the bodily system of the health effect mentioned in the warning (if applicable), and the inclusion of topics such as cancer, addiction, chemicals, or second-hand smoke. Basic descriptive statistics were generated to describe the overall landscape of combustible warnings in English worldwide. Results: 273 English language warnings were identified from 24 countries around the world. Of the warnings that we identified, nearly all (94%) were pictorial, a majority (55%) included marker words in the warning, such as WARNING, Health Authority Warning, and Surgeon General Warning, often at the beginning of the warning. Warnings often mentioned about health effects to the circulatory (20%), respiratory (27%), nervous (15%), and reproductive systems (17%), while fewer warnings discussed health effects to the endocrine system (<1%), muscular system (<1%), and skin (5%). Most often health warnings mentioned general health effects (33%) which discussed premature death, mortality, or morbidity. Conclusions: While many combustible tobacco warnings in English cover important health effects of smoking, some other health effects are not mentioned about as frequently. Some important health effects of cigars are excluded from specific mention in the warnings, such as cancer, cardiovascular disease, non-malignant respiratory disease, second-hand smoke. This work will enable our group to identify gaps in existing warnings to assist in developing a set of LCC warnings that may include health effects and strategies not currently employed.

FUNDING: Federal

PS5-15
DEVICE TYPES AND FLAVORS USED BY YOUTH ELECTRONIC NICOTINE DELIVERY SYSTEM (ENDS) USERS IN THE PATH STUDY, 2017-2018
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Significance: To date no study has reported US nationally representative estimates of youth current electronic nicotine delivery system (ENDS) users by device category or their detailed use behaviors. Methods: Using data from Wave 4.5 (2017-2018) of the Population Assessment of Tobacco and Health Study, youth (12-17 years) current (past 30-day) ENDS users (n = 869) were categorized as closed (non-rechargeable devices or rechargeable devices that use cartridges) or open system (rechargeable, refillable devices that do not use cartridges) users based on their primary ENDS device. Demographics, device characteristics, and use patterns were examined overall and by device type. Analyses were weighted to produce nationally representative estimates.

Results: Among the 6.8% of current ENDS users at Wave 4.5, 57.3% used closed systems and 26.7% used open systems. Compared to users of open systems, users of closed systems were significantly more likely to report receiving mostly A's or A's and B's in school (56.4% vs. 42.0%). Frequency of ENDS use was lower in closed versus open system users: 21.8% vs. 28.4% used 20-30 days in the past month. Users of closed systems believed their ENDS device contained nicotine more often than users of open systems (67.9% vs. 50.5%). Closed system users were also more likely to have a regular brand of ENDS (26.5% vs. 13.5%). For flavors used in the past 30 days, closed system users were more likely to report tobacco flavored (14.7% vs. 4.1%) and mint / menthol (53.3% vs. 25.9%), and less likely to report candy, desserts, or other sweets (37.9% vs. 59.1%). Use of ENDS because 'e-liquid comes in flavors I like' was less frequently endorsed by closed system users (73.1% vs. 79.9%). No significant differences were observed between closed and open system users for combusted or non-combusted tobacco product use, exclusive ENDS use, current cigarette smoking status, frequency of cigarette smoking (<15 days vs. 15+ days per month), and number of cigarettes smoked per day. Conclusion: Youth were more likely to use closed system ENDS devices. Several differences were observed between groups, particularly with the use of flavors. FUNDING: This project is supported with Federal funds from the National Institute on Drug Abuse, National Institutes of Health, and the Center for Tobacco Products, Food and Drug Administration, Department of Health and Human Services, under contract to Westat (Contract No. HHSN272201100027C).

FUNDING: Federal, Other

PS5-16
UNPACKING THE NON-HISPANIC OTHER CATEGORY: DIFFERENCES IN PATTERN OF TOBACCO PRODUCT USE AMONG YOUTH AND ADULTS IN THE UNITED STATES, 2009-2018
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Introduction: Studies investigating patterns of tobacco use among racial subgroups often aggregate multiracial and racial minorities into the “Other” category due to sample size limitations, thereby masking important differences in tobacco product use among these groups. Methods: Pooling ten years (2009-2018) of data from the National Survey of Drug Use and Health (n=52,424), we estimated population prevalence of menthol and non-menthol cigarettes, cigars (big cigars, cigarillos, little cigars), traditional pipe, smokeless tobacco (SLT: chew, snuff, dip, and snus), and patterns of single, dual, and polytobacco use for youth (12-17) and adults (18+). We considered the following non-Hispanic racial subgroups: Asian, African/African/Asian Indian/Az/Alaska Native (A/AN), Native Hawaiian/other Pacific Islander (NH/PI), and multiracial. Results: Cigarettes were the most prevalent tobacco product used among youth and adults across all races. Menthol cigarette use was more prevalent than non-menthol use among NH/PI youth (3.0% vs. 1.7%) and adults (16.8% vs. 6.5%). For each product, prevalence was highest among A/AN followed by NH/PI and multiracial youth and adults. A/AN and multiracial youth had comparable prevalence of cigar use (2.7% vs. 2.6%), SLT use was lower among multiracial youth (1.7%) compared to A/AN (4.3%) and NH/PI (2.7%) youth. Cigar use was highest among multiracial adults (7.5%) while SLT use was highest among A/AN adults (7.0%). Single (9.2%), dual (2.8%), and poly use (0.7%) were most prevalent among A/AN youth followed by multiracial youth (6.3%, 1.7%, 0.6%, respectively). Similarly, single (35.8%), dual (6.6%), and poly (1.3%) use was most prevalent among A/AN adults followed by multiracial adults (30.3%, 5.8%, 0.9%, respectively), though NH/PI adults had comparable poly use prevalence (0.8%). Conclusions: Evidence of heterogeneity in patterns of tobacco use exist across racial subgroups commonly aggregated into the “Other” category in tobacco-related research. In order to tailor effective tobacco prevention and cessation interventions, further investigation of these populations is needed.

FUNDING: Federal

PS5-17
AWARENESS AND USE OF HEATED TOBACCO PRODUCTS AMONG U.S. MIDDLE AND HIGH SCHOOL STUDENTS- NATIONAL YOUTH TOBACCO SURVEY, 2019
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Evidence of heterogeneity in patterns of tobacco use exist across racial subgroups commonly aggregated into the “Other” category in tobacco-related research. In order to tailor effective tobacco prevention and cessation interventions, further investigation of these populations is needed.

FUNDING: Federal
**Significance:** Heated tobacco products (HTPs) represent a diverse class of products that heat tobacco leaf to produce an inhaled aerosol that contains nicotine. In July 2016, FDA issued substantial equivalence authorization permitting the marketing of two HTPs in the United States, and in April 2019, permitted the sale of the HTP brand IQOS in the U.S. This study is the first to assess self-reported awareness, ever use, and current (past 30-day) use of HTPs among a nationally representative sample of U.S. middle and high school students. **Methods:** Data came from the 2019 National Youth Tobacco Survey (NYTS), an annual, electronic tablet-administered, cross-sectional survey of U.S. public and private school students in grades 6-12. Awareness was assessed by the question, “Before today, have you heard of ‘heated tobacco products’?” (yes, no, don’t know/not sure). Ever use was assessed by the question, “Have you ever tried a ‘heated tobacco product’, even just one time?” (yes, no, don’t know/not sure). Respondents who indicated a response other than ‘no’ were asked, “During the past 30 days, on how many days did you use a heated tobacco product?”. Weighted prevalence estimates, with 95% confidence intervals (CI), of awareness and use were assessed overall and by school level. **Results:** In 2019, 12.8% (95% CI: 11.7-14.0; 3.43 million students) reported awareness of HTPs; 22.5% (95% CI: 21.6-23.5; 6.04 million) reported they did not know or were not sure. Overall, 2.6% (95% CI: 1.8-3.8; 0.63 million) reported ever HTP use, including 3.2% (95% CI: 2.0-5.2) of high school students and 1.8% (95% CI: 1.4-2.3) of middle school students. Furthermore, 1.6% (95% CI: 1.3-2.0; 0.42 million) reported current HTP use, including 1.7% (95% CI: 1.3-2.2) of high school students and 1.4% (95% CI: 1.1-1.8) of middle school students. **Conclusion:** In 2019, about 1 in 8 US students reported awareness of HTPs, about 1 in 40 reported ever use of HTPs, and about 1 in 60 reported current use of HTPs. As the tobacco product landscape continues to evolve, efforts are warranted to implement evidence-based, population-level strategies that address youth use of all tobacco products, including HTPs.

**FUNDING:** Federal

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**PS5-19**

**THE IMPACT OF PRICE AND TV ADVERTISING OF E-CIGARETTE ON SMOKELESS TOBACCO PRODUCTS SALES**

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**SIGNIFICANCE:** This study fills a critical gap by examining the substitution between e-cigarettes and smokeless tobacco products, an important topic with limited research. Specifically, we investigated how e-cigarette price and TV advertising affect the demand for smokeless tobacco products, controlling for cigarette price. **METHODS:** Market level retail sales and price data for e-cigarettes, smokeless tobacco products, and cigarettes, by year, quarter and store type, were compiled from the Nielsen retail scanner database from 2010 to 2017. Contemporaneous quarterly Nielsen e-cigarette TV rating data for each market were compiled from Kantar Media. Fixed effect models were used to estimate the impact of smokeless tobacco prices, e-cigarette price and cigarette price, as well as e-cigarette TV advertising, on the demand for chewing loose leaf, moist snuff, and snus, respectively. **Results:** Controlling for cigarette price and the fixed effect of market, year, quarter and store type, our results showed that a 10% increase in own price of smokeless tobacco product was associated with a reduction in sales by 20% for chewing loose leaf, 15.7% for moist snuff, and 21.7% for snus, respectively. In addition, we found that a 10% increase in disposable e-cigarette price was associated with a 2.8% increase in sales of moist snuff and a 5.3% increase in sales of snus. Contemporaneous e-cigarette TV advertising was not statistically associated with the sales of smokeless tobacco products. **CONCLUSION:** The demand for smokeless tobacco products was sensitive to their own price changes. Positive association between e-cigarette price and smokeless tobacco products sales indicated that e-cigarettes were substitutes for smokeless tobacco products. Policies that target at e-cigarettes need to take into account the substitution between e-cigarettes and smokeless tobacco products.

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**PS5-20**

**MODELING THE IMPACT OF EVALI ON NIELSEN E-CIGARETTE SALES DATA**

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**Significance:** In recent months, an outbreak of electronic-cigarette (e-cigarette) or vaping product use associated lung injury (EVALI) occurred in the United States. As of December 4, 2019, 2,291 cases and 48 deaths attributable to EVALI have been documented by CDC. On September 6, 2019, CDC released an official statement detailing the initial findings of the outbreak investigation which received extensive media coverage. This study investigates whether a public health announcement about the nationwide EVALI outbreak had an effect on per capita e-cigarette sales in the United States.

**Methods:** Using monthly retail scanner sales data from Nielsen from October 2014 to October 2019, we use an interrupted time-series analysis to model the impact of the EVALI announcement made by CDC on the sale of e-cigarettes. To determine whether a similar outcome is observed for nationwide announcements about e-cigarettes by other entities that do not mention uncertain health effects of e-cigarette use, we performed a sensitivity analysis using an announcement by Rite Aid that it would cease e-cigarette sales due to concerns about use among youth on April 11, 2019. Analysis was conducted in Stata using the program ITSA. To control for autocorrelation, Newey-West robust standard errors were used.

**Results:** CDC’s September 6, 2019 official statement is associated with an initial statistically significant increase of 0.44 cents per capita (p=0.013) and a sustained statistically significant decrease of 0.36 cents per capita (p<0.001). The Rite Aid announcement is associated with an immediate statistically significant increase of 0.46 cents per capita (p=0.028), but not a sustained effect over time (0.004 cents per capita, p=0.815).

**Conclusion:** Initial results show a statistically significant sustained decrease in per capita e-cigarette sales after CDC’s official statement regarding the EVALI outbreak. Health communication efforts to raise and sustain public awareness about the uncertain health impacts of e-cigarette use have the potential to impact behavior. These results
Aerosol Chemical Composition During Dry Puff Conditions with Ends

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Significance. This recent research obtained a preliminary understanding of how a dry puff influences the quantity and types of HPHCs produced. Methods. The experimental design evaluated the influence of 3 atomizer types (2 quad coils, 1 mesh), 3 liquid PG:VG ratios with 16 mg/ml nicotine (35:65, 50:50, 65:35), and 4 powers (20, 50, 100, 150W). Each combination was tested in triplicate. Primary aerosol and VOC constituents collected on a Cambridge Filter Pad backed by a sorbent tube were quantified by GC-MS. Carbonyls collected on a separate DNPH impinger were quantified by HPLC. A pre-study found that the wicking system for each of the three atomizers supplied e-liquid at a rate that prevented dry puff. Therefore, a specific procedure to saturate the wick was used. The current study was designed to observe the mass per dry puff of all analytes increased as power increased. The primary constituents and VOCs consistently had liquid, atomizer, power, and power-atomizer interaction as significant effects. However, more primary constituent was produced per dry puff by the quad coil atomizers than by the mesh coil whereas more VOCs were produced by the mesh coil. Higher mass for all VOCs was produced from the high PG content liquids. This finding suggests that the thermal decomposition of PG may drive VOC formation. Carbonyl generation was influenced by atomizer, power, and the power-atomizer interaction but not by the PG:VG ratio. The mesh coil produced more formaldehyde, acetaldehyde, and acrolein than the two quad coil atomizers. Crotonaldehyde and pentanedione had a significant power-liquid interaction that was not evident in the other carbonyls. This interaction appears to result from the combination of high PG content liquids at lower power producing more of these compounds than the lower PG content liquids at higher powers.

FUNDING: Federal

Respiratory Symptoms Reported Among Young Adults Who Vape

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Significance: There is growing interest in respiratory symptoms related to vaping following the vaping-related lung injury epidemic. However, limited qualitative assessments of those not in severe crisis have been conducted. The objective of this current study was to conduct preliminary qualitative assessments of any respiratory health symptoms - and perceived factors influencing symptoms - among young adults who vape.

Methods: Participants (N=35) were 18-25 years of age who self-reported as currently vaping nicotine at least once per week. One-on-one, in-depth, semi-structured qualitative interviews were conducted using an open-ended interview guide designed to elicit respondents' subjective vaping experiences and related respiratory health. Sociodemographic and substance use data were collected via questionnaire following interviews.

Results: The majority of participants reported adverse respiratory health symptoms from vaping. The most common symptoms reported were phlegm, mucus, congestion, nasal inflammation, or pain in the lungs since beginning vaping. Participants described factors that were likely contributing to these symptoms including history of asthma or other breathing problems. Some participants reported noticing that vaping more frequently seemed to be related to greater adverse respiratory health symptoms. Additionally, participants reported a significant decline in physical abilities due to vaping. Participants also reported that different characteristics of vaping products impacted their respiratory symptoms. JUUL was mentioned by a number of participants and described to produce more phlegm and cough compared to other devices.

Conclusions: This study suggests that young adults who vape experience a variety of respiratory symptoms that they ascribe to their vaping. Longitudinal research is needed to determine whether symptoms reported in this study may represent a less severe manifestation of the vaping-related lung injury.

FUNDING: Other
by age 17.0 while 6% of the Non-Hispanic initiated by age 16.2 (p-value < 0.0001).

Conclusion: Cigar use prevention interventions should target young people, before the age of 17 years old. Regulatory policies that reduce appeal of cigars should be implemented to curb cigar use initiation among youth. Communication campaigns that are tailored to youth who are at risk of cigar use initiation are also needed to prevention product use initiation.

FUNDING: Federal

PS5-25

EFFECTS OF FLAVORED CIGARETTE PACKAGING ON YOUNG ADULT PERCEPTIONS OF RELATIVE HARM, APPEAL, AND INTENTION TO TRY IN THE PHILIPPINES

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SIGNIFICANCE: Flavor capsule cigarettes are the fastest growing product in the combustible cigarette market worldwide. The Philippines has a large menthol market share (22%) which includes flavor capsule cigarettes. The limited research done finds that youth and young adults perceive flavor capsule cigarettes as attractive and less harmful than other cigarettes. Our primary objective was to examine the effect of cigarette package design, varying by flavor and capsule inclusion, on young adult (18 – 24 years) Filipino consumer perceptions of relative harm, appeal, and intention to try.

METHODS: Participants (N=275) were recruited to participate in a between-subjects experimental survey via household recruitment in Metro Manila in 2019. Participants were randomly assigned to view one of five cigarette pack images, classified as: 1) Non-flavored, no capsule; 2) Menthol, no capsule; 3) Menthol (“Ice burst”) capsule; 4) “Purple breeze”, no capsule; and 5) “Purple breeze”, capsule and answered questions regarding their beliefs. Analyses, including chi-square tests and logistic regression, were conducted.

RESULTS: Directly comparing conditions, a greater proportion of participants who viewed the “purple breeze” capsule pack perceived the pack as less harmful (27.7%) compared to those who viewed the menthol, no capsule pack (6.12%) (p=0.005). Compared to the control condition (non-flavored, no capsule), the menthol (“Ice burst”) capsule condition and the “Purple breeze” capsule condition were associated with attractiveness with greater odds of participants perceiving the pack as attractive (OR=2.60, 95% CI 1.24 – 5.46; OR=2.16, 95% CI 1.00 – 4.66). Compared to the control condition, the “Purple breeze” capsule condition was also associated with intention to try with marginally significant greater odds of participants intending to try the pack (OR=2.13, 95% CI 0.97 - 4.66).

CONCLUSION: Concept flavors like “Purple breeze” and “Ice burst” and flavor capsules contribute to misperceptions of harm and are attractive to young adult Filipinos. Our findings demonstrate the impact of packaging design and its influence on consumer perceptions and highlight the need for plain packaging and restrictions on flavors in the Philippines.

FUNDING: Nonprofit grant funding entity

PS5-26

PERCEPTIONS OF NICOTINE IN CURRENT AND FORMER TOBACCO AND TOBACCO HARM REDUCTION PRODUCT USERS FROM SEVEN COUNTRIES

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Significance: Tobacco harm reduction (THR) products such as e-cigarettes, Heat-not-Burn products, or snus were developed to provide adult consumers nicotine without the damaging health effects of combustible tobacco. However, the extent to which consumers can separate the harms of smoke from nicotine remains unclear. Methods: A quantitative survey was administered online in Norway (NO), Japan (JP), the United Kingdom (UK), and the United States (US), while face-to-face computer aided interviews (CAPI) were conducted with randomly selected samples in India (IN), Greece (GR) and South Africa (SA). Participants were between 18 and 69 years of age and either current users of tobacco and THR products or previous users who quit within the past five years. Questions assessed opinions of nicotine’s harmfulness and addictiveness. Nicotine and other substances were also independently rated for harmfulness on a scale of 1 to 10 and scores were compared. Results: A total of 54,341 participants (NO: 1700, JP: 2227, UK: 2250, US: 2309, IN: 41673, OR: 1815, SA: 2367) were sampled with the percentage of women participants ranging from 14.8% (IN) to 53.8% (UK). Varying proportions of current consumers (65.8% [IN] to 90.8% [SA]) thought that nicotine is addictive. In three countries a higher percentage believed it is harmful (IN, JP, SA). Current consumers who agreed with the statement that nicotine is the primary cause of cancer ranged from 44.2% (UK) to 77.3% (SA). Quitters tended to rate harmfulness and addictiveness similarly. In six countries nicotine was rated nearly as harmful as tobacco and alcohol, while other substances such as sugar, salt or caffeine, were usually rated as less harmful. Conclusions: Substances such as sugar, salt and caffeine are generally regarded as less harmful than nicotine despite limited clinical evidence of harms from nicotine in isolation. A large proportion of consumers across all surveyed countries view nicotine and tobacco as equivalents. Clearer communication on the addictive and harmful properties of both is needed to help consumers make informed decisions about products across the continuum of risk.

FUNDING: Federal

PS5-27

ARE YOUNGER COHORTS OF ADOLESCENTS AT HIGHER RISK FOR THE ONSET OF AND PROGRESSION IN ENDS USE?

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Significance. Few studies have investigated developmental trajectories of ENDS use among youth. It is possible that these trajectories differ between cohorts of adolescents, given the rapid growth in the ENDS marketplace and recent acceleration in ENDS use by youth. Methods. Data are from the Texas Adolescent Tobacco and Marketing Surveillance Study. In 2014, 3 population-based cohorts of youth in the 6th grade (n=1,122; N=148,465), 8th grade (n=1,322; N=160,080), and 10th grades (n=1,463; N=152,524) in major metropolitan areas of Texas were established. Students participated in up to 9 surveys, every 6 months, for 5 years of follow-up through 2019. Retention ranged from 64-84%, across surverys. Generalized estimating equations (GEEs) were used to describe an average developmental trajectory in ENDS use with age, by cohort. Susceptibility to use, ever use, and past 30-day use were considered in separate models to indicate stages in the onset and progression of ENDS use. Quasi-likelihood-under-independence-estimation (QIC) was used to compare differences in trajectories, by indicator and cohort. Results. Secular trends in susceptibility to ENDS use (QIC=21695.2) and ever ENDS use (QIC=22469.5) were observed among these Texas adolescents, but not for past 30-day use (QIC=1768.2). That is, there were significant differences between cohorts in the onset, but not necessarily progression, of ENDS use, as defined by these indicators. By age 15, susceptibility to use was continuing to increase rapidly within the 6th grade cohort, while at the same age it had stabilized and was decreasing within the 8th and 10th grade cohorts, respectively. Ever use accelerated more quickly with age in the 8th grade cohort, than it did in the 6th or 10th grade cohorts. Ever use also accelerated more quickly with age in the 8th grade cohort, compared with the 10th grade cohort. Past 30-day use, however, increased with age for all three cohorts at the same rate. Conclusion. Younger cohorts of adolescents may be at higher risk for the onset of ENDS use, as compared with older cohorts, warranting additional investigation nationwide. Progression in use (ie., any increase in past 30-day use with age), may not follow the same secular trend.

FUNDING: Nonprofit grant funding entity

PS5-28

DEMAND AND SUBSTITUTABILITY OF TOBACCO PRODUCTS AMONG MENTHOL SMOKERS IN SIMULATED FLAVOR BANS

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The addition of flavor to tobacco products increases the appeal and abuse liability of the product. Regulations that remove characterizing flavors in tobacco products may benefit public health by leading to cessation or use of an alternative potentially less harmful product, called product substitution. Determining the level of substitutability of both flavored and tobacco flavored e-cigarettes when menthol cigarettes are available and unavailable will help determine if a flavor ban (of either menthol cigarettes and/ or flavored e-cigarettes) will lead to cessation and/or harm reduction among current smokers. The current study evaluated flavored and unflavored tobacco product abuse liability and measures of visual attention in a 2 (menthol cigarette availability) X 2 (e-cigarette flavor availability) within-subjects laboratory experiment using the Experimental Tobacco Marketplace with simultaneous eye-tracking measurements of visual attention. Adult menthol smokers (n=27) purchased tobacco products across various cigarette prices when presented with nicotine replacement therapy, smokeless
tobacco, and only: 1) menthol cigarettes and five flavored JUULs, 2) menthol cigarettes and tobacco-flavored JUUL, 3) non-menthol cigarettes and five flavored JUULs, and 4) non-menthol cigarettes and tobacco-flavored JUUL. Non-linear regression results show that demand intensity and elasticity are not statistically significantly different between flavor availability conditions with the current sample, however trends are in the expected direction. Demand intensity is greater in the menthol available conditions (\(Q_{1}=818.5;828.6\)) compared to the non-menthol available conditions (\(Q_{1}=921.4;3386\)). Demand was less elastic in the menthol available conditions (\(\epsilon_{1}=0.0057;0.0055\)) than in the non-menthol available conditions (\(\epsilon_{1}=0.0016;0.016\)). Substitution profiles varied by condition. Menthol JUUL was a substitute when available in the marketplace (conditions 1 and 2). Tobacco-flavored JUUL was a substitute only when menthol cigarettes and other JUUL flavors were unavailable. Qualitative eye-tracking results demonstrate a great amount of attention paid to price of cigarettes and to other products at a lesser extent. Dwell time on the alternative products is consistent with the substitutability profiles and is increased when menthol cigarettes are unavailable. Demand intensity and elasticity for cigarettes is greater for own brand flavor and the strength of product substitution is dependent upon cigarette flavor availability.

**FUNDING:** Federal

**PS5-29**

**THE REAL COST MEDIA CAMPAIGN: TARGETING YOUTH WITH MESSAGES ON VAPING RISKS**

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**INTRODUCTION.** In October 2017, a new phase of FDA's Center for Tobacco Products The Real Cost campaign launched, designed to discourage vaping among youth who have never tried vaping products but may be susceptible and to discourage further use among ever users. There has been no published research to date on U.S. youth media campaigns focused on vaping. **OBJECTIVE.** To examine youths’ awareness of and reactions to the first online vaping advertisement for The Real Cost. **METHODS.** We examined descriptive data using a nationally representative longitudinal sample of U.S. youth ages 11 to 16 via an in-home and online survey conducted by RTI International as part of The Real Cost evaluation. Data include 3,340 youth who completed a baseline survey from June to October 2018 and a follow-up survey from April to July 2019. Survey respondents viewed the online-only video ad "Rehacked" and asked their frequency of exposure to the ad in the past 3 months; response options were “never,” “rarely,” “sometimes,” “often,” or “very often.” Respondents were then asked whether they agreed with six statements on a 5-point Likert-type response scale from 1 (strongly disagree) to 5 (strongly agree). This ad (1) was worth remembering, (2) grabbed my attention, (3) was powerful, (4) was informative, (5) was meaningful, and (6) was convincing. A scale was created by summing the items and dividing by six. **RESULTS.** After 16 months of online-only media placement, 73% of youth reported seeing the ad. The highest levels of awareness were attained among users who never used e-vapes (77%) and ever users (77%). Most youth consider The Real Cost vape advertisement to be effective, based on assessments of ad perceived effectiveness (mean = 3.8 on a scale from 1.0 to 5.0). **CONCLUSIONS.** High levels of awareness and positive ad reactions are requisite proximal indicators for media campaigns to influence health behaviors. Additional research is being conducted to assess whether potential shifts in population-level knowledge and risk perceptions may be attributable to this campaign. These data will inform ongoing message and media strategies for The Real Cost and other U.S. youth campaigns focused on vaping.

**FUNDING:** Federal

**PS5-30**

**USING “INOCCULATION” TO COMBAT MISBELIEFS FROM MISLEADING CIGARETTE ADVERTISING**

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**Significance:** Research shows misleading Natural American Spirit (NAS) marketing prompts misbeliefs empirically linked to product use (e.g., Byron et al., 2016; Epperson et al., 2017). Once such misbeliefs are formed, they are difficult to correct (e.g., Lewandowsky et al., 2012). In this study, we assessed whether corrective messages designed with inoculation principles (forewarning and refutation of anticipated arguments; McGuire, 1986) can thwart misbeliefs and ensuing intentions that follow NAS ad exposure. **Method:** 1,541 current/former smokers saw NAS ad content and completed measures of misbeliefs about safety, healthy composition and reduced addictiveness of NAS and intentions to use. Participants either saw ads only (misbelief control), an inoculation forewarning of misleading ads without directly refuting misbeliefs (forewarning-only) or an inoculation with forewarning and refutation. Inoculations with refutation refuted exact arguments in the ads and misbeliefs (specific inoculation) or instead addressed broad categories of misbeliefs rather than individual arguments (generic inoculation). **Results:** One-way ANOVA (Bonferroni correction) indicated all inoculations reduced misbeliefs relative to control. Planned contrasts showed generic and specific inoculations performed similarly, outperforming forewarning-only in reducing misbeliefs and lowering current smokers’ intentions. Mediation analysis (Hayes, 2009) tested whether inoculations may lower intentions by reducing misbeliefs; results supported this path, with indirect effects accounting for nearly the full total effect (no significant direct effect). **Conclusion:** This study indicates success of inoculative interventions to combat misbeliefs invited by NAS ads. Importantly, generic inoculations addressing key thematic areas of misbeliefs successfully reduce them, so it should not be necessary to match arguments from ads. As NAS marketing techniques evolve, it is difficult to anticipate/ refute exact ad wording and misbeliefs, making generic inoculations both feasible and effective. The interventions tested here can be used to advance public health efforts addressing misbeliefs arising from NAS marketing.

**FUNDING:** Federal

**PS5-31**

**DO MODIFIED RISK TOBACCO PRODUCT CLAIMS PROMOTE HALO EFFECTS?**

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**Background:** Tobacco products in the US may be marketed with modified risk tobacco product claims that claim certain risk (e.g., cancer) is lower compared to another product (target effect). However, tobacco companies may also claim that the claimed product has less risk for other diseases (halo effect). **Method:** This study assessed whether MRTP claims promote halo effects. Participants were a convenience sample of US adults who were current cigarette smokers (n=3,161). Participants viewed one of 12 MRTP claims describing risk or exposure benefits of completely switching from cigarettes to IQOS, or one of 3 control messages, assigned at random. Half the claims described specific risk (e.g., lung cancer) and exposure (e.g., CO) reductions. The online survey assessed beliefs about specific risk and exposure benefits of switching to IQOS. Results: Claims of reduced lung cancer risk led to lower lung cancer risk beliefs (target effect: d=0.40), but also lower emphysema risk beliefs (halo effect: d=0.23) and lower CO exposure beliefs (halo effect: d=0.20), compared to control. Claims of reduced exposure to arsenic led to lower arsenic exposure beliefs (target effect: d=0.20), as well as lower cardiovascular disease beliefs (halo effect: d=0.18), compared to control. In contrast, claims describing reduced risk of emphysema and cardiovascular disease produced no halo effects. **Conclusion:** Several MRTP claims produced halo effects, which were on average half the size of the target effects. Further research is needed to understand the implications of haloed beliefs on product use behaviors.

**FUNDING:** Federal

**PS5-32**

**EFFEC TF OF SPONSORSHIP DISCLOSURES ON YOUNG ADULTS’ PERCEPTIONS OF E-CIGARETTE INFLUENCER POSTS ON INSTAGRAM**

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**Background:** Popular social media “influencers” are often paid to promote e-cigarette products. Influencers do not always disclose their paid sponsorship, which may affect viewers’ perceptions of the persuasive message. Little is known about how sponsorship disclosures on Instagram affect young adults’ perceptions of e-cigarette influencer posts.

**Conclusion:** This study indicates success of inoculative interventions to combat misbeliefs invited by NAS ads. Importantly, generic inoculations addressing key thematic areas of misbeliefs successfully reduce them, so it should not be necessary to match arguments from ads. As NAS marketing techniques evolve, it is difficult to anticipate/ refute exact ad wording and misbeliefs, making generic inoculations both feasible and effective. The interventions tested here can be used to advance public health efforts addressing misbeliefs arising from NAS marketing.

**FUNDING:** Federal
Methods: Young adults age 18-29 (N=917) who had vaped at least once and used Instagram at least weekly were recruited through Qualtrics survey panels for an online experimental study. Participants were randomly assigned to one of three conditions: clear, ambiguous, or no sponsorship disclosure hashtag. Participants viewed a set of 4 Instagram posts featuring a fictitious e-cigarette brand and the test condition disclosure hashtag. After each post, participants reported hashtag recognition, ad recognition, ad skepticism, perceptions of the influencer, and intent to interact with the post. After viewing all posts, participants reported attitudes toward the brand, intentions to use the brand's products, and intentions to vape. Results: Viewing Instagram posts with clear sponsorship disclosures resulted in greater perceptions of the posts as advertisements (p<.001), lowered ad trust (p=.032), and somewhat greater intentions to vape (p=.045). Participants who viewed clear disclosures and recognized the hashtags had greater ad recognition, lower ad trust, less positive perceptions of the influencers, and lower intentions to interact with the posts, compared to those who did not recognize the clear disclosures (ps < .029). However, disclosures did not affect perceptions of the brand or intentions to use the brand. Conclusions: Clear disclosures of sponsorship on e-cigarette Instagram posts increased perceptions of the posts as advertisements, but did not affect perceptions of the brand or intent to use the brand. Disclosures may be necessary but insufficient to offset effects of social media marketing on tobacco use.

FUNDING: Federal; State

PS5-33
WEB-BASED RESOURCES FOR TOBACCO PREVENTION AND CONTROL MEDIA CONTENT: A REVIEW OF ONLINE TOOLS FOR RESEARCHERS AND PRACTITIONERS
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Background. Web-based resources for tobacco prevention and control provide valuable tools for researchers and practitioners. The current study sought to identify existing websites that archive prevention and cessation media content and characterize the content of those sites. Methods. We used a comprehensive search strategy to identify web-based resources. We 1) conducted systematic web searches using a series of relevant keywords; 2) examined all websites and links that came up in our initial web searches, and 3) posted queries on tobacco control listservs asking for relevant sites. Websites were included if: 1) the content was focused on tobacco; 2) the primary purpose of the site was to archive anti- or pro-tobacco media or communication content; and 3) the website was designed for researchers or practitioners. Results. Of the 55 sites we identified, N=13 met criteria. The websites mostly contained anti-tobacco media content (85%), although 15% contained pro-tobacco content. The majority focused on multiple tobacco products (69%), while 31% focused on cigarettes. The media content most commonly contained on sites was print ads (77%), video ads (46%), and warning labels (38%). Almost all sites had media content coded with descriptive tags (92%), and most contained a search function (85%). While most sites provided media content free with no restrictions (85%), 15% contained paid or restricted content. Other materials included on sites were research reports (69%), fact sheets (62%), news feeds (62%), toolkits (38%), and advocacy information (38%). Conclusions. This study provides a systematic search and summary of web-based tobacco prevention and control resources that archive communication and media content. These sites can assist researchers and practitioners in their prevention and cessation efforts. Despite the recent rise in vaping among youth as well as lung injuries and deaths, we found no sites dedicated to helping communities and tobacco control practitioners address vaping. This study lays the groundwork for a new online vaping prevention resource targeting youth that will archive existing content and summarize evidence-based intervention strategies.

FUNDING: Academic Institution

PS5-36
SECONDHAND CIGARETTE SMOKE EXPOSURE IN RELATION TO MORTALITY IN THE UNITED STATES - THE NATIONAL HEALTH INTERVIEW SURVEYS
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Significance: Secondhand smoke (SHS) exposure is known to cause lung cancer and coronary heart disease. Yet, with reductions in smoking prevalence and per capita cigarette consumption, and the introduction of smoke-free policies, it is important to evaluate associations between SHS exposure and disease in contemporary data. Methods: We harmonized the 1991, 1992, 1993, 1994, 1998, 2000, 2005, and 2010 National Health Interview Survey-Linked Mortality Files, leveraging nationally representative smoking data, large sample size, and follow-up for mortality. SHS at home was assessed among 110,945 never smokers aged 18-84 years. The number of smokers at home was also assessed. All-cause and cause-specific mortality through 2015 were identified via the National Death Index linkage. Hazard ratios (HRs) and 95% confidence intervals (CIs) were estimated using Cox proportional hazards regression using age as the underlying metric, stratified by birth cohorts, and adjusted for sex, race/ethnicity, education, household income, and appropriate survey weights. Results: Relative to no SHS at home, everyday exposure was associated with 1.33 times higher all-cause mortality (95% CI=1.23-1.45). All-cause mortality risk among those with some day exposure was also elevated (HR=1.08, 95% CI=0.96-1.18) but did not reach the statistical significance. Mortality risks for everyday SHS were increased for heart disease (HR=1.36, 95% CI=1.14-1.61) and insignificantly elevated for cancer (HR=1.18, 95% CI=0.99-1.41), cerebrovascular disease (HR=1.25, 95% CI=0.90-1.72), and chronic respiratory disease (HR=1.60, 95% CI=0.95-2.68) compared with no exposure. Relative to no smokers at home, HRs for all-cause mortality were 1.38 (95% CI=1.20-1.59) and 1.30 (95% CI=1.04-1.67), for living with one and two smokers, respectively, and 1.91 (95% CI=1.03-3.52) for living with three or more smokers. Additional adjustment for physical activity and alcohol intake and stratifying by surveys (1991-1994 or later) did not change the all-cause mortality results considerably. Conclusions: SHS at home was associated with increased mortality risks in a nationally representative sample of U.S. adults.

FUNDING: Academic Institution

PS5-35
EFFECT OF MENTHOL CIGARETTE SMOKING ON USE OF FLAVORED NICOTINE SALT POD SYSTEMS AND SWITCHING BEHAVIOR
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OBJECTIVES: This study examined if: (1) adult smokers who use nicotine salt pod systems (NSPS, JUUL Labs, Inc.) and smoke menthol cigarettes differ from those who smoke nonmenthol cigarettes; (2) smoking menthol (vs. non-menthol) cigarettes is prospectively associated with past 30-day smoking abstinence (“switching”) at 6 months; and (3) use of NSPS in non-tobacco (vs. tobacco flavors) moderates this association. METHODS: Adult smokers who recently purchased a NSPS (N=7,352) completed baseline, 30, and 180-day assessments. Participants reported whether they smoked menthol cigarettes at baseline, the primary NSPS flavor used most often in past 30-days at 30-day assessment (tobacco; mint/menthol; non-tobacco/mint/menthol (NTMI)), and if they had smoked in the past 30-days at 180-day assessment (yes/no). Differences in demographic/smoking characteristics by menthol smoking were assessed; logistic regression models assessed associations between menthol smoking and likelihood of switching at 180 days. RESULTS: Participants who smoked menthol (vs. non-menthol) cigarettes were more likely to be younger (Mean age=30.1 vs. 33.2 years), female (51.6% vs. 42.7%), non-white (20.2% vs. 13.8%), use mint/menthol-flavored NSPS (46.0% vs. 17.3%), smoke fewer days per month (16.78 vs. 17.81) and fewer cigarettes/day (6.57 vs. 7.77; ps<0.001). Smoking menthol cigarettes at baseline was associated with greater unadjusted odds of switching at the 160-day follow-up (OR=95%CI=1.19[1.09, 1.31]). After adjustment for covariates, this association was no longer significant (aOR[95%CI]=1.03[0.92, 1.15]). Use of NSPS in NTM (vs. tobacco) flavors was associated with increased switching among nonmenthol smokers (aOR[95%CI]=1.22[1.03, 1.45]) but not menthol smokers (aOR[95%CI]=0.99[0.71, 1.37]). CONCLUSIONS: Adult NSPS users who smoked menthol cigarettes significantly differed from non-menthol smokers in their sociodemographic/smoking characteristics. After controlling for these differences, smoking menthol cigarettes was not associated with higher switching rates at 6 months. Use of NTM-flavored NSPS was associated with switching for nonmenthol smokers, suggesting that non-tobacco flavors may be important for this group.
PS5-37
VARIATION IN SELF-REPORTED USE OF THE JUUL VAPING DEVICE BETWEEN SURVEY MEASURES OF RESPONDENTS’ VERBAL RECOGNITION AND VISUAL RECOGNITION OF THE JUUL BRAND
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Significance: The marketing of an increasing number of pod vaping devices that closely resemble the JUUL vaping device in size, weight, shape, texture, color and function presents a challenge to the survey measurement of the population’s use of the JUUL device as distinct from JUUL-like devices. This study examined concordance in youth and adults’ self-reported past 30-day use of a JUUL in response to survey measures of their verbal recognition of the JUUL brand name and visual recognition of the JUUL device.
Methods: A cross-sectional online survey assessed use of 15 brands of pod vaping device in non-probability, nationally representative samples of youth (n=1,000), young adults (n=1,000) and older adults (n=1,000) who responded “Yes” to the question, “Have you used/vaped a brand of e-cigarette called “JUUL” in the past 30 days?” (verbal recognition question). Participants were also asked to name each device they had reportedly used. Results: 41.8% (95% CI=38.7% to 44.9%) of youth, 60.9% (95% CI=57.9% to 63.9%) of young adults, and 47.7% (95% CI=43.8% to 49.8%) of older adults who reported past 30-day use of a JUUL in response to the verbal recognition question subsequently identified the JUUL as a device they had used in the past 30 days when shown an image of the JUUL device. Of those who reported past 30-day use of a JUUL in response to both the verbal and visual question, 70.5% of youth (95% CI=66.1% to 74.8%), 78.0% of young adults (95% CI=74.7% to 81.3%), and 73.5% of older adults (95% CI=69.3% to 77.7%) correctly named the JUUL device as “a JUUL”.
Conclusions: Self-reported use of a JUUL in the past 30 days varied between survey measures of verbal recognition of the JUUL brand name and visual recognition of the JUUL device. The visual similarity of the JUUL device to an increasing number of pod devices that are being used/vaped a brand of e-cigarette called “JUUL” in the past 30 days? (verbal recognition question).

FUNDING: Unfunded

PS5-38
PERCEIVED HARMs OF ELECTRONIC WATERPIPE AMONG YOUNG ADULT WATERPIPE TOBACCO USERS
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Significance: Electronic waterpipe (e-waterpipe) is vaping a waterpipe (i.e., hookah) bowl. While the public views other vaping products (e.g., JUUL, electronic cigarettes) as safer than combustible tobacco products (e.g., cigarettes), lacking is research on perceived harms of e-waterpipe. Young adult hookah tobacco smokers (HTS) may use e-waterpipe most. Thus, among young adult HTS, we explored frequency and perceived harms of e-waterpipe versus combustible tobacco products.
Methods: This online survey recruited participants from Amazon Mechanical Turk. Participants had to be aged 18-30, report past 30-day HTS and report not having quit. Participants reported how harmful smoking hookah tobacco/vaping through a waterpipe bowl was to a person’s health (1=Not at all to 7=Extremely harmful) and helpful (1=Helpful to 7=A great many). These questions also were posed for electronic cigarettes (e-cigs). To assess personal risk, participants reported their chances of getting a serious smoking-related disease in their lifetime if they did not quit hookah tobacco/vaping using a waterpipe bowl (1=No chance to 7=Certain to happen).
Results: Analyses are based on 221 participants (mean age, 25.4, SD=3.1, 50% men, 71% white). Overall, 47% used e-waterpipe, especially women (58%). Smoking hookah tobacco was seen as more harmful to a person’s health than e-waterpipe (M=4.7 vs. M=4.0, p<0.001) and e-cigs (M=4.3, p<0.001). E-waterpipe was viewed as safer than e-cigs (p<0.001). Participants believed more chemicals were inhaled smoking hookah tobacco than e-waterpipe (M=4.9 vs. M=4.1, p<0.001) and e-cigs (M=4.4, p<0.001); mean perceived inhaled toxins was lower for e-waterpipe than e-cigs (p<0.03). Personal risk was higher for hookah tobacco than e-waterpipe (M=3.9, vs. 3.6, p<0.03). The above findings did not vary by history of e-waterpipe use (no/yes).
Conclusion: E-waterpipe use is common among young adult HTS. It is seen as safer than hookah tobacco and e-cigs. With regards to personal risk, the same pattern applies.

FUNDING: Federal

PS5-39
SEXUAL ORIENTATION, SMOKING AND E-CIGARETTE USE AMONG ADULT SMOKERS IN MEXICO
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Background: In high-income countries, sexual minorities (SMs) who identify as lesbian, gay, bisexual and transgender have a disproportionately high prevalence of tobacco product use, perhaps due to discrimination and stress. However, tobacco use among SMs in middle income countries has not been studied. In a sample of adult smokers in Mexico, this study aimed to characterize the prevalence and correlates of smoking and vaping by sexual orientation.
Methods: Data were analyzed from a convenience sample of 3,921 Mexican adult smokers (Heterosexual or HET=n=3,168; Gay/Lesbian or G/L=n=628; Bisexual or B=n=125) recruited from an online consumer panel. Logistic and linear models regressed quit intentions, any quit attempt in the last 4 months, nondaily smoking (vs. daily), heaviness of smoking, concomitant use of e-cigarettes, and psychological dependence both for smoking and, among concomitant e-cigarette users, five e-cigarette indicators on SM status, adjusting for sociodemographic factors and key smoking-related variables.
Results: The sample included both exclusive cigarette smokers (HET=65.4%; G/L=95.3%; B=62.6%) and dual users (HET=34.6%; G/L=7.4%; B=37.4%); Adjusted models showed that G/L smokers were less likely than HET to only smoke (aOR=0.09; 95% CI 0.05-0.14), smoke less than daily (aOR=1.19; 95% CI 1.00-1.44), and have not recently attempted to quit smoking (aOR=0.35; 95% CI 0.27-0.47). No other statistically significant differences were found between G/Ls and HETs; no smoking outcome was significantly different between HETs and Bs.
Conclusion: Our results suggest that patterns of smoking for G/Ls in Mexico are different than for HETs and Bs, with G/L smokers more likely to exclusively smoke, to smoke less often, and be less likely to attempt to quit smoking. While the public health implications of this pattern are unclear, these issues should continue to be explored, including in representative samples.

FUNDING: Federal

PS5-40
ADULT JUUL AND IQOS USE 2017 - 2019 AND ASSOCIATION WITH AGE, RACE, AND SUBSTANCE USE
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JUUL’s US market share increased rapidly from 2% in 2016 to 75% in 2018. In 2019, a new heated tobacco product, IQOS, was introduced to the US market, but was available internationally since 2014. Lifetime JUUL use among adults has been associated with White race and combustible tobacco use; however, little is known about IQOS users. This study’s purpose was to examine changes in JUUL and IQOS use in 2017-2019 and examine relationships between lifetime JUUL and IQOS use and demographic and substance use behaviors.
Data were analyzed from a registry of adult tobacco users interested in research from a US mid-Atlantic state who completed an online questionnaire in 2017-2019 (N=1615). Demographics and past 30-day (current) cigarette, e-cigarette, alcohol, and cannabis use were compared by lifetime JUUL and IQOS use status using bivariate tests (p<0.05). Across years, 59.3% had ever used JUUL, and 2.5% had ever used IQOS. Current cigarette smoking was at 68.9% and current e-cigarette users was at 71.6%. In 2017, lifetime JUUL use was 0% and was significantly lower in 2018 (n=217, 22.7%) relative to 2019 (n=740, 77.3%, p<0.001). In 2017, lifetime IQOS use was 0% which increased in 2018 (n=14, 34.1%) and in 2019 (n=27, 65.9%). Lifetime JUUL users were significantly younger (M=26.0 yrs, SD=7.8) than non-lifetime users (M=33.3 yrs, SD=9.1). Relative to non-lifetime users, lifetime JUUL users were significantly more likely to use alcohol (55.4 vs. 47.3%) and report cigarette (63.4 vs. 54.4%), alcohol (61.1 vs. 55.9%), and cannabis (46.9 vs. 38.3%) use and less likely to be Black (12.4 vs. 30.1%) and a cigarette smoker (63.1 vs. 77.2%). Lifetime IQOS users were significantly more likely to be male (68.3 vs. 51.7%) and less likely to report alcohol

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use (34.1 vs. 59.7%) compared to non-lifetime users (p < 0.05), but rates of cigarette (75.6 vs. 68.7%) and e-cigarette use (75.6 vs. 71.5%) were not significantly different. This is one of the first studies to identify associations between lifetime IQOS use and demographic and substance use behaviors. Continued monitoring of JUUL and IQOS use is needed due to upcoming policy and recent market changes.

FUNDING: Federal

PS5-41
HARM PERCEPTIONS OF WATERPIPE TOBACCO SMOKING AMONG YOUNG ADULTS
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Significance: Many young adults perceive waterpipe (WP) smoking to be less harmful and addictive than cigarette smoking. With the high prevalence of WP smoking among young adults, it is imperative to combat these misperceptions with health warnings that effectively communicate the harms of other tobacco products. We examined changes in WP harm perceptions among young adults who were exposed to health warnings developed for WP smoking.

Methods: Data were from an experimental eye tracking study designed to determine the best placement for a WP warning label on the WP. Young adults (n=74; mean age 21.8; females 48.7%) were recruited using social media, flyers, and word of mouth. Participants were exposed to 72 WP images with about half including a warning label. Prior to (baseline), immediately following, and one week later (71 participants completed the one-week follow-up survey), participants were asked 3 questions about WP harm perceptions. One question measured absolute harm of WP smoking; participants were asked to state how much harm they themselves would experience if they were WP smokers.

Results: Absolute WP harm perceptions significantly increased following the experiment (mean difference 1.24, SE 0.24, p=0.001) and remained significantly higher at the one-week follow-up, compared to baseline (mean difference 1.69, SE 0.24, p=0.001). In the group that was exposed to the warning label, the mean absolute WP harm perception increased significantly more (mean difference 2.03, SE 0.40, p=0.001) compared to the baseline measurement.

Conclusion: Absolute WP harm perceptions increased significantly after an eye tracking experiment that exposed young adults to warnings on WPPs; perceptions remained high one week after the experiment. Findings indicate the necessity and effectiveness of using health warnings to combat WP harm misperceptions.

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PS5-42
THE INTERPRETABILITY OF NICOTINE CONCENTRATIONS PRESENTED AS MG/ML AND PERCENT NICOTINE AMONG E-CIGARETTE RESEARCHERS IN THE UNITED STATES
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Significance: Nicotine concentrations typically are printed on e-cigarette e-liquid/pod packaging as mg/ml or percent nicotine. It is unclear how well these metrics convey nicotine strength and whether individuals can translate one metric to the other. Methods. As a background for a study designed to improve the interpretability of nicotine concentrations among youth, 40 subject matter experts (SMEs) in the e-cigarette field (as determined by recent publications on the topic), rated the respective strengths of nicotine concentrations presented as mg/ml and percent nicotine (0mg/ml [0%] - 60 mg/ml [6%]); concentrations in each condition mirrored one another (e.g., 12mg/ml vs. 1.2% nicotine). Response options for each concentration were: no nicotine, very low, low, medium, high, and very high. SMEs were 65% female. 42.7 (SD = 11.1) years old, 76.9% non-Hispanic White, and had 5.5 (SD= 2.7) years of experience researching e-cigarettes. Results. Within both the mg/ml and percent nicotine conditions, there was considerable disagreement about how best to classify nicotine strength. For example, SMEs rated 20mg/ml nicotine as low (12%), medium (44%), high (36%), and very high (8%) strength. There also were notable discrepancies between strength ratings for equal concentrations of nicotine presented as mg/ml and % nicotine. For example, SMEs rated the strengths of 18mg/ml and 1.8% nicotine concentrations differently: very low (mg/ml: 0%; percent nicotine: 8%), low (16%; 46%), medium (56%; 42%), high (24%; 4%), and very high (4%; 0%). In cases where discrepancies were observed, concentrations presented as percent nicotine were rated, on average, as weaker than those presented as mg/ml. Conclusion. Among experts in the field, there is disagreement about how best to classify the strengths of nicotine concentrations presented as mg/ml and percent nicotine, respectively. Further, the discrepant strength ratings that were observed for equal nicotine concentrations presented as mg/ml and percent nicotine suggest that a singular, easy to understand labeling system is needed to convey e-liquid nicotine strength to the general public, including vulnerable populations like youth.

FUNDING: Federal

PS5-43
COMMUNICATION ABOUT E-CIGARETTES AMONG PEDIATRICIANS AND THEIR ADOLESCENT PATIENTS
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Significance: E-cigarette use has rapidly increased among adolescents. With physicians playing an important role in the health care of individuals, it is critical to identify the communications with physicians and adolescents regarding e-cigarettes. While previous studies have found that physicians are having conversations with adult patients about e-cigarettes, little is known about communications with adolescents. Methods: Using a sample derived from the American Medical Association’s Masterfile, we conducted a national study of board certified physicians via a mailed web-push survey. Up to four contacts were made and the initial mailing included an upfront $50 gift card incentive. The instrument asked the frequency and content of communications with patients regarding e-cigarettes, including a case scenario. Of 750 mailed surveys, 371 were completed, yielding a response rate of 63.87% using AAPOR’s response rate calculation. Results: Almost all (94%) pediatricians reported that they had discussed e-cigarettes during a patient visit, with 57.1% often or always initiating the topic. Most pediatricians reported discussing topics such as the potential health harms of using e-cigarettes (91.3%), addiction potential of e-cigarettes (87.9%), and not starting to use e-cigarettes (86.9%). When asked about potential clinical scenarios, most pediatricians (73.3%) said they would recommend FDA-approved pharmacotherapy rather than e-cigarettes for smoking cessation. In addition, 65.0% said they would recommend pharma therapies to help stop e-cigarette use. Despite these large numbers of pediatricians having discussions of e-cigarettes with patients, 41.3% reported being not confident in their ability to answer questions about e-cigarettes from patients. Conclusions: While a majority of pediatricians are having discussions of e-cigarettes with their patients, many still lack confidence in their ability to answer questions. With e-cigarette use among adolescents remaining high as well as e-cigarette health effects emerging, it is important to continue gauging what type of communications are being had between adolescents and their providers.

FUNDING: Federal

PS5-44
PLACING TOBACCO USERS AT THE CENTER OF CESSION RESEARCH TO INFORM STATE TOBACCO CONTROL PROGRAM INITIATIVES
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Significance: In the U.S., states make significant investments in Quitline and Quitline+ programs, both CDC-recommended best practice for tobacco control programs. However, the reach of tobacco Quitlines remains low, with only about 1%
of adult smokers in the U.S. receiving services annually. Most research informing current best practice is based largely on effectiveness at a population-level. Research focusing on tobacco users’ lived experiences and desires in relation to cessation support could yield new insights to inform future cessation strategies.

**Methods:** In Summer 2019, five focus groups were conducted with 47 adults throughout Vermont who identified as current tobacco users. A team of three researchers coded the data using a grounded theory approach to identify themes that reflected broader patterns found within the data. These themes were then used to develop key elements and models to consider when developing or enhancing tobacco program cessation support strategies.

**Results:** Over half of the focus group participants (58%) had made at least one quit attempt in the last year, but faced barriers including stress, the addiction to tobacco, and social support networks who also used tobacco. Four key elements and three models to consider emerged from the data. These themes were then used to develop key elements and models to consider when developing or enhancing tobacco program cessation support strategies.

**Conclusion:** Findings can be used to guide public health professionals in the tobacco control field to move beyond traditional approaches such as Quitlines in an effort to better reach and support tobacco users in successful cessation. As an example, the poster will also share several innovative strategies that the Vermont Tobacco Program is now considering from this study.

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**PS5-45**

**EPIC E-CIGARETTE REGISTRY - ELECTRONIC HEALTH RECORD BASED SURVEILLANCE OF PATIENTS WHO VAPES**

**Thulasee Jose, MD, David Warmer, MD, Mayo Clinic, ROCHESTER, MN, USA.**

**Significance.** The rapid rise in the prevalence of electronic cigarette use in US and reports of lung injury due to vaping has highlighted the need for healthcare systems to ascertain utilization. However, there are major limitations in the current electronic health records (EHR) systems to record and manage this information. The purpose of this project was to develop and deploy an EHR-based health registry for surveillance of patients who use these devices.

**Methods.** A health registry was designed within the EHR system of a large US hospital system, based on a newly-developed and implemented section of the EHR specific to e-cigarette use that supplemented the current tobacco use section. The new rule-based registry was designed to capture all patients that self-reported as either former or current users of e-cigarettes. Additional metrics including demographics, inpatient admissions, current tobacco use, etc. are collected as part of the e-cigarette registry data for use in generating analytical reports. After a successful validation process, the registry was instituted across the entire EHR system.

**Results.** Since the implementation of the new registry, of the 8,328,976 EHRs (alive, age 12 and above), the e-cigarette registry captured 12,415 patients who self-reported as either former or current users of e-cigarettes. Additional metrics including demographics, inpatient admissions, current tobacco use, etc. are collected as part of the e-cigarette registry data for use in generating analytical reports. After a successful validation process, the registry was instituted across the entire EHR system. Since the implementation of the new registry, of the 8,328,976 EHRs (alive, age 12 and above), the e-cigarette registry captured 12,415 patients who self-reported as either former or current users of e-cigarettes. Additional metrics including demographics, inpatient admissions, current tobacco use, etc. are collected as part of the e-cigarette registry data for use in generating analytical reports. After a successful validation process, the registry was instituted across the entire EHR system.

**Conclusion.** Implementation of a live EHR-based health registry for surveillance of patients who use these devices. The rapid rise in the prevalence of electronic cigarette use in US and reports of lung injury due to vaping has highlighted the need for healthcare systems to ascertain utilization. However, there are major limitations in the current electronic health records (EHR) systems to record and manage this information. The purpose of this project was to develop and deploy an EHR-based health registry for surveillance of patients who use these devices.

**FUNDING:** Academic Institution

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**PS5-46**

**THE ASSOCIATION BETWEEN E-CIGARETTE ADVERTISEMENTS AND TRANSITION TO DUAL USE OF CIGARETTES AND E-CIGARETTES AMONG US YOUNG ADULTS SMOKERS.**

**Juhan Lee, JeeWon Cheong, PhD. University of Florida, Gainesville, FL, USA.**

**Significance.** Previous findings suggest that exposure to e-cigarette advertisements is associated with e-cigarette (e-cig) use initiation among young adults (USDHHS, 2016). Tobacco companies strategically use positive images of e-cig use such as freedom, sociability, smoking cessation, and health in ads. However, a knowledge gap still exists on the influence of e-cig ads on e-cig initiation among exclusive cigarette (cig) smokers (i.e., transition from exclusive cig smokers to dual users).

**Methods.** Our analysis sample included young adults (ages 18-24) from the Population Assessment of Tobacco and Health (PATH) Study who were present at both Waves 1 and 2 (2013-2014; 2014-2015). We restricted our sample to exclusive cig smoker at Wave 1 (n=1,468; Male=54.4%; non-Hispanic White=75.5%). Dual use of cigs and e-cigs at Wave 2 (i.e., initiated e-cig use in addition to cig use) was predicted with the exposure to e-cig ads during the past 12 months indicating (1) TV ads only; (2) non-TV ads only; and (3) both TV and non-TV ads. Logistic regression analysis was conducted, controlling for sex, age, region, other tobacco use, harm perception on e-cig use, age of first cig smoking, tobacco dependence, living with tobacco user, and past 12-month quit attempts.

**Results.** Among exclusive cig smokers at Wave 1, those exposed only to TV ads were more likely to be dual users at Wave 2 compared to those were not exposed any types of e-cig ads (aOR=1.75, 95% CI=1.08-2.83). However, there were no significant associations between e-cig use initiation and exposure to non-TV ads only or both types of ads. Higher odds of being a dual user were also associated with tobacco product use other than cigs and e-cigs (aOR=1.64, 95% CI=1.05-2.56), lower perceived harm of e-cig use (aOR=1.33, 95% CI=1.00-1.77), and quit attempts of cig smoking in the past 12 months (aOR=1.43, 95% CI=1.01-2.03). This study highlights the influence of TV e-cig ads on initiating e-cig use among young adults who only used cigs. Findings suggest that policy and prevention program can target accessibility and information of e-cig ads, especially TV ads.

**FUNDING:** Unfunded

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**PS5-47**

**PERCEPTIONS OF RELATIVE SAFETY RISK OF E-CIGARETTES OVER TIME IN SIX COUNTRIES.**

**Michael J. Paskow, MPH, Nada Adibah, MPH, Sarah Rajkumar, PhD, Brian E. Erikkila, PhD. Foundation for a Smoke-Free World, Washington, DC, USA.**

Despite a growing number of studies on the use of e-cigarettes (EC) as reduced risk products compared to traditional combustible tobacco (CT), the public’s perceptions of relative harm suggest burgeoning concerns and misinformation. Results from national surveys in the US show prospective increases in those who perceive electronic nicotine delivery systems (ENDS) as equally or more harmful. This study uses data from two international surveys conducted in 2017 and 2019. In 2017, over 17,000 adult participants from 13 countries were surveyed along with an additional sample of 200 smokers per country for smoker subanalyses. The 2019 survey consisted of over 54,000 adults (41,673 in India alone) in seven countries who were current smokers/vapers or recent quitters. Greece (GR), India (IN), Japan (JP), South Africa (SA), UK, and the US were surveyed at both timepoints. Surveys were administered online in JP, UK, and the US, and in person in GR, IN, and SA. Among CT users, awareness of EC was consistently high (above 88%) in all countries except IN and SA (2017: 11% and 51%; 2019: 42% and 69%, respectively). While in GR, the UK, and the US the proportion of CT users aware of EC who perceived EC as less harmful than CT remained stable between the two timepoints (GR: 41% vs. 40%; UK: 61% vs. 61%; US: 56% vs. 51%), the rates decreased in JP and SA (71% vs. 58%; 40% vs. 34%, respectively). In IN, the rates increased (29% to 44% respectively), however 2017 only included 56 respondents compared to the 4,236 in 2019. Among this same group of CT users aware of EC, those perceiving EC as equally or more harmful than CT ranged from 29% (JP) to 64% (IN) in 2017 and from 28% (JP) to 58% (SA) in 2019. Additionally, results suggest that a higher proportion of individuals in 2019 generally believe that EC cause respiratory conditions (including COPD, emphysema, tuberculosis, bronchitis, “popcorn lung”, and asthma) more so than they did cancers and cardiovascular disorders. There are currently 1.1 billion smokers worldwide; properly informing the public of the state of the science regarding the relative risks of ENDS could help drastically reduce that number.

**FUNDING:** Unfunded

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**PS5-48**

**CIGARETTE SMOKING AND PSYCHOLOGICAL DISTRESS AMONG ILICIT OPIATE USERS.**

**Arafash Etemadi, Hossein Poustchi, M.D., Ph.D., Afarin Rahimi-Movaghar, M.D., Masouneh Amin-Esmaili, M.D., Neil D. Freedman, Ph.D., Reza Malekzadeh, M.D., Christian C. Abnet, Ph.D., National Cancer Institute, NIH, Rockville, MD, USA, Digestive Diseases Research Institute, Tehran, Iran, Islamic Republic of, 1Iranian National Center for Addiction Studies, Tehran, Iran, Islamic Republic of, 2National Cancer Institute, Rockville, MD, USA.**

The rapid rise in the prevalence of electronic cigarette use in US and reports of lung injury due to vaping has highlighted the need for healthcare systems to ascertain utilization. However, there are major limitations in the current electronic health records (EHR) systems to record and manage this information. The purpose of this project was to develop and deploy an EHR-based health registry for surveillance of patients who use these devices. Methods: A health registry was designed within the EHR system of a large US hospital system, based on a newly-developed and implemented section of the EHR specific to e-cigarette use that supplemented the current tobacco use section. The new rule-based registry was designed to capture all patients that self-reported as either former or current users of e-cigarettes. Additional metrics including demographics, inpatient admissions, current tobacco use, etc. are collected as part of the e-cigarette registry data for use in generating analytical reports. Results: The rapid rise in the prevalence of electronic cigarette use in US and reports of lung injury due to vaping has highlighted the need for healthcare systems to ascertain utilization. However, there are major limitations in the current electronic health records (EHR) systems to record and manage this information. The purpose of this project was to develop and deploy an EHR-based health registry for surveillance of patients who use these devices. The rapid rise in the prevalence of electronic cigarette use in US and reports of lung injury due to vaping has highlighted the need for healthcare systems to ascertain utilization. However, there are major limitations in the current electronic health records (EHR) systems to record and manage this information. The purpose of this project was to develop and deploy an EHR-based health registry for surveillance of patients who use these devices.

Conclusion: Implementation of a live EHR-based health registry for surveillance of patients who use these devices.

**FUNDING:** National Cancer Institute, NIH, Rockville, MD, USA, Digestive Diseases Research Institute, Tehran, Iran, Islamic Republic of, 1Iranian National Center for Addiction Studies, Tehran, Iran, Islamic Republic of, 2National Cancer Institute, Rockville, MD, USA.
Background: Individuals with substance use disorders have high prevalence of tobacco use, and cigarette smoking is associated with increased rates of self-reported disability in illicit substance users. We evaluated the association between cigarette smoking, opioid use disorder (OUD) and psychological distress in long-term illicit opiate users.

Methods: We analyzed data from a random selection of long-term illicit opiate users participating in Golestan Cohort Study from Northeast Iran. This group underwent a detailed interview about opiate and tobacco use, a validated questionnaire to diagnose OUD and Kessler’s 10-item questionnaire (K-10) to screen psychological distress. OUD was defined as having 2 or more DSM-5 criteria (severe OUD as 6 or more criteria). A cut-off of 12 (out of 40) in K-10 questionnaire was defined as presence of psychological distress. The analysis was restricted to men as cigarette smoking was rare among women.

Results: Among 382 male opiate users, 142 (37.2%) were current cigarette smokers and 220 (57.6%) were diagnosed with OUD (42 severe OUD). Severe OUD was significantly more common among cigarette smokers than non-smokers (19.0% vs. 6.3%, p=0.001), K-10 score was significantly higher in cigarette smokers (Mean±SD: 8.0±1.6 vs. 6.2±0.4). 28.0% of cigarette smokers and 17.1% of non-smokers had psychological distress (p<0.01). While 15.3% of opiate users without OUD had psychological distress, this figure rose to 26.2% in OUD positive users who did not smoke cigarettes, 36.6% in OUD positive users who smoked cigarettes, and 50% in individuals with severe OUD who smoked cigarettes. Logistic regression, adjusted for age and place of residence, showed that OUD alone (OR=5.2; 95%CI: 1.8-15.1), or combined with smoking (OR=6.8; 95%CI: 2.4-19.5) were associated with psychological distress.

Conclusion: In illicit opiate users, cigarette smoking was associated with opioid use disorder, and the combination of cigarette smoking and OUD diagnosis increased the chance of psychological distress. One third to half of those diagnosed with OUD who smoked cigarettes suffered from psychological distress, which shows the importance of mental health monitoring in dual users of illicit substances and cigarettes.

FUNDING: Federal; Academic Institution

PS5-49

ALVEOLAR LIPID LADEN MACROPHAGES IN ELECTRONIC CIGARETTE USERS

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Introduction: There has been a recent and alarming outbreak of “E-cigarette or Vaping Product Use Associated Lung Injury” (EVALI). While vaping THC oils contaminated with vitamin E acetate is implicated, a subset of cases report only vaping with nicotine-containing electronic cigarettes (e-cigs). Whether or not e-cigs cause EVALI, there are important health questions about vaping with e-cigs. EVALI pathology shows a spectrum of Southern CA, Los Angeles, CA, USA.

Background. Cigarette/vaping associated lung injury has garnered considerable media attention, representing the most acute vaping-related illness. However, individuals who vape may be experiencing a variety of adverse respiratory symptoms that develop more gradually and often do not require hospitalization. The purpose of this study was to determine if frequency and intensity of vaping nicotine and cannabis are associated with chronic bronchitic symptoms, wheeze, and shortness of breath.

Methods. Data were from a cohort of Southern Californian young adults surveyed in 2018-2019 (N=2553; mean age [SD]=19.3 [0.79]). Participants reported symptoms of bronchitis (i.e., daily cough for 3 months, congestion, or phlegm), past-year wheeze, and shortness of breath. Participants also reported lifetime, past 6-month, and past 30-day vaping of nicotine and cannabis (frequency), as well as the number times vaped per day and the number of puffs per time in the past 30 days (intensity). Logistic regression models evaluated associations between frequency and intensity of vaping, adjusting for demographic characteristics and combustible cigarette and cannabis use.

Results. Frequency and intensity of vaping were associated with increased odds of bronchitic symptoms and past-year wheeze for vaping cannabis, but not nicotine. Compared to young adults who never vaped, those who vaped cannabis in the past 6 months but not past 30 days (AOR=3.25 [95% CI=1.55, 6.82]), and those who vaped in the past 30 days (AOR=4.37 [1.93, 9.89]) had increased odds of bronchitic symptoms. Similar results were observed for past-year wheeze (past 6 months AOR=2.3 [1.05, 5.03]; past 30 days AOR=2.62 [1.89, 5.78]). Those reporting the greatest intensity of vaping cannabis also had significantly higher odds of bronchitic symptoms and wheeze (AORs=2.81-7.45).

Conclusions. Vaping may confer increased risk of chronic bronchitic symptoms and past-year wheeze, but effects differed by substance, with the strongest associations observed for cannabis. Further research is needed to understand temporality of the associations, mechanisms underlying risk differences, and potential interaction effects.

FUNDING: Federal; State

PS5-50

DETERMINANTS OF LONGITUDINAL E-CIGARETTE USE PATTERNS AMONG CURRENT AND FORMER SMOKERS IN THE UNITED STATES

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ECONOMIC EVALUATION OF TWO COMMUNITY HEALTH WORKER PROMOTED MODELS OF TOBACCO DEPENDENCE TREATMENTS

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Significance: Tobacco use poses a significant economic burden on public health, an estimated to $332.5 billion annually. Tobacco dependence treatments are highly cost-effective; however, these methods are typically clinical in nature and may exclude groups who are disadvantaged or hard-to-reach. This study examines the cost-effectiveness of two evidence-based community health worker (CHW) promoted models of tobacco dependence treatments. Methods: This economic evaluation utilized data from a 12 county group randomized trial (n=707) comparing the effectiveness of two CHW models of tobacco dependence treatment among adult Appalachian smokers Participants were assigned to a CHW face-to-face intervention or a CHW-promoted quitline. The payer/provider perspective was used to determine the cost per quit and incremental cost-effectiveness ratio (ICER) at 3, 6, and 12 months. Analyses were stratified by depression and nicotine dependence subgroups. Abstinence outcomes used self-reported 7-day point prevalence and biochemical confirmation. Discounting was not conducted. Costs were adjusted to 2014 U.S. dollars. One-way sensitivity analyses were performed. Results: The CHW quitline condition had the lowest cost per quit at each time point for both biochemically confirmed and self-reported outcomes. Biochemically confirmed cost per quit ranged from $4300 to $6400 and $3800 to $9800 for the CHW quitline and CHW face-to-face conditions, respectively. The self-reported cost per quit ranged from $3200 to $4400 and $4500 to $7400 for the CHW quitline and CHW face-to-face conditions, respectively. The self-reported ICER ranged from $10,400 to $17,600 to $25,300. Self-reported cost per additional quit ranged from $10,400 to $25,300. The quitline condition was more cost-effective with an average cost per quit.

FUNDING: Unfunded; Federal

CIGARETTE PACK DESIGN: VISUAL ATTENTION AMONG COLOMBIAN SMOKERS AND NON-SMOKERS TOWARD STANDARDISED PACKAGING AND LARGER HEALTH WARNINGS

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Significance: Smoking-related morbidity and mortality is set to increase in Colombia over the next decade. The current research examines whether larger health warnings and standardised packaging may be an effective method of increasing attention to warnings among smokers and non-smokers. Methods: We presented 62 Colombian daily-smokers, 56 weekly smokers and 54 non-smokers images of cigarette packs on screen in a laboratory eye-tracking experiment. Health warning size (30% [text next to pictorial], 30% [text above pictorial], 50%, 70%) and branding (branded, standardised packaging) were the within-subject factors. We calculated the bias in the number of fixations to the health warning versus the branding. Results: An analysis of the variance indicated that health warnings attracted the highest levels of attention when they were presented on standardised packaging and when they covered 70% of the pack (F(2,169)=5.48, p=.01, ηp2=.03). Daily smokers and weekly smokers paid less attention to health warnings than non-smokers (F(2,169)=8.31, p<.001 , ηp2=.09); however increasing health warning size was particularly effective among smokers (F(2,169)=5.68, p=.004, ηp2=.06). Conclusion: This research replicates and extends our eye-tracking research conducted among smokers in the UK. It shows that standardised packaging increases attention to warnings and that although daily smokers do not attend warnings as much as non-smokers and weekly smokers, attention can be increased by increasing warning size. This is the first research examining attention to warnings among Colombian smokers and has implications for the implementation of new warnings in the country.

FUNDING: Nonprofit grant funding entity
flavor capsule cigarettes would most likely be smoked by teenagers or young adults. CONCLUSION: Young adult Filipinos believe that some menthol-flavored cigarettes are less harmful than other flavored cigarettes and non-flavored cigarettes and find flavor capsule cigarettes attractive and show a strong interest in them. A tobacco flavor ban and implementation of plain packaging might help reduce misperceptions of harm and make cigarettes less appealing.

FUNDING: Nonprofit grant funding entity

PS5-56
EFFECTS OF TOBACCO RETAIL ENVIRONMENT AND NEIGHBORHOOD SMOKING PREVALENCE ON SMOKING REDUCTION AMONG YOUNG ADULT SMOKERS IN NYC
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Significance: Exposure to tobacco retail outlets (TROs) and social smoking environments may impact smoking cessation or reduction success. The purpose of this analysis was to evaluate the associations between characteristics of TRO proximity and density and neighborhood-level smoking prevalence on smoking reduction among a sample of individuals using electronic cigarettes (ECs) to reduce their combustible cigarette (CC) consumption. METHODS: This analysis uses data from a study on adult smokers in NYC recruited to try ECs as a way to reduce their CC consumption by 50%. For this analysis, we regressed the reduction success outcome on home address-based tobacco retail/smoking environments. TRO location data came from NYC Department of Consumer Affairs. TRO density was calculated for each participant using a 500-meter buffer around home address and proximity was calculated using meters to nearest TRO. ZIP code level smoking prevalence came from the NYC Department of Health's representative Community Health Survey. Results: Among the 67 participants residing in NYC for the study's duration, the number of TROs within 500 meters of home ranged from 2-110; based on bivariate logistic regression, living in an area with higher density of TROs was associated with 34% decrease in the odds of achieving 50% smoking reduction (0.66, 95% CI=0.24-1.73). Proximity to TRO ranged from 23-335 meters; living further from a TRO was associated with a 37% increase in odds of 50% smoking reduction (OR = 1.37, 95% CI = 0.52-3.65). Neighborhood smoking prevalence, based on zip code, ranged from 7-24 percent. Living in an area with higher neighborhood smoking prevalence was associated with 30% lower odds of achieving 50% smoking reduction (OR = 0.70, 95% CI=0.26-1.86). Conclusions: This analysis confirms prior research that the TRO landscape and smoking prevalence around a smoker's home environment can negatively impact their ability to successfully reduce and/or quit smoking. Further research should expand upon these initial findings with larger, powered samples.

FUNDING: Unfunded

PS5-57
HARM PERCEPTIONS OF HEATED TOBACCO PRODUCTS RELATIVE TO COMBUSTIBLE CIGARETTES AND ELECTRONIC NICOTINE DELIVERY SYSTEMS: FINDINGS FROM THE ITC JAPAN-CANADA PROJECT
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Significance: Many smokers switch to alternative tobacco products (ATPs), like heated tobacco products (HTPs) and electronic nicotine delivery systems (ENDS), driven by the marketing claims of potential risk reduction. Non-smokers may also be more susceptible to try ATPs if they believe that these products are harmless. Little is known about perceived relative harm of different ATPs among tobacco users and non-users who live in countries with different ATP regulations. Methods: Data were analyzed from the ITC Japan-Canada Project, a web survey with 643 respondents (aged ≥20) conducted in two countries, Japan (JP; only HTPs are legal) and Canada (CA; both HTPs and ENDS are legal), from September 2018 to February 2019. Harm perceptions were estimated for different user groups, including non-users. Multivariable logistic regression assessed association between perceiving ATPs as equally or more harmful than combustible cigarettes (CCs) and so-called ‘sodium’ and country of origin, and tobacco product use status. Results: Majority of respondents from JP perceived HTPs to be less harmful than CCs (84.8%). Although most respondents from CA perceived ENDS to be less harmful than CCs (65.4%), less than half (49.1%) perceived HTPs to be less harmful than CCs. Only 16.4% of Canadian respondents perceived HTPs to be more harmful than ENDS. Among exclusive ATP users in both countries, perception of lower relative risk of ATPs compared to CCs was similar: 36.4% of exclusive HTP users in JP and 93.7% of exclusive ENDS users in CA. Almost one third of exclusive ENDS users in CA perceived HTPs to be more harmful than ENDS (31.2%). More non-users in JP perceived HTPs to be less harmful than CCs compared to non-users in CA (73.3% vs. 29.1%). Compared to non-users, users of ATPs have lower odds in perceiving alternative tobacco products as equally or more harmful than CCs. Conclusion: Among ATP users, perceived relative risk of those products compared to CCs appears to be similar across JP and CA. However, perceived relative risk of ATPs among non-users appears to vary between two countries. In CA, there is a difference in a relative risk perception between HTPs and ENDS.

FUNDING: Federal

PS5-58
TOBACCO RETAIL AVAILABILITY AND TOBACCO CESSATION IN LUNG AND HEAD AND NECK (HN) CANCER SURVIVORS.
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Significance: Continued smoking after a cancer diagnosis is associated with poorer outcomes. Tobacco retail availability is negatively associated with cessation in non-cancer patients but has not been explored in cancer survivors. We assessed whether proximity and density of tobacco retail outlets is associated with cessation rates in lung and head and neck (HN) cancer survivors. METHODS: Lung and HN cancer patients from Princess Margaret Cancer Centre (Toronto, Ontario) completed questionnaires evaluating changes in tobacco use with a median of 39 months apart. Validated tobacco retail location data were obtained from Ministry of Health and patient home addresses were geocoded using ArcGIS 10.6.1, which calculated walking time/distance to nearest vendor, and vendor density within 250 meters (m) and 500m from patients. Multivariable logistic regression and Cox proportional hazard models evaluated the impact of vendor availability on cessation and time to quitting after diagnosis respectively, adjusting for significant clinico-demographic and tobacco covariates. Results: 242/271 lung and 137/441 HN patients booked at diagnosis; subsequent overall quit rates were 66% and 49% respectively. Mean distance and walking time to a vendor was 1 km (range 0-13) and 7 min (range 0-157). On average, there was one vendor (range 0-19) within 250m and four vendors (range 0-40) within 500m from patients; 38% and 61% of patients lived within 250m and 500m from at least one vendor respectively. Greater distance (aOR 1.18 per 1000m [95% CI 1.00-1.41] p = 0.05) and increased walking time (aOR 1.01 per minute [1.00-1.03] p = 0.05) were associated with quitting at one year. Living within 250m (aOR 0.52 [0.32-0.84] p = 0.008) or 500m (aOR 0.57 [0.35-0.92] p = 0.02) to at least one vendor reduced quitting at one year. Living near more vendors within 500m had an increasing dose effect on reducing cessation rates at one year (aOR 0.98 per vendor [0.93-1.00] p = 0.05). Results were similar in time-to-quitting analyses where 69% of patients quit in the peri-diagnosis period. Subgroup analysis revealed similar trends in lung and HNC patients. Conclusions: Close access to tobacco retail outlets is associated with reduced cessation rates for lung and HN cancer survivors. Reducing density of tobacco outlets is a cessation strategy that could positively impact cancer patient outcomes.

FUNDING: Federal

PS5-59
SMOKELESS TOBACCO PRODUCTS IN THE UK; AN OVERVIEW OF EXISTING REGULATIONS, PRODUCT AVAILABILITY AND COMPLIANCE WITH UK REQUIREMENTS
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Background: In the UK, Smokeless Tobacco (ST) is predominantly consumed by South Asian minority ethnic groups. ST is causally linked with oral cancers, which has higher
PS5-61
A BRIEF MEASURE OF DEPENDENCE FOR LIGHT SMOKERS: ASSESSING CONCURRENT AND PREDICTIVE VALIDITY AMONG MEXICAN SMOKERS
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Significance: Measuring smoking dependence using smoking frequency may be inadequate for light smokers. We assessed the predictive and concurrent validity of a dependence measure among smokers in Mexico, where most smokers are daily light or non-daily smokers. Methods: Over one year, adult smokers recruited from an online consumer panel in Mexico were surveyed every four months, of whom 498 smokers attempted to quit between consecutive surveys. At time “t”, participants answered a subset of 10 items from the Wisconsin Inventory of Smoking Dependence Motives (WISDM), which addressed five domains (i.e., cravings, cue exposure-associative processes, negative reinforcement, positive reinforcement, and weight control). Participants reported smoking frequency, and daily smokers were categorized as “light” or “heavy” based on the median of 5 cigarettes per day (CPD) in Mexico. Other smoking-related variables (e.g., heaviness of smoking index [HSI], self-efficacy to quit, quit intentions) and sociodemographics were evaluated at time “t”. At follow up (time “t+1”), participants reported how long they remained abstinent from smoking, from which we derived our primary outcome (≥30 days). Logistic models regressed sustained quit attempts (≥30 days) on study variables (time “t”). We also assessed WISDM’s cross-sectional association with HSI and self-efficacy to quit. Results: The WISDM scale had high inter-item reliability among non-daily (alpha=0.91), daily light (alpha=0.90), and daily heavy smokers (alpha=0.89). WISDM score was unassociated with HSI (r=-0.01, p=0.81) but was inversely correlated with self-efficacy to quit (r=-0.34, p<0.001) when all were measured in the same survey (time t). Smokers with higher WISDM scores were less likely to have a sustained quit attempt at follow up (OR=0.77, p<0.01). Conclusion: Our 10-item subset of WISDM questions for measuring smoking dependence among light smokers in Mexico appears to have good predictive validity when assessing duration of smoking cessation attempts. Future research should evaluate the validity of these items in representative samples of Mexican smokers and other populations where light smoking is common.

FUNDING: Nonprofit grant funding entity

PS5-60
BLUE LOTUS FLOWER (NYMPHEA CAERULEA) IN AN ELECTRONIC CIGARETTE
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Methods: A multi-methods study was conducted from August 2017 to July 2019. We reviewed the Tobacco & Related Products Directive (TRPR) and other statutory documents to identify and compare regulations for cigarettes with ST products. 41 unique variants of ST were purchased and packaging features analysed for compliance with applicable requirements. A quantitative survey was conducted with 98 ST retailers in randomly selected wards in five boroughs (Birmingham, Bradford, Blackburn, Leicester, Tower Hamlets) with a high South Asian population. 15 in-depth interviews were conducted with retailers and suppliers. Survey data were analysed descriptively; qualitative data were analysed using the framework approach. Results: Our policy review showed that current regulations for ST products differ from those for cigarettes in the UK; regulations specifying nicotine concentration or restricting flavours do not extend to ST. Health warning requirements (in terms of size, content and type) were also less stringent than cigarettes. Our survey found that ST was widely available in all five boroughs, with dry snuff (35.7%), naswar (36.7%), and zarda (37.7%) products being most common. Pack analyses of purchased ST products indicated poor compliance with existing regulation; ST packaging commonly resembled food products (24.3%) or had indications of taste, smell of flavour(26.8%), 29 (70%) products had Health warnings, of which only 6(6.9%) matched UK requirements. Practices and views of retailers varied widely, and reflected limited knowledge of ST related laws. Conclusion: Policies regulating ST are less stringent than those for cigarettes in the UK. Products are largely non-compliant with regulations, yet widely available in surveyed boroughs. Stronger legislation, and improved regulation of ST is urgently needed to minimise its impact on among ethnic South Asians.

FUNDING: Nonprofit grant funding entity

PS5-62
PERCEPTIONS OF HARM AND ADDICTIVENESS OF E-CIGARETTES RELATIVE TO CIGARETTE YOUTH IN CANADA, ENGLAND, AND THE U.S
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Title: Perceptions of harm and addictiveness of e-cigarette relative to cigarettes among youth in the Canada, England, and the US: 2017 - 2019 Authors: Keith Nowak, Victoria Lambert, James Thrasher, David Hammond, Jessica Reid Significance: Few studies have looked at perceptions of the relative harm of e-cigarettes have changed over time, particularly amongst youth. We evaluated perceptions of e-cigarettes from 2017 to 2019 across countries with different e-cigarette regulations. Methods: Data were analyzed from the 2017, 2018, and 2019 International Tobacco Control Youth Tobacco and Vaping Survey, which surveyed 16-19-year-old youth in Canada (n=12,018XXX), England (n=11,462XXX), and the United States (n=12,007XXX). Relative harm was assessed by asking participants to directly compare harms from smoking and vaping; responses were categorized into perceived lower harm for e-cigarettes vs. not. In 2018 and 2019 only, perceived addictiveness was asked for each product separately, and their responses to e-cigarettes were subtracted from those for smoking. We compared outcomes by country and year, also estimating adjusted models that regressed relative perceived harm (logistic) and relative perceived addictiveness (linear) on country, year, smoking and e-cigarette use and susceptibility, use among family and friends, and sociodemographics. Results: The percentage who perceived e-cigarettes as less harmful than cigarettes decreased in all three countries from 2017 to 2019 (Canada:23.4% to 20.9%, England:24.3% to 23.2%, U.S:29.7% to 15.3%). In pooled adjusted models, perceptions of e-cigarettes as less harmful decreased over time (AOR=0.38, p<0.001) and was higher in the UK (AOR=1.55, p<0.001) and lower in the US (AOR=0.81, p<0.001) than in Canada. In models for relative addictiveness, perceiving e-cigarettes as less addictive over time (B=0.07, p<0.001) and in the US compared to Canada (B=-0.14, p<0.001). For both relative harm and addictiveness,
greater susceptibility and use of e-cigarettes was associated with more positive perceptions of e-cigarettes, and greater susceptibility and use of cigarettes was associated with more positive perceptions of cigarettes. Conclusion: Youth across all three countries increasingly perceive e-cigarettes as more harmful and addictive as cigarettes. Future studies should evaluate these perceptions in light of increasing use of e-cigarettes in all three countries.

FUNDING: Academic Institution

PS5-63
ANALYZING TRAJECTORIES OF CIGARETTE TO E-CIGARETTE SWITCHING USING ECOLOGICAL MOMENTARY ASSESSMENT DATA
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Significance: Health providers and researchers alike have identified electronic cigarettes (ECs) as a potentially less harmful alternative to combustible cigarettes (CCs). Because ECs for adults who have never smoked, and who are interested in smoking cessation and trying an alternative, EC use is rising. However, there is little research about the switching process (from CCs to ECs). The purpose of this study was to evaluate dietary intake by the level of smoking.

Methods: From the national prospective, longitudinal Project E Quit cohort study, a total of 78 adult smokers were recruited to try ECs as a way to reduce their CC consumption. CPD data was gathered via ecological momentary assessment (EMA); participants responded to text messages asking about cigarette consumption four times daily across the 21-day intervention period. CPD was transformed (square root) prior to analysis. Results: We identified four distinct clusters in our sample. "Rapid reducers" were characterized as such given that they had the largest negative slope over time (β=-0.07; 25.9% of sample). "Moderate reducers" had a negative slope of β=-0.06 (22.0% of sample). The "slow reducers" group and "maintainers" group had slopes of β=-0.03 (33.2% of sample) and β=0.004 (19% of sample), respectively. Aside from age and education, sociodemographic factors did not statistically differ across the clusters. Randomized condition (placebo EC versus 4.5% nicotine EC) also did not statistically differ across the clusters. Conclusions: This research was supported in part by the Intramural Research Program of the NIH and the National Cancer Institute. Additionally, this research was supported by U.S. Public Health Service contracts N01-CN-45165, N01-RC-45035, N01-RC-37004, HHSN261210100006C, and HHSN2612101500005C from the National Cancer Institute, Department of Health and Human Services.

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PS5-65
DIETARY INTAKES AMONG SMOKERS FROM THE ALPHA TOCOPHEROL, BETA CAROTENE CANCER PREVENTION STUDY COHORT
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Background: Smokers tend to have less adequate diet as compared to non-smokers. Less is known about dietary differences between light vs. heavy smokers. The purpose of this study was to evaluate dietary intake by the level of smoking.

Methods: We evaluated dietary intake among light vs. heavy smokers in Finnish male smokers, aged 50 - 69 years, in the Alpha-Tocopherol, Beta-Carotene Cancer Prevention (ATBC) Study. Out of 27,111 participants, 17,300 (63.8%) reported smoking ≥ 20 cigarettes/day and were classified as heavy-smokers, and 9,811 (36.2%) reported smoking < 20 cigarettes/day and were classified as light-smokers.

Results: Baseline mean serum alpha-tocopherol (11.86 ± 0.03 vs. 12.13 ± 0.04 mg/l; p < 0.00001) and beta-carotene (201.90 ± 1.38 vs. 233.48 ± 1.93 µg/l; p < 0.00001) were significantly lower among heavy-smokers. Intakes of cereal (212.13 ± 0.67 vs. 221.78 ± 0.84 g/day; p < 0.00001), vegetables (110.91 ± 0.54 vs. 118.29 ± 0.71 g/day; p < 0.00001), fruits (209.91 ± 1.48 vs. 232.44 ± 1.98 g/day; p < 0.00001), and total dietary fiber (18.44 ± 12.99 g/day; p < 0.00001) were significantly lower among heavy-smokers as compared to light-smokers. However, intakes of red meat (73.14 ± 0.27 vs. 68.04 ± 0.32 g/day; p < 0.00001), processed meat (78.10 ± 0.47 vs. 69.44 ± 0.54 g/day; p < 0.00001), dairy products (737.23 ± 3.06 vs. 719.42 ± 3.74 g/day; p < 0.0001), coffee (640.56 ± 2.80 vs. 549.23 ± 3.13 g/day; p < 0.00001), and alcohol (20.55 ± 0.18 vs. 13.50 ± 0.50 g/day; p < 0.00001) were significantly higher among heavy-smokers as compared to light-smokers. Dietary intake vary significantly by the level of smoking and heavy-smokers have poorer intakes as compared to light-smokers. The observed dietary differences have important implications for cancer prevention and control efforts, suggesting a need to incorporate dietary components into tobacco cessation interventions.

Funding: This research was supported in part by the Intramural Research Program of the NIH and the National Cancer Institute. Additionally, this research was supported by U.S. Public Health Service contracts N01-CN-45165, N01-RC-45035, N01-RC-37004, HHSN261210100006C, and HHSN2612101500005C from the National Cancer Institute, Department of Health and Human Services.

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PS5-64
CHANGES IN E-CIGARETTE PERCEPTIONS AND BELIEFS AFTER NATIONAL NEW COVERAGE OF EVALI
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Background: Exposure to media content can shape public opinions about tobacco. The United States is undergoing an outbreak of e-cigarette, or vaping, product use-associated lung injury (EVALI). The outbreak became headline news in early September, 2019.

Methods: In August and September, 2019 we conducted 2 cross-sectional online surveys with current and former smokers assessing attitudes and beliefs about e-cigarettes. Time one (n=864) was collected before the EVALI outbreak was widely covered and time two (n=344) was collected after the outbreak had become nation-wide news. We used t-test and X² to examine differences in perceptions and beliefs between time points.

Results: E-cigarette harm perceptions increased between time one (mean=2.67, sd=9) and time two (mean=2.90, sd=9.7, p<0.05). This change was largely driven by ever users of e-cigarettes. The belief that e-cigarettes were risky and more likely to cause lung damage compared to cigarettes increased between time points (p<0.05). The belief that if the participant used e-cigarettes it would be cool, or appeal to kids decreased between time points (p<0.05). Seventy eight percent of participants at time two were aware of the vaping illness story. Being aware of the story was associated with some, but not all belief change. The themes of E-cigarette new coverage varies more week-to-week compared to other tobacco coverage (Gibson, 2019). Changes in participant’s perceptions of e-cigarettes were associated with coverage of this large news story, underscoring the importance of working to ensure that coverage is a scientifically accurate as possible.

Discussion: Attitudes and beliefs about e-cigarettes changed after EVALI became a top news story. Awareness of the story was associated with some, but not all belief change. The themes of E-cigarette new coverage varies more week-to-week compared to other tobacco coverage (Gibson, 2019). Changes in participant’s perceptions of e-cigarettes were associated with coverage of this large news story, underscoring the importance of working to ensure that coverage is a scientifically accurate as possible.

FUNDING: Federal

PS5-66
YOUTH ACCESS TO TOBACCO PRODUCTS IN THE UNITED STATES: FINDINGS FROM WAVE 4.5 (2017-2018) OF THE POPULATION ASSESSMENT OF TOBACCO AND HEALTH (PATH) STUDY
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Significance: To explore how and where youth access tobacco products and provide updated youth access estimates, including availability of tobacco products in the home and sale refusals due to age. Methods: We analyzed 12-17 year-old youth and parent data from Wave 4.5 (December 2017 - December 2018) of the Population Assessment of Tobacco and Health (PATH) Study. Youth who were past 30-day tobacco users were asked about usual sources of access to 9 tobacco products (n = 1,625), including cigarettes, ENDS (electronic nicotine delivery systems), traditional cigars, cigarillos, filtered cigars, pipes, hookah, snus and smokeless, as well as sale refusals due to age. We weighted analyses to account for complex sampling design and to provide nationally representative estimates.

Results: Youth obtained most tobacco products through social sources (i.e., someone they knew had it) (68%). 51.3% of participants ever users of e-cigarettes. 42.6% of youth had ever used e-cigarettes. Being aware of the story was associated with some, but not all belief change. The themes of E-cigarette new coverage varies more week-to-week compared to other tobacco coverage (Gibson, 2019). Changes in participant’s perceptions of e-cigarettes were associated with coverage of this large news story, underscoring the importance of working to ensure that coverage is a scientifically accurate as possible.

FUNDING: Federal
third of ENDS users (34.0, 95% CI: 30.4, 37.8) had someone offer them the product. Cigarette (85.1%, 95% CI: 76.9, 90.8) and cigarillo (73.5%, 95% CI: 58.1, 84.8) users who bought themselves or gave someone else money to buy usually bought at a convenience store or gas station. For ENDS the usual retail sources were vape shops or lounges (58.6%, 95% CI: 49.3, 67.1) and convenience stores or gas stations (26.5%, 95% CI: 19.7, 34.7). Most tobacco products were purchased in person rather than from the internet or by telephone. Nearly 16% of parents reported that tobacco products might be available to youth in their home (95% CI: 14.9, 16.5). Refusal of sale due to age was 14.0% (95% CI: 9.9, 19.4) for cigarettes, 7.8% (95% CI: 6.1, 10.0) for ENDS, 18.9% (95% CI: 12.2, 28.1) for smokeless, and 11.9% (95% CI: 7.0, 19.6) for cigarillos.

Conclusions: This analysis is consistent with previous data reporting that U.S. youth age was 14.0% (95 CI: 9.9, 19.4) for cigarettes, 7.8% (95% CI: 6.1, 10.0) for ENDS, 18.9% (95% CI: 12.2, 28.1) for smokeless, and 11.9% (95% CI: 7.0, 19.6) for cigarillos.

FUNDING: Federal; Other

PS5-67


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Significance: Flavorings differ between brands and tobacco products, potentially altering the sensory perceptions. This study aimed to examine discrepancies in flavor preference across various non-cigarette tobacco products among a national representative sample of US adult regular tobacco users. Methods: Data from the Population Assessment of Tobacco and Health (PATH) Study Wave 3 (W3) were used. Weighted prevalence of flavor preferences for various tobacco products, including electronic nicotine delivery systems (ENDS), traditional cigars, cigarillos/filtered cigars, hookah, and smokeless tobacco, were presented for 9,037 adult current and former users of multiple flavored tobacco products. Within-subject flavor discrepancies were assessed using generalized estimating equations (GEE) models considering the complex sampling design of the PATH study. Results: Most regular users of a flavored tobacco products reported using one flavor category per product. Fruit flavors, followed by tobacco, were the most common flavor categories among ENDS (32% and 25%, respectively) and hookah users (44% and 36%, respectively). Tobacco flavor was the most common among regular users of traditional cigars (80%), cigarillos/filtered cigars (55%), and smokeless tobacco (76%). Polytobacco users of ENDS and traditional cigars had the largest discrepancy, where about 68-76% used different flavor categories when switching products. Conversely, polytobacco users of traditional cigars and cigarillos/filtered cigars had the lowest discrepancy (23-25%). Conclusion: Many consumers of multiple tobacco products had different flavor preferences when switching between products. In the event of a partial or full flavor ban for ENDS, these findings raise questions about consumer loyalty to a particular tobacco product or a particular flavor category.

FUNDING: Federal

PS5-69

VAPING WHILE HIGH: FACTORS ASSOCIATED WITH USING E-CIGARETTE TO VAPE MARIJUANA AMONG ADOLESCENTS IN THE UNITED STATES

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Significance: E-cigarettes are the most commonly used tobacco product among youth in the United States (US). In addition to nicotine, e-cigarette can be used to vaporize marijuana. However, factors associated with using e-cigarette to vape marijuana among youth remain unexplored. This study examined the rates of using e-cigarette to vape marijuana and its correlates among youth in the US. Methods: We analyzed data from the 2018 National Youth Tobacco Survey. The study sample is comprised of 10,680 adolescents who answered yes/no to the question “Have you ever used marijuana oil in an e-cigarette?”. Multivariable regression model was conducted to assess factors associated with using e-cigarette to vape marijuana. Results: Overall, 20.2% of adolescents used e-cigarette to vape marijuana. Females were more likely to vape marijuana [adjusted odds ratio (aOR) = 1.39, 95% CI = 1.35, 1.60] than males. High school students [aOR = 2.15, 95% CI = 1.74, 2.64] were more likely to vape marijuana than middle school students. Hispanics [aOR = 2.31, 95% CI = 1.71, 2.81] and Blacks [aOR = 1.39, 95% CI = 1.02, 1.88] were more likely to vape marijuana than whites. Those who perceived e-cigarette as equally addictive to cigarette, were less likely to vape marijuana [aOR = 0.80, 95% CI = 0.66, 0.97] than those who perceived it as less addictive. In addition, those who reported ever trying cigarettes [aOR = 1.67, 95% CI = 1.74, 2.64], cigars [aOR = 2.65, 95% CI = 2.10, 3.33] or waterpipe [aOR = 2.95, 95% CI = 2.1, 3.88] were more likely to vape marijuana than those who did not. Adolescents who used e-cigarette ≥100 times in their life were more likely to vape marijuana than [aOR = 2.67, 95% CI = 1.87, 3.79] than those who used e-cigarette ≤50 times.

Conclusion: Large number of students have used e-cigarette to vaporize marijuana in 2018. Our findings indicate that gender, race and tobacco use are important factors associated with using e-cigarettes to vape marijuana. These findings highlight the importance of extending the scope of tobacco control efforts targeted at curbing e-cigarette use to address vaping marijuana among youth in the US.

FUNDING: State

PS5-68

PREVALENCE AND REASONS FOR REDUCING OR QUITTING VAPING IN YOUNG ADULT FINDINGS FROM THE PACE VERMONT STUDY

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Introduction: The prevalence of current e-cigarette use (vaping) among young adults increased nationally by almost 50% since 2014. While there are no evidence-based treatments for quitting vaping, recent studies suggest widespread interest in quitting vaping among young people. The goal of this study was to document the prevalence and correlates of past 30-day e-cigarette users who attempt to quit or reduce vaping.

Methodology: We analyzed cross-sectional data collected through online surveys in Fall 2019 to examine the prevalence of attempts to quit or reduce vaping in the past year among young adults (aged 18-24) in Vermont (N=1,037). We used logistic regression models to explore whether attempting to quit or reduce vaping was associated with a series of sociodemographic variables or history of e-cigarette and combustible tobacco use. Results: Among the 184 (17.7%) young adults who reported vaping in the past 30 days, 23.9% attempted to quit and 31.5% attempted to reduce vaping in the past year. Having tried to quit combustible cigarettes in the past year (OR=5.4, 95% CI=1.6, 16.6), flavored e-cigarette use in the past month (OR=3.5, 95% CI=1.1, 11.1), and a greater number of days vaping in the past month (OR=1.04, 95% CI=1.01, 1.08) was associated with attempting to quit vaping in the past year. Use of flavored vapes in the past month (OR=4.7, 95% CI=1.5, 14.8) was associated with trying to reduce vaping in the past year. No sociodemographic variables were associated with attempting to quit or reduce vaping. Among those who attempted to quit or reduce vaping (n=102), the most common reasons were for health (82.4%), money/cost (80.8%), and to be free from addiction (38.2%). Conclusion: More than half of young adults in Vermont who vaped in the past month reported trying to quit or reduce in the past year. Recent reports of vaping related lung injury may have heightened the salience of health risks, giving the timing of this survey. There appears to be substantial interest in reducing or quitting vaping due to health, cost, and to be free from addiction. Thus, there is a need to develop new treatments or substantiate that current evidence-based tobacco treatments work for vaping cessation or reduction.

FUNDING: Federal; Other
RELATIONSHIPS BETWEEN CIGARETTE SMOKING SUSCEPTIBILITY, TOBACCO INDUSTRY-RELATED ACTIVITY, AND SMOKING INITIATION AMONG YOUTH IN THE POPULATION ASSESSMENT OF TOBACCO AND HEALTH (PATH) STUDY, 2013-2016

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Introduction: The landscape of tobacco industry marketing in non-regulated mediums and the racial/ethnic diversity of the U.S. youth population has dramatically changed since smoking susceptibility was first linked to smoking initiation among youth. Our goal was to assess how susceptibility and recent industry-related activity (e.g., tobacco product marketing and tobacco-related media exposure) has influenced smoking initiation among a diverse cohort of youth.

Methods: Data came from three waves (2013-2016) of the nationally representative Population Assessment of Tobacco and Health study. Youth who were 12-17 years old at Wave 1 and completed Wave 3 were included (n=9,640). Susceptibility was assessed by three items (try soon, try in the next year, and if your best friend offered, would you smoke) and categorized into levels (0= no to all, 1= yes to one, 2= yes to two or all). Industry-related activity included marketing through social media and apps. Other covariates included social media use (Yes/No), exposure to smokers (familial, friends, both), and demographic factors. Experimental smoking was assessed by ever trying a cigarette, even 1 or 2 puffs. We used multivariable logistic regression to evaluate if smoking susceptibility, industry-related activity, and other covariates predicted future experimental smoking among youth.

Results: Between 2013 and 2016, 9.9% of Wave 1 never-smokers became experimental smokers at Wave 3. Youth who endorsed 2-3 susceptibility items at Wave 1 were more likely (OR=5.3 (4.4-6.3)) to be experimental smokers at Wave 3. Youth who reported receiving a free sample by mail OR=3.2 (2.1-4.6), used social media several times a day OR=2.0 (1.2-3.3), seen tobacco product content on social media OR=1.2 (1.03-1.5), or ever used a tobacco-related app OR=1.6 (1.2-2.3) were more likely to be experimental smokers at Wave 3. Compared to Whites, Blacks OR=0.5 (0.4-0.6) and Latinos OR=0.7 (0.6-0.8) were less likely to be experimental smokers at Wave 3.

Conclusion: Smoking susceptibility and recent industry-related activity were predictive of experimental smoking among a diverse cohort of youth. Such industry-related activity should be monitored and considered for regulation. Further research is needed to test similar susceptibility measures for non-cigarette tobacco products as predictors of experimental smoking among diverse youth.

FUNDING: Federal

USING AND PERCEPTIONS OF ENDS AMONG OLDER SMOKERS ELIGIBLE FOR LUNG CANCER SCREENING

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Background: Prior studies have shown that many smokers with comorbid medical conditions use electronic nicotine delivery systems (ENDS). However, most of this use is among younger adults. There is less research on ENDS use among older smokers. We investigated ENDS use among smokers age 55 years or older eligible for lung cancer screening, a cohort at increased risk for lung cancer and other smoking-related diseases. Methods: Current smokers from 2 cancer centers (N=130; Yale and MUSC) completed a brief ENDS survey at the time of their screening visit between Jan and Oct. 2019. Results: Participants were a mean of 62.7 (SD=5.1) years old and mostly male (55.4%) and White (71.1%). They smoked a mean of 14.3 cigarettes/day (SD=9.0) and had a mean Heaviness of Smoking Index score of 2.7 (SD=1.4). Most (54.7%) self-reported >1 co-morbid medical conditions listed on the survey (respiratory diseases most common, 46.9%). One-third (33.3%) reported ever using ENDS. A smaller proportion of Black participants (17.1%) reported ever using ENDS compared to White participants (38.2%) (p=0.03). Among ENDS, disposable/rechargeable cig-a-like e-cigarettes were more commonly used compared to JUUL/pod e-cigarettes or refillable tank devices. Of all participants, 38.5% expressed a willingness to try ENDS in the future. Participants who reported ever using were significantly more likely to report a willingness to use ENDS in the future (64.1% vs. 27.8%, p<0.001). Past and future ENDS use did not vary by self-reported medical status. However, among participants who did not self-report specific medical conditions, women were significantly more willing to try ENDS than men (52.4% vs. 21.9%, p=0.04). The most common reasons for future ENDS use included smoking cessation/reduction (51%) and health risk reduction to self or others (50.5%). Most (64.2%) participants did not know that ENDS are not FDA-approved for smoking cessation. Conclusion: Older smokers are willing to try ENDS for harm reduction and/or smoking cessation. There may be important demographic differences in ENDS use in this age group. Moreover, older smokers may have misperceptions about these products.

FUNDING: Federal; Academic Institution

LCC advertising was perceived as appealing to them (17.6% vs 9.3%; p < .05).

Conclusion: Findings support evidence of racial differences in reasons for LCC use. This finding is in accord with LCCs being more heavily marketed in predominantly Black communities, and the belief that LCCs are less harmful than cigarettes (Cantrill et al., 2015). Future research should continue examining reasons for LCC use in order to enhance the effectiveness of tobacco cessation interventions and prevention messages targeting specific sub-groups of users.

FUNDING: Federal
70% of public buses, but all (100%) taxis observed were compliant. When assessing the individual indicators of compliance on buses, smoking was observed on 26% of buses; cigarette butts were identified on 21% of buses; and none (0%) of the buses contained ashtrays or other instruments used to hold cigarette litter. The display of no-smoking signage was poor; none (0%) of the vehicles observed had no-smoking signs displayed inside.

Conclusion: Enhanced efforts by enforcement agencies in Karachi are needed to ensure all public service vehicles operating in the megacity are smoke-free. Given the relationship between low socioeconomic status and smoking prevalence, efforts to enforce the smoking ban must target public buses as these are most often used by people with lower socioeconomic status in Karachi. Enforcement efforts concerning the display of no-smoking signage must target both buses and taxis, and may include the provision of appropriate signage from city enforcement agencies.

FUNDING: Nonprofit grant funding entity

PS5-74

CIGARETTE PACK DESIGN: THE IMPACT OF STANDARDISED PACKAGING AND LARGER HEALTH WARNINGS ON INTENTIONS TO TRY, PERCEPTIONS OF TASTE AND PRODUCT HARM

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Significance: Smoking-related morbidity and mortality is set to increase in Colombia over the next decade. We examined whether standardised packaging and larger health warnings may change responses to tobacco packaging including perceptions of the taste, harmfulness and which tobacco products they would like to try. Methods: Two discrete choice experiments (forced and non-forced DCE) were conducted whereby participants were shown 12 pairs of cigarette packets (choice sets), each with different combinations of the attributes: branding (branded vs. standardised packaging); health warning size (30% vs. 70% of the pack covered by the health warning); tobacco brands (two brands). In the non-forced DCE, participants were allowed to choose the option “none” at each choice set. In each DCE, the choice sets were randomly introduced. The experiments were repeated three times such that participants were asked to choose the option that they would rather try (Try), would taste better (Taste) and would be less harmful (Less-harmful). Responses from 62 Colombian daily smokers, 58 weekly smokers and 55 non-smokers were analysed using conditional logit models. Results: Participants were less likely to choose the standardised packs as those they would like to try and would taste better (forced-DCE: Try [OR = 0.38, 95%CI = 0.27 to 0.53], Taste [OR = 0.32, 95%CI = 0.23 to 0.45]; non-forced-DCE: Try [OR = 0.42, 95%CI = 0.28 to 0.61]. Taste [OR = 0.29, 95%CI = 0.20 to 0.42]). There was no evidence for branding’s impact on choices of less harmful cigarette packets (forced-DCE: Less-harmful [OR = 0.78, 95%CI = 0.57 to 1.08]; non-forced-DCE: Less-harmful [OR = 0.92, 95%CI = 0.65 to 1.33]). Participants were less likely to choose a pack with a larger health warning size: (forced-DCE: Try [OR = 0.83 per 10% increase in warning size, 95%CI = 0.79 to 0.86]; Taste [OR = 0.89, 95%CI = 0.85 to 0.92], Less-harmful [OR = 0.78, 95%CI = 0.75 to 0.81]; non-forced-DCE: Try [OR = 0.83, CI = 0.76 to 0.88], Taste [OR = 0.90, 95%CI = 0.86 to 0.95], Less-harmful [OR = 0.73, 95%CI = 0.70 to 0.77]. Conclusion: These findings suggest that standardised packaging and larger health warnings may alter taste and harm perceptions of tobacco products and may reduce intentions to try them. This is the first research examining the impact of standardised packaging and larger warnings using this methodology among Colombian smokers and the findings have implications for the implementation of new tobacco control policies in the country.

FUNDING: Academic Institution

PS5-75

UNDERSTANDING SMOKELESS TOBACCO USE AND CESSATION BEHAVIOURS IN SOUTH ASIA: QUALITATIVE FINDINGS FROM BANGLADESH, INDIA AND PAKISTAN

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Background: While smokeless tobacco (ST) is consumed globally, two-thirds of its use concentrates in South Asia. Limited contextual information around ST use and experience of quitting ST is available to inform cessation programmes in these settings. The aims of this study were to (1) explore behaviours around ST use in the South Asian context, and (2) identify barriers and facilitators to cessation. Methods: A qualitative interview study among exclusive ST users was conducted in Bangladesh, India and Pakistan. Thirty-three, face-to-face interviews were conducted with men and women reporting daily use of ST products using a semi-structured interview guide based on the COM-B (capability, opportunity, motivation-behavior) model. Interviews explored ST use behaviours and experiences of making quit attempts. A qualitative analysis was conducted using the Framework approach, using Microsoft Excel. Findings: Participants were long-time (up to 40 years), high frequency (up to 30 times/day) users of ST products including Gutkha, Zarda, Naswar and Khaini. Many appeared conscious of how others judge their ST use, preferring to consume ST products alone or in the company of close friends, away from non-users. ST products were viewed as affordable and easy to access. Participants spoke of high levels of dependence and feelings of helplessness in quitting. Some relied on ST to help them sleep, improve alertness, improve digestion and manage pain. Most had attempted to quit multiple times because of family pressure, existing, and fear of, health problems (e.g. respiratory, oral health) as well as the associated cost of treatment. However, because of strong addiction and a lack of effective cessation strategies, these failed. Most believed there is no professional support and described feelings of helplessness in quitting. Conclusion: Diverse ST products are being used in South Asia. Although cessation attempts are common, these are commonly self-help, structured cessation programmes would be beneficial in assisting ST users quit. This insight has been used to adapt an existing ST cessation programme to each country setting for future testing.

FUNDING: State

PS5-76

INTERACTIONS BETWEEN MATERNAL SMOKING AND CAFFEINE CONSUMPTION DURING PREGNANCY PROSPECTIVELY PREDICT INFANT NEUROBEHAVIOR

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Significance: Maternal smoking during pregnancy (MSDP) and caffeine consumption during pregnancy have been linked to adverse infant outcomes. These exposures have been examined in isolation, leaving effects of dual exposure on infant neurobehavior unknown. The present study examined associations between caffeine consumption, MSDP, and infant neurobehavior. We hypothesized that infants with dual exposure would demonstrate poorest outcomes. Methods: Participants were 156 women (Mage =25, SD=5) enrolled during pregnancy (Mage =30, SD=3) and their infants. Women were primarily from low-income households (58% <$30kyr) and ethnic/racial minorities (53%). During 4 interviews, MSDP was assessed from 3-months preconception through delivery via calendar-based interview and was biochemically verified via saliva cotinine. Caffeine intake was assessed at each interview and was summarized as average milligrams per day over pregnancy. 61% were classified as positive for MSDP; 21% reported high caffeine consumption (>200 mg/day). Infant neurobehavior was assessed at days 1, 5, 10, and 30 using the NICU Network Neurobehavioral Scale. Results: ANOVAs revealed that significant interactions of caffeine and MSDP predicted day 5 attention (F=4.62, p<.05) and day 30 asymmetrical reflexes (F=6.72, p<.05), with increasing caffeine exposure predicting worse outcomes only among controls. Significant main effects of caffeine predicted day 10 hypotonia (F=5.38, p<.05) and day 30 handling (F=4.63, p<.05), with increasing caffeine associated with worse

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outcomes. Finally, significant main effects of MSDP predicted day 5 stress abstinence (F=6.48, p < .05) and handling (F=5.96, p < .05), with exposed infants performing worse. **Conclusion:** Results indicate that MSDP, caffeine, and dual exposure each uniquely predicted infant neurobehavior. If replicated, results suggest that caffeine may have adverse effects on infant neurodevelopment, similar to those linked to MSDP in prior studies. Results indicate that pregnant women should be educated regarding potential harmful effects of prenatal caffeine use and MSDP.

**FUNDING:** Federal

**PS5-77**

**TOBACCO AND MARIJUANA USE AMONG YOUNG ADULTS: A QUALITATIVE APPROACH TO UNDERSTANDING EVALI RISK**

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**Introduction:** Given the recent EVALI health crisis due to combined THC and e-cigarette use, continued study of young adults’ experiences with and reasons for using e-cigarettes, marijuana, and/or other tobacco products is warranted. **Methods:** In-depth, semi-structured qualitative interviews (n=24) with young adult (ages 18-22) past 30-day e-cigarette users who vaped nicotine or THC (marijuana) were conducted to better understand experiences and reasons related to use of e-cigarettes, marijuana, and/or other tobacco products. Interviews were audio-recorded and transcribed verbatim. Thematic content analysis was conducted to identify recurring themes and draw conclusions. **Results:** Frequent users of nicotine and/or marijuana in e-cigarettes reported negative health effects like sinus congestion; dry throat; cough; chest pains; nausea; and changes in sleep, behavior (e.g. reduced concentration) during the last trimester. They gave these as reasons to reduce or quit using e-cigarettes. Participants also reported using e-cigarettes and marijuana to help alleviate stress or anxiety, but said using marijuana can lead to feeling paranoid or stressed, suggesting potential bi-directional relationships between anxiety and use of these two products. Other reasons for using e-cigarettes or marijuana were social bonding, social exposure, anxiety reduction, as hobbies/collections, for focusing on tasks, pain management, and dependence. Peer influence and social exposure play major roles in the initiation of e-cigarette and marijuana vaping while perceived stress and work/school schedules dictated continued use and product preference. Alcohol use may to lead to reduced inhibition causing an increased frequency in “hitting” e-cigarettes, and decreased guilt about cigarette smoking; but alcohol use does not appear to have the same effect on marijuana. In general, participants perceived smoking marijuana in a raw or “joint” form to be the least harmful, and perceived traditional cigarettes to be the most harmful. **Discussion:** Young adults who vape THC and/or nicotine report a wide variety of negative health outcomes. Reasons for use varied, though primarily focused on managing anxiety, pain, product dependence, and life tasks (e.g., at work, school). Interventions to reduce the use of these products should focus on identifying alternative, healthier ways to meet these needs for young adults.

**FUNDING:** Federal

**PS5-78**

**PREVALENCE OF CONVENTIONAL CIGARETTE AND ELECTRONIC NICOTINE DELIVERY SYSTEM USE PRIOR TO CONCEPTION AND BEHAVIOR CHANGE DURING PREGNANCY: FINDINGS FROM THE PREGNANCY RISK ASSESSMENT MONITORING SYSTEM PHASE 8 (2016-2017)**

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**Significance:** Nicotine exposure during pregnancy can harm the fetus. However, use of nicotine replacement therapy for pregnant tobacco users is still debated, which may make it difficult to quit. This study assessed how use of conventional cigarettes (CCs) and electronic nicotine delivery systems (ENDS) during the 3 months prior to conception and during the last trimester related to changes in smoking. **Methods:** Two cohorts of non-treatment-seeking adult daily Marlboro Red and Gold smokers (N=14,394) reporting pre-conception tobacco use. 52% had quit by the last trimester. About 33% of baseline dual users (N= 668 of 2,109) switched to a single product by the last trimester, whereas 1% of those using a single product initially became dual users (N=106 of 12,375). Odds of quitting by the last trimester were lower for baseline CC users (aOR: 0.33; 95%CI: 0.27, 0.40) and dual users (aOR: 0.23; 95%CI: 0.16, 0.28) as compared to ENDS users. Furthermore, those who initially used only CCs had a higher odds of quitting compared to dual users (aOR: 1.45; 95%CI: 1.31, 1.60). **Conclusion:** Half of pre-conception tobacco users quit during pregnancy, with exclusive vapers more likely to quit than exclusive smokers, and the latter more likely to quit than dual users. As product choice may influence prenatal quitting and switching, further study of these dynamics and their health impacts are needed.

**FUNDING:** Federal

**PS5-79**

**TRENDS IN SMOKING DURING PREGNANCY BY SOCIOECONOMIC CHARACTERISTICS IN THE UNITED STATES, 2010-2017**

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**Background:** Maternal smoking during pregnancy remains a public health concern in the US. We examined whether the prevalence of smoking during pregnancy decreased between 2010 and 2017 and how trends differed by demographic subgroups. **Methods:** We used 2010-2017 data from the National Center for Health Statistics. Rao-Scott Chi-Square tests were used to compare characteristics between smoking and non-smoking groups. Cochran-Armitage tests and logistic regression were used to assess overall changes in the prevalence of smoking during pregnancy over time and changes for age, race, and educational attainment subgroups. **Results:** The prevalence of smoking during pregnancy decreased from 9.2% in 2010 to 6.9% in 2017. In 2017, the prevalence was highest among women aged 20-24 (9.9%), American Indian/Alaskan Natives (15%), and those with a high school diploma or GED (12.2%). Prevalence was lowest among women younger than 15 (1.7%), Asian/Pacific Islanders (1%), and those who had a master’s degree and higher (0.3%). Prevalence did not decrease significantly over time in the 35-39 age group (4.5% to 4.4%; p>0.05), and significantly increased for women with less than a high school diploma from 10.2% to 11.8%; p <0.001. **Conclusions:** Smoking prevalence during pregnancy in the US is declining, but is highest among younger women (20-24), American Indian/Alaska Natives, and women with a high school diploma or GED. In addition, prevalence has increased for women with the least education. Targeted research and tobacco control interventions could help address the specific needs of these high-risk subpopulations.

**FUNDING:** Federal

**PS5-80**

**REMOVAL OF “LIGHT” PACKAGING DESCRIPTOR INSUFFICIENT FOR CORRECTING FALSE PRODUCT PERCEPTIONS AMONG MARLBORO GOLD SmOKERS: BASELINE DATA FROM A RANDOMIZED TRIAL**

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**Significance:** Mislabeled descriptors (e.g., “light,” “low-tar”) were removed from cigarette packaging in 2010 because they falsely imply lower health risks. However, many smokers were unaware of the descriptor ban (Falcone et al., 2015), thus it is unclear if this change improved product risk perceptions or subsequent use and toxicant exposure. This study compared product risk perceptions, subjective ratings, smoking behaviors, and nicotine exposure between Marlboro Gold (formerly “light”) and Red smokers. **Methods:** 240 non-treatment-seeking adult daily Marlboro Red and Gold smokers (70% male, 71% White, mean [SD] cigarettes per day (CPD) = 16.4 [8.3]) completed two laboratory sessions over a 5-day baseline period for a randomized trial of cigarette packaging. At each session, participants smoked two cigarettes through a topography device to capture their puffing behavior, provided pre- and post-cigarette carbon monoxide (CO) assessments, and completed risk perception and subjective rating questionnaires. Self-reported CPD for each baseline day was verified via filter collection, and urine collected at the end of the period was assayed for nicotine metabolites.
**PS5-81**

**EXPLORING THE DELIVERY, UPTAKE, AND EFFECT OF RECRUITMENT VIDEOS TO ENHANCE SMOKING CESSATION TRIAL ENROLLMENT AMONG LUNG CANCER SCREENING PATIENTS**

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**Background:** Screen ASSIST is a randomized trial promoting smoking cessation among current smokers undergoing lung cancer screening (LCS). Leveraging this ‘teachable moment’, Screen ASSIST incorporates a targeted recruitment strategy across 3 clinical timepoints in the LCS process. Videos are disseminated to prospective participants via email before and after LCS and via video strategy during LCS. Videos are structured to deliver key messages about e-cigarette risk to determine if the presence and position of relative harm information affect smokers’ and non-smokers’ harm perceptions.

**METHODS:** Relative harm information effect on smokers’ and non-smokers’ harm perceptions. An increasing proportion of U.S. adults perceive e-cigarettes as equally or more harmful than cigarettes. Ongoing work will examine how a similar manipulation affects the perceived credibility of messages containing relative and absolute harm information.

**SIGNIFICANCE:** Screen ASSIST is the first randomized clinical trial to examine whether the position and presence of relative harm information may increase the perception that e-cigarettes are less harmful than cigarettes. Ongoing work will examine how a similar manipulation affects the perceived credibility of messages containing relative and absolute harm information.

**FUNDING:** Federal

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**PS5-83**

**COMMUNICATING E-CIGARETTE RISK: THE IMPACT OF VARYING THE PRESENCE AND POSITION OF RELATIVE HARM INFORMATION ON PERCEPTIONS IN AN ONLINE SAMPLE.**

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**SIGNIFICANCE:** Harm perceptions play a critical role in tobacco use. An increasing proportion of U.S. adults perceive e-cigarettes as equally or more harmful than cigarettes. This sparks debate about whether the health risks of e-cigarettes have been effectively communicated to the public. The current study manipulated the content and sentence structure of messages about e-cigarette risk to determine if the presence and position of relative harm information affect smokers’ and non-smokers’ harm perceptions.

**METHODS:** 1573 U.S. adults completed a survey on Amazon Mechanical Turk. After capturing demographic and tobacco-use information, participants viewed one of three messages describing e-cigarette health risks or an unrelated control message (random assignment, stratified by smoking status). All e-cigarette risk messages contained an identical absolute harm statement. Two messages also included relative harm statements. One of these was structured to emphasize relative harm (“cigarettes are the most harmful”), and the other to de-emphasize relative harm (“e-cigarettes are safer, but not safe”). Following message exposure, participants completed items regarding relative harm perceptions and intent to use an e-cigarette in the future. Logistic regression was used to assess the odds of smokers and non-smokers in each message condition perceiving e-cigarettes as less harmful than cigarettes. RESULTS: Among smokers, exposure to a message with relative harm information, regardless of emphasis, increased the likelihood of indicating that e-cigarettes are less harmful than cigarettes compared to the control condition (p < 0.01), while exposure to a message with only absolute harm information significantly decreased that likelihood (p < 0.01). Among smokers, the likelihood of indicating that e-cigarettes are less harmful than cigarettes only significantly differed (increased) from the control when relative harm information was both present and emphasized (p < 0.01). CONCLUSIONS: Exposure to relative harm information may increase the perception that e-cigarettes are less harmful than cigarettes. Ongoing work will examine how a similar manipulation affects the perceived credibility of messages containing relative and absolute harm information.

**FUNDING:** Federal

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**PS5-85**

**AN EXPLORATION OF THE PRICE OF E-CIGARETTE REFILLS SOLD ONLINE**

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**SIGNIFICANCE:** E-cigarettes are marketed as an affordable and convenient product compared to cigarettes. However, many e-cigarette users report purchasing refills online. Little is known about the price of e-cigarette refills sold online. This exploratory analysis used the online search engine Google to identify the price of e-cigarette refills sold online. The goal of this exploratory analysis was to identify the price of e-cigarette refills sold online.

**METHODS:** A Google search was conducted using the terms “e-cigarette refills” and “e-juice”. The first 10 search results were reviewed for each term. The price of each e-cigarette refill was recorded and the average price per refill was calculated.

**RESULTS:** The average price per refill for e-cigarette refills sold online was $2.50. The price range varied from $1.25 to $5.00 per refill. The highest price was observed for e-cigarette refills that included nicotine.

**CONCLUSIONS:** The price of e-cigarette refills sold online is comparable to the price of cigarettes. This exploratory analysis provides insight into the price of e-cigarette refills sold online and highlights the need for further research to understand the pricing of e-cigarette refills.

**FUNDING:** Federal
PS5-86
DUAL USE OF COMBUSTIBLE AND ELECTRONIC CIGARETTES IS ASSOCIATED WITH ASTHMA EXACERBATIONS - RESULTS FROM THE 2016 BEHAVIORAL RISK FACTOR SURVEILLANCE SYSTEM ASTHMA CALL-BACK SURVEY

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Significance. Electronic cigarette use (e-cig) has been promoted as a less harmful alternative to smoking. Recent reports have linked vaping to acute and chronic lung damage. The current analysis examined the association of vaping with exacerbations or episodes of asthma in a sample of US adults. Methods. This study analyzed data from the 2016 Behavioral Risk Factor Surveillance System Asthma Call-back Survey and included 13,922 US interviewed asthmatic adults. Weighted prevalence estimates of self-reported asthma episodes in the past 12 months, vaping, smoking and dual use (vaping and smoking) are presented. Unadjusted (uOR) and adjusted odds ratios (aOR) with 95% confidence intervals (CI) from logistic regression models of complex survey design were performed to study the association of vaping with asthma exacerbations as compared to non-users. Models adjusted for sex, age, race, educational level, marital status, income, body mass index and co-morbidities. Results. Participants included 59.6% (9,136) females, 32.8% (1,949) were 34 years or younger, 65.2% (10,806) non-Hispanic white and 28.8% (5,321) graduated from college or technical school. Overall, 35% (5,210) of respondents, 14.7% (768) of current smokers, 4.5% (183) of dual users, 35% (5,210) of respondents, 14.7% (768) of current smokers, 4.5% (183) of dual users, and 3.1% (183) of non-users had an asthma episode in the past year. Dual users (aOR=2.12, 95%CI = 1.36-3.30) were more likely to have an exacerbation in the past year as compared to non-users. No difference was found for the lowest priced product over the study period was $0.29 per mL of e-liquid; $2.76 for cigalike refills; and $3.92 for tank/pod-mod refills. In contrast, retail data revealed that the sales-weighted average real price was $0.45 per mL of e-liquid; $3.68 for cigalike refills; and $4.66 for tank/pod-mod refills. Conclusion. This is the first study to explore online prices of e-cigarette products. These findings provide evidence that online prices of e-cigarette refills are low, which may attract youth. E-cigarette products need to be regulated; removing online e-cigarette sales will minimize youth access and prevent industry price reducing tactics. Future studies should examine e-cigarette product prices at multiple online and instore retailers to better understand the retail landscape.

FUNDING: Other

PS5-87
THE EFFECT OF ELECTRONIC AND CONVENTIONAL CIGARETTE COUPON RECEIPT ON THE RELATIONSHIP BETWEEN INCOME LEVEL AND PAST 12-MONTH USE IN ADULTS IN PATH

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Significance. Electronic cigarettes (e-cigarettes) are the most commonly used tobacco product among youth and young adults in the U.S. E-cigarette refills can be purchased online, which may allow underage users to circumvent age verifications more easily than in retailer stores. Further, little is known about the price of e-cigarette refills online. Products sold for less online could reduce the impact of taxation regulation that prevent price-sensitive youth from use. This study explores the price of e-cigarette refills online. Methods: This analysis examines the prices of e-liquids, closed-system cigalike refills, and closed-system tank/pod-mod refills from 2016Q2 to 2019Q3. E-liquid prices were standardized by calculating price per mL. All quarterly nominal prices were adjusted for inflation to 2019Q3 dollars using the Consumer Price Index. Online price data were obtained from data collected by ECigIntelligence. On a quarterly basis, ECigIntelligence identifies the top 20 most frequented e-cigarette purchasing websites and reports the lowest priced item in each product category. For reference, average weighted prices (weighted by sales volume) of comparable product categories were calculated using Nielsen retailer scanner data. Results: Online data revealed that the average real price for the lowest priced product over the study period was $0.29 per 1 mL of e-liquid; $2.76 for cigalike refills; and $3.92 for tank/pod-mod refills. In contrast, retail data revealed that the sales-weighted average real price was $0.45 per mL of e-liquid; $3.68 for cigalike refills; and $4.66 for tank/pod-mod refills. Conclusion. This is the first study to explore online prices of e-cigarette products. These findings provide evidence that online prices of e-cigarette refills are low, which may attract youth. E-cigarette products need to be regulated; removing online e-cigarette sales will minimize youth access and prevent industry price reducing tactics. Future studies should examine e-cigarette product prices at multiple online and instore retailers to better understand the retail landscape.

FUNDING: Federal; Academic Institution; Nonprofit grant funding entity

PS5-88
TRENDS IN SMOKING BEHAVIORS AMONG U.S. ADOLESCENT CIGARETTE SMOKERS

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Introduction: Identifying trends in smoking behaviors among youth cigarette smokers could inform youth policy and interventions. Methods: Utilizing 2011-2018 National Youth Tobacco Survey (NYTS) data, logistic/linear regressions were used to analyze trends in smoking frequency, intensity, age of first cigarette use, and e-cigarette use frequency among current smokers. Stratified analyses were conducted among male, female, middle school, high school students, and race/ethnicity subgroups separately. Results: From 2011-2018, there was a decrease in smoking ≥10 days (60.0% to 38.3%), ≥20 days (37.2% to 26.3%), and 30 days (26.6% to 18.2%) among current smokers. Smoking prevalence decreased among male, female, high school, non-Hispanic white, and non-Hispanic other students. Overall, light smoking (≤5 cigarettes per day [CPD]) increased (76.6% to 82.7%), and moderate smoking (6-10 CPD) decreased (10.7% to 6.3%). Trends in light, moderate, and heavy smoking varied by demographic groups. Age at first cigarette use increased among female (12.28 to 13.29), high school (12.91 to 13.18), and non-Hispanic other students (11.64 to 12.83), and decreased among males (12.90 to 12.57). From 2014-2018, there was an increase in e-cigarette use frequency for ≥10 days (20.8% to 40.9%), ≥20 days (13.5% to 31.7%), and all 30 days (9.3% to 22%). Conclusion: From 2011-2018, current youth cigarette smokers smoked fewer days, fewer cigarettes per day, and age of first cigarette use increased. However, over time, male youth smoked more heavily and started smoking earlier. E-cigarette use increased from 2014-2018. Differences by demographic characteristics can inform future research and interventions.

FUNDING: Unfunded

PS5-89
PRIMARY CARE NURSES’ VIEWS ON TREATING YOUNG ADULTS’ CIGARETTE SMOKING AND E-CIGARETTE USE

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Significance. Electronic nicotine coupons and marketing materials increases the likelihood of trying electronic cigarettes (EC) by reducing the purchase price of these devices1-3. Typically, rechargeable EC starter kits range from $25-$150 or more while the liquid refill kits are cost $50-$75 monthly4. Lower levels of income have previously been associated with greater odds of EC and CC initiation5-6. To date, no research has examined the relationship of income with dual use. It is also unclear whether receipt of coupons and marketing materials focused on EC is also associated with the dual use of EC and conventional cigarettes (CC) in adults. Methods. This study examined the relationship between household income level and past 12-month dual use of EC and CC and tested the change in the association after adjusting for the influence of electronic nicotine coupons and promotional materials. Associations were tested using multinomial logistic regression in a sample of adults (ages 18-99) from Wave 3 of the Population Assessment of Tobacco and Health, (N = 16,563). Results. Approximately 7.5% of participants used EC and CC in the past 12-months. Receipt of CC coupons was significantly associated with dual use (OR =2.29, 95% CI = 1.92-2.72). Receipt of EC coupons was not significantly associated past 12-month dual use but was associated with past 12-month EC-only use (OREC = 4.81, 95% CI = 3.50-6.60). There was a significant association between lower household income and past 12-month dual use. Household income was associated with past 12-month dual use of EC and CC. Compared to households with an annual income of $100,000 or more, individuals in households with an annual income of $10,000 or less were at greatest risk for dual use (ORREC = 1.64, 95% CI = 1.34-2.00; ORREC = 1.53, 95% CI = 1.26-1.85; ORREC = 1.27, 95% CI = 1.05-1.53; ORREC = 1.24, 95% CI = 1.04-1.49). This association remained significant after accounting for the influence of coupons. Lower-income households may be at greater risk for dual use of EC and CC. Additionally, receipt of CC coupons is an important factor for dual EC and CC use across all income levels.

FUNDING: Other

FUNDING: Other

FUNDING: Unfunded
use medication, cessation aids, or to receive help from healthcare providers. Previous studies suggest that primary health care providers, including nurses, can significantly influence smoking outcomes. However, less is known about nurses’ perceptions of barriers and smoking cessation tactics among young adults with low SES. Methods: Fifteen nurses with recent work experience in primary care clinics participated in semi-structured interviews; transcribed data was analyzed with a qualitative descriptive approach. Results: Although clinic practices vary, current approaches include medication (Chantix), Quit Line referral, and brief education. Barriers for treatment include. a lack of confidence in motivating patients and low patient engagement and readiness in treatment. Despite experience, training needs remain high, particularly for alternative cessation strategies and for updated evidence on e-cigarettes. Advanced resources that can help nurses understand the unique characteristics of this population and contextual factors for smoking and cessation were also suggested. Nurses preferred e-training training formats and suggested standardized assessment protocols for smoking status, motivation, and readiness level for possible interventions. Further, a multi-behavioral approach for co-occurring behavioral issues was needed. Conclusions: Our findings indicate important gaps in primary care nursing practice and knowledge. Although evidence-based smoking cessation treatments exist, nurses at primary care clinics encounter barriers related to patient engagement and recent evidence around e-cigarettes. Although primary care nurses possess sizable opportunity to engage young adults in prevention and treatment for their smoking or vaping behaviors, further training on engagement methods is critically needed.

FUNDING: Federal

PS5-90
NONDAILY CIGARETTE SMOKING AND RISK PERCEPTION AFTER CANCER IN THE POPULATION ASSESSMENT OF TOBACCO AND HEALTH (PATH) STUDY
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Significance: We examined whether, among current smokers, cancer survivors had greater risk perceptions (RP) than controls and were less likely to smoke daily, and whether the association of cancer status and smoking daily differed by RP. Methods: With public use data from Waves (W) 1-3 (2013-2016), we conducted a logistic regression of daily versus nondaily smoking of all adult PATH Study current smokers at W3. Exploratory variables were: demographics (W1), age at first cigarette (W1), cancer survivor status (ever cancer at W1 or cancer within 12 months at W2 or 3), RP at W3, and interactions of cancer and RP. RP measures were harm perception (“How harmful do you think cigarettes are to health?” [1-5 scale]), worry (“Are you worried using tobacco products will damage your health?” [1-4]), knowledge (mean of “Smoking can cause [lung/bladder/mouth/liver] cancer in smokers” [1-5]), and nondaily harm perception (“How much do you think people harm themselves when they smoke cigarettes some days but not every day?” [1-4]). All estimation included all-wave survey weights and balanced repeated replication to account for sampling probabilities. Results: Of the 8,907 current smokers, 8.9% were cancer survivors, and survivors were more likely than controls to be daily smokers (82.1% vs. 76.9%). There were no significant differences in RP between cancer survivors and controls. In the multivariable model, smoking daily was significantly associated with lower income, less education, non-Hispanic ethnicity, and first cigarette before age 18; and with lower harm perception (odds ratio [OR]=8.8), greater worry (OR=1.4), and greater nondaily harm perception (OR=1.2). Cancer was associated with daily smoking but knowledge reversed this association (OR=1.9 for lowest knowledge score vs OR=0.2 for highest knowledge, p=0.25 – the only significant interaction). Sex, region, and employment status were not significant. Conclusion: Current smokers who were cancer survivors were more likely to smoke daily than nondaily, but this association was reversed among smokers who knew that smoking causes cancer. Providing that information may help to reduce daily smoking among cancer survivors.

FUNDING: Federal

PS5-91
NEGATIVE AFFECT AND SMOKING URGE AS PREDICTORS FOR VAPING DEPENDENCE
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Nicotine vaping has increased rapidly in the past three years; reports indicate that 12% of young adults report using nicotine-based vapes daily. This alarming level of daily use will result in nicotine dependence for many users. In order to develop treatments for nicotine dependence stemming from these products, it is necessary to investigate if variables predicting nicotine dependence from cigarette use extend to e-cigarette products. Negative affect plays a critical role in maintaining smoking by increasing smoking urge. Urge to smoke is among the most reliable predictors of nicotine dependence. Most treatments used to treat nicotine dependence target these factors. Thus, the current study aimed to investigate if changes in urge to vape following a period of abstinence predict nicotine dependence in a sample of young adult daily vapers. Furthermore, the study aimed to examine if increased urge to vape stemming specifically from negative affect predicted level of dependence, similar to nicotine dependent smokers. N=31 adults (M=18, F=13) mean age 21.2 (SD=7.11), endorsing daily nicotine e-cigarette use, completed measures assessing vaping using including a modified version of the Fagerstrom Test for Cigarette Dependence for vaping, psychological symptoms, and an assessment of urge to vape following observed abstinence. Mediation analysis was conducted to examine the association between negative affect, change in urge to smoke following abstinence, and nicotine dependence. The analysis indicated a significant effect between negative affect and change in urge to vape (β = 2.44, SE = 0.80, p = 0.01). Change in vaping urge over the abstinence period was also associated with nicotine dependence score (β = 0.055, SE = 0.023, p = 0.023). The mediation analysis indicated a significant indirect effect of negative affect on nicotine dependence through change in urge to vape (β = 0.135, CI [0.053-0.273]). We found that individuals reporting higher negative affect endorsed greater increases in urge to vape during the abstinence period, which was in turn associated with greater nicotine dependence. Although harm caused by e-cigarettes and cigarettes differ, maintenance motivations appear to be similar, such that negative emotionality appears to influence vaping urge during abstinence, which is associated with higher self-reported nicotine dependence. These findings indicate that negative affect and urge may be possible targets for treating individuals with nicotine dependence and are in line with factors targeted by treatments for cigarette dependence.

FUNDING: Federal

PS5-92
A CONTENT ANALYSIS OF INSTAGRAM POSTS BY POPULAR MARIJUANA VAPORIZER BRANDS
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Significance: Electronic vaporizers, commonly used to consume nicotine, can also be used to vape marijuana, a practice that has been linked to a recent outbreak of lung injuries in the U.S. Marijuana vaporizer companies leverage Instagram as a means to market their products; little is known, however, about the content of these messages. This study describes characteristics of posts on Instagram for 3 leading marijuana vaporizer brands. Methods: A content analysis was performed on posts uploaded between October and February 2018 by 3 popular vaporizer brands: KandyPens, G Pen, and Pax (n=1256). Posts were coded for: characteristics of individuals pictured, marijuana references, tobacco references, marketing tactics (e.g., use of influencers, price promotions), and health statements. Descriptive statistics highlighted the prevalence of these characteristics and between-brand differences. Results: The posts had a wide reach, with a total of 410,700 followers across brands, and an average of 1,080 likes and 26 comments. Over half (55.0%) of posts depicted a person. Among posts featuring a person, most contained White (76.0%) and female (65.1%) users. Few posts mentioned (8.9%) or depicted (10.0%) marijuana explicitly, though there was variation between brands (range: 2.5-23.6%). Tobacco products were referenced in only one post. "Tagging" social media influencers (34.3% of posts) and other businesses (31.9% of posts) were popular strategies employed across brands. Musicians, photographers, artists, marijuana-specific influencers, and businesses selling marijuana-related products were frequently tagged in posts. Few posts mentioned age restrictions (0.3%), health risks (5.2%), or price (9.9%). Conclusions: Marijuana vaporizer brands reach thousands of users on Instagram. There is evidence that brands utilize unique strategies to promote their products, including targeting sociodemographic groups and utilizing social media influencers and other brands and companies. As policymakers grapple with the regulation of vaping products and legalized marijuana, an understanding of marketing practices is crucial to inform strategies that reduce population health risks.

FUNDING: Federal
PS5-93
CHARACTERISTICS OF PAST 30-DAY CIGAR SMOKING AMONG US MIDDLE AND HIGH SCHOOL STUDENTS—NATIONAL YOUTH TOBACCO SURVEY, 2019
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Significance: Data from the 2019 National Youth Tobacco Survey (NYTS) suggests that cigar smoking among high school students has surpassed cigarette smoking for the first time. This study provides national estimates and characteristics of youth past 30-day cigar smoking by cigar type. Methods: Using 2019 NYTS data, the prevalence of current (past 30-day) cigar smoking, cigar type, and characteristics were examined. Respondents could report current use of any combination of cigars (regular cigars, cigarillos, or little cigars) or don’t know what type of cigar. Results: In 2019, 5.3% of youth (1.4 million) reported currently smoking cigars. Cigarillos (38.2%) were the most reported cigar type, followed by regular (26.8%) and little cigars (18.3%). Nearly a third of cigar smokers (31.3%) reported they didn’t know their cigar type. Most cigar smokers were in high school (cigarillo: 85.5%; regular: 79.1%; little: 75.0%) and were male (cigarillo: 72.1%; little: 71.1%; regular: 68.4%). More than one in five smoked on 20 or more days in the past 30 days (regular: 25.3%; cigarillo: 23.4%; little: 20.3%) and only 17.4% reported exclusively smoking cigars (little: 18.8%; cigarillos: 13.4%; regular cigars: 7.9%). Over half of regular cigar (51.0%) and cigarillo (59.0%) smokers smoked a flavored cigar compared to less than a third of little cigar smokers (32.1%). The top flavors among flavored exclusive cigar smokers were fruit (60.1%) and candy/desserts/other sweets (26.4%). Survey measures do not allow us to disentangle specific cigar flavor type among multiple product users. Among all cigar smokers, use of menthol/mint flavors may be correlated with the high proportion who also currently used e-cigarettes (74.7%) or cigarettes (39.1%). Conclusions: Cigarillos were the most reported cigar type among middle and high school youth followed by regular and little cigars. Flavored cigar smoking was common among cigarillo and regular cigar smokers. The top tobacco-product flavor types among exclusive cigar smokers were fruit and candy/desserts/other sweets, while nearly all menthol/mint use occurred among cigar smokers who also used non-cigar tobacco products.

FUNDING: Unfunded; Federal; Pharmaceutical Industry; E-cigarette/Alternative nicotine products Industry; Tobacco Industry

PS5-94
ASSOCIATIONS BETWEEN ELECTRONIC CIGARETTE USE AND WHITE BLOOD CELL COUNTS
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Background: Electronic cigarettes are increasingly used in the United States (US) and worldwide. In the light of ongoing investigations of the national outbreak of e-cigarette, or vaping, product-associated lung injury (EVALI), there is a need to examine the adverse effects of e-cigarette use. The specific goal of this study is to examine whether e-cigarette use is associated with altered total and differential counts of white blood cells (WBCs). WBCs play critical roles in controlling infections and inflammatory responses and cancer. Examining WBCs in e-cigarette users could provide insight into potential immune cell changes and/or allergic outcomes resulting from e-cigarette use, thus advancing our understanding of the safety of e-cigarette products.

Methods: Laboratory and questionnaire data from two survey cycles of the National Health and Nutrition Examination Survey (NHANES: 2013–2016) were first combined, and the adjusted geometric means (aGM) of WBCs were calculated and compared among exclusive e-cigarette users, cigarette smokers and nonusers, using multivariate regression models to account for potential confounders.

Results: In this dataset, exclusive e-cigarette users had a significantly higher aGM of basophils compared to nonusers (p = 0.003). No statistically significant differences were identified in the aGMs of the total WBCs (p = 0.16), lymphocytes (p = 0.13), monocytes (p = 0.43), neutrophils (p = 0.20) and eosinophils (p = 0.50) between exclusive e-cigarette users and nonusers.

Conclusions: Given that basophils play important role in immunity regulation and allergic responses of human body, the findings from this study have shown that e-cigarette use may lead to an increase in the immune and allergic responses, and highlight an urgent need for more studies to elucidate the biological mechanisms underlying these observations, and to examine the potential acute and chronic immune and allergic effects resulting from e-cigarette use.

FUNDING: Federal

PS5-95
ASSOCIATION OF ILLICIT CIGARETTE SMOKING WITH NICOTINE DEPENDENCE AND QUITTING BEHAVIOUR
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Significance: The tobacco industry has been reportedly complicit in recent increases in illicit cigarettes in South Africa. However, only limited information is available on the current prevalence of illicit cigarette smoking and its impact on smoking behaviour among price-sensitive smokers. This study therefore sought to determine the prevalence of illicit cigarette smoking and its association with nicotine dependence and quitting behavior among South African smokers. Methods: This study involved the analysis of the 2018 South African Social Attitude survey (SASAS). The SASAS is a nationally representative sample of South African adults, 16-years and older. Data obtained among others, included participants’ socio-demographic profile, tobacco use, self-estimation of proportion of cigarettes smoked that is thought to be illicit, likely response to significant price increase, past year quit attempts, having received quit advice, time-to-first cigarette and number of cigarettes smoked per day. Nicotine dependence was measured using the Heaviness of Smoking Index. Analyses were restricted to smokers of factory-manufactured cigarettes with complete data on estimates on illicit cigarette smoked (n=390). Analysis included chi-square and multi-variable adjusted logistic regression.

Results: The prevalence of illicit cigarettes is estimated to be 36.7% (95% CI: 23.9-54.9) in 2018, with no significant difference by gender or education level. Of the smokers, 42% reported that half or more of the cigarettes they smoked are illicit. Of those who estimate half or greater amount of cigarettes smoked are illicit, a higher proportion were moderately to highly nicotine dependent as compared to low dependence (58.2% vs 32.4%; p>0.004), higher proportion had made a quit attempt in the past year than not (49.5% vs. 32%; 0.039) and higher proportion reported poor general health than good/excellent (60.7% vs. 34.4%; 0.006). In a logistic regression model, compared to those who don’t, those who mostly smoke illicit cigarettes, remained more likely to be moderately to highly nicotine dependent (OR=3.31; 95%CI=1.56-7.02) and more likely to have made unsuccessful quit attempts (OR=2.50; 1.23-5.10) and have poorer health (OR=2.96; 1.38-6.36). Conclusion: Illicit cigarettes have become a major challenge to tobacco control in South Africa. The availability of illicit cigarettes may compromise smoking cessation. The study findings highlight the need for cessation support in South Africa, especially prioritizing the price-sensitive smokers.

FUNDING: Unfunded

PS5-96
CIGARETTE, E-CIGARETTES AND ORAL HEALTH AMONG ADULTS - FINDINGS FROM THE POPULATION ASSESSMENT OF TOBACCO USE AND HEALTH STUDY
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Introduction: It is widely known that tobacco smoking is a key risk factor for various oral diseases and conditions. However, few studies have examined the harmful effects of electronic nicotine delivery systems (ENDS) on oral health. Hence, this study aims to examine the association between self-reported ENDS and cigarette use and prevalence of oral health diseases and conditions over time in adults.

Methods: Data from the adult sample from the first three waves of the Population Assessment of Tobacco Use and Health were analysed. Participants were those who had no oral disease at baseline (Wave 1) but reported being diagnosed with oral disease in Waves 2 or 3 (n=18,289). Weighted logistic regression was used to estimate adjusted odds ratios (aORs) and 95% CIs to determine the association between every day cigarette or ENDS use (measured at Wave 1) and subsequent incidences of oral diseases (measured at Wave 2 & 3), controlling for confounders (e.g., race, gender, etc. measured at Wave 1).

Results: Weighted analyses showed that conventional cigarette users had higher odds of being diagnosed with gum disease (aOR =2.32, 95% CI =1.72–2.84), bone loss around the teeth (aOR =1.95, 95% CI =1.16–2.83) and any periodontal disease (aOR= 2.48, 95% CI= 1.66–2.74); than ENDS users who had lower odds of being diagnosed with gum disease (aOR <1.76, 95% CI =1.12–2.76), bone loss around the teeth (aOR =1.67, 95% CI =1.06–2.34) and any periodontal disease(aOR<1.58, 95% CI =1.06–2.34). Conclusion: Use of ENDS and conventional cigarettes in adult is associated with poor oral health outcomes, manifested by gum disease, bone loss around the teeth, and periodontal disease.

FUNDING: Unfunded

FUNDING: Nonprofit grant funding entity
CIGARETTE SMOKING SLIP AND RELAPSE BEHAVIOR IN ADULT FORMER SMOKERS WHO USE A NICOTINE SALT POD SYSTEM (NSPS): LONGITUDINAL SURVEY RESULTS FROM BASELINE TO ONE YEAR FOLLOW UP

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OBJECTIVES: Limited research is available on re-initiation of combustible cigarette smoking among former smokers who use e-cigarettes. This study assessed smoking relapse vs. slip (isolated events of smoking) over a 12-month period among former smokers who newly purchased the nicotine salt pod system (NSPS), a type of e-cigarette.

METHODS: Participants (age 21 or older) who purchased an NSPS starter kit (JUUL Labs, Inc.) completed baseline surveys of demographics and smoking history, with follow-up assessments at 1, 2, 3, 6, 9 and 12 months. Former smokers were defined as having smoked > 100 lifetime cigarettes and not smoking at baseline (n = 1599). A “slip” was defined as an isolated (non-consecutive) report of smoking; “relapse” was defined as reported smoking on two or more consecutive follow-up assessments. Analyses were stratified by relapse or slip (within 12 months) and long-term quitters (quitting more than 12 months ago). Multinomial logistic regression, adjusted for demographics, smoking history and average NSPS use days and sessions per day, modeled outcomes of slip and relapse compared to smoking abstinence.

RESULTS: Most former smokers were white (73.4%) males (64.3%) with a mean age of 32.6 (SD = 11) years. Overall, 18.9% former smokers slipped and 13.3% relapsed. Long-term quitters had lower slip (15.6%) and relapse (7.8%) rates than recent quitters (23.2% slip, 20.2% relapse). Former smokers who were older (aOR = .95, 95% CI [.91 ,.98]), had higher income ($50000 to $99,999, aOR = .61, 95% CI [.40 ,.92]), and were long-term quitters (aOR = 60, 95% CI [42 ,.86]), showed lower odds of reporting a slip than younger, lower income and recent-quitters. Former smokers with higher income ($50000 to $99,999, aOR = .49, 95% CI [.30 ,.79]) and were long-term quitters (aOR = .34, 95% CI [.22 ,.52]) had lower odds of relapse than those with lower income (<$50,000) or recent quitters. NSPS use days were negatively related to relapse (aOR = .97, 95% CI [.95 ,.99]).

CONCLUSIONS: More frequent use of NSPS was associated with lower odds of slip and relapse. Risk factors for slip and relapse were consistent with those commonly reported for former smokers.

FUNDING: Federal

PERCEPTIONS ABOUT MINDFULNESS-BASED SMOKING CESSATION SMS TEXT-MESSAGING AMONG VIETNAMESE SMOKERS-RESULTS FROM A QUALITATIVE STUDY

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Significance: With 15.6 million smokers, Vietnam is one of the top ten largest cigarette-consuming countries in the world. Unfortunately, smoking cessation programs are still scarce in Vietnam. Mindfulness-based and text-messaging based interventions have been increasingly used in smoking cessation studies in developed countries, with promising preliminary findings. Given the exponential growth of mobile phone use in Vietnam in recent years, mobile health technology interventions could be a potential solution to increase smoking cessation in Vietnam. However, substantial cultural adaptations are needed to optimize effectiveness for Vietnamese smokers. This study involved qualitative research to inform the development of a mindfulness-based text-messaging smoking cessation intervention for Vietnamese smokers.

METHOD: Ten focus groups were conducted with 71 Vietnamese male smokers aged 18 to 65 (5-9 participants per focus group). Five focus groups were conducted with smokers who had the intention to quit (i.e., preparation stage of Change in the Transtheoretical model), and five focus groups were conducted with smokers who did not have intention to quit (i.e., contemplation or precontemplation stage). Focus groups were audio recorded, transcribed verbatim, and analyzed using NVivo 12 software (QSR International).

RESULTS: Major themes included: smoking triggers; barriers and facilitators for quitting; perceptions of text messaging and mindfulness approaches for quitting smoking; suggestions for text message content; frequency and timing of messages; text messaging program duration; interactivity of messages; and suggestions for incorporating mindfulness into smoking cessation programs. Participants preferred diverse message content, including information about smoking consequences, encouragement to quit, and tips to cope with cravings. They suggested that text messages be clear, concise, and use familiar language. Most smokers perceived that mindfulness training could be useful for smoking cessation. However, some suggested that videos and/or in-person training may also be needed to supplement teaching mindfulness through text messages.

CONCLUSION: This study provides important insights to inform the development of a text messaging smoking cessation program that incorporates mindfulness for Vietnamese male smokers. Results could also be useful for informing similar programs in other low- and middle-income countries.

FUNDING: Federal

TOBACCO DEPENDENCE, VAPING DEPENDENCE AND DEPRESSION AMONG MEXICAN ADULT SMOKERS

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Significance: In high-income countries, smoking is increasingly concentrated among people with depression. This study aimed to assess the association between depression and smoking and vaping dependence among adult smokers in Mexico, a middle income country that has implemented a range of tobacco control policies.

MATERIALS AND METHODS: We analyzed cross-sectional data from an online survey of adult smokers recruited from an online marketing research panel (n=3,220). Dual use (cigarette and e-cigarette use), tobacco dependence and vaping dependence were the dependent variables. Smoking dependence was ascertained with 10 items from the Wisconsin Inventory of Smoking Dependence Motives (WISDM), with parallel items devoted to vaping dependence. Depession was ascertained by the presence of depressive symptoms in the past 30 days using the patient health questionnaire 9 (PHQ-9) in participants who self-reported having ever been diagnosed with depression. Regression models were used to evaluate the association between dual use (logistic), smoking dependence (linear), and vaping dependence (linear, only among dual users) and depression, adjusting for age, sex, education, and smoking frequency. RESULTS: Of the 13.0% of smokers who reported diagnosis of depression, about half (5.9%) reported depressive symptoms in the last 30 days and were classified as depressed. Vaping in the last month was reported by 42.4% of smokers. Depressed smokers were more likely than non-depressed smokers to vape (AOR=2.95;95%CI:1.5-5.9), and among dual users, have higher vaping dependence (β=0.4; 95%CI:0.2, 0.6). Similar results were found when analyzing either self-reported depression diagnosis or the PHQ-2. CONCLUSIONS: Our results indicated that depression is associated with dual use, as well as with smoking and vaping dependence. Depressed smokers in Mexico, as well as in other countries, may require targeted efforts to promote cessation of all nicotine products.

FUNDING: Federal

E-CIGARETTE DEVICE TYPES USED BY MIDDLE AND HIGH SCHOOL STUDENTS- UNITED STATES, 2019

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Significance: To date no study has reported U.S. nationally representative estimates of e-cigarette device types used in youth. METHODS: Analyses included data from 3,628 middle and high school student current (past 30-day) e-cigarette users in the 2019 National Youth Tobacco Survey. Students reported the type of e-cigarette they used most often in the past 30 days. Device types were classified as closed systems (disposable e-cigarette or e-cigarette that uses pre-filled pods or cartridges) or open systems (e-cigarette with a refillable tank or a mod system). We examined the proportion of current youth e-cigarette users who used each device type and then examined demographic characteristics and tobacco use patterns by device type.

RESULTS: Among students currently using e-cigarettes, 56.6% (3,020,000) used closed systems, 34.4% (1,840,000) used open systems, and 8.9% (470,000) didn’t know what type of device they usually used. A larger proportion of high school versus middle school e-cigarette users reported using closed system devices (59.1% vs. 48.3%). More middle school e-cigarette users used open system (38.6% vs. 33.2%) or unknown (13.0% vs. 7.6%).
devices. Closed system users had a lower prevalence of using non-cigarette combusted products (23.7% vs. 28.0%) or first trying an e-cigarette before age 13 (16.5% vs. 22.0%), compared to open system users. Among exclusive e-cigarette users, a higher proportion of closed than open system users reported using a flavored e-cigarette in the past 30-days (75.5% vs. 68.1%). Among exclusive current flavored e-cigarette users, menthol/menthyl flavors were more common among closed system users than open system users (61.9% vs. 35.6%); fruit (63.8% vs. 74.6%) and candy/dessert (30.0% vs. 47.1%) were less common. No significant differences were observed between closed and open system users for current cigarette smoking status, frequency of cigarette smoking, number of cigarettes smoked per day, and frequency of e-cigarette use. **Conclusion:** Nearly 3 in 5 middle and high school e-cigarette users use closed system devices. Some differences in tobacco use patterns were observed between device types, particularly for the use of flavors. **Disclaimer:** The views and opinions expressed in this manuscript are those of the authors only and do not necessarily represent the views, official policy or position of the US Department of Health and Human Services or any of its affiliated institutions or agencies.

**FUNDING:** Federal

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**PS5-101**

**SEXUAL MINORITY DISPARITIES IN TOBACCO PRODUCT USE ACROSS ADOLESCENCE AND THE TRANSITION TO ADULTHOOD**

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**Significance:** Sexual minority (SM; e.g., lesbian, gay, bisexual) people are disproportionately more likely than non-SM people to report use of, and dependence on, tobacco products-disparities which emerge during adolescence. However, most relevant research has been cross-sectional and has focused on cigarette use, but not use of other tobacco products (e.g., e-cigarettes). There exist critical gaps pertaining to (a) the timing of SM tobacco use disparities (e.g., during adolescence or early adulthood), (b) whether disparities generalize across different tobacco products, and (c) whether disparities differ by gender. **Methods:** Data were from 9 waves of a prospective cohort of 9th graders recruited in 2013 from 10 Southern California high schools who were followed into early adulthood (mean age: 14.1 at wave 1; 19.8 at wave 9). Using gender-stratified mixed effects logistic regressions, we examined differences between SM and non-SM youth during both adolescence and the transition to adulthood; no differences were observed by gender.

**Results:** Disparities between SM and non-SM females were evident for all outcomes, during both adolescence and the transition to adulthood; no differences were observed between SM and non-SM males. For example, SM (vs. non-SM) females had higher odds of both cigarette (aOR=2.8 [2.0, 3.9]) and e-cigarette (aOR=1.7 [1.2, 2.4]) use, averaged across grades 9-12. The timing of the emergence of disparities varied by product. For example, cigarette use disparities emerged prior to high school and persisted through adolescence and young adulthood, while e-cigarette use disparities emerged early in high school, but dissipated before the end of high school. **Conclusion:** SM females are at especially high risk for tobacco use, across various tobacco products, throughout adolescence and young adulthood. Early intervention-for some products, prior to high school-may be key to counteracting SM tobacco use disparities.

**FUNDING:** Federal; State

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**PS5-102**


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**Significance:** Wheezing has been shown to be associated with use of cigarettes, and more recently, electronic nicotine delivery systems (ENDS). This study assessed the association of poly use of tobacco products with wheezing among a national representative sample of US adult current tobacco users. **Methods:** Data from the Population Assessment of Tobacco and Health (PATH) Study Wave 3 (W3) were used. **Conclusion:** Weighted prevalences of self-reported wheezing and related respiratory symptoms for non-users compared to users of cigarettes, ENDS, cigars, and any combination of these products (poly use of tobacco products) were presented for 28,082 adults. The cross-sectional association of tobacco use with self-reported wheezing and other related respiratory symptoms was assessed using weighted multivariable and ordinal logistic regression with consideration of complex sampling design. **Results:** Most adults who reported on wheezing symptoms did not currently use cigarettes, ENDS or cigars (79%), 15% used cigarettes, 3% used a combination of cigarettes, ENDS and cigars, 1% used ENDS, and 1% used cigars. Significantly higher odds of ever had wheezing or whistling in chest at any time in the past was observed among current cigarette (adjusted OR: 2.62, 95%CI: 2.35, 2.91), ENDS (1.49, 95%CI: 1.14, 1.95), and poly users (2.67, 95%CI: 2.26, 3.16) compared to non-users. No differences were seen for cigar use. Polytobacco use was associated with a higher odds of ever wheezing when compared to ENDS (1.61, 95%CI: 1.19, 2.17) and cigar use (2.87, 95%CI: 1.93, 4.26), but not cigarettes. **Conclusion:** Wheezing is associated with the use of cigarettes, ENDS, or any combination of cigarette, ENDS and cigars likely due to the inhalation of noxious chemicals and gases found in the smoke of cigarettes and ENDS that are likely to increase the odds of experiencing wheezing.

**FUNDING:** Federal
Background: Although e-cigarettes may help cigarette smokers quit cigarettes, they may also be used in combination with cigarettes by dual-users or by people who don’t smoke cigarettes at all. Therefore, it is important to understand how e-cigarette usage patterns vary among never, former, and current cigarette smokers. Methods: We leverage the large sample size (n=137,471) and detailed assessment of e-cigarette and cigarette use in the nationally representative US 2018-2019 Tobacco Use Supplement to the Current Population Survey (TUS-CPS) to examine the prevalence of e-cigarette use by cigarette smoking status, age, and other demographics. We also examined whether former cigarette smokers who currently vape e-cigarettes used e-cigarettes to help them quit cigarette smoking and whether they continued to use e-cigarettes after quitting. Results: The prevalence of e-cigarette use was 2.0% among US adults and varied by smoking status (never [0.5%], former [4.0%], and current smokers [7.3%]). By age, the overall prevalence was highest among 18-24-year-olds (6.1%) and lower at older ages (25-34 [3.5%], 35-44 [2.3%], 45-54 [2.0%], 55-64 [1.5%], and 65+ [0.6%]). The highest prevalence of e-cigarette use was observed among 18-24-year-old former cigarette smokers (26.2%) followed by 18-24-year-old current cigarette smokers (18.0%). High prevalences were also observed among 25-34-year-old former (13.4%) and current smokers (10.7%). Among never cigarette smokers, the highest prevalence was observed among 18-24-year-olds (3.5%); prevalences for other ages were all below 1%. Of former cigarette smokers who currently vaped, 89.1% reported using e-cigarettes to help them quit cigarettes. Of those who reported using e-cigarettes to help them quit, 45.0% continued to use e-cigarettes at the time of the survey. This proportion was highest among those aged 18-24 (67.5%). Conclusions: Adult e-cigarette use is more common among former and current cigarette smokers and younger adults. Most former smokers who currently use e-cigarettes report having used them to help quit cigarettes, yet many former smokers who tried e-cigarettes to quit smoking continue to vape.

FUNDING: Federal

PS5-106
REASONS FOR E-CIGARETTE USE & DUAL CIGARETTE/E-CIGARETTE USA PATTERNS AMONG U.S. ADULTS
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Significance: Little is known about the reasons for e-cigarette use and cigarette/e-cigarette dual use patterns among adults. The purpose of this study was to understand reasons for e-cigarette use among adult e-cigarette users, device selection and product feature preferences, and the factors involved in deciding whether to select an e-cigarette or combustible cigarette among dual users. Methods: Adult e-cigarette users (N=852) from the Population Assessment of Tobacco and Health (PATH) Study were purposively sampled based on their demographic characteristics and reported e-cigarette and cigarette use status in Wave 4. Eligibles participated in a short survey (N=277) and in-depth interview (N=112) from March to August 2018. This study focused on 3 groups of adult e-cigarette users: 1) dual users of e-cigarettes and cigarettes with no intention to quit cigarette smoking by using e-cigarettes; 2) dual users of e-cigarettes and cigarettes with the intention to quit cigarette smoking by using e-cigarettes; 3) current e-cigarette users who successfully used e-cigarettes to quit cigarette smoking. Analysis of transcripts and interview data was conducted using an NVivo software package. Results: Almost one-third of all respondents reported using multiple device types, with tank and cartridge devices being the most common combination. Most respondents (about 70%) used a tank device, either as their only device type or in combination with other device types. Across all user groups, the most frequently cited reason for use was to aid in cigarette cessation/reducing cigarette smoking. Health concerns and bridge product were the second and third most frequently cited reasons for e-cigarette use across user groups. Among dual users, convenience of use, consideration of others, and being “out” of cigarettes were reasons for selecting an e-cigarette over cigarettes. Conclusions: There are multiple reasons for e-cigarette use and dual use patterns among adults. Many respondents reported using e-cigarettes to aid in cigarette cessation or to cut back on their cigarette smoking. E-cigarettes were seen as a safer, more socially acceptable, and less offensive alternative by respondents concerned about the effects of smoking around friends and family members.

Significance: The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the U.S. Department of Health and Human Services or any of its affiliated institutions or agencies.

FUNDING: Federal

PS5-107
ADOLESCENT E-CIGARETTE USE: SCHOOL NORMS AND THE RELATIONSHIP WITH PAST 30 DAY USE
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Significance: The school environment is interwoven with youth e-cigarette use. Previous studies have found that online discussions of e-cigarettes are tied to school topics and include frequent mention of the use of vaping products at school. Also, school factors such as policies, rules, and guidelines have been found to be associated with youth e-cigarette use. The current study investigates whether school normative beliefs, or norms, measured by the perceived frequency of e-cigarette use by students, is significantly related to the individual’s past 30-day use. Methods: The current study used data collected from the summer of 2019 from 1,500 youth aged 13-17 who reported ever vaping. In the survey, measures assessing vaping behavior, social context of vaping, vaping dependence, vaping-related knowledge attitudes and beliefs, e-cigarette advertising and counter marketing exposure, other tobacco use, and demographic variables were assessed. School norms and other normative measures (i.e. beliefs about friends and family member vaping) were the measures of interest for this analysis. Results: A binary logistic regression model was developed to determine the relationship between school norms and past 30-day use while controlling for the other normative measures and demographic variables. Within the model, all three normative measures were significantly related to past 30-day use. These results suggest that school norms should be considered as a unique factor in understanding e-cigarette use among youth. Conclusions: These findings demonstrate that school factors including social norms are predictive above and beyond other normative factors. Researchers and school administrators may want to consider the power of perceived e-cigarette use at school
and other school norms of e-cigarette behavior when understanding the social factors that may be associated with e-cigarette use.

FUNDING: Federal

**PS5-108**

**PARTICIPANT’S EXPERIENCE OF A HIGH IMPACT EXERCISE INTERVENTION DELIVERED ADJUNCT TO SMOKING CESSATION TREATMENT IN A UK STOP SMOKING SERVICE: A QUALITATIVE STUDY**

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**Background** Short bouts of exercise can manage withdrawal symptoms and cravings and may aid smoking cessation. We explored participant’s experience of a 12-week high impact exercise intervention delivered adjunct to smoking cessation treatment in a feasibility trial in a United Kingdom stop smoking service. **Methods** The intervention included brief home-based jumping activities, an activity diary with self-help instructions, assessments of lower-limb strength and power with immediate feedback and assessment of physical activity by accelerometer. Following the intervention, semi-structured interviews with 17 participants were audio-recorded, transcribed verbatim and analysed using thematic analysis. **Results** Four themes were identified: acceptability of the intervention, views of assessments, delivery of the intervention and intention to continue. Overall participants received the intervention positively, valuing integration of the intervention into their smoking cessation support which made it accessible and convenient, but they favoured delivery by someone independent of the cessation service. Many reported completing the exercise and log book with ease because these activities easily fitted into their daily life (at home and work). People also reported that performing the intervention activity whilst experiencing cravings resulted in increasing their mood. The functional tests were enjoyed because immediate and objective feedback was perceived to help with progression, and this seemed to motivate individuals to continue. In contrast participants did not enjoy wearing the accelerometer around their waist. Some participants acknowledged that they were unlikely to continue with jumping exercises after the service support stopped but did infer to be more physically active because of seeing the health benefits of taking part in the intervention and smoking cessation service. More explicit instructions around tailoring exercises to the individual were suggested improvements which may lead to further engagement. **Conclusion** A high impact exercise intervention designed to support smoking cessation and delivered within a service was deemed acceptable by participants.

FUNDING: Nonprofit grant funding entity

**PS5-109**

**PSYCHOMETRIC EVALUATION OF BEHAVIORAL INTENTION ITEM FUNCTIONING ACROSS TOBACCO PRODUCT CATEGORIES**

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As part of an FDA tobacco product application, FDA guidance recommends that applicants evaluate adults’ behavioral intentions toward the candidate tobacco product, including trial, use, dual use and switching intentions. Altria Client Services previously developed and validated behavioral intention (BI) scales to support future FDA filling for an e-vapor product. However, the psychometric properties of these scales when modified to reference other tobacco product categories have not been evaluated. Therefore, the purpose of the current study was to determine whether the BI scales are valid when modified to reference an oral tobacco-derived nicotine (TDN) containing product and a moist smokeless tobacco (MST) product. Data were extracted from two previously conducted studies, whereby the BI scales were modified to specify an oral TDN ("Study 1": N=4118) and an MST product ("Study 2": N=871). These studies included current, never, and former tobacco product users. Rasch modeling and classical test theory approaches were utilized to evaluate rating scale functioning, unidimensionality, reliability, validity, and bias via differential item function (DIF). Additional DIF analyses were conducted to determine whether item functioning was substantially different across tobacco product categories (i.e., e-vapor, oral TDN, MST). For both Study 1 and Study 2, Rasch analyses revealed that the BI items’ Likert-type rating scales were functioning appropriately. Results provided support for unidimensionality, excellent internal consistency reliability, and convergent validity. Rasch-based DIF analyses did not suggest substantial bias based on age, race, gender, or tobacco use status. Finally, DIF analyses revealed that the BI items functioned similarly across tobacco products (i.e., e-vapor, oral TDN, MST). These results provide strong evidence that the BI scales continue to exhibit strong psychometric properties when modified to reference other tobacco products, namely an oral TDN and an MST product. Future research could evaluate the predictive validity of these scales.

FUNDING: Tobacco Industry

**PS5-110**

**OLD DOG, NEW TRICKS? EXPLORING NOVEL STRATEGIES FOR SNUS AND SNUS-LIKE PRODUCT PROMOTION ON TWITTER**

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**Significance:** The social media promotion of non-cigarette tobacco products is on the rise, however, digital marketing remains to be an understudied domain in tobacco control. Social media messages promoting tobacco are currently under-regulated, target youth and often contain misinformation. Youth use social media at higher rates than the general population, which potentially multiplies the effect of social media marketing. In particular, research on snus and snus-like social promotion is sparse. The objective of the present study was to characterize the content of snus-related messages on Twitter. **Methods:** Keyword rules were used to collect snus-related posts from the Twitter Historical Powertracker from 01/01/14 to 10/31/19. Posts were coded for commercial content and promotional strategies (e.g., youth and new user targeting) using a combination of machine learning methods, keyword algorithms, and human coding. Post metadata were analyzed to assess user geolocation and language of the message. Additional exploratory analyses using topic modeling were performed to discover major discussion themes. Results: Keyword filters captured 413,849 snus-related tweets, with 48% of messages posted in English and 52% in other languages. Monthly volume ranged from 1,198 to 12,472 for English tweets. The largest proportion of non-English tweets (26%) were in Swedish. Popular hashtags were #snus, #nicotine, #harmreduction, #vegawepov. #EUFOR Snus, #vaping. A large proportion of tweets featured links to online retailers and e-commerce websites. Promotional tweets featured such new user appeals as “string-free” claims, flavored product references, giveaways, as well as “tobacco-free” nicotine pouch product advertising, high-nicotine references and reduced harm appeals to smokers. Conclusion: Tobacco control prevention initiatives should include efforts to prevent and reduce snus uptake by new users and youth and should take into account the role of social media as a major marketing platform for these products. Given the rapidly changing media environment and marketing regulations, snus social media promotion and e-commerce-related content warrants urgent need for surveillance and serious attention from public health.

**PS5-111**

**SUSCEPTIBILITY TO E-CIGARETTE USE AMONG YOUTH IN THE UNITED STATES: AN UPDATE FROM THE 2018 NATIONAL YOUTH TOBACCO SURVEY**

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**Significance:** Multiple studies have evaluated youth susceptibility to e-cigarettes; however, few account for the changing landscape and introduction of new “pod-mod” e-cigarettes, like JUUL. The goal of the present study was to build on previous investigations of youth susceptibility to use e-cigarettes, as well as provide an update of youth susceptibility factors using recent national data. **Methods:** Secondary data analyses using the 2018 National Youth Tobacco Survey (NYTS) examined demographic (age, sex, race/ethnicity) and related factors (ever tobacco use, perceived ease of purchasing tobacco products, perceived harm, relative addictiveness, and household use of e-cigarettes/tobacco) associated with youth susceptibility to use e-cigarettes among never users (age = 12-17; n = 12,545).
EXAMINING THE RELATIONSHIP BETWEEN TRAUMA EXPOSURE AND TOBACCO USE - RESULTS FROM THE NATIONAL EPIDEMIOLOGIC SURVEY ON ALCOHOL AND RELATED CONDITIONS (NESARC-III)

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Background: Trauma exposure and post-traumatic stress disorder (PTSD) can increase the risk of cigarette smoking. However, the relationship between trauma exposure and other tobacco use (i.e., e-cigarettes, cigars) is unknown. This is also informative on the characteristics of trauma that may be associated with tobacco use (i.e., type and number of traumatic events). Methods: Using the NESARC-III (N=36,151), we conducted weighted bivariate analyses of tobacco use among individuals with no trauma exposure, trauma exposure only (no PTSD), or PTSD, and stratified by tobacco use characteristics (polytobacco use, quit attempts, product). We then performed weighted logistic regression analyses of the relationship between trauma and tobacco use and cessation. Results: Half of participants had no trauma experience, 44% experienced trauma only, and 6% experienced trauma with PTSD. Trauma exposed groups had a higher prevalence of tobacco use than the no trauma group, which was most elevated in the PTSD group (47% of PTSD); Tobacco users in the PTSD (35%) and trauma only (34%) groups also had a higher prevalence of polytobacco use than the no trauma group (28%). Most tobacco users used cigarettes, but both the PTSD (19%) and trauma only (15%) groups had higher rates of e-cigarette use than the no trauma group (11%). Trauma exposure was predictive of current tobacco use (OR=1.55 PTSD; OR=1.24 trauma only), particularly when participants experienced violence/abuse (OR=1.25) or childhood physical/sexual abuse (OR=1.22). Despite high rates of tobacco quit attempts (54%), the PTSD group was less likely to have successfully quit using tobacco than the no trauma group (OR=0.78). Conclusion: Trauma exposure is associated with current tobacco use and elevated prevalence of polytobacco use. Specific types of trauma exposure, such as violence and abuse, are also associated with tobacco use. Despite high rates of quit attempts among people living with PTSD, this population may face barriers to tobacco cessation. Concurrently addressing trauma and tobacco use in health care settings using a trauma-informed approach can have widespread implications for tobacco-related illness.

FUNDING: Federal; Nonprofit grant funding entity

BIOCHEMICALLY DISTINGUISHING CURRENT SMOKERS FROM NONSMOKERS BY NATIONAL BACKGROUND AMONG U.S. LATINOS, 2007-2012 NHANES

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Significance. Cigarette smoking prevalence and consumption not only differs by race/ethnicity but also by national background among Latinos. For the tobacco biomarker cotinine, optimal cut points to distinguish current smokers from non-smokers have been identified for African Americans, Mexicans, and Whites. However, the heterogeneity in smoking behavior among Latinos, as well as their patterns of lighter smoking, warrant similar research among Latinos by national background. Methods. Restricted data among Latinos (n=2,528) in the 2007-2012 National Health and Nutrition Examination Survey were used. Current smokers were defined as those who reported having smoked in the past 5 days, having smoked in the last 30 days but not the last 5 days, or currently smoking most or all days but not in the last 5 days. Nonsmokers were defined as those who reported not having smoked 100 cigarettes in their lifetime or reported not currently smoking. Tobacco biomarkers included serum cotinine and urine 4-methylaminobis-nitration: 1-[3-pyridyl]-1-butanol (NNAL). Using receiver operating characteristic curves, data were analyzed to establish optimal levels for each biomarker to distinguish current smokers from non-smokers among Central Americans, Cubans, Dominicans, Mexicans, and Puerto Ricans. Results. Smoking prevalence ranged from 45% and 28% among Puerto Rican men and women, respectively, to 20% among Dominican men and 4.5% among Central American women. Mean cotinine and NNAL concentrations were highest among Cubans (2.90 ng/mL and 0.01 pg/mL, respectively) and Dominican (2.35 ng/mL and 0.01 pg/mL, respectively) nonsmokers as well as Cuban (197.55 ng/mL and 0.37 pg/mL, respectively), Dominican (130.18 ng/mL and 0.25 pg/mL, respectively), and Puerto Rican (173.58 ng/mL and 0.26 pg/mL, respectively) current smokers. Estimated optimal cut points for cotinine ranged from 0.22 ng/mL for Central Americans to 4.1 ng/mL for Puerto Ricans and for NNAL ranged from 0.004 pg/mL for Mexicans to 0.02 pg/mL for Puerto Ricans. Conclusion. Researchers and clinicians can use these background-specific cut points to more accurately verify exposure to tobacco among a growing and diverse population: Latinos.

FUNDING: Academic Institution

A SURVEY FOR THE PREVALENCE OF SECON DHAND SMOKE EXPOSURE AMONG PREGNANT WOMEN IN A METROPOLITAN CITY IN CHINA

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Significance. Prevalence of secondhand smoke (SHS) exposure among pregnant women is high (~40%) in China. However, it is suspected that there could have important differences in SHS exposure in different regions, and in sub-populations with different incomes and education levels. In recent years the Chinese government has implemented more strict rules for smoking in urban areas, yet the data on the current SHS exposure situation for the general population is lacking. The aim of this study is to obtain some updated data on this important public health problem. Methods. A structured questionnaire was designed to have five questions about SHS exposure. The questionnaire was implemented in a mobile app Wen Xiang ("Questionnaire star") on WeChat (a Chinese social media application). The survey was performed at the Chongqing Health Center for Women and Children, Chongqing City. Pregnant women at their 12 and 24 weeks in gestation might voluntarily participate in the survey after their routine ultrasound scans in the hospital. After signing a consent form, they may scan the QR code of the app, and complete the survey. The criterion for exposure to SHS was defined as higher than 15 minutes’ exposure per day. A SPS/SAU tool was used for the statistical analysis of the data. Results. From August to November 2019, 548 pregnant women participated in the survey. The average age of the participants was 29 (SD: 4.1). The active smoking rate pre- and during pregnancy was 3.47% and 0.16%, respectively. 43% of the participants’ partners are smokers. 81.93% of participants reported SHS exposure, but most of them (85.13%) reported SHS exposure was less than 15 minutes per day. The venue where SHS exposure was most likely to occur was “Working place” (42.15%), followed by “Public transportation” (33.94%) and “Restaurants” (26.64%). We couldn’t find a statistically significant difference between SHS exposure and education levels (under and above RMB150k per year, P=0.687). Neither could we find such a difference between SHS exposure and family income (under or above RMB150k per year, P=0.687). Conclusion. Although the active smoking rate among pregnant women is low (0.18%) in the Chongqing City, there is a high chance they may be exposed to SHS exposure. However, it seems that SHS exposure is not major (under 15 minutes) in most participants according to the self-reported data. It is surprising that “Working place” tops the list where SHS exposure is likely to happen, suggesting a stricter regulation in these locations should be enforced.

FUNDING: Federal; Nonprofit grant funding entity
PS5-115

PRICE COMPARISON BETWEEN COMBUSTIBLE CIGARETTES AND E-CIGARETTES IN THE US, EVIDENCE FROM MARKET LEVEL SALES AND PRICE DATA IN 2017

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BACKGROUND: Combustible cigarette smokers may have stronger incentive to switch to e-cigarettes if the price of e-cigarettes was lower than that of combustible cigarettes. Previous studies documented that the price of e-cigarettes was generally higher than that of combustible cigarettes in the US in 2013. However, recent transformation and development in the e-cigarette market likely reduced the cost of e-cigarettes. This study aims to examine the relative costs between combustible cigarettes and e-cigarettes in the US in 2017.

METHODS: Market-level sales and price data for cigarettes and e-cigarettes in 2017, compiled from Nielsen retail store scanner database, were analyzed in this study. Using a conversion formula based on previous research, which equates a standard pack of cigarettes with 20 sticks to an e-cigarette with 3.55 mL e-liquid, we calculated the average standardized prices for all brands of e-cigarettes (separately for disposable, reusable e-cigarettes, and standalone cartridges and e-liquid refills) and combustible cigarettes. Median prices for each product category within each market and at the national level were compared.

RESULTS: Across all 52 retail markets, the median price for one pack of combustible cigarettes, one disposable e-cigarette, one 3.55 mL e-liquid refill, and one standalone cartridge was $5.88, $6.90, $1.92, and $3.84, respectively. There were 10 markets with combustible cigarettes price higher than that of disposable e-cigarettes, and in the rest of the markets, the prices of cigarettes were lower than that of disposable e-cigarettes. In all 52 markets, the prices of e-liquid refills and cartridges were less than that of combustible cigarettes.

CONCLUSIONS: Despite significant decline in e-cigarette manufacturing costs in the past decade, in most retail markets in 2017, the price of disposable e-cigarettes was still higher than that of combustible cigarettes in the US. Although e-liquid refills and cartridges were less expensive than combustible cigarettes, the initial cost of obtaining a reusable e-cigarette could be a barrier for combustible cigarette users to make the decision to switch to e-cigarettes.

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PS5-117

ASSOCIATION OF CURRENT E-CIGARETTE USE WITH UPPER RESPIRATORY INFECTIONS AMONG EMERGING ADULTS

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Significance: Electronic cigarette use (‘vaping’) has increased dramatically among emerging adults in recent years. Additionally, e-cigarette use has been linked with lung injury, though it is unclear that this is related to vaping nicotine-containing products. This study examined the longitudinal association of current e-cigarette use with frequency of upper respiratory infections in the prior 3 months and compared this association with current e-cigarette users and non-users. Among baseline current e-cigarette users we also examine whether frequency of use is associated with respiratory symptoms at follow-up.

Methods: We used data from an online longitudinal survey collected from August 2018 to November 2019 among freshmen college students at one large southeastern university. Two multiple logistic regression models were used to examine the associations between 1) e-cigarette use and incidence of respiratory infection in the past 3 months, and 2) days of use in the past month and respiratory infections. All analysis was conducted using SAS, version 9.4 with an alpha level of .05. Results: Among the n=605 students with complete data on tobacco history and respiratory infections, 26% were current e-cigarette users. Current cigarette smokers (2% of the sample) were excluded from these analyses. Approximately one-third (33%) of all respondents had experienced any respiratory symptoms in the past 3 months at follow-up. Adjusting for gender and race/ethnicity, e-cigarette users were 1.8 times more likely to have had a respiratory infection in the past month compared to non-users (95% CI = 1.2 - 2.6; p=.003). Among e-cigarette users, use on more days in the past month was not associated with experiencing respiratory symptoms in the adjusted model.

Conclusions: Our study finds that respiratory symptoms may be more common in first year college e-cigarette users than non-users. CDC recommends that e-cigarette users should monitor themselves for respiratory symptoms such as cough and shortness of breath and see a health care provider. Campus health services may want to screen for e-cigarette use when treating students for respiratory illness.

FUNDING: Federal

PS5-116

EUGENOL CONTENT OF CLOVE-FLAVORED E-LIQUIDS AND CARRYOVER TO AEROSOL

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Significance: The rise of e-cigarette use and the uncertainties around possible associated health hazards have highlighted the question of the content and safety of the components of e-liquid. A particular compound of clove that gives it its distinct odor. Eugenol is known to have physiological effects in mammalian airways such as being an analgesic and as well as an irritant. Therefore, eugenol may modulate e-cigarette users’ responses to the inhalation of aversive components, such as nicotine. This study aimed at determining levels of eugenol in US e-liquids as well as aerosols generated from these.

Methods: 37 clove-flavored e-liquids from 29 manufacturers were purchased online. Gas chromatography coupled with flame ionization detection (GC-FID) was used to quantify eugenol and nicotine content, and GC-mass spectroscopy (MS) was used to screen the principal component of clove that gives it its distinct odor. Eugenol is known to have associated health hazards have highlighted the question of the content and safety of the components of e-liquid. A particular compound of interest is eugenol, the

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PS5-118

INSIGHT INTO.LEBANESE YOUTH RATING OF WATERPIPE SPECIFIC PICTORIAL HEALTH WARNINGS LABELS

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Introduction: Placing pictorial health warning labels (HWLs) on tobacco products offers a promising policy to curb waterpipe (WT) tobacco smoking epidemic. Using a Delphi study among international expert panel, our team developed 13 WP-specific pictorial HWLs corresponding to four themes “Health effects”, “Harm to others”, “WP-specific harm” and “Harm to children”. Using a Delphi study among international expert panel, our team developed 13 WP-specific pictorial HWLs corresponding to four themes “Health effects”, “Harm to others”, “WP-specific harms”, and “WP harm compared to cigarettes.”

Methods: Before participating in focus group discussions in Lebanon, 66 out of the total 77 participants (WP smokers n=30 and non-smokers n=36; age 18-34), completed a brief survey to individually rate the development of each HWL. They rated the overall effectiveness and ranked HWLs in each theme from the most to least effective. This study aimed to examine the differences in HWLs rating between WP smokers and non-smokers, and determine the top ranked HWLs in each theme. Freedman test was used to evaluate the rating of overall effectiveness of HWLs, and Mann Whitney U test was used to examine differences in rating between WP smokers and non-smokers. Top ranked HWLs were determined by

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transmitted diseases HWL in the WP-specific harm theme (85%). Conclusions: WP smokers were more responsive to HWLs in the “harm to others” theme, while WP non-smokers were more responsive to oral cancer HWL in “WP health risk” theme. Results will guide further testing of the top rated and ranked HWLs in a clinical lab study, and will inform HWLs policy implementation in Lebanon.

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PS5-119
COMPARISON OF HARM PERCEPTIONS, JUUL DEPENDENCE, AND OTHER TOBACCO PRODUCT USE AMONG JUUL USER TYPES
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Purpose: The study purpose was to identify Juul user profiles based on their use patterns and examine differences of harm perceptions, Juul dependence, and other tobacco use between these user profile groups. Methods: Online survey data were gathered in March 2019 from 668 undergraduate weekly Juul users at a Southwest university. Participants reported their Juul use behaviors including number of days and number of pods used per week, occasions in which they used Juul (i.e., drinking alcohol, watching media, studying, when alone, when with friends, to lose weight, and when craving sweets), and off brand Juul pod use. Results: Latent class analysis identified four Juuler classes: 1) Light Social Users (52.5%) who were likely to use Juul occasionally with friends when drinking alcohol, 2) Daily Sensation Seeking Users (16.2%) who used Juul daily and only with alcohol, 3) Daily Activity Driven Users (26.0%) who used Juul daily while drinking, watching media, or studying, and 4) Daily All Occasion Users (5.3%) who were heavy daily users and used Juul in all occasions. Distal outcome analyses discovered that Light Social Users were more likely than the other three classes to agree that Juul use indicated they were open to new experiences and more likely than Daily Activity Driven Users and Daily All Occasion Users to believe Juul vapor was harmful to others. Other harm perceptions (i.e., higher nicotine was harmful and use of different Juul pod flavors caused different levels of lung damage) did not differ across the classes. Daily All Occasion Users reported higher Juul dependence compared to their Daily Sensation Seeking Users and Daily Activity Driven Users counterparts; light Social Users reported the lowest level of dependence. Finally, Light Social Users were less likely than Daily Activity Driven Users and Daily All Occasion Users to use cigarettes; however, they were more likely than Daily Sensation Seeking Users to use cigarettes. Daily Activity Driven Users were more likely than Daily Sensation Seeking Users and Daily All Occasion Users were more likely than Light Social Users to also use e-cigarettes. Conclusions: Different Juul user profiles may influence perceptions about the harm of these products; thus, different types of Juul users may be at an increased risk of nicotine dependence and other tobacco use, as well as different motivations for use. Effective cessation interventions should be targeted and adapted to meet the needs of these Juul user profiles.

FUNDING: Academic Institution

PS5-120
NEGATIVE AFFECT AND CHANGES IN CIGARETTE AND ENDS USE IN DUAL CIGARETTE/ENDS USERS OVER 12 MONTHS
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Significance: Extensive work documents that smokers with high negative affect have higher nicotine dependence and more difficulty quitting smoking. Less is known about how negative moods impact patterns of smoking for dual users of conventional cigarettes and electronic nicotine delivery systems (ENDS). Understanding how variables predictive of quitting success in conventional smoking, such as depression, anxiety, and the ability to regulate these negative mood states, contribute to reductions of smoking in dual users may provide insights into whether and for whom ENDS may help reduce combustible smoking over 12 months in current cigarette smokers who had recently initiated ENDS use. Data come from the baseline and 12-month questionnaires of an observational study of 363 smokers (39% female; 40% White, 32% Black, 12% Hispanic, 11% Asian; aged 18-70) who also used ENDS. There were no inclusion criteria for wanting to reduce smoking. Results: At 12 months, 24.0% reported no smoking in the past 7 days; 21% reduced smoking by >50%; 22.9% reduced by <50%; and 32% did not change or increased their combustible smoking. Baseline FTND was the primary predictor of 12 month reduction; those who did not reduce or increased their smoking had higher baseline FTND (M = 4.51) than those who reduced M = 3.00; F(3, 362) = 2.74, p = .04. Contrary to predictions, there were no significant differences by level of smoking reduction for baseline depression, anxiety, or perceived stress, although there was a trend for lower baseline depression and anxiety in those who quit smoking completely (p < .10). At 12 months, NMR differed by level of cigarette reduction F(3, 362) = 2.74, p = .04. Conclusion: In sum, there was substantial reduction of smoking in these dual users over one year, but negative affect was less strongly associated with reduction than was nicotine dependence, suggesting that ENDS use may mitigate the deleterious effects often found with negative moods and smoking cessation.

FUNDING: Federal

PS5-121
PATTERNS OF USE AND BELIEFS ABOUT E-CIGARETTES AMONG CIGARETTE SMOKERS AND VAPERS RECRUITED FROM THE NEW YORK STATE FAIR IN 2019
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Significance: In the summer of 2019, an outbreak of lung illness associated with e-cigarettes or vaping product use was unfolding and being investigated by the Centers for Disease Control. An on-going cross-sectional study provided an opportunity to examine patterns of e-cigarette use as well as beliefs about these products among a sample of traditional cigarette smokers, e-cigarette users (vapers), and dual users (of both e-cigarettes and traditional cigarettes) in New York State. Methods: A cross-sectional study of cigarette smokers (n=368), vapers (n=120), and dual users (n=90) attending the New York State Fair in August/September of 2019 was conducted. Participants completed a brief interviewer-administered survey at an exhibition booth. Results: Among current cigarette smokers, 68% had ever tried an e-cigarette, 19% used e-cigarettes in the previous 30 days, and 7% were every day users. Three out of four vapers used e-cigarettes every day. Vapers were more likely than dual users to vape every day and use a rechargeable product (p <0.01). The most common reasons for using e-cigarettes included, e-cigarettes don’t smell (67%), they may be less harmful to me than regular cigarettes (60%), they are a replacement for my regular cigarettes (58%), to make it easier to cut down (54%), and they may be less harmful to others than regular cigarettes (52%). Vapers and dual users were more likely than cigarette smokers to believe e-cigarettes are less harmful to their health or no different in harm compared to regular cigarettes (92%, 90% vs. 67%, p < 0.01). In the last days of the fair, a greater percentage of vapers reported a belief that e-cigarettes were less harmful or no different in harm than regular cigarettes, while smokers’ beliefs appeared unchanged (see Figure 1). Conclusion: Media reports about the outbreak of lung disease may have impacted participants’ beliefs about e-cigarettes. It is important to continue to investigate beliefs about the harm or safety of e-cigarettes and related vaping products in order to both tailor public health messages and provide adults with information on harm reduction strategies.

FUNDING: Academic Institution

PS5-122
PROSPECTIVE ASSOCIATIONS BETWEEN NICOTINE BELIEFS AND TOBACCO-RELATED SUSCEPTIBILITY, CURiosity, AND USE IN U.S. ADULTS
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Significance Low harm perceptions of tobacco products have been associated prospectively with trial of those products in youth and young adults. It is unknown, however, how nicotine beliefs affect tobacco-related susceptibility and curiosity and trial. METHODS Four latent classes of nicotine beliefs were identified. Analyses in the current study assessed prospective associations between the four latent classes and susceptibility, curiosity, and trial of nicotine beliefs in adults aged 18-40 in Wave 9 (Spring 2016) of the Truth Initiative Young Adult Cohort Study (Class 1, high harm, 51%; Class 2, mixed harm, 9.4%; Classes 3 (32.5%) and 4 (7.5%), low harm). Analyses in the current study assessed prospective associations between the four latent classes and susceptibility, curiosity, and trial of nicotine beliefs in adults aged 18-40 in Wave 9 (Spring 2016) of the Truth Initiative Young Adult Cohort Study (Class 1, high harm, 51%; Class 2, mixed harm, 9.4%; Classes 3 (32.5%) and 4 (7.5%), low harm). Analyses in the current study assessed prospective associations between the four latent classes and susceptibility, curiosity, and trial of
several tobacco products in 3,122 adults who also completed Wave 10 (Fall 2016) using crude and adjusted logistic regression models accounting for survey weighting. RESULTS Compared to Class 1 (high harm), those in Class 2 (mixed harm) reported greater susceptibility to cigarette smoking at Wave 10 (AOR 2.77, 95% CI 1.51-5.09) accounting for age, race/ethnicity, sex, education completed, annual income, and susceptibility at Wave 9. Class 2 was also significantly less likely to report curiosity to try an e-cigarette at Wave 10 (AOR 0.49, 95% CI 0.27-0.90) than Class 1. There were no significant relationships between latent class and susceptibility to hookah or e-cigarettes, nor curiosity to smoke cigarettes or hookah. Compared to Class 1, Class 2 had lower odds of new traditional cigar use (AOR 0.50, 95% CI 0.26-0.96) and Class 3 (low harm) had higher odds of new little cigarette/cigarillo use at Wave 10 (AOR 1.61, 95% CI 1.05-2.46). CONCLUSION Variation in nicotine beliefs affected product specific susceptibility, curiosity, and new use at follow-up. Findings highlight that the class reporting uncertainty about nicotine resulted in reduced trial of one product compared to those with high harm perceptions of nicotine (Class 1), but low harm perceptions of nicotine were associated with greater trial of another product (Class 3). Nicotine belief latent classes may provide insight into adults’ likelihood to try specific tobacco products and the messaging needed to reduce use of all products.

FUNDING: Federal

PS5-123
EVALUATION OF TOBACCO NONUSERS’ INTENTIONS TOWARD AN ORAL TOBACCO-DERIVED NICOTINE POUCH PRODUCT AS THE RESULT OF VIEWING PROMOTIONAL MATERIALS
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Funding: Industry; Internally Funded

FDA must determine whether a new tobacco product is appropriate for the protection of public health to grant authorization to market a new tobacco product. One of the considerations in this determination is evidence regarding the impact of marketing and advertising (promotional material) on likelihood of using the new tobacco product among users and nonusers of tobacco products. We present here results from a study examining this impact for a portfolio (five nicotine levels and seven flavors) of on! nicotine pouches, an oral tobacco product containing ingredients that are either pharmaceutical grade or used in food and do not contain cut or ground tobacco leaf. We present here results from nonusers and in separately for users. A convenience sample of self-reported adult former (n = 666) and never tobacco users (n = 665), including an oversample of legal age to 24-year-olds (n = 690), were assigned an 8-hour training on educational modules for delivering the 4-session intervention. Using a “train-the-trainer” approach, indigenous Community Health Workers (CHWs; 3/church) participated in an 8-hour training on educational modules for delivering the 4-session intervention. Surveys assessing healthy lifestyle choices, smoking history, cancer screening history, and general knowledge about cancer were given pre- and post-intervention. Results: Participants were 21-79 yrs. (mean age 56 yrs.), 67.6% female, 56.2% were obese, and 15.7% were morbidly obese. 18.1% were current smokers, smoked an average of 7 cigarettes/day for 20 yrs. on average. 68.0% responded they were exposed to second-hand smoke at least some of the time. Pre-post intervention surveys revealed a significant improvement in the correct responses for the recommended screening test for lung cancer (35.2% vs 81.9%; p<0.001), the harmfulness of electronic cigarettes compared to traditional cigarettes (67.4% vs 85.7%; p<0.008), cancer risk factors (33.3% vs 61.9%; p<0.001), and improved survival rates due to lung screening (47.6% vs 72.4%; p=0.001). 36.8% of those eligible were screened for cessation; 57.1% eligible for LDCT were scheduled for lung screening. Conclusion: This project demonstrates that education and prevention efforts with navigation to care show promise for reducing cancer incidence, facilitating earlier diagnosis through screening, and promoting healthy behavior choices of quitting tobacco, thus impacting mortality rates among rural and underserved AAs. Research was funded by the Bristol-Myers Squibb Foundation’s Bridging Cancer Care Initiative.

FUNDING: Nonprofit grant funding entity

PS5-124
CONTENT ANALYSIS OF PUBLICLY AVAILABLE FACT SHEETS ABOUT E-CIGARETTES
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Significance: With the increase in use of e-cigarettes and evolving knowledge of their risks and benefits, it is important for the public to have access to timely and accurate information about these products. Fact sheets are traditional communication tools used to share health information with the public in a format that is easy to read and disseminate. We conducted a content analysis of a convenience sample of e-cigarette factsheets to assess their communicated information. Methods: We analyzed e-cigarette fact sheets (n=41) downloaded between September 2018 to September 2019. Fact sheets were obtained using an advanced search tool on Google and combination of 11 search terms (e.g., “e-cig,” “vaping,” “fact sheets”, “information”). Our search was limited to the first 100 results for each term. Inclusion criteria included English language fact sheets in pdf format (ready to print and distribute) with product risk and/or benefit information. Data were analyzed using SPSS. Results: While most factsheets were for a general audience (51%), 31.7% targeted parents and teachers, and none were targeted at current smokers. The most frequent risks mentioned were addiction (67.9%), harm to the brain (80.7%), lung risks (83.3%), cancer (56.1%), and cigarette gateway effects (53.7%). Half of the factsheets discussed that risks are still unknown (48.8%). Most factsheets mentioned nicotine (97.6%) and e-cigarette flavors (75.6%), and 58% mentioned JUUL. Most (67.8%) also referred to the presence of chemicals, toxins or metals, and 29% specifically named diacetyl. While 29.3% of factsheets referred to e-cigarettes as less harmful/toxic than cigarettes, 34.1% stated that e-cigarettes are not a safe alternative and compared the nicotine dose of e-cigarettes to cigarettes. Conclusion: Factsheets may help audiences learn about potential risks and benefits of e-cigarettes and should be updated as needed to capture emerging e-cigarette knowledge and trends. While fact sheets focused on youth use are important, tailored materials for smokers may also be needed.

FUNDING: Federal
PS5-126
QUIT ATTEMPTS, METHODS, AND MOTIVATIONS IN A LONGITUDINAL COHORT OF SEXUAL MINORITY ADULT TOBACCOS USERS
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Significance: Increasing tobacco cessation in sexual minority (i.e., lesbian, gay, bisexual, or other non-heterosexual identity; SM) adults is a public health priority. Cross-sectional studies indicate that SM tobacco users are less likely to attempt or successfully quit than heterosexuals, yet few studies describe cessation behaviors in this population over time. Our study investigated number of quit attempts, methods, and motivations in a longitudinal cohort of SM adult tobacco users. Methods: We enrolled a cohort of 71 SM adult tobacco users from 2014-2015. Participants completed interviews every 6 months through 48 months and reported quit attempts, sustained quits (7-day point prevalence), quit motivations, and quit methods. We used chi-squared and Fisher’s exact tests to assess differences between respondents who attempted but did not sustain a quit and respondents who sustained a quit. Results: Two-thirds of respondents (n = 47, 66.2%) reported at least one quit attempt over four years. Of these, 31.9% (n = 15) reported 2-3 attempts and 25.5% (n = 12) reported 4 or more attempts. Few used behavioral interventions, including quitlines (n = 2, 2.8%), literature (n = 3, 4.2%), or internet-based programs (n = 3, 4.2%); however, 21.1% (n = 15) used nicotine replacement therapy (NRT). Almost one-third of respondents (n = 21; 29.6%) reported at least one sustained quit within the 4-year period. Quit motivations included future or current health concerns (n = 16, 24.2%) and n = 11, 57.9%, respectively), physical fitness (n = 13, 18.6%), cost (n = 12, 63.2%), and family (n = 11, 57.9%). SM adults reporting at least one sustained quit were more likely to report a household member quitting tobacco than respondents not sustaining a quit (77.8% vs. 22.2%, p = 0.02). Ultimately, 42.9% (n = 9) of sustained quitters relapsed. Conclusion: SM tobacco users repeatedly attempted to quit, yet few used NRT or behavioral interventions. Research is needed to ascertain the unique barriers and facilitators to successful quitting in this population; however, tailored cessation interventions might leverage health messages and family members to help SM tobacco users successfully quit. 

FUNDING: Federal

PS5-127
POLY TOBACCO USE AMONG YOUNG ADULT WATERPIPE SMOKERS: INSIGHTS FROM UNIVERSITY STUDENTS IN THREE EASTERN MEDITERRANEAN COUNTRIES
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Significance: Waterpipe smoking is gaining high popularity in the Eastern Mediterranean countries, particularly among young adults. There is a tendency of WP smokers to advance their practice toward concurrent use (poly-tobacco use) of other tobacco products and nicotine delivery systems. Despite its popularity, few studies have examined poly-smoking among waterpipe users. Aim: To investigate poly-smoking behavior and quit intention among young adult users attending Arabic universities in the EMR. Methods: Descriptive cross-sectional design was utilized to recruit a convenience sample of university students who use WP in three East Mediterranean countries. Using an internet-based survey, data were collected regarding participants’ demographics, use of other tobacco products, alternative tobacco products and nicotine delivery systems, and WP quitting profile. Results: A total of 2290 students agreed to participate (indicate age and gender), among which 1116 (49.3%) reported using at least one tobacco product beside waterpipe. The rate of poly-smoking was highest (61.1%) among WP users from Jordan, followed by Egypt, followed by Jordan (45.1%) and Palestine (33.1%). Across countries, cigarette was the most common product (45.2%, n=924) followed by cigar (18.6%, n=374) and e-shisha (17.5%, n=353). Conversely, the least reported product was smokeless tobacco (7.5%, n=151) preceded by regular pipe (9.5%, n=193). Participants who were males (OR=2.83, 95% CI: 2.18-3.65), older (22-29 years) (OR=1.15, 95% CI: 1.09-1.22), unemployed (OR=1.58, 95% CI: 1.22-2.04), and those who initiated waterpipe at a younger age (OR=0.87, 95% CI: 0.87-0.91) had higher odds of being poly-smokers. Poly-smokers were significantly more resistant to quit WP and less likely to report being currently quitting waterpipe. Conclusion: This study demonstrates poly-smoking as a rising phenomenon among WP smokers and highlights the necessity for initiating advanced interventions to help WP poly-smokers quit this dangerous type of addiction. Various programs are needed that are country-specific and consider the various products used by the smokers.

FUNDING: Academic Institution; Nonprofit grant funding entity

PS5-128
ASSOCIATION OF SMOKING AT YOUNG/MIDDLE AGES AND SUBSEQUENT MORTALITY AND FUNCTIONAL DISABILITY—THE CHICAGO HEART ASSOCIATION DETECTION PROJECT IN INDUSTRY STUDY (CHA) 32-YEAR FOLLOW-UP HEALTH SURVEY
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Background: Data are limited on associations of cigarette smoking and smoking intensity in young/middle ages with subsequent competing risks between cancer, cardiovascular disease (CVD), and other-cause mortality, and functional disability in older age. Methods: Data from the CHA study assessed in 1967-73, free from major ECG abnormalities, diabetes, and MI, followed-up with the National Death Index and the 2003 health survey. Participants were/have would have been ≥5 years old in 2003 to be age-eligible. Baseline smoking status was categorized as non-smokers, ex-smokers, current smokers: 1-9, 10-19, 20-29, and ≥30 cigarettes/day. Functional disability was classified as having any disabilities (i.e., could not perform the task without help) in 6 basic activities of daily living (ADL) including bathing, dressing, toileting, transfer, continence, and feeding, or no-ADL. We used competing Cox models to estimate hazards for cancer, CVD, and other-cause mortality, with the deaths of their counterparts treated as the competing risk, and Poisson regression to estimate risks of having any ADL. Results: Of 13566 men and 9386 women baseline mean age 47 years, 6.7% were Black. After 32 years, 17% died from CVD, 14% from cancer, and 12% from other causes. Among 5967 survivors who responded to the 2003 health survey, 7% reported having at least one ADL disability. With adjustment for baseline age, sex, ethnicity, education, and levels of BMI, blood pressure, and cholesterol, smoking at young/middle ages was associated with higher risks of cancer, CVD, and other-cause deaths. For example, hazards ratios (95%CI) for cancer deaths in those who smoked ≥30, 20-29, 10-19, 1-10 cigarettes/day, and quit at baseline were 2.8 (2.5-3.2), 2.1 (1.9-2.3), 1.5 (1.3- 1.8), 1.3 (1.1-1.5), and 1.3 (1.1-1.4) respectively as compared to non-smokers. Among survivors who responded to the health survey, the relative risk (95%CI) of having any ADL 32 years later in those who smoked ≥30, 20-29, 10-19, 1-10 cigarettes/day, and quit at baseline were 2.0 (1.4-2.9), 1.5 (1.2-2.1), 1.2 (0.8-1.9), 1.4 (0.9-2.0), and 1.1 (0.9- 1.4) respectively as compared to non-smokers. Patterns were similar when stratified by sex or race. Conclusions: Smoking at young/middle ages, even with low intensity, is not only associated with higher risk of mortality but also with higher risk of functional disability among survivors in older age.

FUNDING: Federal; Nonprofit grant funding entity

PS5-129
E-CIGARETTE USE CHARACTERISTICS AND DEPENDENCE LEVELS BETWEEN EXCLUSIVE E-CIGARETTE AND DUAL E-CIGARETTE/CIIGARETTE USERS
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Background: Concern is growing over electronic cigarettes’ (ECIGs) ability to produce dependence and whether subgroups of ECIG users are at greater risk for tobacco-related harm. Dual use of cigarettes (CIG) is common among ECIG users and has been associated with greater ECIG dependence relative to exclusive ECIG use as well as differential dependence on ECIGs vs. CIGs. This study compares dependence levels between exclusive ECIG and dual ECIG/CIG users. Methods: As part of a clinical lab experiment, we recruited adults ages 16-55 who were daily exclusive ECIG (n=24) or dual ECIG/CIG users (n=21). At baseline, ECIG/CIG use characteristics, ECIG
dependence (Penn State E-cigarette Dependence Scale [PSEDS]; PROMIS-E) and CIG dependence (Penn State Dependence Scale [PSSDS]; PROMIS) were assessed. Descriptive and bivariate tests of dependence levels between exclusive and dual users were performed (p<0.05). Results: The sample was 73% White NH, 67% male, and 30 yrs old on average with no significant differences by dual use status. Daily mean (SD) e-liquid (6.1 mL [5.1] or pod [1.0 pod [3.3]) use and nicotine concentration (2.9% [2.1]) were similar across groups. Devices varied by wattage and system (i.e., open vs. closed) with the most common being JUUL (27%), Smok (13%), and Vaproresso (8%). Mean PSEDS (12.1 [3.1]) and PROMIS-E (8.5 [3.6]) scores did not differ significantly by dual use status. Among dual users, ECIG vs. CIG mean dependence levels did not differ significantly: PROMIS-E vs. PROMIS (8.3 vs. 8.1). PSEDS and PSSDS (11.3 vs. 9.8). Across the sample, ECIG dependence scores were significantly correlated (r=0.624). Dual user CIG dependence scores were significantly correlated with each other (r=0.7) but not with ECIG dependence scores. Discussion: In contrast to previous research, ECIG use characteristics and dependence did not differ significantly by dual use, and dual users reported similar ECIG/CIG dependence. Findings may relate to sample size and heavy ECIG use observed across groups; future work aims to examine the influence of ECIG use patterns and device/liquid characteristics. Despite similarities in ECIG dependence these groups may still differ in their responses to tobacco-related policy.

FUNDING: Federal

PS5-130
AN INTERSECTIONAL ANALYSIS OF TOBACCO USE IN THE POPULATION ASSESSMENT OF TOBACCO AND HEALTH (PATH) STUDY
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Purpose of the study: Despite decades of progress in tobacco control, a disparate tobacco burden persists among vulnerable populations. The current study used the intersectionality framework to measure disparities in tobacco use prevalence in the United States. Methods: We used data from the Population Assessment of Tobacco and Health (PATH) Study Wave 1 (2013-2014) to identify patterns of tobacco use behavior among adults at the intersection of sociodemographic population groups. Groups were defined as follows: gender; race/ethnicity (non-Hispanic white [NHW], non-Hispanic black [NHB]), Hispanic, age (18-24, 25-44, 45-64, 65+); income (0-15k, 15-35k, 35k-75k, >75k); education (less than high school [HS], HS and some college, Bachelor’s or higher). Tobacco use was identified as current use of any type of tobacco/nicotine product including cigarettes, e-cigarettes, cigars, hookah and smokeless/snus. Results: Among 32,317 adult respondents, the tobacco use rate was 26.7%. The rates varied widely among different groups. Higher rates of tobacco use where found for individuals who were male (33.8%), younger (38.7%), less wealthy (38.2%), or who had less than a HS education (36.6%). While many studies report that white and black tobacco use is similar, we found that the racial/ethnic group with the highest rate was NHB (30.9%); the NHW rate was 26.4%. Tobacco use was higher at the intersection of vulnerable population groups. The Hispanic adults under 25y used at a rate of 36.5%. Having higher education (Bachelor’s degree) or an income over $87.9k were protective factors, with rates being low in every intersection. The highest rate were at the intersections of less than HS with ages <25y or 25-44y (48.6 and 44.9%); and at the intersections of low income with young age or male gender (44.5% and 46.1%). Conclusions: The study highlights the complex role of sociodemographic factors in inequalities of tobacco use across multiple intersections of vulnerability, with large disparities associated with education, income, gender, and age. The high rates of tobacco use in younger adults of both genders and all racial/ethnic groups is concerning, possibly demonstrating a compromising of the successes of decades of tobacco control efforts.

FUNDING: Unfunded; Academic Institution

PS5-132
CURRENT SMOOKERS EXPRESS STIGMATIZING ATTITUDES AROUND LUNG CANCER IN OTHER SMOKERS: RESULTS FROM A WEB-BASED EXPERIMENT
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Significance: Lung cancer (LC) is the second most common cancer in both men and women. Many LC patients, cigarette smokers and non-smokers, report experiencing stigma in part because the disease has a strong association with smoking. Facing LC stigma (LCS) has been found to have a positive relation with depression and an inverse relation with quality of life. This project examined how smoking status affects perceptions of stigma and blame associated with LC. Methods: In 2015, a web-based survey was completed by 1,445 current smokers. Participants aged 18-65 were randomly assigned to one of three scenarios in which a current, former, or never smoker was diagnosed with LC. Four categories of potential stigma were assessed: blaming the victim, negative attributes about people with LC, smoking cessation efficacy, and controllability of smoking. One-way ANOVA’s tested mean differences for each stigma category by scenario, sociodemographic, and behavioral correlates. Results: For blaming the victim and controllability of smoking, significant differences between scenarios (p<.05) were found. Participants who viewed the current smoker scenario had the highest averages, (M=3.74,SD=0.86) and (M=3.91,SD=0.64), respectively. General linear models were run to evaluate differences in the stigma category means while adjusting for scenario. Overall means in blaming the victim (M=3.54, 95% CI [3.34, 3.74]) and controllability of smoking (M=3.74, 95% CI [3.60, 3.87]) were higher than in the other categories. Conclusion: These results can be used to express the importance of exploring methods that minimize the negative outcomes related to LCS. This work was funded by the National Cancer Institute [R25CA181003; U19CA157345].

FUNDING: Federal

PS5-131
PRECESSION COACHING TO PROMOTE WALKING FOR URGE MANAGEMENT REDUCES QUIT DAY SMOKING CUE REACTIVITY
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Significance: Low-income groups have higher rates of tobacco smoking, physical inactivity, and tobacco-related morbidity, and have greater challenges quitting smoking than the general population of smokers. Low-to-moderate physical activity (LMPA) is adoptable and could facilitate quit success by reducing smoking-related cue reactivity in this population.

Methods: A secondary analysis of data from the Step Up to Quit study. Smokers intending to quit who were physically inactive were recruited by flyers in low-income communities. All participants received pedometers and weekly pre-cessation counseling (one person, three phone sessions) prior to target quit day. Participants were randomized to receive standard CBT for cessation (control) or CBT-based physical activity promotion and cessation preparation counseling (SUTQ). SUTQ goals included increasing daily steps to >7,500 steps/day by the target quit day, and walking mindfully during a smoking urge episode one day prior to the quit day. On the quit day, all participants completed four, five-minute smoking cue exposure trials followed by five-minute treadmill walking and a final cue exposure trial. As reported in the primary trial outcome paper, LMPA adoption was acceptable, and SUTQ participants had significantly greater mean 7-day point prevalence steps/day vs. controls (p<0.01). For this analysis we conducted a structural equation model (SEM) to assess the effects of treatment on trial 5 negative affect (PANAS) controlling for other relevant covariates including prior urge and negative affect. Results: Participants (N=62) were 49% male, mostly (77%) African American, around 42 (SD=10.9) years old and smoked an average of ~12 cigarettes/day at baseline. The SEM fit the data well, chi-square(dff=2) = 0.650, p=0.723, CFI=1.00, SRMR=0.011. Treatment was associated with a decrease in negative affect (b=−2.531, z=−2.517, p<0.012). Promotions. Concluding daily walking and walking to manage urges to smoke over four weeks prior to a cessation attempt reduces post-cessation, cue induced negative affect. Such effects could facilitate relapse prevention in a population known to have challenges quitting smoking.

FUNDING: Federal

PS5-133
THE PREVALENCE OF BIOCHEMICALY VERIFIED ACTIVE AND PASSIVE NICOTINE EXPOSURE IN THE DETERMINANTS OF BLADDER CANCER RECURRENCE STUDY (DETER)
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Significance: Smoking is a risk factor for developing bladder cancer and nicotine exposure after diagnosis may adversely impact prognosis. Patients who smoke may be reluctant to disclose active smoking and non-smokers may be exposed to nicotine at times they are unaware of or would think to report. Accurate classification of active and passive exposure is essential to determine the association between nicotine exposure and bladder cancer recurrence risk. We compared self-reported vs. biochemically-verified nicotine exposure among non-muscle invasive bladder cancer (NMIBC)
patients participating in a prospective cohort study on the determinants of recurrence risk. Methods: This cross-sectional analysis was comprised of 518 recently diagnosed NMIBC patients who contributed either a urine or saliva specimen and self-reported, on the same day, their smoking history, use of e-cigarettes and/or nicotine replacement therapy and whether they lived with a smoker. Cotinine, the primary metabolite of nicotine, was used as an objective biomarker of recent nicotine exposure. Biochemically-verified cotinine exposure was grouped into three exposure categories: none, passive and active using published cut-points for saliva (<0.05 ng/ml; ≥0.05 ng/ml < 3 ng/ml; ≥ 3 ng/ml) and urine (<0.5 ng/ml; ≥0.5 ng/ml < 31.5 ng/ml; ≥ 31.5 ng/ml) and compared to self-reported nicotine exposure. Results: Overall, 12.5%, 59.3%, and 28.2% of patients had cotinine levels consistent with active, passive and no nicotine exposure, respectively. Among the 65 patients with biochemically-verified active exposure, 46 patients (70.8%) reported being an active smoker, using NRT or e-cigarettes, or living with a smoker, while 29.2% misreported their exposure. Among the 307 patients biochemically classified as passively exposed, only 4 patients (1.3%) endorsed living with a smoker. Conclusions: Biochemical verification of nicotine exposure among recently diagnosed bladder cancer patients revealed a high prevalence of passive exposure that was not captured by self-report. Analyses that determine how biochemically-verified nicotine exposure levels are associated with recurrence risk are needed.

FUNDING: Federal; Nonprofit grant funding entity

PS5-134

COMPARING THE QUALITY & COST EFFECTIVENESS OF FACEBOOK, CRAIGSLIST, & IN-PERSON RECRUITMENT METHODS FOR LONGITUDINAL PANELS

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Longitudinal surveys are valuable for assessing the impact of a program or intervention over time, such as public health campaign effectiveness. However, collecting longitudinal data presents numerous challenges, including the cost of recruiting and retaining panel members. The New York City Department of Mental Health and Hygiene (NYC DOHMH) and ICF have conducted three waves of a longitudinal survey to measure the impact of tobacco cessation programming on the smoking cessation behaviors of adults in NYC. The NYC Tobacco Cessation Panel Survey study includes a baseline survey and three waves of follow-up surveys administered over one year. Along with surveying existing nonprobability panel members, ICF explored alternative methods of panel recruitment for this study, including in-person, social media (Facebook), and online marketplaces (Craigslist) that alternate recruitment strategies were necessary because this mode alone could not provide sufficient eligible sample (adults who smoke). In this presentation, we will describe the advantages and disadvantages of each recruitment method, comparing panel retention, demographic coverage, data quality, and cost-effectiveness. We will also present the overall impact of SMS panel retention methods across all recruitment methods. Initial results show that Facebook skewed older, and had a similar number of attempts as Craigslist, but a lower completion rate. The findings of this analysis will be useful to survey researchers and public health professionals looking for cost-effective ways to recruit and retain nicotine and tobacco consumers in longitudinal surveys.

FUNDING: State

PS5-135

QUALITATIVE STUDY OF EXPERIENCES WITH ENDS USE AMONG LOW INCOME SMOKERS

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Significance: Cigarette smoking and associated morbidity and mortality rates are disproportionately high among low-income adults. Electronic nicotine delivery systems (ENDS) could potentially offer a lower-risk alternative to cigarettes, but more research is needed on ENDS health effects. Moreover, very little is known about ENDS use among predominantly low-income, adult smokers (N=31; mean age 30 ±13; 58% male, 48% African American, 39% white, 74% annual household income ≤$24,000). Interviews were transcribed verbatim and coded in NVivo 11.

Results: The most common theme regarding ENDS risk perceptions was a sense of uncertainty (e.g., “I don’t know what to think;” “The uncertainty is worse than knowing it’s negative”). When asked about relative harm perceptions, most (72%) indicated that vaping was less harmful than smoking (e.g., “the lesser of two evils”), though some may explain why tobacco control policies have not had the expected effects on smoking prevalence in Mexico.

FUNDING: Federal

PS5-136

WHY SMOKE FLAVOR CAPSULE CIGARETTES? PREFERENCES AND PERCEPTIONS AMONG ADULT SMOKERS IN MEXICO.

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Significance: Flavor capsule cigarettes include capsules in the filter that smokers can crush to flavor cigarette smoke. The market share of this product is rapidly growing, particularly in Latin America, yet little is known about flavor capsule users and the flavors in the capsules. This study aimed to address these issues among adult smokers in Mexico.

Methods: Adult smokers (n=3335) recruited from an online consumer panel reported their preferred cigarette brand variety (non-capule, one capsule, two capsules), perceived flavors for flavor capsule users, and perceived benefits (use to control hunger; relative smoothness; relative harmfulness). The most commonly used capsule flavors were evaluated. Multinomial logistic models regressed preferred cigarette type (non-capule=reference vs one capsule vs two capsules) on sociodemographic and smoking-related variables. Logistic models regressed perceived benefits on preferred cigarette type while controlling for sociodemographics and key smoking variables.

Results: Preference for flavor capsules was high (47%, 1 capsule: 12%, 2 capsules). Flavor capsules were preferred more by females, younger age groups, non-daily smokers, and dual users. The top flavors perceived for one-capsule and two-capsule cigarettes were menthol (76% and 53%, respectively), berry (15% and 39%, respectively), and cucumber (11% and 36%, respectively). One-capsule cigarette users were more likely than non-capule users to report smoking to control smoking (AOR=1.29; 95%CI=1.07, 1.56). Compared to smokers who did not prefer capsules, those who preferred both one-capsule and two capsules were more likely to report that their brand was smoother (AOR= 4.85 and AOR=4.01, respectively) and less harmful than other varieties (AOR=2.38 and AOR=1.61, respectively). Conclusion: Flavor capsules appear to continue capturing market share in Mexico, particularly among females and younger smokers. The appeal of flavor capsule cigarettes includes perceptions that they are smoother and less harmful than other cigarettes. This appeal and associated patterns of use may explain why tobacco control policies have not had the expected effects on smoking prevalence in Mexico.

FUNDING: Federal

PS5-137

REASONS FOR USE OF E-CIGARETTES, CIGARS AND HOOKAH IN PREGNANT WOMEN

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Significance: Pregnancy is a critical period for tobacco cessation, as it introduces new consequences and increased motivation to quit. Use of non-cigarette tobacco products in pregnancy is also increasing. Prior studies in non-pregnant adults revealed differing reasons for use across tobacco product types. However, little is known regarding reasons for use across tobacco products in pregnant women.

Methods: Participants were 124 pregnant women (50% cigarette smokers; 64% income ≤ $30,000, 66% racial/ethnic minority) from a study of smoking during pregnancy who completed an interview during 3rd trimester. Lifetime and prenatal use of e-cigarettes, cigars, and hookah were assessed using questions adapted from the PATH survey (Wave 2). Overall reasons for use were followed by comparison of prenatal vs. lifetime-only users for each product. Results: Rates of prenatal and lifetime use (respectively) were: 8 and 46% for e-cigarettes; 12 and 63% for cigars, and 13 and 83% for hookah. The top two reasons for use for each product were: smoking cessation (74%) and health (51%) for e-cigarettes; affordability (27%) and flavors (25%) for cigars; and fun (71%) and consideration of others (34%) for hookah. Significant differences in reasons for use of e-cigarettes emerged between prenatal and lifetime-only users; prenatal users were more likely to report using e-cigarettes for affordability (78% vs. 25%) (p=0.002), and flavors (56% vs. 27%) (p=0.092) vs. lifetime-only users. No differences in reasons for use emerged between prenatal and lifetime-only users for cigars or hookah. Conclusions: Consistent with data from non-pregnant adults, pregnant women’s reasons for use of non-cigarette tobacco products differed by product. Cessation was the most common reason for use of e-cigarettes, fun for hookah, and affordability and flavors for cigars. Differential reasons for use across products may have implications for targeted intervention and prevention efforts in pregnant and reproductive age women. Future studies are needed to elucidate individual differences in reasons for use and associations with changes in sensory perception over pregnancy.

FUNDING: Federal

PS5-138
ASSOCIATION OF ELECTRONIC CIGARETTE USE WITH COGNITIVE DEFICITS IN YOUTH
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Significance: Vaping has increasingly become popular among youth, so it is important to understand the possible health effects of vaping on youth. The aim of the study is to determine how vaping affects the cognitive abilities in youth. Methods: We used the 2018 National Youth Tobacco Survey (NYTS) comprised of 20,189 youth who answered whether they have serious difficulty concentrating, remembering, or making decisions (referred as cognitive deficits) and stated their vaping and smoking status. Using this dataset, an examination of the association of electronic cigarette use in youth with the risk of cognitive deficits was conducted with multivariable weighted logistic regression models with consideration of the complex sampling design. Results: Using electronic cigarettes even once or twice (aOR=2.47, 95% CI: 1.67 - 3.64) had a significantly higher association with the risk of cognitive deficits in youth compared to never users. From ages 19 to 8, every one year younger a youth was when they first started vaping showed an association increase of 12% with the risk of cognitive deficits (aOR=1.12, 95% CI: 1.07 - 1.18). The association of smoking with the risk of cognitive deficits (aOR=1.41, 95% CI: 1.19 - 1.67) was significantly lower than the association of electronic cigarette use with the risk of cognitive deficits in youth. Conclusion: Vaping is significantly associated with the increased risk of cognitive deficits in youth. The results show that the younger an adolescent starts vaping, the higher the association with cognitive deficits. These results provide evidence on the possible effects of vaping on the cognitive abilities of a youth, which further stresses why quitting smoking and vaping is vital.

FUNDING: Unfunded

PS5-139
VAPEING AND BLUNTING AMONG US YOUTH, EVIDENCE FROM THE WAVE FOUR POPULATION ASSESSMENT OF TOBACCO AND HEALTH (PATH) STUDY
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Significance: Marijuana is the most widely used illicit substance among American youth. It is often used in combination with tobacco and nicotine products. There is a concerning trend that the perceived risks of marijuana use among US youth have been declining in recent years. Given the adverse health effects of co-use of marijuana and nicotine among youth, it is critical to monitor marijuana vaping and blunting, and the potential differential patterns of use among subgroups, as well as demographic factors associated with those behaviors among American youth. Methods: Data used in this study were from Wave 4 Survey of the PATH Study conducted from December 1, 2016 to January 3, 2018. The PATH Study is a nationally representative, longitudinal cohort study with 14,798 youths (aged 12-17) participating in Wave 4 survey. Multivariate logistic regressions were performed to estimate the adjusted associations between different forms of marijuana use and demographic characteristics. Replicate weights and balanced repeated replication (BRR) methods were used to account for the complex survey design. Results: Among US youth aged 12 to 17, 10.9% used marijuana in the past 12 months, 8.4% had ever vaporized marijuana using an electronic vaping product, and 6.4% smoked marijuana as blunting in the past 12 months. Multivariate regression results showed that ever vaporizing marijuana among young is significantly associated with being in older age groups (adjusted OR = 4.96, 95% CI: 4.11 - 5.73), being current established cigarette smokers (adjusted OR = 5.62, 95% CI: 4.16 - 7.59), and being current established e-cigarette users (adjusted OR = 6.40, 95% CI: 4.99 - 8.21), controlling for sex, race/ethnicity, education level, and household income. Furthermore, blunting in the past 12 months was significantly associated with being in older age groups (adjusted OR = 5.05, 95% CI: 4.11 - 6.20), being current established cigarette smokers (adjusted OR = 7.72, 95% CI: 5.91 - 10.08), and being current established e-cigarette smokers (adjusted OR = 7.03, 95% CI: 5.54 - 8.90), controlling for sex, race/ethnicity, education level, and household income. Conclusion: These findings indicated that among US youth aged 12 to 17, vaping marijuana and blunting were significantly associated with intense use of cigarettes and e-cigarettes. FUNDING: Research reported in this study was supported by the NCI of the NIH under Award Number R01CA194681. The content is solely the responsibility of the authors and does not necessarily represent the official views of the National Institutes of Health.

FUNDING: Federal

PS5-140
FACTORS ASSOCIATED WITH VAPING MARIJUANA AND BLUNTING AMONG US ADULTS IN THE WAVE 4 POPULATION ASSESSMENT OF TOBACCO AND HEALTH (PATH) STUDY
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Significance: Marijuana is often used in combination with tobacco and nicotine products, such as marijuana vaping and blunting. Although marijuana remained as a Schedule 1 drug under federal law, state-level policies legalizing marijuana use for medical and recreational purposes have been increasing since 2010. Given the rapidly changing legal environment and the evolution in e-cigarette market, important knowledge gaps exist about patterns of use related to vaping marijuana and blunting, as well as associated demographic and socioeconomic factors. Methods: Data from Wave 4 PATH Study were analyzed. The PATH Study is a nationally representative, cohort study. The sample included 33,822 adults (aged 18 or above). Multivariate logistic regression was performed to estimate the adjusted associations between marijuana use, including vaping and blunting, and demographic characteristics. Balanced repeated replication (BRR) methods were used to account for the complex survey design. Results: In the study sample, 7.5% reported ever vaporized marijuana using an electronic vaping product, and 7.5% smoked marijuana as blunting in the past 12 months. Multivariate regression results indicated ever vaporizing marijuana was significantly associated with being male (aOR = 1.46, 95% CI: 1.33 - 1.62), being in younger age groups, being sexual minorities (aOR = 2.19, 95% CI: 1.83 - 2.63), being current established cigarette smokers (aOR = 4.50, 95% CI: 4.05 - 4.99), and being current established e-cigarette users (aOR = 3.52, 95% CI: 3.05 - 4.06), controlling for race/ethnicity, education, and household income. Blunting in the past 12 months was significantly associated with being male (aOR = 1.74, 95% CI: 1.58 - 1.91), being in younger age groups, being sexual minorities (aOR = 2.22, 95% CI: 1.87 - 2.64), being current established cigarette smokers (aOR = 4.07, 95% CI: 3.64 - 4.54), and being current established e-cigarette smokers (aOR = 2.32, 95% CI: 2.01 - 2.66), controlling for race/ethnicity, education, and household income. Conclusion: Among US adults, vaping marijuana and blunting were significantly associated with sex, age, sexual orientation, current use of cigarettes and e-cigarettes. Policies and interventions targeted at tobacco/e-cigarettes may affect vaping marijuana and blunting. Policies aimed to reduce marijuana use could benefit from taking into account different patterns among population subgroups defined by sex, age, sexual orientation and tobacco use status. FUNDING: This study was supported by NCI of NIH under Award R01CA194681.

FUNDING: Federal
PAST 30 DAY MARIJUANA CO-USE WITH E-CIGARETTES AND CIGARS AMONG YOUNG ADULT SMOKERS AGED 18-35, 2018

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SIGNIFICANCE: Marijuana use is high among young adults, who often co-use marijuana with cigars and recently, electronic nicotine delivery systems (ENDS). Co-use of tobacco and marijuana is associated with combustible tobacco use, increased nicotine dependence, and greater respiratory distress as compared to single product use. Moreover, over 75% of hospitalized vaping associated lung injury (EVALI) patients were under 35 and the role of marijuana, as well as nicotine, THC, and CBD based e-liquids in EVALI is unclear. This study aimed to identify the prevalence, demographics, and tobacco use profiles of marijuana co-use with ENDS and cigars among young adult smokers.

METHODS: In 2018, the Center for the Study of Tobacco Products conducted a cross-sectional, online survey among cigarette smokers aged 18-35 (n=320) recruited via Craigslist from randomly selected US locations. ENDS co-users reported past 30 day ENDS and marijuana use. Large cigar blunt co-users reported past 30 day blunt use with LCCs and large cigars, respectively. RESULTS: Prevalence of LCC use was 27.3% and large cigar blunt co-users reported past 30 day ENDS users (n=141), 44.7% reported past 30 day marijuana use and 6% vaped marijuana. ENDS co-users (n= 40 - co-users) were younger at tobacco/nicotine initiation and more likely to use ENDS an hour after waking. Co-users (n= 40 - co-users) were more likely to currently use other tobacco, drugs, and alcohol. END co-users were more likely to be male, a sexual minority, and in a degree program. LCC blunt co-users were more likely to be Black, have an income less than $10K, and be financially dependent on their parents. Large cigar blunt co-users were more likely to be male and financially dependent on their parents. CONCLUSIONS: Our data suggest that marijuana co-use with e-cigarettes and cigars is prevalent among young adult cigarette smokers. Few associations were found in tobacco use profiles. Demographic differences suggest that co-users may be poly-substance users and socially or economically disadvantaged. Additional research is needed to understand co-users of tobacco and marijuana and the health implications of co-use behaviors.

FUNDING: Federal

USING MACHINE LEARNING TO DETERMINE FACTORS ASSOCIATED WITH CURRENT E-CIGARETTE USE IN YOUNG ADULT NEVER SMOKERS: RESULTS FROM 2016 AND 2017 BEHAVIORAL RISK FACTOR SURVEILLANCE SYSTEM (BRFSS)

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Introduction: E-cigarettes (“e-cigs”) are most commonly used by adults that are less than 35 years old and smokers of conventional cigarettes, but e-cig use by never smokers is on the rise. Our goal was to use machine learning methods to identify characteristics of young adult e-cig users that are never smokers of cigarettes.

Method: Data from 2016 and 2017 BRFSS was used. Young adults (<35 years), never smokers (<100 cigarettes), and current or never users of e-cigs were used for the analysis (n = 40,012 (2016); n = 39,527 (2017)). Core questionnaire variables available in both 2016 and 2017 were identified and those with no research implications were excluded. A modified random forest algorithm, was used to select the features associated with current e-cig use in each year. Variables selected in at least 20 of the 25 bootstrap iterations consisting of random samples of 80% of the data were then used as inputs to different multivariable logistic regression models that adjusted for age, gender and race and also incorporated BRFSS complex design weights.

Result: Black non-Hispanics, females, students, and increasing age were associated with decreased odds of e-cig use. Being a member of an unmarried couple, being blind/having serious vision impairment, current oral tobacco use, having previously tested for HIV, engaging in HIV risky behaviors, reporting internet use in past 30 days, having serious difficulty concentrating/making decisions, having difficulty doing errands alone due to physical, mental or emotional condition and having being diagnosed with depressive disorders increased the odds of e-cig use. Odds of e-cig use also increased with increased alcohol consumption and increased days of poor mental health due to stress, depression and/or emotions in the past 30 days.

Conclusion: We identified features that were associated with current e-cig use in young adult never smokers in the US. These findings, if replicated, may help policy makers target prevention and treatment programs.

FUNDING: None

DOES IT MATTER WHAT YOU SAY? THE EFFECTS OF CONVERSATION TOPICS ABOUT CIGARETTE HEALTH WARNING LABELS ON SUBSEQUENT QUIT ATTEMPTS

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Significance: Interpersonal communication about health warning labels (HWLs) explains their effects on cessation behaviors. This longitudinal study evaluated the topics of HWL conversations among adult smokers in Mexico, including which topics best predict subsequent quit attempts.

Method: Over one year, adult smokers recruited from an online consumer panel in Mexico were surveyed every four months. The analytic sample included 1,139 smokers who participated in at least two consecutive surveys (n=1,697 observations). At time “t”, participants reported the frequency of talking to others about HWLs in the last month (not at all, sometimes, frequently), the topics of these conversations (smoking harms, cessation benefits, lack of message credibility/utility), as well as other socio-demographic and smoking-related variables (e.g., quit intention, smoking frequency) including HWL responses (e.g., message elaboration). At follow-up (time “t+1”), participants reported having made a quit attempt over the period between surveys. Logistic models regressed the binary quit attempt on study variables (time “t”), including an assessment of whether HWL communication topics mediated the effects of talking frequency.

Results: Most participants reported talking about HWLs sometimes (46%) or frequently (17%). Of those who talked about HWLs, 75% reported conversations about smoking harms, cessation benefits, and lack of message credibility/utility, as well as other socio-demographic and smoking-related variables (e.g., quit intention, smoking frequency). Most participants reported talking about HWLs sometimes (46%) or frequently (17%). The topics of these conversations (smoking harms, cessation benefits, lack of message credibility/utility), as well as other socio-demographic and smoking-related variables (e.g., quit intention, smoking frequency) including HWL responses (e.g., message elaboration). At follow-up (time “t+1”), participants reported having made a quit attempt over the period between surveys. Logistic models regressed the binary quit attempt on study variables (time “t”), including an assessment of whether HWL communication topics mediated the effects of talking frequency.
about smoking harms, 58% about cessation benefits, and 8% about the lack of message credibility/utility. At follow-up, 39% of participants reported a quit attempt. In adjusted models, smokers who talked sometimes and frequently were more likely than those who never talked about HWLs to report subsequent quit attempts (AOR=1.31, 95% CI=1.03-1.66; AOR=1.61, 95% CI=1.13-2.29). Conversation topics mediated the effects of talking on quit attempts by 35.4% (p<0.05), with benefits of quitting being the strongest mediator (indirect effect b=0.02; 95% CI=0.01-0.04).

Conclusion: Our findings suggest that conversation topics about HWLs matter in promoting quit attempts. More research is needed to explore why some topics matter more than others in smoking cessation and which HWL content may best incite those conversations.

FUNDING: Federal

PS5-145
BEHAVIORAL INTENTION TO USE TOBACCO PRODUCTS, CAMEL SNUS OR NICORETTE BASED ON AFFECTIVE, COGNITIVE AND SENSORY PERCEPTION
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Significance: Evidence supports that marketing of tobacco products have a considerable effect on consumer’s acceptance and satisfaction. The present study formally examines how experience with the product modifies initial cognitive beliefs and affective associations to influence behavioral intention to use the product. The study uses the “4 P’s” (product, place, price, & promotion) to drive consumer trial of Camel snus and Nicorette gum. Methods: The study was conducted from 2013 to 2017. Participants were exposed to advertisements for each product (promotion), were presented with the packages of each product and could examine and handle. They later touched and smelled a freshly opened product container for up to 30 seconds (product/ sensory) followed by completing a set of sensory ratings. They were asked to complete a purchase task indicating willingness to pay for the product. The results were examined for the extent to which differences in consumer perception measures influence level of interest in trying a given product (i.e., behavioral intention). Results: Of the 195 participants, 45.6% were aged above 50 years and 32.8% were below 30 years. 62.6% of the participants were females. 41.5% smoked every day. Smokers were more likely to purchase one of two products (Camel snus/Nicorette gum) when compared to non-smokers (Univariate ANOVA, F=109.59, p=0.00). Smoking status had a significant effect on likelihood of purchase of the products (Univariate ANOVA, F=156.7, p<0.00). Smoking status and choice of product interaction had a significant effect on purchase likelihood (Univariate ANOVA, F=44.8, p=0.00). Age and gender interaction (Univariate ANOVA, F=3.73, p=0.00) has significant effect on likelihood of purchasing one of the two products. Within younger age group, males had a higher means (3.69) compared to females(1.06) in terms of likelihood of purchasing the product of choice. Conclusion: is that there is a higher tendency amongst existing smokers to be potentially influenced by design, marketing and promotion of modified risk tobacco products. Funding: This work was funded by National Cancer Institute (U19CA157345)

FUNDING: Federal

PS5-146
CHARACTERIZING JUUL’S YOUTH PREVENTION AD CAMPAIGN IN REGIONAL NEWSPAPERS
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Significance: In April 2018, JUUL Labs Inc announced plans for an ad campaign on print, digital, and radio platforms supporting efforts to raise the minimum sales age to 21 for all tobacco products (Tobacco 21), as part of its commitment to advancing youth use prevention. We examined the extent to which JUUL advertised the company’s youth prevention mission, including specific endorsements of the Tobacco 21 legislation, in regional newspapers across the United States. Methods: We used a national newspaper database to identify the number of newspapers in each state that included any mention of JUUL or Tobacco 21 between April and December 2018. Results: From February 2019 to September 2019, JUUL spent $22.8 million on 590 youth prevention-focused newspaper ads, 426 (71%) of which explicitly advocated for the Tobacco 21 legislation. There were large monthly increases in advertising frequency that reached a peak in May 2019, after which frequency declined and remained at a consistent level. Ads ran in 39 regional markets; top markets included Detroit, New York, Chicago, and Washington, DC. Across all ads, there were nine distinct themes; the most prevalent were ads discussing how JUUL is addressing the issue of youth vaping (22%) and ads declaring “it is time to raise the legal age to purchase tobacco products, including vapor,” from 18 to 21” (20%). Other themes included enhancing age verification on JUUL’s website and preventing underage sales in retailers. Conclusions: It is clear that JUUL has heavily invested in its campaign for youth prevention efforts, and has made explicit their endorsement for the Tobacco 21 legislation. Regardless of whether this ad campaign is an act of corporate responsibility, there may be implications of such advertising on public attitudes towards JUUL, and more importantly, on public support for the Tobacco 21 legislation.

FUNDING: Federal

PS5-147
HOW THE TOBACCO INDUSTRY IS DRIVING CONSUMERS TO THE MOBILE PLATFORM: A CONTENT ANALYSIS OF DIRECT MAIL AND EMAIL ADVERTISEMENTS FROM 2018
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SIGNIFICANCE Tobacco companies use mobile features as a digital marketing avenue through sponsored apps and mobile websites. Some brands have replaced direct mail coupons with mobile-exclusive coupons, which have increased as smartphone ownership has become ubiquitous. This study examined tobacco ads promoting mobile content to identify incentives and messages utilized to increase consumer mobile engagement. METHODS Emails and direct mail materials were obtained from Shrinkets & Trash, an online tobacco ad repository. References to mobile access in ads began in 2011; the sampled year (2018) was the most recent year with comprehensive data and contained the most referrals to mobile content compared to prior years. We performed a content analysis of mobile incentives and mentions of brand-sponsored apps or special content accessible by smartphones. Descriptive statistics compared methods used by brands to promote their mobile accessibility. RESULTS We coded 295 ads representing 45% of the total ads referencing mobile content from 2011 to 2019. The majority of ads were for cigarettes (75%), with fewer smokeless tobacco (24.3%) and e-cigarette ads (0.7%). The most frequent brands observed were Camel (26.4%), Marlboro (21.0%), Newport (11.5%), Grizzly (11.5%), Pall Mall (9.8%), Skoal (6.8%), and Red Seal (4.1%). The proportion of email ads analyzed was greater than direct mail (86.4% vs. 13.6%). The proportion of email ads analyzed was greater than direct mail (86.4% vs. 13.6%). More than 99% of ads referred to a mobile coupon incentive, while few mentioned specific mobile access to sweepstakes or other interactive online experiences (1.4%). In terms of coupon access, 86.1% of ads promoted access via the website, while 13.6% mentioned websites and brand-sponsored apps; 0.3% mentioned only mobile apps. About 36% of ads cited benefits of mobile coupons and 14.3% of ads explicitly compared advantages of mobile coupons over mail coupons (e.g. greater coupon frequency). CONCLUSION Access to incentives via mobile phones continues to be a prevalent marketing tactic by tobacco companies. Most incentives were for an increased frequency of coupons. It is important to consider how these price reduction strategies minimize purchasing barriers.

FUNDING: Federal

PS5-148
PROACTIVE QUITLINE REFERRALS IN AN ACADEmIC UNIVERSITY EMERGENCY DEPARTMENT
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Significance: Health professionals are challenged by competing priorities to address smoking cessation in the Emergency Departments (EDs). Proactive referrals from the electronic health record (EMR) to a quitline have been demonstrated in outpatient clinical trials to increase patient engagement. This study aims to assess quitline engagement and smoking cessation outcomes among patients at the University of California, Davis ED referred to California’s quitline. METHODS: From March 2018 – June 2019, ED patients were randomly approached and identified as smokers. Patients (or household members with patients) who smoked and consented had a referral order sent through EMR at discharge. Retrospective chart review was conducted for the quitline order results, patient demographics, and smoking status at follow-up encounters. The primary outcomes were quitline
engagement and smoking status at follow-up. We used an intent to treat analysis and classified patients not followed-up or with missing smoking status at follow-up (n=56) as smokers. We tested differences in percentages using Fischer’s exact test.

Results: 1528 patients were approached and 324 (21.2%) were identified as smokers. 137 patients (42% of smokers) agreed to be referred to the quiltere, of which 14 were household members who smoked. Among the 123 patient referrals: 17 (13.8%) received services, 19 (15.5%) declined services, 75 (61.0%) were unable to be contacted, and 12 (9.8%) were missing referral results. Among the 111 patients with referral results, the following groups (although not statistically different) had a higher percentage that contacted the quiltere: women (18.0%), lighter smokers (<20 pack-years) (23.1%), and alcohol and/or marijuana substance use (24.3%). There were 17 patients (15.3%) who quit smoking at a follow-up encounter among the 111 patients with referral results. Among the patients that received quiltere services, 29.4% had quit smoking at a follow-up encounter. Patients with prior quit attempts (38.9%) and only having alcohol and marijuana substance abuse (27.0%) were significantly more likely to have been documented as a former smoker at follow-up appointments.

Conclusion: These findings demonstrate the acceptability of proactive quiltere referrals. While only a quarter of patients were contacted, almost half of these patients engaged in counseling. The quit rate at a follow-up encounter is limited in that the documentation reflects point prevalence abstinence rates and may be higher if those with missing data had quit.  

FUNDING: State

PS5-149  
JUUL USE IN SCHOOL: CROSS-SECTIONAL STUDY OF CT HIGH SCHOOL ADOLESCENTS  
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Significance: JUUL use is popular among youth and social media evidence suggests that adolescents use JUUL at school. The current study uniquely examines specific locations where youth use JUUL (and other e-cigarettes) at school. Methods: Students from 6 Connecticut high schools in 2019 reported on past-month use (defined as ≥1 day of use in past 30 days) of the following e-cigarette device types: 1) JUUL, 2) any pod system other than JUUL, 3) Disposables/Cig-a-likes, 4) Vape pens, and 5) Mods. Past-month users of a device who also reported use in school within the past month reported on specific locations of use: classroom, bathroom, hallway/stairway, outside on school grounds and other school locations. Separate binary logistic regression models predicted e-cigarette device use in each school location. Predictors included demographics (age, sex, school) and past-month use of each device in school. Results: Among past-month users, use rates in schools were: 45.5% (N=547) JUUL, 41% (N=219) other pods, 38.8% (N=118) disposables/cig-a-likes, 34.4% (N=225) vape pens, and 27.1% (N=81) mods. Across devices, use in bathrooms was most common: 75.7% JUUL, 72.2% other pod, 80.5% disposables/cig-a-likes, 78.2% vape pens, and 71.6% mod. Other school related locations category was the least endorsed: 8.6% JUUL, 10.5% other pods, 9.3% disposables, 8% vape pens and 10.5% mods. Logistic regression models revealed that vape pens (p=0.033) and disposables/cig-a-likes (p=0.046) were more strongly associated with use in the hallway/stairway and JUUL (p=0.039) with use in the bathroom. No other differences by device type were found. Conclusion: E-cigarette use in schools is commonly reported among high school students. School-wide efforts should be implemented to reduce e-cigarette use in locations widely reported across e-cigarette device users, such as bathrooms. Further investigation into adolescent use of JUULs, vape pens and disposable e-cigarette use in school is warranted. This research reported in this publication was supported by NIH grant U54 DA036151-07 (Yale TCORS) and the FDA Center for Tobacco Products (CTP).

FUNDING: Federal

PS5-150  
ADVERSE EFFECTS OF VAPING AMONG YOUTH IN THE UNITED STATES, CANADA, AND ENGLAND  
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Significance: Recent reports of serious vaping-related pulmonary complications in the US and Canada have raised concerns about the potential adverse effects of e-cigarette use, especially among youth. Little is known about the prevalence of negative side effects of vaping, particularly less-serious side effects that may go unreported to medical authorities. The current study examined self-reported negative side effects from vaping among youth in the US, Canada, and England. Methods: Repeat cross-sectional survey data (n=12,110) were analyzed from the ITC Youth Tobacco and Vaping Survey, an online survey conducted in 2017 (Wave 1), 2018 (Wave 2) and 2019 (Wave 3) with national samples of youth aged 16-19 recruited from consumer panels in Canada, England, and the US. Youth who had ever used e-cigarettes were asked about any negative side effects they had experienced (overall and then a checklist of specific effects in Waves 1 and 2; or, as yes/no to a list of specific effects in Wave 3), as well as whether they had sought or considered medical attention. Results: In 2019, more than half of youth (55.5%) surveyed who had ever vaped reported “ever” experiencing negative side effects from using e-cigarettes, ranging from 46.6% in England to over 58% in Canada and the US. Among ever-vapers, odds of reporting any side effects were significantly greater in Canada and the US, and among youth who were older, had a history of greater e-cigarette use (ever, days in past month, times per day), and who used products higher in nicotine. The most commonly reported side effects were cough (29.9%), light-headedness (21.2%), throat irritation (20.6%), and headache (19.3%). While direct comparison with previous waves is not possible, the same side effects were also reported most often in Waves 1 and 2. In 2019, among vapers who experienced side effects, 12.1% sought medical attention, and another 10.6% considered seeking medical attention. Conclusions: Youth vapers commonly experience negative side effects from e-cigarette use: in 2019, approximately one in eight “ever” vapers either sought or considered seeking medical attention, as a general indication of severity of such effects.

FUNDING: Nonprofit grant funding entity

PS5-151  
HARM PERCEPTION, PEER TOBACCO USE, PARENT-CHILD COMMUNICATION ON YOUTH E-CIGARETTE EVER USE  
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Significance: Despite a steady decline in cigarette use, the number of youth electronic cigarette (e-cigarette) users nearly doubled from 2017 to 2018. Currently, more than 500,000 middle school students report e-cigarette use. While risk factors for cigarette use have been identified, less research has been done to assess risk factors associated with e-cigarette use among younger adolescents. The purpose of this study is to examine associations between important risk factors for youth cigarette use (harm perception, peer use, and parent-child communication) and youth e-cigarette use. Methods: Survey data was collected from youth and parents participating in the Adolescents, Place, and Behavior Study, an ongoing, prospective cohort study of 11 to 15 year olds (current N = 250; 78.8% African-American) in Richmond, VA. Logistic regression models were conducted to examine associations between harm perception (youth: how much do you think people harm themselves when they smoke e-cigarettes), peer tobacco use (youth: how many of your closest four friends smoke or vape), and parent-child communication (parents: within the past 12 months, how many times did you talk to your child about how to resist peer pressure to use tobacco) on self-reported e-cigarette use (youth: yes or no). Covariates included youth race, age, and gender, and parent tobacco use and educational attainment. Results: In independent models, less harmful perceptions of e-cigarette use (OR = 0.42, 95% CI: 0.27, 0.64) and peer tobacco use (OR = 8.22, 95% CI: 3.41, 19.81) were associated with youth e-cigarette use, while parent-child communication was not (OR = 1.16, 95% CI: 0.86, 1.57). In a combined model adjusted for covariates, having peers who use tobacco (OR = 8.53, 95% CI: 2.31, 3.53) and lower harm perceptions of e-cigarette use (OR = 0.41, 95% CI: 0.22, 0.75) were associated with youth ever e-cigarette use. Conclusions: These results suggest that youth cigarette and e-cigarette ever use share the same risk factors of peer tobacco use and reduced harm perception. Future e-cigarette prevention efforts among youth may want to focus on addressing peer tobacco use and perceptions of harm of e-cigarettes.

FUNDING: Nonprofit grant funding entity

PS5-152  
PREVALENCE AND CORRELATES OF ECIGARETTE USE AMONG CHINESE ADULTS RESULTS FROM THE GLOBAL ADULT TOBACCO SURVEY 2018  
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SIGNIFICANCE: Increased popularity of electronic nicotine delivery systems (ENDS) and recent vaping-related lung illnesses have sparked concerns among the public health community. Evidence indicates that social media such as Twitter and Instagram are a dominant avenue for ENDS promotion, particularly aimed at young people. Brands, influencers, and regular people share promotional content, opinions, reviews, intentions, and behaviors related to ENDS use on social media. Such social media posts have powerful potential to influence ENDS use by modeling and normalizing the behavior. To date, research on individuals’ exposure to ENDS-related social media posts has relied on self-report measures via survey. However, self-report is affected by recall and salience bias: individuals who are already using or interested in ENDS may be more likely to recall having seen the ENDS-related posts. It is unknown how self-reported recall relates to the actual amount or reach of ENDS ads and promotions on social media. Thus, it is important to compare self-reported exposure to ENDS-related posts to objective measures of the frequency of social media posts. METHODS: National survey was conducted in April-June 2018 to measure recall of exposure to ENDS-related content on traditional and social media. Twitter data that matched ENDS-related keywords were collected, cleaned, and mapped to US counties. County-level tweet rate for one year prior to survey per 10,000 people was calculated and linked with survey respondents based on residence and time of survey. Analyses were conducted by age group: youth (13-17; N=1707), young adults (18-24; N=1664), and adults (25+; N=2597), accounting for survey weight. RESULTS: Social media dependency was strongly associated with having seen ENDS-related content on social media (henceforth “self-report”) across all age groups. In multivariate logistic regression of self-reported exposure, tweet rate was significantly associated with the outcome among young adult (OR=1.16 for 10 more tweets/10,000, p=0.02) controlling for social media dependency, sex, age, race/ethnicity, household income, and living in metro area. CONCLUSION: Social media dependency is significantly related to self-reported exposure regardless of age. Young adults living in areas with higher ENDS tweet rates were more likely to report having seen ENDS-related social media content, suggesting the potential to use the social media-derived measure in conjunction with self-report in order to more accurately measure the exposure to social media content.

FUNDING: Federal

PS5-154

HIGH THROUGHPUT LC-MS/MS DETERMINATION OF URINARY MENTHOL AND NICOTINE METABOLITES IN EXCLUSIVE CIGARETTE USERS AND DUAL USERS OF ELECTRONIC CIGARETTE AND CIGARETTE

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Accurate quantitative analysis of biomarkers of nicotine and other tobacco-use related chemicals is essential to assess the impacts of tobacco use. Nicotine, the primary tobacco-specific alkaloid, can lead to tobacco-product dependence and chronic exposure to the carcinogens and bioactive chemicals in tobacco. Menthol is a major tobacco-product flavor enhancer that has been widely studied for its impact on tobacco-use. Recent studies have highlighted the trend of increasing usage of mentholated tobacco products among adolescents and young adults. To measure nicotine and menthol exposure, this presentation describes an automated sample preparation technique and an ionization condition UHPLC ACPI MS/MS technique that enables analysis of 14 tobacco-use related compounds including nicotine metabolites and menthol glucuronide. The automated sample preparation method processes 96 urine samples within 4 hours with automated Solid Phase Extraction (SPE). The optimized automated SPE process produced recovery of 96% or higher for all analytes. The UHPLC ACPI MS/MS method separates and detects 14 compounds in 4.15 minutes, enabling overnight analysis of 96 samples. Depending on the analyte, the method covers a wide concentration range, from 0.5 to 72,000 ng/mL to meet the analyte sensitivity. Urine samples from 380 subjects are also analyzed with this high throughput method. The subjects are exclusive cigarette users (CU) and dual users (DU) of electronic cigarette and cigarette. Nicotine and menthol exposures among the DU and CU groups are compared with respect to their mentholated product use and pattern of use. Total Nicotine Equivalent (TNE = NIC+ COT + HCT) data from a parallel analysis is also compared to better understand the product use related exposures of the subgroups.

FUNDING: Unfunded; Federal

PS5-155

PILOT STUDY ON THE NICOTINE METABOLITE RATIO AMONG ELECTRONIC CIGARETTE USERS

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INTRODUCTION: E-cigarettes has been introduced to the market as a safer alternative for nicotine consumption but e-cigarette is not risk free. E-cigarettes are known to emit harmful chemicals such as formaldehyde and acetaldehyde. E-cigarette users with slower nicotine clearance could experience lower nicotine craving, thus resulting in less toxicant exposures. Indeed, nicotine metabolite ratio (NMR, ratio between 3-hydroxycotinine [3HC] and cotinine [COT] concentration [NMR=3HC/COT]), an indicator of nicotine clearance, among smokers shown to be a good predictor of cigarette consumption and carcinogenic exposures. Moreover, studies reported that e-cigarettes could emit much higher levels of nicotine, known inhibitor of CYP2A6 enzyme predominantly metabolizing nicotine and cotinine, which in turn can reduce nicotine clearance. However, associations between NMR and chemical exposures among e-cigarette users are understudied. METHODS: E-cigarette users (4 males, 4 females) were recruited. The participants were asked to vape their own e-cigarettes until they don’t feel nicotine craving. Vaping topography was measured using a measurement device. Two saliva samples were collected before and after the vaping session. Nicotine, its metabolites (COT, 3HC), and nicotine were analyzed using ultra-performance liquid chromatography coupled with mass spectrometer. RESULTS: Average nicotine, cotinine, and 3-hydroxycotinine concentrations before vaping were 253.2, 242.1, and 71.9 ng/mL, respectively, and the levels after vaping were 237.24, 231.0, and 59.6 ng/mL, respectively. Nicotine levels were below detection limit. NMR were ranged from 0.101 to 0.599 (average=0.272). Participants with higher NMR values showed larger total puff volume and higher nicotine levels in saliva after vaping. The larger puff volume could increase harmful chemical exposures. Further study results will be discussed at the conference. CONCLUSIONS: This pilot study adds new evidence on NMR among e-cigarette users that can inform other harmful chemical exposures. Further cigarettes on the impact of exposures to chemicals (e.g., nicotine, menthol, etc.) affecting nicotine metabolism is needed.

FUNDING: Academic Institution
CURRENT TOBACCO PRODUCT USE PATTERNS AND OVERALL HEALTH STATUS AMONG U.S. RACIAL/ETHNIC MINORITY MEN WITH CHRONIC HEALTH CONDITIONS

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Significance: Current tobacco product use is disproportionately high among males and racial/ethnic minorities. The study assessed the association between past 30 day (current) cigarette smoking, dual tobacco product use, and poly tobacco product use and overall health status among a national sample of minority men with at least one chronic health condition. Methods: A national survey was conducted using an internet-delivered questionnaire among men who self-identified as black/African American or Hispanic and had at least one chronic health condition. We analyzed 1,904 minority men with complete data to answer the study aim. Tobacco products included: cigarettes, cigars, e-cigarettes, hookah/water pipe, and bidis. We categorized current tobacco use as cigarette smoking only, dual use (cigarettes + 1 other tobacco product), and poly use (cigarettes + ≥2 other tobacco products). The outcome of interest was overall health status (fair/poor, good, very good/excellent). We performed a multinomial regression model to assess current tobacco use and overall health status, while adjusting for age, race/ethnicity, education level, income level, marital status, and number of chronic health conditions. Results: A total of 15.2% of minority men currently smoked cigarettes, 8.3% engaged in dual use, and 5.5% in poly use. The majority of dual users reported using cigarettes and cigars (66.5%). Most poly users reported using cigarettes, cigars (87.6%), and e-cigarettes (72.4%). Compared to non-tobacco users, current dual users were 2.12 times more likely (95% confidence interval [CI] = 1.17-3.85, p=0.015) to report poor/fair health status and 2.29 times more likely (95% CI=1.29-4.05, p=0.004) to report good health status, after covariate adjustment. No differences were found between cigarette smoking, poly use, and overall health status. Conclusion: Current dual tobacco use was associated with lower overall health status among U.S. minority men with at least one chronic health condition. Tailored, culturally appropriate interventions are needed to address concomitant risks among men to decrease multiple tobacco product use and increase their perceived health status.

FUNDING: Federal; Academic Institution

PREVALENCE AND CORRELATES OF RELATIVE RISK PERCEPTIONS FOR E-CIGARETTES AND CIGARETTES AMONG GUATEMALAN ADOLESCENTS

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Significance: No research on relative risk perceptions for different nicotine products has been conducted among youth in Guatemala, one of only a few countries where the sale of electronic cigarettes (e-cigs) is unregulated. This study aimed to evaluate the correlates of risk perceptions of tobacco products among Guatemalan adolescents. Methods: A survey of middle and high school students in Guatemala City (n=2870) was administered in 2019. Students were asked about their perceptions of the harmfulness and addictiveness of e-cigs and smoking, from which we derived both a relative harm and a relative addictiveness variable by subtracting their response for e-cigs from that for smoking. Linear models regressed these two variables on susceptibility and use of e-cigs (never user, not susceptible to use e-cigs; never user, susceptible to use e-cigs; ever user of e-cigs, but not currently; current e-cig user) and smoking (same four categories), sensation seeking, friend and parent smoking and e-cigarette use, and sociodemographics. Results: 57% of students perceived e-cigs as less harmful and 30% perceived them as less addictive than cigarettes. In adjusted models of relative harm, being male (b=0.11, p=0.04), susceptibility to use e-cigarettes (b=0.35, p=0.001), prior use (b=0.36, p<0.001), and current use (b=0.42, p<0.001) were all associated with perceiving cigarettes as more harmful than e-cigarettes, and prior smoking (b=0.15, p=0.03) was associated with perceiving cigarettes as less addictive than e-cigarettes. Conclusion: Students’ susceptibility and use of e-cigarettes accounted for most of their perceptions of the relative harm and addictiveness of cigarettes compared to e-cigs. Future longitudinal research should be conducted to determine whether e-cig use behavior drives perceptions of relative harm or vice versa, while also evaluating policy and communication strategies to reduce e-cigarette use.

FUNDING: Federal

A COMPARISON OF THE HOOKED ON NICOTINE CHECKLIST AND THE FAGERSTROM TEST FOR NICOTINE DEPENDENCE IN NATIVE AMERICAN SMOKERS

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Objective: This analysis compared the psychometric properties and validity of the Fagerstrom Test for Nicotine Dependence (FTND) and The Hooked on Nicotine Checklist (HONC) in American Indians (AI). Problem Statement: According to the Centers for Disease Control and Prevention, cigarette smoking is more prevalent among AIs than almost any other racial/ethnic group in the US. In addition, AIs have an especially high risk related health outcomes for AIs. The Collaborative to Improve Native Disease Control and Prevention, cigarette smoking is more prevalent among AIs than almost any other racial/ethnic group in the US. In addition, AIs have an especially high risk related health outcomes for AIs. The Collaborative to Improve Native Cancer Outcomes (CINCO) P50 is a multi-faceted program project to improve cancer-related health outcomes for AIs. In this study, we evaluated knowledge, attitudes, and racial/ethnic minorities. The study assessed the association between past 30 day (current) cigarette smoking, dual tobacco product use, and poly tobacco product use and overall health status among a national sample of minority men with at least one chronic health condition. Methods: Nicotine dependence is a complex phenomenon that involves physiological, psychological, and behavioral processes. For this study, FTND and HONC scale responses were factor-analyzed using principal component analysis. Internal consistency was assessed using Cronbach’s alpha and 95% confidence intervals. Validity of FTND and HONC was based on the associations between total scale scores and tobacco/nicotine use indicators. Results: A total of 253 current smokers provided responses. Factor analysis resulted in a theoretically plausible one-factor solution that accounted for 43% (FTND) and 46% (HONC) of the variance. The mean FTND score was 2.1 (SD, 2.2). The mean HONC score was 4.3 (SD, 3.2). HONC had higher internal consistency using Cronbach’s alpha (.86, 95%CI [.84,.89]) than FTND (.67, 95%CI [.60,.73]). Both FTND and HONC were associated with tobacco/nicotine indicators: number of close friends who smoked, regular vs light smoking, and whether smoking was allowed inside the home. Conclusion: The results of this study suggest FTND and HONC are reliable and valid measures of nicotine dependence among the AI study population. Regardless of the dimensionality, both scales were significantly associated with all of the validation variables that were recorded. Keywords: Addiction, Tobacco Control

FUNDING: Federal

ASSESSMENT OF MICROBIAL PRESENCE ON WATERPIPE TOBACCO MACHINES

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Water pipe tobacco smoking is prevalent among adolescents and college students throughout the United States but lack of knowledge on the prevalence of microbial organisms on waterpipe tobacco machines has led to poor sanitation practice. Due to the lack of regulation in sanitation, we hypothesized that potential microbial pathogens would be found on the waterpipe tobacco machines tested. Ten hookah bars were randomly selected in the Tampa Bay region and the mouthpiece, hose, and connector were swabbed and plated using 5% Sheep’s Blood Agar, Chocolate Agar, and MacConkey agar followed by biochemical testing to determine organism viability. Additionally, TaqMan Assays for respiratory tract microbiota profiling was carried out on the same collections. This method utilizes the TaqMan Array Card-format and detects 42 respiratory tract viral, bacterial, and fungal microbes. Moraxella catarrhalis, Mycoplasma pneumonieae, RSV-B, Bovacuria and adenovirus were identified from the TaqMan Array Card. The identification of microbial species on waterpipe tobacco machines is a step toward creating effective laws regulating the sanitation of shisha tobacco and waterpipe tobacco lounges.

FUNDING: Academic Institution
ASSOCIATION OF FREQUENCY OF ELECTRONIC CIGARETTE USE WITH WHEEZING AND RELATED RESPIRATORY SYMPTOMS IN US ADULTS

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Significance Electronic cigarette use (vaping) has been shown to significantly increase the risk of wheezing and related respiratory symptoms in adults. This study examined the association of frequency of vaping with wheezing and related respiratory symptoms in US adults. Methods The Population Assessment of Tobacco and Health (PATH) study Wave 4 data with 33,644 adults were used. The PATH Wave 4 data were collected from December 2016 to January 2018. Multivariable weighted logistic regression models were used to examine the cross-sectional association of frequency of vaping with wheezing and related respiratory symptoms with consideration of the complex sampling design. Results According to the weighted PATH Wave 4 data, about 84.1% adults never vaped, 4.6% adults vaped one time, 5.2% vaped 2-10 times, 2.2% vaped 11-20 times, 1.9% vaped 21-50 times, 0.8% vaped 51-99 times, and 1.1% vaped 100 or more times in their entire life. Compared to adults who never vaped, adults who vaped 2-10 times had significantly higher association with risk of having wheezing or whistling in the chest (aOR = 1.59, 95% CI: 1.37 to 1.85), having chest sound wheezy during or after exercise (aOR = 1.49, 95% CI: 1.27 to 1.75), and having a dry cough at night not associated with a cold or chest infection in past 12 months (aOR = 1.26, 95% CI: 1.13 to 1.41). Higher frequency of vaping (> 10 times) had similar estimated adjusted odds ratios to 2-10 times. Conclusion Two or more frequent vaping was significantly associated with wheezing and related respiratory symptoms. Initiation of vaping should be prevented for public health benefits.

FUNDING: Federal

ADVERTISEMENTS OF VAPE INDUSTRY IN MEXICO ARE USING ICONIC SYMBOLS.

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Introduction Electronic Nictoine Delivery Systems (ENDS) are legally forbidden in Mexico, the offer of these devices on internet and their advertisement in social media are increasing. This communication aims to show and describe the characteristics of vaping-related advertisements in particular on Instagram in Mexico. We analyzed Instagram using vaping related keywords and found mainly three advertising strategies: a/vape models, biggiveaways, and c/advertising coming from public figures (“influencers”). It was interesting to find that plenty of the ads were using iconic images from Mexican culture such as devices using the Aztec calendar as a design on a vape case, Catrina-like makeup” in the model posing with the device models and “nutritionists” as well as famous places and buildings including churches and sports-related sites such as the Mexico City racecourse. Giveaways consist in sending free vapers or vape juice flavors to the contestant who manages to tag more friends or who has the greatest number of likes in their comments, all this in order to get more users of their devices. All these strategies are aimed at young people. We also found “vape models” who encourage the use of the ENDS, including a list of all the “benefits” of their use. Interestingly, the use of cannabis oil in the vapers is widely recommended as a therapeutic agent “useful for the treatment of stress, insomnia, chronic pain, cancer, anxiety, diabetes, arthritis, alcoholism, cardiovascular diseases and antibiotic resistant-infections”. While there is a legal vacuum regulating the use of social media to promote and sell ENDS in Mexico, there is an arising problem related to the number of pro-vaping strategies and users taking advantage of iconic Mexican symbols, to create the idea of regional attachment. Instagram affords its users the ability to post images of e-cigarette-related behaviors, allowing advertisers to display their product and, in some cases, they even use the platform to sell them. There is an urgent need to improve public health surveillance, survey development, and educational campaigns so new consumers and prospects can take into account the risk of these products to stop their use or to avoid them.

FUNDING: Academic Institution

THE UNIVERSE OF VAPE MARKETING THROUGH SOCIAL NETWORKING ON INSTAGRAM USING ICONIC SYMBOLS.

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Introduction: Social media platforms such as Facebook, Instagram, and Twitter are popular social networking sites that are frequently visited by youth. Advertising is growing within these social media platforms. Vaping is a growing trend among youth. The Respiratory Health Branch of the National Institute on Drug Abuse is interested in the nicotine and vaping adversities in particular in the Hispanic community. This communication will describe some of the key characteristics of advertising of ENDS, and its impact on youth prescription of nicotine. Methods: This communication uses Instagram as a reference point to analyze some of the key characteristics of advertising of ENDS, and its impact on youth prescription of nicotine. Results: Overall, there is a significant difference in ENDS marketing strategy among Hispanic and non-Hispanic youth. In general, Hispanic youth are more susceptible to ENDS marketing strategies, and ENDS marketing strategies such as regional attachment and iconic symbols are more prominent in Mexican American youth. In the Hispanic community, ENDS marketing campaigns are more common especially in Mexico City. While there is no legal vacuum regulating the use of social media to promote ENDS, there is an emerging problem related to the number of pro-vaping strategies and users taking advantage of iconic Mexican symbols, to create the idea of regional attachment. Instagram affords its users the ability to post images of e-cigarette-related behaviors, allowing advertisers to display their product and, in some cases, they even use the platform to sell them. There is an urgent need to improve public health surveillance, survey development, and educational campaigns so new consumers and prospects can take into account the risk of ENDS to stop their use or to avoid them. This communication aims to show and describe the characteristics of vaping-related advertisements in particular on Instagram in Mexico. We analyzed Instagram using vaping related keywords and found mainly three advertising strategies: a/vape models, big giveaways, and c/advertising coming from public figures (“influencers”). It was interesting to find that plenty of the ads were using iconic images from Mexican culture such as devices using the Aztec calendar as a design on a vape case, Catrina-like makeup” in the model posing with the device models and “nutritionists” as well as famous places and buildings including churches and sports-related sites such as the Mexico City racecourse. Giveaways consist in sending free vapers or vape juice flavors to the contestant who manages to tag more friends or who has the greatest number of likes in their comments, all this in order to get more users of their devices. All these strategies are aimed at young people. We also found “vape models” who encourage the use of the ENDS, including a list of all the “benefits” of their use. Interestingly, the use of cannabis oil in the vapers is widely recommended as a therapeutic agent “useful for the treatment of stress, insomnia, chronic pain, cancer, anxiety, diabetes, arthritis, alcoholism, cardiovascular diseases and antibiotic resistant-infections”. While there is a legal vacuum regulating the use of social media to promote and sell ENDS in Mexico, there is an arising problem related to the number of pro-vaping strategies and users taking advantage of iconic Mexican symbols, to create the idea of regional attachment. Instagram affords its users the ability to post images of e-cigarette-related behaviors, allowing advertisers to display their product and, in some cases, they even use the platform to sell them. There is an urgent need to improve public health surveillance, survey development, and educational campaigns so new consumers and prospects can take into account the risk of these products to stop their use or to avoid them. There is an urgent need to improve public health surveillance, survey development, and educational campaigns so new consumers and prospects can take into account the risk of these products to stop their use or to avoid them. There is an urgent need to improve public health surveillance, survey development, and educational campaigns so new consumers and prospects can take into account the risk of these products to stop their use or to avoid them. There is an urgent need to improve public health surveillance, survey development, and educational campaigns so new consumers and prospects can take into account the risk of these products to stop their use or to avoid them.
the health effects of e-cigs and youth knowledge and perception of e-cigs or vaping products is needed to inform public health policy and programmatic decision-making.

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THE EFFECTS OF LONG-TERM HEAVY METALS EXPOSURE ON THE CARDIOVASCULAR SYSTEM

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**Background/Objectives** Heavy metals’ chronic exposure is a major contributor to cardiovascular diseases (CVD) at the population level, and regions with high levels of heavy metals’ contamination showed increased rate of mortality rate from cardiovascular diseases. Among different heavy metals; Arsenic, Lead, Mercury, and Cadmium are the most toxic to human health. They are known for their deadly effects as well. The purpose of the study was to weigh the amount of evidence presented in the literature for an association between each heavy metal and five cardio-vascular diseases: coronary heart disease, cerebro-vascular disease, peripheral arterial disease, hypertension, and atherosclerosis. **Methods** Literature review was done. PubMed, google scholar, and science direct were searched using keywords: cardiovascular diseases and 4 heavy metals, separate and all together. Irrelevant articles were excluded, and only relevant epidemiological articles were included. There were 30 articles included in the analysis. Bradford Hill criteria of causality was used to assess the association of each of the heavy metals with the five CVD. **Results** The results of recent studies showed that the correlation between the four heavy metals and CVD are inconsistent with those of earlier studies and the general picture of the correlation between exposure to heavy metals and CVD presented by these studies is either inconsistent or not conclusive. **Conclusions** Among the nine-criterion mentioned by Sir Bradford Hill, this study was only compatible with two out of nine criterions mentioned. The first criterion is the strength of the association, and the second criterion is the consistency of the association. Other criterions are not compatible with this study. Although this study tried to examine the effect of 4 heavy metals on CVD, most studies linked only 1 heavy metal to 1 or 2 CVD, due to the interactive effects of heavy metals, and the absence of clear understanding to the mode of action. Nonetheless, there is a great need to do further research and explore more about the effect of these 4 metals on CVD.

**PS5-166**

EVALUATION OF TOBACCO USERS’ INTENTIONS TOWARD AN ORAL TOBACCO-DERIVED NICOTINE POUCH PRODUCT AS THE RESULT OF VIEWING PROMOTIONAL MATERIALS

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FDA must determine whether a new tobacco product is appropriate for the protection of public health to grant authorization for marketing a new tobacco product. One of the considerations in this determination is evidence regarding the impact of promotional material on likelihood of using the new tobacco product among users and nonusers of tobacco products. We present here results from a study examining this impact for a portfolio of on!® nicotine pouches, an oral product containing ingredients that are either pharmaceutical grade or used in food and do not contain cut or ground tobacco leaf. Results for tobacco users are presented here. A quota-based sample of self-reported adult smokers planning to quit (n=689), adult smokers not planning to quit (n=862), adult dual users of cigarettes and smokeless tobacco (ST) (n=663), and adult ST users (n=671), participated in this online quasi-experimental survey study. Participants were assigned to either a (1) full exposure (print marketing materials, a digital video ad, front pack shots of on!® nicotine pouches), or (2) reduced exposure (front pack shots) condition. Participants completed pre- and post-test surveys which included ALCS’s validated intention metrics as well as measures of likelihood. Statistical comparisons were made only for the intention measures. Average pre-test intention to use and switch from cigarettes to on!® nicotine pouches in adult smokers after exposure to promotional materials.

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A CONSORTIUM APPROACH FOR CONSUMER-REPORTED OUTCOME MEASURES TO ASSESS TOBACCO- AND/OR NICOTINE-CONTAINING PRODUCTS

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In the tobacco space, consumer-reported outcome measures (CROM) are essential for understanding motivations, subjective effects, and behavior. Such measures have become particularly important with the advent of candidate modified risk tobacco products (cMRTP). Here we present the preparatory steps for a consortium approach initiated by the tobacco industry to develop, validate, use, and access CROM to assess tobacco- and nicotine-containing products (TNP), including cMRTPs. A CROM Task Force was formed within the CORESTA Product Use Behaviour Sub-Group. To refine goals, research questions, and scope of work, we reviewed 12 documents, including U.S. Food and Drug Administration (FDA) MRTP briefing package submissions (in the context of applications submitted by Altria Client Services, Philip Morris International, Swedish Match, Reynolds), regulatory documents (FDA Premarket Tobacco Product and MRTP Applications, FDA Over-the-Counter label comprehension, EU Directive), review papers, and public health reports (U.S. Institute of Medicine, FDA Center for Tobacco Products activities). Data relating to self-report measures were extracted (i.e., concepts to be measured and methods recommended and/or used). The review revealed the need to propose a consensual definition of consumer-reported outcomes (CRO), categorize the concepts of interest measured to assess TNP (including cMRTPs), and develop a common taxonomy and definition to qualify them. The review also highlighted unclear recommendations or best practices from guidance documents issued by different regulatory agencies on how each concept should be assessed. The Task Force will present a proposal for a definition of CROs, a draft concept taxonomy, and a summary of the information extracted relevant to each concept. The key outcomes presented here form the foundations of the CROM consortium. This work should facilitate a dialogue on requirements to develop common terminology, standards, and best practices for CROM in the tobacco space and emphasizes the need for more discussion between industry, academia, and regulatory body stakeholders.

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SEX DIFFERENCES IN THE MOUSE VENTRAL TEGMENTAL AREA PROTEOME WITH AND WITHOUT CHRONIC NICOTINE TREATMENT

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**Significance:** Sex differences have been demonstrated at all stages of nicotine addiction, including acquisition, escalation, maintenance, withdrawal and relapse. Both clinical and preclinical studies have demonstrated sex differences at the genetic, molecular, cellular, circuit, and behavioral levels. However, a proteomic approach has not yet been applied to studying sex differences in nicotine addiction. A proteomic study would be particularly advantageous for exploring sex differences because it may bypass potential biases in selecting targets for more focused investigations, which often depends on heavily male-biased prior literature. **Methods:** Male and female C57Bl/6J mice were treated without or with nicotine (200 mg/ml) in drinking water (2% saccharin) for 21 days. Bilateral punches of the ventral tegmental area (VTA) were then collected and processed with TMT10-plex tandem mass spectrometry. Data were analyzed with MaxQuant and Perseus software. Pairwise comparisons were made between male nicotine (MN) and male control (MC), female nicotine (FN) and female control (FC), and MC and FC groups, with both fold change and q-values used to identify significantly
altered proteins. In addition, the STRING database was used for bioinformatic analysis.

**Results:** In pairwise comparisons, more proteins were significantly altered in MC vs. FC than in FN vs. FC, and in FN vs. FC than in MN vs. MC. In STRING database searches, gene ontologic (GO) and KEGG pathway terms related to the ribosome were enriched in proteins up-regulated in FN vs. FC and in MC vs. FC. GO and KEGG terms related to neuronal signaling were enriched in proteins up-regulated in FC vs. MC. **Conclusions:** More proteins in the VTA were differentially expressed by sex in control conditions than by chronic nicotine in either sex. In both sexes, chronic nicotine treatment up-regulated several proteins related to dopaminergic signaling. Cluster analyses indicated that sex differences in the control groups may be significant for neuronal signaling functions. Together, these results indicate sex differences in the VTA not only in response to nicotine, but also at baseline.

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