



### **Board 101**

#### **Does the Presence of Children in the Home Affect Smoking Rules and Smoking Behaviors? Results from a Community Health Center in the Southeastern U.S.**

Elizabeth Holt, Haley Park, Jackson Pearce, Amani Bright, Noelle Best, and Matthew J. Delfino

Background: Despite reductions in the rates of smoking among U.S. adults, some children continue to face secondhand smoke (SHS) exposure and subsequent adverse health effects. Health care providers can play a key role in reducing children's SHS exposure by assisting patients in establishing smoking rules and in quit attempts. Purpose: We sought to understand how to best tailor a clinic-based smoking cessation intervention for low-income patients living in the rural/suburban South. We examined whether smoking behavior, smoking rules, and quit rates differed among households with and without children. Methods: Waiting room surveys were conducted at 4 community health clinics for underserved patients in South Carolina. Results: The patient population (n=110) was 48.1% black, 32.7% white and 79.2% uninsured/publicly insured. Over half (53.6%) of patient households had 1+ children. Of patients surveyed, 27.8% were current smokers, 44.5% reported that smoking is allowed in their home, and 24.1% reported that smoking is allowed in their car. Compared to patients living in households without children, patients in households with children were less likely to be current smokers (p=0.019), and less likely to report that they allowed smoking in the car (p=0.007) and home (p=0.001). Despite this, 23.7% of patients with 1+ child living in their household reported that someone had recently smoked inside their home and 20.3% of these patients reported someone had smoked inside their car. Quit attempt rates did not differ among households with children and those without children. Conclusion: Though smoking is less prevalent and smoking rules more stringent among households with children, many children in this population are still exposed to SHS in the home and car. An intervention targeting patients with children in the home will combine provider training with EMR changes in order to increase screening for SHS, patient counseling, and prescriptions for smoking cessation aids.

### **Board 102**

#### **Associations of BMI-based and Perceived Weight Status with Electronic Vapor Product Use, Cigarette Smoking, and Dual Use among U.S. Adolescents**

Dong-Chul Seo, Beom-Young Cho, Hsien-Chang Lin, David K. Lohrmann, Andrea K. Chomistek, Peter S. Hendricks, and Lava R. Timsina

Introduction: This study examined the associations of body mass index (BMI)-based and perceived body weight status with electronic vapor product (EVP) use, cigarette smoking, and dual use among U.S. adolescents. Methods: We conducted a cross-sectional analysis on data from 15,129 adolescents in the 2015 National Youth Risk Behavior Survey. Multiple logistic regression analyses were used to examine the associations of BMI-based and perceived weight status with EVP use, cigarette smoking, and dual use, after adjusting for all other covariates. The regression models were stratified by gender. Results: Overall, 25.5% of males used EVP, 11.6% smoked cigarettes, and 8.1% used both; percentages among females were 22.6%, 9.8% and 6.8%, respectively. Females who perceived themselves as overweight were more likely



than those who perceived themselves as normal weight to be current EVP users (adjusted odds ratio [AOR]: 1.09, 95% confidence interval [CI]: 1.01-1.19) and dual users (AOR: 1.23, 95% CI: 1.01-1.49). When compared to normal BMI-based category, males with obese BMI status were more likely to be current cigarette smokers (AOR: 1.61, 95% CI: 1.06-2.44), however, only females with overweight BMI status were more likely to be current smokers (AOR: 1.89, 95% CI: 1.25-2.86). Conclusions: Findings suggest that the influence of adolescents' body weight perceptions and BMI-based status should be accounted for when developing nicotine-containing product use prevention programs for adolescents. Specific strategies for influencing female adolescents who perceive themselves as overweight should be included to prevent emerging EVP and dual use.

### **Board 104**

#### **Vaping Behavior, Outcome Expectations, and Perceived Norms among College Students**

Anna Greer, Kerry D. Morgan, Jessica E. Samuolis, Gabrielle Diaz, Julianna Merighi, and Patrick Mahoney

Vaping among young adults has increased substantially in recent years warranting further examination of this issue. We examined vaping behavior, outcome expectations, and perceived norms for vaping among 1229 students attending a mid-sized, northeastern university. We administered a cross-sectional survey that included validated behavioral questions and scales for outcome expectations and perceived norms which demonstrated good internal consistency reliability ( $\alpha > .80$ ). We used SPSS for analysis, including descriptive, chi square, and t-test statistics. Student respondents were mostly white (81.1%), females (67.3%) with an average age of 19.73 years ( $SD = 1.39$ ). Almost 41% of respondents reported vaping in the prior 30 days (current user), 26.8% reported trying vaping but no use in the past 30 days (occasional user), and 32.3% reported never trying vaping. The most common reasons for initiating vape use among current and occasional users were 'I was curious' (74.2%, 75.1%), 'Friends use it' (65.8%, 65.0%), and 'Someone gave it to me at a party' (35.0%, 41.0%). Current (61.4%) and occasional users (62.4%) most often reported vaping when at parties; current users reported vaping in their campus dorm ( $p < .001$ ), a friend's campus dorm ( $p = .024$ ), in class ( $p < .001$ ), and walking on campus ( $p < .001$ ) more often than occasional users. Current users perceived vaping as more likely to control their appetite ( $p < .001$ ), control their negative emotions ( $p < .001$ ), and taste pleasant ( $p < .001$ ) than occasional users. Current users perceived vaping as less likely to cause negative health outcomes than occasional users ( $p < .001$ ). Current and occasional users had stronger perceived norms than never users that others would approve of them vaping ( $p < .001$ ). This study highlights a need for multi-level strategies to reduce vaping among college students. Interventions should increase awareness about the risks of vaping, include peer-based interventions to foster health-promoting campus social environments, and explore the use of policies restricting campus vape use.

### **Board 105**

#### **Using Susceptibility Measures to Prospectively Predict Current Use of Electronic Cigarettes among Adolescents**



Elizabeth Kwon and Dong-Chul Seo

**Purpose:** Preventing youth from using e-cigarettes is crucial given that e-cigarette use can lead to multiple unhealthy behaviors such as conventional cigarette smoking and other substance use. In order to inform prevention efforts, the present study examined determinants that affect youth current e-cigarette use including susceptibility measures, psychosocial, environmental, and behavioral factors. **Methods:** Wave 1 and Wave 2 of the Population Assessment of Tobacco and Health (PATH), nationally representative longitudinal panel datasets, were analyzed. Youth who were naïve to both conventional cigarettes and e-cigarettes (n=7578) were included in the study sample. Multivariable logistic regression was conducted to examine the determinants of youth current e-cigarette use. **Results:** Overall, 2.22% (n=168) of youth who were naïve to both conventional cigarettes and e-cigarettes at Wave 1 became current e-cigarette users at Wave 2. Susceptibility to e-cigarette use at Wave 1 was found to be a significant predictor of current e-cigarette use at Wave 2 (adjusted odds ratio [AOR]=2.68; 95% CI =1.92, 3.74). Youth who were unsusceptible to e-cigarette use at Wave 1 but became current users at Wave 2 were more likely to show a higher level of alcohol use, be a member of modified family, be exposed to secondhand tobacco smoke, and have a higher level of psychological problems. **Conclusions:** The findings of the present study appear to validate the predictive validity of the susceptibility to e-cigarette use measures as a significant predictor of future e-cigarette use. Thus, prevention efforts should benefit from using the susceptibility measures to identify youth with a higher risk of future e-cigarette use. Additionally, interventions should incorporate psychological and environmental factors to thwart e-cigarette use.

### **Board 106**

#### **Is E-cigarette Use a Gateway to Marijuana Use? Revisiting the Gateway Theory**

Su-Wei Wong and Hsien-Chang Lin

**Purpose:** E-cigarette use prevalence in the U.S. has increased rapidly in the past decade. It has been concerned that e-cigarette use may serve as a stepping-stone to other substance use. Based on Kandel's gateway theory, we hypothesized that e-cigarette use could lead to marijuana use among U.S. adults. This study tested this hypothesis by examining the two conditions: 1) E-cigarette use is a gateway to marijuana use; and 2) marijuana use is not a gateway to e-cigarette use. **Method:** This was a retrospective longitudinal study. Adults aged 18-64 years were extracted from the Population Assessment of Tobacco and Health survey Wave 1 (2013-2014) and Wave 2 (2014-2015) (unweighted N=23,772). Three stages of e-cigarette and marijuana use, including initiation, re-initiation, and persistence, were considered as outcomes. To test Condition 1, three logistic regressions were conducted to examine the associations between Wave 1 e-cigarette use and Wave 2 marijuana use (including initiation, re-initiation, and persistence). To test Condition 2, another three logistic regressions were conducted to examine the associations between Wave 1 marijuana use and Wave 2 e-cigarette use (including initiation, re-initiation, and persistence). Sociodemographic characteristics were controlled in all logistic regression models. **Results:** This study found Wave 1 e-cigarette use was not associated with Wave 2 marijuana use initiation, re-initiation, or persistence. Additionally, Wave 1 marijuana use were associated with Wave 2 e-cigarette use initiation



(OR=1.52,  $p < .05$ ). Conclusions: This study found no evidence to support Kandel's gateway theory implying that e-cigarette use could be a gateway to marijuana use among the U.S. adults. The mechanisms and behavioral characteristics, such as etiological and psychosocial factors, that may pertain to the development from e-cigarette use to other substance use should be further studied and explored to inform effective behavioral, educational, and policy interventions.

### **Board 107**

#### **The Association of Place on Multiple Lifestyle Risk Factors among Rural Women: Smoking, Overweight/Obesity, and Physical Activity**

Devon Noonan, Richard Sloane, Amnazo Muhirwa, Jewel Scott, Tiffany Bice-Wigington, and Leigh Ann Simmons

Purpose: Rural women have higher rates of chronic disease associated with unhealthy lifestyle factors compared to their urban counterparts. Few studies have examined whether unhealthy lifestyle factors differ based on geographic region and rurality in this population. This study investigated the prevalence of individual and co-occurring smoking, BMI>25, and low levels of physical activity (PA) to determine whether rates differ by rurality and geographic region to inform future interventions. Methods: Data were from Rural Families Speak about Health, an 11-state, epidemiologic study of American women and their families (N=300) living in a rural county (Rural-Urban Continuum Code  $\geq 4$ ). Chi-square analysis and logistic regression were conducted to examine the association between geographic region (South, Midwest, Northeast and West), rurality (Rural-Urban Commuting Area [RUCA] 1-10), and the dependent ordinal behavioral lifestyle factor variable with four levels (no risk factors, one risk factor, two risk factors, three risk factors). Results: The South had the highest proportion of two or more risk factors (50%) compared to the Midwest (30%), Northeast (39%), and West (39%). The Midwest had significantly fewer risk factors compared to the South (OR:0.40 95% CI=0.20, 0.79). There were no significant differences between the South and other regions. In examining individual behaviors, the Midwest had significantly fewer people with high BMI (OR: 0.19 95% CI=0.06, 0.44), high levels of PA (OR: 3.3 95% CI= 1.5,7.4), and smoking (OR: 0.16 95% CI= 0.07-0.36) compared to the South. There were no differences in number of risk factors by RUCA. Conclusions: Regional differences exist in the co-occurrence of unhealthy factors among rural women. Population health interventions to address multiple behavioral risk should target regional areas, especially the rural South. Given no differences in lifestyle risk factors based on RUCA, county-level interventions for rural populations may be both adequate and cost-effective in addressing rural-urban health disparities.

### **Board 108**

#### **Positive Perceptions and Expressions of #Vape Products on Twitter**

Matthew Kearney and Philip Massey

Purpose: To quantify sentiment and characterize themes among a random sample of Twitter posts mentioning "vape". Methods: Between April 11th and June 21st, 2018, we collected



publicly available tweets containing the word “vape” (n=221,757) using Twitter API. We randomly sampled ~10% (n=22,071) to conduct sentiment analysis using R Studio’s “SentimentAnalysis” package and content analysis using NVivo 12. Results: Tweets were overwhelming positive (82%). However, positive tweets were less likely to be retweeted, compared to negative tweets (OR=0.84; p<.001). The top four most salient categories of terms included: social use of vape products (e.g. #vapefam; 48.3% mentioned), sales and purchasing of vape products (e.g. #smokeshop; 38.4% mentioned), active use of vape products (e.g. #vaping; 18.8%), and use of vape products for cannabidiol (e.g. #CBD; 9.3%). Few tweets mentioned tobacco/nicotine (3.4%) and use of vape products for smoking cessation (1.3%). Tweets discussing social use of vape products were nearly twice as likely to be retweeted compared to those not mentioning social use (OR=1.79; p<.001). Tweets mentioning cannabidiol were more than three times as likely to be retweeted compared to those not mentioning cannabidiol (OR=3.24; p<.001). Conclusion: Vape products are often framed as a harm reduction intervention to promote smoking cessation; however, the vast majority of tweets did not mention tobacco or nicotine. Rather, our analysis of relevant Twitter discourse illuminates the perceived positive benefits of using vape products, such as inclusion in a social network of other “vapers”, as well as potential alternative uses, such as use of cannabidiol rather than nicotine. Our findings may present an opportunity to target vape-related social networks on Twitter, and potentially other social media platforms, for health communication campaigns that highlight the harms of vape products, and thus address the positivity bias we observed.

### **Board 109\***

#### **Perceptions of E-cigarette Safety among Pre-Adolescents and Young Adolescents from Low-income Families Living in the Midwest: A Mixed Methods Study**

Yumary Ruiz\*, Lindley McDavid, Ellen Gundlach, Sanjna S. Vinze, Meghan H. McDonough, Rita Debate\*, and Frank J. Snyder

Purpose: Electronic(e) cigarette use is growing among adolescents and pre-adolescents, despite declines in use of traditional combustible cigarettes. As e-cigarettes are marketed as a less harmful alternative to tobacco products, youth, who may not be susceptible to cigarette use, may be drawn to these products. This mixed methods study examined youth’s perceptions related to e-cigarette safety and their beliefs about the safety of e-cigarettes compared to combustible cigarettes. Methods: Participants were 223 youth ages 8-14 (Mage = 10.71, SD = 0.11, 65.9% males, 14.8% had tried e-cigarettes) from low-income families who reside in the Midwest. Survey data were analyzed using correlations and logistic regression. Semi-structured interviews conducted with 41 youth ages 10-14 (Mage = 12.1, SD = 1.12, 48.8% males, 17.1% had tried e-cigarettes) were thematically analyzed using a constructivist paradigm. Results: Logistic regression revealed that e-cigarette use is positively predicted by perceptions of e-cigarette safety (OR = 4.48; 95%CI = 1.51, 15.16; p = .008), peer e-cigarette use (OR = 19.54; 95%CI = 3.10, 123.01; p = .002), and parent e-cigarette use (OR = 8.82; 95%CI = 2.73, 28.51; p < .001). Youth’s age and their perceptions of e-cigarette safety compared to combustible



cigarettes were not significant. Youth perceive e-cigarettes as unsafe, and these findings were confirmed by interview data with youth reporting addiction and adverse health outcomes as key concerns. Participants also discussed circumstances under which youth learn about, access, or view e-cigarette usage. Supporting findings from the quantitative analysis, peers were relevant in influencing perceptions related to e-cigarette safety beliefs. Youth typically access e-cigarettes from peers or parents, and public spaces, including parks, were identified as locations where youth see discarded e-cigarette equipment or peers using e-cigarettes. Conclusions: Study findings imply that e-cigarette preventive strategies prioritizing low-income youth should consider the critical role of peers and parents on youth's perceptions of e-cigarette safety and use.

\*Research Scholars Mentoring Program

### **Board 110\***

#### **News Coverage of the National Academies of Sciences, Engineering, and Medicine E-Cigarette Report**

Jessica King\*, Binu Singh, Michael B. Steinberg, and Cristine Delnevo\*

Significance In January 2018, the National Academies of Sciences, Engineering, and Medicine (NASEM) released a summary report on e-cigarettes and stated, "e-cigarettes cannot simply be categorized as either beneficial or harmful," concluding e-cigarettes may lead youth to start and adults to stop cigarette smoking. News articles are an important information source for the public; thus, this study examined news stories that covered the NASEM report using Agenda Setting Theory. Methods We conducted a content analysis of NASEM-related news articles published in top circulating newspapers and wire services within the first week of its January 23rd release. Given the use of wire services to disseminate news stories to journalists, we identified duplicate as well as unique articles for content analysis. For each article, we recorded the title and primary source, and coded for a variety of topics, including prevalence of use, regulatory aspects of e-cigarettes, inclusion of health benefit or risk statements, and pros and cons related to use. We then weighted each unique article by the number of duplicate news stories as identified via google search. Results We identified 50 articles, representing eight unique news stories. Most (80%) articles included information about FDA-regulation, and 50% stated the health effects are unknown. Positive aspects discussed within articles included that e-cigarettes are less risky than cigarettes (98%) and effective for smoking cessation (44%). Negative aspects included that e-cigarettes are a gateway to other tobacco products (100%), nicotine is addictive or harmful (54%), explosions, fires, or other mechanical dangers can occur (54%), and flavors appeal to youth (14%). Conclusions Although half of the articles presented balanced information, the focus of several was predominantly on negative aspects. Future research should continue to monitor news coverage about e-cigarettes to determine the information the public is exposed to regarding e-cigarettes.

\*Research Scholars Mentoring Program



**Board 111**

**Internalizing and Externalizing Problems as Risk Factors for Initiation and Progression of E-cigarette and Combustible Cigarette Use in the U.S. Youth and Young Adult Population**

Hsien-Chang Lin, Yi-Han Hu, and Anne Buu

Introduction: Cross-sectional studies inspired a research hypothesis that e-cigarettes could recruit mentally healthier adolescents who may otherwise be less susceptible to cigarette use. Yet, evidence based on longitudinal data that supported this hypothesis is sparse. This study used longitudinal national survey data to examine the association between internalizing/externalizing problems and initiation of exclusive e-cigarette use, exclusive cigarette use, or dual use. This study also extended the literature by investigating whether internalizing/externalizing problems were associated with progression to daily e-cigarette or cigarette use. Methods: This study conducted secondary analysis on data from 8,374 youth and young adults (aged 12-24) participating in the Population Assessment of Tobacco and Health (PATH) Study Wave 1 (2013-2014) and Wave 2 (2014-2015). Weighted multinomial logistic and logistic regression models were performed to investigate whether internalizing and externalizing problems were associated with initiation of e-cigarette/cigarette use and progression to daily use, respectively, controlling for other substance use and sociodemographic variables. Results: Higher internalizing problems were associated with higher risk for not only initiation of e-cigarette use (OR=1.33,  $p<.01$ ) but also progression to daily e-cigarette use (OR=1.28,  $p<.01$ ). Externalizing problems were not significantly associated with either initiation or progression of cigarette or e-cigarette use possibly due to the short follow-up period. Findings also suggested that young adults were more likely to initiate exclusive cigarette use than adolescents (OR=1.74,  $p<.05$ ). Conclusions: The findings illustrate that youth and young adults with higher levels of internalizing problems were more likely to not only experiment with e-cigarettes but also progress to daily use. Thus, intervention efforts may focus on this high-risk group to counteract the rising prevalence of e-cigarette use and potential progression to risky tobacco use among young people. In addition, prospective longitudinal studies that characterize developmental trajectories of e-cigarette use from adolescence to young adulthood are particularly needed.

**Board 112**

**Rethink Vape: Development and Evaluation of a Risk Communication Campaign for E-Cigarettes**

Kelli England Will, Ann L. Edwards, Amy C. Paulson, Paul T. Harrell, and Ellen P. Libby

E-cigarettes are now the most common form of tobacco use among adolescents, and use is associated with increased risk of initiation of cigarette smoking. This project used a community-engaged research process to develop and pilot a risk communication campaign for teens. The research team worked with a 30-member Teen Advisory Council (TAC, comprised of adolescents), a 19-member Expert Panel (EP, comprised of practitioners and scientists), employed survey (N=674) and focus group (3 rounds, 10 groups, N=82) methodologies, and hired a marketing company to review findings and partner on development of the campaign.



Campaign concepts were developed, eliminated, and/or modified through an iterative process of feedback and refinement. Teen ideas and preferences differed greatly from the favored concepts of the research and marketing teams, underscoring the importance of testing advertising with teen audiences. The final campaign, Rethink Vape, included video ads (<https://bit.ly/2QMR8gH>), a microsite ([rethinkvape.org](http://rethinkvape.org)), and social media sites (@rethinkvape). Based on themes garnered in initial research, the campaign communicated three messages to teens: what's in the vapor, health risks, and connections to big tobacco. Prior to launch of the campaign, a randomized controlled 2(time) x 2(group) online experiment was conducted to evaluate the campaign (N=415). Repeated measures analyses of variance indicated that vaping knowledge, perceptions of risk, and anti-vape intentions significantly increased among teens viewing the Rethink Vape Materials compared to their own baseline, while control participants did not change. Following evaluation, the team launched a 6-week teen-targeted online media campaign with a targeted geo-fence radius to reach teen users in 95 middle and high schools in the region. The campaign delivered 3,838,465 impressions and 18,316 clicks over mobile app, Snapchat, YouTube, and Spotify platforms. The majority of placements exceeded industry standards, with mobile pre-roll and Snapchat as top performers. The e-cigarette campaign showed clear signs of effectiveness and scalability.

### **Board 113**

#### **Can Supportive Messages Alone Influence Smoking-Related Outcomes? Findings from a Pilot Study on the Real-Time Effects of Positive Cessation Messages**

Victoria Lambert, Stuart G. Ferguson, David Hammond, Jeff Niederdeppe, Hardin W. James, and James F. Thrasher

Purpose: Canada is the only country that uses cigarette package inserts that describe the benefits of quitting (i.e., response efficacy messages) and recommendations for quitting (i.e., self-efficacy messages). Theory and empirical evidence suggest that efficacy inserts may promote cessation-related outcomes in the presence of graphic health warning labels (HWLs), but the independent effects of efficacy inserts have not been assessed. The current study used ecological momentary assessment (EMA) to evaluate smokers' real-time responses to efficacy inserts. Method: Twenty three U.S. smokers were provided one week supply of cigarettes with inserts and one week supply without inserts and randomly assigned to the order in which they were instructed to use the insert packs (i.e., inserts à no inserts vs. no inserts à inserts). For 14 consecutive days, participants used smartphones to answer brief surveys every time they opened a new pack and at three additional smoking occasions each day. Surveys assessed feeling toward smoking, desire and motivation to quit, self-efficacy to reduce smoking and to quit smoking, response efficacy, worry about smoking risks, and forgoing smoking in the prior 24 hours (asked once per day). Multilevel mixed-effects linear and logistic regression models compared responses during the insert period to the non-insert period, controlling for the order of insert week exposure. Results: The insert exposure week was associated with greater desire to quit ( $b=0.21$ ,  $p=0.012$ ), motivation to quit ( $b=0.18$ ,  $p=0.001$ ), self-efficacy to cut down ( $b=0.26$ ,  $p<0.001$ ) and to quit ( $b=0.28$ ,  $p<0.000$ ), and response efficacy ( $b=0.13$ ,  $p=0.012$ ). Insert exposure was not significantly associated with forgoing cigarettes ( $OR=1.9$ ,  $p=0.2$ ). Conclusion: Our results indicate that efficacy inserts influence cessation-related variables. Future research





using larger samples and between-subject design should further assess the effects of efficacy inserts, including their synergy with HWLs on the outside of packs.

#### **Board 114**

##### **Young Adults' Use of E-Cigarettes to Quit Smoking: A Reasoned Action Approach**

Page D. Dobbs, Amanda Wilkerson, Marshall Cheney PhD, Kristen N. Jozkowski, and Tiffany Marcantonio

**Significance.** Although quitting smoking has been reported as a primary reason for using electronic cigarettes (e-cigarettes), few have found e-cigarettes to significantly reduce cigarette smoking. To further investigate this behavior, we used an expanded version of the reasoned action approach (RAA) as the theoretical framework to 1) develop a theory-driven measure and 2) test the constructs' (intention, experiential attitude, instrumental attitude, injunctive norm, descriptive norm, autonomy, and capacity) ability to predict intention to use e-cigarettes. **Methods.** A national sample of young adults (18 to 24 years) were recruited via Qualtrics Survey Company's participant pool to participate in one of two cross-sectional surveys to test the RAA measure. Study 1 (n=315) included an exploratory factor analysis (EFA) to examine the factor structure of the 48-item RAA measure. During Study 2 (n=315), a confirmatory factor analysis (CFA) confirmed the factor structure identified in Phase 1, and structural equation modeling (SEM) was used to test the theory's application. **Results.** During Phase 1, eight items were removed that did not meet pre-determined criteria (e.g., communalities less than 0.50, multiple factor loadings greater than 0.40). The final 40-item measure loaded onto six factors. RAA constructs, except capacity, were measured and were internally consistent (Cronbach's alpha from 0.89 to 0.97). After removal of one item, the CFA met acceptable model-fit and explained 43% of the variance in intention to use e-cigarettes to quit smoking cigarettes. Experiential attitude ( $p < .001$ ) and injunctive norms ( $p < .01$ ) significantly predicted behavioral intention. **Conclusion.** Participants using e-cigarettes for cessation purposes appear concerned with the experience (e.g., level of appeal) and social pressure of conforming with referent others' beliefs. Based on our findings, we recommend health educators and clinical providers inform young adult users, as well as their friends and family members, about e-cigarettes' safety and cessation effectiveness.

#### **Board 115**

##### **Patient E-Cigarette Decision Aid: A Feasibility Study**

Tyler Dorman, Christy Kollath-Cattano, Andrew Albano, Meenu Jindal, and Scott Strayer

**Background:** Given the increasing use of e-cigarettes among smokers and the uncertainties of their long-term risks and efficacy for smoking cessation, we developed an iPad-delivered decision aid with information about e-cigarettes and recommended cessation methods. In this study, we conducted usability testing of this decision aid, which was based on emerging scientific evidence and qualitative research with physicians. **Methods:** Eligible participants were current smokers, aged 18 and older who were recruited in family medicine clinics in two major health systems in South Carolina. At enrollment, patients answered a survey that categorized



them into three groups, each of which received different information: Group 1. intending to quit and not currently using e-cigarettes (recommended nicotine replacement therapies and prescription medicines); Group 2. not intending to quit (potential benefits and risks of e-cigarettes for harm reduction); Group 3. intending to quit and currently using e-cigarettes (both types of information). Afterwards, participants completed survey questions assessing usability (i.e. helpfulness, information clarity, amount of information). Results: Thirty-seven patients participated (group 1, n=18; group 2, n=12; group 3, n=7). Most (86%) found the amount of information presented “about right,” very helpful (86%), and very clear (81%). Most participants also reported that the decision aid was at least “quite a bit” effective in helping: identify that a decision needed to be made (59%); weigh pros and cons of each cessation method (68%); and prepare for a decision to stop smoking (46%). No significant differences were found in these outcomes across the three groups. Conclusions: The results of this study indicate that most patients were satisfied with the tool. According to the results, it was effective for most participants in preparing them for a discussion with their physician as well as planning to quit. The content and format appeared equally useful across smoker groups.

### **Board 116**

#### **Analysis of South Carolina's Long-term Uninsured: Unmet Health Care Needs among Smokers**

Caitlin Torrence and Khoa Truong

**Purpose:** The purpose of this study was to explore the relationship between the cost of healthcare and smoking among SC's long-term uninsured (LTU) population with regard to seeking medical care when needed and filling prescriptions. **Methods:** Secondary data analysis of SC Long-Term Uninsured (LTU) Survey was conducted. Survey participants were uninsured SC residents between the ages of 18 and 64. LTU was defined as living without healthcare insurance for at least 24 months. Logistic regression was used to estimate effect sizes of smokers vs non-smokers likelihood of delaying care due to cost and/or not filling prescriptions when needed. **Results:** While only marginally significant (p-value .07), uninsured smokers compared to uninsured non-smokers have a 1.33 increased odds of delaying medical care due to cost. Further, uninsured smokers are significantly more likely than uninsured non-smokers to cite cost as the reason for not filling a prescription (OR 1.42, p-value = .022, 95% CI 1.05-1.93). Uninsured smokers are more likely than uninsured non-smokers to report cost as the main reason for delaying care and not filling a prescription (OR 1.63, p-value .01, 95% CI 1.1-2.4). **Conclusions:** While 20% of South Carolina residents report smoking, this percentage is amplified among participants in the SC LTU study. Forty-four percent of participants report smoking. The cost of care, regardless of how discretionary income is spent, is the reported main deterrent to seeking care. The long-term uninsured population is a highly vulnerable population. Among this population, those who smoke are more likely to report delaying health care when needed due to cost. They are also significantly more likely to report not filling prescription medications when needed because of the associated cost.



### **Board 117**

#### **Exploring the Degree to which Opioids, Gateway Drugs, and Vaping are Associated with Risk of Substance Use Disorders in Adolescent Substance Users Ages 12 to 18**

Mikyoun Jun, Rachael D. Nolan, Jon Agle, Wasantha Parakrama Jayawardene, Dan Agle, and Ruth A. Gassman

**Purpose:** Adolescent substance use disorder (SUD) researchers continue to investigate the complex role played by ‘gateway’ drugs. The U.S. opioid epidemic and the rising prevalence of electronic vaping devices have complicated this work. This study used secondary analysis of the 2018 Indiana Youth Survey to test associations between potential predictive variables and risk of SUD as measured by the CRAFFT screening tool. **Methods:** Four-hundred-seven of 1,448 Indiana schools serving 6th to 12th grade students participated in the 2018 survey, yielding 112,240 valid cases. Students in grade 6, under age 12, and who reported no past-month use of any substance studied herein were excluded (eliminating 89,532 cases), as were 5,093 students who did not provide data for all model variables (final n=17,615). We used multivariable logistic regression to calculate adjusted odds ratios (AOR) for ‘risk of SUD,’ which was dummy-coded (CRAFFT<2 => Low; CRAFFT≥2 = Elevated). Our independent variables were past-30-day use of heroin, prescription drugs, electronic vaping devices, and ‘gateway’ drugs (alcohol, cigarettes, and marijuana). We controlled for gender, age, race, mental health, and perceptions of peer approval, parental approval, drug availability, and personal safety. **Results:** 45.8% of substance-using adolescents (n=8,076) were at elevated risk of SUD. Few substance users specifically reported heroin use (0.3% - 0.5%). All variables but race and parental approval significantly were associated with risk of SUD. Adjusted odds of elevated risk included heroin (AOR=4.12, 1.53L–11.21U), marijuana (AOR=4.66, 4.31L–5.05U), alcohol (AOR=2.41, 2.23L–2.61U), electronic vaping (AOR=1.46, 1.35L–1.58U), and prescription drugs (AOR=2.29, 1.99L–2.64U). **Conclusion:** Although heroin use strongly was associated with risk of SUD, the prevalence rate was relatively low. Conversely, many adolescents reported using marijuana and alcohol, which yielded substantially increased odds of elevated risk. These data remind us not to ignore the fundamentals of adolescent substance prevention amidst the present epidemic.

### **Board 118**

#### **Cannabidiol (CBD) Products: According to Pinterest, we have a miracle drug!**

Julie Williams Merten, Benjamin T. Gordon, and Calista Pappas

**Background:** Pinterest, a widely used social media platform to save and share online content has shaped how people seek and share health information. Cannabidiol (CBD), a non-psychoactive component of cannabis is marketed as a potential treatment for many conditions and is now legally available for purchase. CBD has grown in popularity with the legalization of marijuana yet CBD is unregulated and many of the health claims are not scientifically proven. **Purpose:** This study used directed content analysis to examine how CBD products were portrayed on Pinterest, a social media website used to bookmark online content. **Methods:** Using the search terms, cannabidiol and CBD, researchers sampled every fifth pin to collect 250



relevant pins. A codebook was developed, pilot tested, and used to code pins. Two researchers coded pins and interrater reliability was established at 90%. Results: Of the 250 pins, the majority of pins (87.1%) positively portrayed CBD with 54.5% claiming a physical or mental benefit. Multiple mental health benefits claims were made in in 34.1% of the pins including anxiety and depression relief. Physical health benefit claims were made in 44.7% of pins including pain management, inflammation, and improved sleep. Most pins did not address potential side effects (99.2%) or recommend dosage (79.5%). In this sample, user engagement was high with 86.5% of pins being saved and links to commercial sites selling CBD products (40.2%), personal blogs (31.1%), and social media accounts (24.2%). Conclusions: Social media is a powerful source of health information. However, there is evidence of unsupported health claims being propagated. This study revealed widespread acceptance of the use of CBD products to alleviate or treat medical conditions with minimal information from reliable public health sources represented. This presents an opportunity for public health professionals to proactively engage on social media.

### **Board 119**

#### **The Role of Early Onset of Illicit Drug Use in Mediating Major Depressive Disorder to Opioid Misuse and Opioid Use Disorder among U.S. Adults**

Zhi Wang and Hsien-Chang Lin

Purpose: The opioid epidemic has been a public health concern in the U.S. Previous studies found that major depressive disorder (MDD) is a significant predictor of opioid misuse while over 10% Americans have been diagnosed MDD in their lifetime. However, the pathways through which MDD is associated with opioid misuse and opioid use disorder (OUD) remain unclear, which has limited the extent that individuals with MDD could be prevented from misusing opioids and developing OUD. In order to reveal possible pathways for prevention efforts, this study examined how early onset of illicit drug use may mediate the aforementioned associations among U.S. adults. Methods: Adult respondents (N=36,309) from the National Epidemiologic Survey on Alcohol and Related Conditions-III (2012-2013) were included in this study. Two natural effect models with bootstrap variance estimation were utilized to conduct the mediation analyses that estimated the effects of early onset of illicit drug use (15 years or younger) on opioid misuse and OUD associated with MDD, controlling for sociodemographic characteristics and family illicit drug use history. Results: Respondents with MDD were more likely to be current opioid misusers and develop OUD (OR=1.83 and 2.48 respectively;  $ps < 0.001$ ), whereas significant proportions (64% and 45%, respectively) of such associations were mediated by early-onset status of illicit drug use (natural indirect effect: 1.18 and 1.21, respectively;  $ps < 0.001$ ). Conclusions: Findings of this study suggest that early onset of illicit drug use significantly mediates the relationship between MDD and opioid misuse/OUD. In order to prevent individuals with MDD from misusing opioids and developing OUD, MDD treatments should include educational interventions such as improving coping skills to prevent illicit drug use or delay onset of illicit drug use. Future studies are needed for designing and evaluating related interventions and to reveal other pathways that associate MDD with opioid misuse and OUD.



### **Board 120**

#### **The Influence of Recreational Marijuana Use on Cardiovascular Reactivity to Laboratory Stressors**

Katie Dolphin, Andrew Carlin, and Kit Taura

According to the Reactivity Hypothesis, heightened cardiovascular reactivity to stress is related to a greater risk of developing cardiovascular disease (CVD). Smoking tobacco has been linked to increased reactivity, and this is one mechanism by which smoking may be related to increased risk of CVD; however, the influence of smoking marijuana on cardiovascular reactivity has not been explored. Given the recent legalization of recreational marijuana, that smoking is the most common way to use marijuana, and marijuana's potential stress-reducing properties, this relationship should be afforded further attention. Thus, the purpose of this study was to explore the influence of self-reported marijuana use on cardiovascular reactivity during laboratory stressors. Method: Thirty healthy, college-age students were assigned to one of four groups based on self-reported marijuana use: 1) never; 2) monthly; 3) weekly; and 4) daily. To induce stress, all participants performed two tasks – public speaking and cold pressor – during which measurements of heart rate and blood pressure reactivity were taken. Results: Multilevel analyses revealed that self-reported marijuana use does not significantly impact cardiovascular reactivity ( $p = .195-.941$ ), though the stress protocol was successful in eliciting the expected cardiovascular responses. There was a significant increase in heart rate ( $p=.05$ ), systolic blood pressure ( $p < .001$ ), and diastolic blood pressure ( $p = .001$ ) during the public speaking task. There was also a significant increase in systolic blood pressure ( $p < .001$ ) and diastolic blood pressure ( $p < .001$ ) during the cold pressor task; however, there was no difference in heart rate between baseline and during the cold pressor task ( $p = .210$ ). Conclusions: These results suggest that engaging in recreational marijuana use may not impact cardiovascular reactivity in a young, healthy population. Practical implications and directions for future research will be discussed.

### **Board 122**

#### **Hard Poly-drug Use Among High School Students in the U.S.**

Tamika Gilreath

Purpose: Poly-substance use is a public health concern for high school adolescents and has been found to be associated with myriad health and social problems. Few studies have examined patterns of co-occurring hard drug use. This study uses latent class analysis (LCA) to explore hard poly-drug use among high school youth. Methods: LCA was conducted using data from the 2017 Youth Risk Behavioral Surveillance System ( $N=14,765$ ) to explore typologies of hard drug use (e.g., heroin, cocaine, prescription painkillers). Multinomial regression was used to explore the correlates of latent class membership (sex, grade, sexual orientation, and race/ethnicity). Results: Three latent classes were identified: Non-users (91% of the sample), Prescription drug users (7.4%), and Hard poly-drug users (1.5%). Non-heterosexual orientation was associated with increased odds of both drug using classes. Males had nearly four times the odds of being in the Hard drug vs. Non-user class compared to females ( $OR=3.78$ , 95%



CI=2.33-6.14). Black youth were nearly twice as likely as White youth to be in the Hard drug vs. Non-user class (OR=1.81, CI=1.10-3.00). Conclusions: Only 1.5% of youth were likely to engage in hard poly-drug use. LGB youth were at higher risk for using multiple hard drugs compared to their heterosexual counterparts. Generally, black youth have been found to report lower rates of poly-substance use compared to their white counterparts (e.g., alcohol and tobacco). The increased likelihood of use amongst these vulnerable populations warrants further consideration.

### **Board 123**

#### **Early findings from Indiana's Opioid Use Disorder Prescriber ECHO (Extension for Community Healthcare Outcomes): Moving Knowledge, Not People**

Jon Agle, David Tidd, Zachary Adams, Leslie A. Hulvershorn, Ruth A. Gassman, Kaitlyn Reho, Kristen Kelley, and Joan Duwve

Purpose: The opioid epidemic in the United States has strained the small number of healthcare providers specializing in addictions. In Indiana, individuals with an opioid use disorder (OUD) often must travel 1-2 hours to access treatment. Project ECHO is a case-based tele-learning model developed by University of New Mexico that may be a promising way to build treatment capacity. This study evaluates preliminary outcomes from Indiana's OUD Prescriber ECHO. Methods: Forty-three medical providers attended at least 1 ECHO session ( $\mu=5.2$  sessions). Of those, 38 completed a pre-test questionnaire and 21 completed a post-test questionnaire assessing objective case-response knowledge, self-reported counseling skills, confidence engaging in OUD prevention and treatment, and sociodemographic and qualitative data. We geocoded minutes of training across Indiana by zip code and assessed pre- and post- changes in participants using paired Student's T-tests or Wilcoxon tests. Results: Our first cohort attracted providers with diverse credentials, experience, and location. Self-rated confidence in performing OUD-related behaviors, such as 'educating patients and clients about opioid use disorder' (7-item scale), increased moderately and significantly ( $t=-2.88$ ,  $p=0.01$ , Cohen's  $D = 0.68$ ). We observed minimal improvement in case-based knowledge, from 81% to 87% ( $t=1.08$ ,  $p=0.30$ ), and almost no change in self-reported counseling skills (e.g.,  $z=0.00$ ,  $p=1.00$ ). Conclusions: Indiana's OUD Prescriber ECHO was associated with improved confidence in performing OUD-related behaviors. Knowledge scores did not increase, but improvement from a baseline mean above 80% may be unrealistic. Similarly, self-reported counseling skill remained static; objective self-assessment of skill in a new content area is difficult at baseline. Our evaluation used 'harmonized' questions from other ECHO clinics and had several associated limitations. Qualitative data suggest knowledge/skills are improving but not in a way captured by current evaluation questions. The OUD Prescriber ECHO model appears promising. Future work should use modified evaluative measures for knowledge and skill acquisition.

### **Board 124**

#### **Sex Difference in Adverse Childhood Experiences, Mental Health Symptoms, and Associated Prescription Opioid Misuse: A Mediation Analysis**

Shichao Tang and Hsien-Chang Lin



Background: The number of opioid-related overdose deaths has increased dramatically. Studies have shown that adverse childhood experiences (ACEs) which include childhood abuse, neglect and household challenges are associated with prescription opioid misuse, but few shed light on mechanisms and pathways through which ACEs are associated with opioid misuse. This study examined: 1) associations between ACEs and opioid misuse outcomes; 2) whether mental health symptoms (including internalizing and externalizing behaviors) mediate the associations; and 3) sex differences in the associations. Method: This study used data from the National Epidemiological Survey on Alcohol and Related Conditions conducted in 2012-2013. Adults aged 18 or older were included (N=36,309). Weighted generalized structural equation modeling (GSEM) was used to conduct moderated-mediation analyses where sex moderated the associations between ACEs and opioid misuse outcomes mediated by mental health symptoms, controlling for sociodemographic characteristics. Results: Preliminary results demonstrate ACEs were associated with higher odds of ever or current opioid misuse, DSM-V-diagnosed opioid use disorder, and early-onset status (< age 17) of opioid misuse (AORs range: 1.11-1.17; all ps<0.001). The mediation analyses suggest the association between ACEs and ever or current opioid misuse, and opioid use disorder were partially mediated by internalizing and externalizing behaviors (indirect AORs range: 1.14-1.18; all ps<0.001). Sex differences were found in the magnitudes of the aforementioned associations. Conclusions: Externalizing and internalizing mental health symptoms may serve as potential pathways through which ACEs are associated with opioid misuse. Although additional research is needed to understand the pathways, these results underscore the importance of reducing risk for mental health symptoms among individuals exposed to ACEs, which may in turn, reduce their risk for opioid misuse. Efforts to support safe, stable, and nurturing relationships and environments can prevent ACEs and may provide an upstream approach to reducing risk for opioid misuse.

### **Board 125**

#### **Prediction of Opioid Misuse Among U.S. Adolescents using Machine Learning Approach**

Dae-Hee Han, Dong-Chul Seo, and Shieun Lee

Introduction: This study evaluated prediction performance of 4 different machine learning (ML) techniques in predicting opioid misuse among U.S. adolescents. Methods: Data were drawn from the 2015-2016 National Survey on Drug Use and Health (N = 22,530 adolescents, ages 12-17 years). Prediction models were developed using 4 ML algorithms such as naïve bayes classifier, gradient boosting machine, distributed random forest, and neural networks (i.e., deep learning). These results were compared with those using the conventional statistical method of multivariable logistic regression model. The data were randomly divided into calibration and validation subsamples (70% vs. 30%), and all models were tested using ten-fold cross-validation. The area under the curve (AUC) of the receiver operating characteristic (ROC) was used as a primary measure of prediction performance. The predictor variables were grouped into 4 main categories: (1) sociodemographic characteristics, (2) exposure to primary prevention programming and efforts, (3) youth experience with school, parents, and substance use, and (4) depression and mental health. Results: The overall rate of opioid misuse among U.S. adolescents was 3.84% (n=866). Of the four groups of predictor variables, youth experience with school, parents, and substance use showed the highest predictive power of opioid misuse



based on its AUCs (0.701-0.803). In the full model with all the four groups of predictors, the neural networks model showed the best performance in prediction of opioid misuse (AUC: 0.817) followed by logistic regression (0.814), naïve bayes classifier (0.813), distributed random forest (0.798), and gradient boosting machine (0.733). Conclusions: Findings suggest that machine learning techniques are a promising technique especially in the prediction of outcomes with rare cases (i.e., extremely imbalanced) such as adolescent opioid misuse.

### **Board 126**

#### **Risk and Protective Sociodemographic Factors in Opioid Misuse Among Adults Over 25 Years Old in the U.S.**

Shieun Lee, Dong-Chul Seo, Angela Chow, and Dae-Hee Han

Introduction: Opioid misuse, which includes both use of heroin and misuse of prescription opioid pain relievers, has been an epidemic issue in recent years. It is important to examine risk and protective sociodemographic factors in opioid misuse in a recent nationally representative sample of U.S. adults. Methods: Data were drawn from the 2016 National Survey on Drug Use and Health (NSDUH). The analysis sample was noninstitutionalized individuals aged 26 or older who reported use of opioid pain reliever or heroin in the past year (N = 10,620). Data were analyzed using SAS SURVEYFREQ and SURVEYLOGISTIC modules that account for complex survey design and weights. To minimize confounding, covariates such as other substance use were controlled in predicting the likelihood of experiencing opioid misuse. Results: Among the 10,620 individuals, 1399 (11.1%) reported opioid misuse in the past year. More males (13.7%) than females (9.1%) reported opioid misuse ( $p < .0001$ ). A gradient relationship was found in opioid misuse across age groups (24.2% for 26-29 years, 19.4% for 30-34 years, 12.4% for 35-49 years, 9.7% for 50-64 years, and 3.4% for 65+ years,  $p < .0001$ ). A similar pattern was observed across education levels except for college degree or higher (13.7% for less than high school, 11.3% for high school diploma, 11.1% for some college, 8.8% for associate degree, and 10.9% for college degree or higher,  $p < .05$ ). Follow-up multivariable logistic model indicated that being in older age group, being female, and higher income independently buffered opioid misuse ( $ps < .0001$ ) but not education ( $p = .1511$ ). Conclusions: Results indicate that individuals with low income and younger male adults should be prioritized on opioid misuse prevention and treatment programs. Protective effect of educational attainment against opioid misuse appears to be overshadowed by income disparities.

### **Board 127**

#### **Investigating the Relationship between Social Structure and Sobriety in a Campus Recovery Program**

Meg Patterson, Alex Russell, Jordan Nelon, and Beth Lanning

Introduction: Encountered with an abstinence-hostile, pro-drinking environment, 40% of college students regularly engage in binge drinking and 20% meet criteria for an alcohol use disorder. This problem has remained consistent over the past decade, warranting further prevention, treatment, and recovery efforts on campuses. Many universities have begun establishing





collegiate recovery communities (CRCs) - designed to support recovery from addiction, prevent relapse, and foster academic growth and sobriety through the facilitation of peer-to-peer social support. Because social support has been shown to protect college students from relapse, the purpose of this study was to investigate how network position impacts sobriety among college students active in a CRC. Methods: Participants in a CRC completed online surveys in spring 2018 (n=44, 72.7% white, 50% in recovery from alcohol/substances). Social Network Analysis assessed the relationship between length of sobriety and demographic variables, recovery type, mental health, time spent in the recovery program, and network variables. Descriptive and multivariate statistics were conducted using SPSS, and network measures were calculated using UCINET. Results: Regression analysis revealed a significant model ( $R^2=.648$ ,  $p<.004$ ) predicting length of sobriety in this network. Two network measures, In-degree ( $\beta=1.006$ ,  $p=.007$ ) and betweenness ( $\beta=-.499$ ,  $p=.047$ ), were the only significant predictors in the model. Discussion: Length of sobriety was related to students nominated more often by other CRC members (in-degree centrality) and those that served as gatekeepers in their CRC (betweenness). Thus, students who have been sober longer assume important positions within the CRC network. Providing opportunities for students with longer bouts of sobriety to lead in their CRC, as well as connecting them with newer students to recovery, can ultimately enhance length of sobriety for the entire network. This study supports the use of CRCs on college campuses by connecting involvement and relationship within the CRC with longer lengths of sobriety.

### **Board 128**

#### **Alcohol-Induced Blackouts and Rates of Sexual Assault Among College Students**

Lauren Sherrard and Rose Marie Ward

**PURPOSE:** In approximately 50% of the sexual assaults, alcohol plays a significant role with either the victim and/or the perpetrator being intoxicated (Abbey, 2011). The prevalence of sexual assaults that occur during alcohol-induced blackouts is unknown. The purpose of this study was to analyze the rates of sexual assault during a reported alcohol-induced blackout. A second purpose is to examine factors (e.g., gender) that may relate to prevalence rates. **METHODS:** Testa and colleagues (2010) Revised-Sexual Experience Survey (RSES) was adapted to assess sexual assault experiences during an alcohol-induced blackout. There were 227 total participants (55 male and 169 female students) who completed the online survey. Participants with a history of heavy episodic drinking were recruited for the study due to their increased likelihood of experiencing a blackout. **RESULTS:** Approximately, 82% of the sample had ever experienced an alcohol-induced blackout. Resulting prevalence and gender differences provide a baseline prevalence for alcohol-induced blackout sexual assault experiences. Approximately, 28.2% (n = 64) experienced some form of sexual assault whether it be unwanted sexual contact, attempted rape or rape during a blackout. Individuals reporting a victimization experience, 53% (n = 34) regained some memory from their blackout (i.e., fragmentary blackout) and 38% (n = 24) had another individual tell them what happened. The women reported significantly higher rates of sexual assault with 12.8% experiencing rape while blacked out compared to none of the men reporting being raped while blacked out,  $\chi^2(n = 224, 3) = 12.43$ ,  $p = .006$ . Unwanted sexual contact was reported by 0.4% of the men and 6.6% of



the women. CONCLUSIONS: Initial evidence suggests that victimization experiences during an alcohol-induced blackout occur in almost 30% of students with heavy episodic drinking histories. Sexual assaults occurring during alcohol-induced blackouts present significant challenges to the examination of alcohol-related sexual assaults.

### **Board 129**

#### **Smartphone-Based Intelligent System: Using AI and Motion Sensors for Real-Time Intervention During Heavy Alcohol Consumption Events**

Jackson Killian, Danielle Madden, Kevin Passino, and John D. Clapp

Background: Excessive alcohol consumption is an avoidable health risk, yet it causes a significant percentage of yearly deaths and injuries on college campuses. Few studies investigate delivering mobile interventions in real-time during drinking events where interventions could reduce risks like drunk driving, alcohol poisoning, and violence. To address these shortcomings, we built an intelligent system capable of passively tracking smartphone accelerometer data to identify heavy drinking events in real time. Methods: We collected smartphone accelerometer readings and transdermal alcohol content (TAC) readings from 19 subjects participating in a field study. The TAC readings served as the ground-truth when training the system to make classifications. The TAC sensors and smartphone accelerometers both provided noisy readings which were cleaned with the MATLAB signal processing toolbox. We then segmented the data into 10 second windows and extracted features known to change when humans lose control of their center-of-mass (i.e. become intoxicated). Results: We experimented with some feature extraction methods from sound recognition tasks and show that they provide a significant improvement in this task (up to 8% absolute accuracy gain in our case.) Finally, we built and trained several classifiers to call each window as a “sober walk” or “intoxicated walk”, the best of which achieved a test accuracy of 75.04%. Conclusions: This result has promising implications for making classifications on noisy accelerometer data in the field and also offers multiple avenues for improvement. We plan to use our classifiers to build a mobile sobriety tracking application that will serve as a free, reliable, and widely adoptable application that tracks intoxication in real-time, enabling development of effective real-time mobile-based interventions. The results and application will also benefit future studies as new sensor-bearing technologies become widely adopted.

### **Board 130**

#### **Blacking out, Vomiting, and Underage Drinking: Examining First Time Consumption of Supersized Alcopops among Current College Students**

Matthew E. Rossheim, Kaylin M. Greene, Allison M. Yurasek, Adam E. Barry, Kwynn M. Gonzalez-Pons, Helen A. Zeraye, Candace Nelson, Ryan D. Treffers, Dennis L. Thombs, and David H. Jernigan

Background: Supersized alcopops are a class of sugar sweetened, ready-to-drink beverages with extraordinarily high alcohol-by-volume (abv). Among underage drinkers, Four Loko is the most commonly consumed brand of supersized alcopop. The Federal Trade Commission



contends it is unsafe to consume a single supersized alcopop in one sitting. Yet no studies have investigated young people's experiences drinking supersized alcopops. The current study examined the prevalence, correlates, and alcohol-related consequences associated with first-time Four Loko consumption. Methods: Undergraduate lifetime drinkers (n=1,036) attending public universities in Florida, Montana, and Virginia completed a classroom survey. Multivariable logistic regression models examined correlates and consequences. Results: Among student drinkers, 46% had previously consumed Four Loko (n=474). Although nearly one-half of consumers (40%) were of legal drinking age, the vast majority (93%) first drank the product before age 21. During their first Four Loko drinking episode, approximately 58% consumed at least one entire can and 10% drank two or more cans of the product. Being younger (OR=0.89), male (OR=6.5), and white (versus black; OR=4.7) were associated with greater odds of drinking at least one entire can of Four Loko ( $p<0.05$ ). Among those who finished at least one can, 34% blacked out and 18% vomited during that episode. The odds of blacking out were greater if the participant: drank at least one entire Four Loko can (OR=5.5), drank additional alcohol during that episode (OR=2.0), was female (OR=1.9), and was younger (OR=0.82). Compared to Montana, Florida and Virginia sell higher abv Four Loko; students in those states were more likely to black out (OR=1.9) and/or vomit (OR=2.0) drinking Four Loko. Discussion: A large proportion of college students reported underage consumption of Four Loko, drinking the entire can (or more), and blacking out and/or vomiting during these drinking episodes. Improved regulations are needed to prevent underage consumption of these products.

### **Board 131**

#### **Longitudinal Associations between Religiosity and Alcohol Initiation, Reinitiation of Use, and Persistent Drinking among a Nationally Representative Sample in the U.S**

Yi-Han Hu, Alex Russell, Adam Barry, and Hsien-Chang Lin

Purpose: Individuals initiating alcohol consumption in adolescence are far more likely to develop problematic drinking patterns in adulthood and develop subsequent alcohol use disorders. Religiosity has been identified as a protective factor associated with delayed onset of alcohol use and less frequent drinking. These associations, however, are based on cross-sectional research that cannot indicate the variance in drinking patterns over time and period of life. This study examined a national adult sample to investigate the associations between religiosity and alcohol use behaviors over time, including when drinking initiation occurred, whether drinking ceased over re-occurred after initiation, and whether alcohol use was persistent over time. Methods: The National Epidemiologic Survey of Alcohol and Related Conditions Waves 1-2 were used. Wave 1 sample included 5,988 nonusers (at risk for initiation), 5,960 prior users (at risk for reinitiation), and 21,139 current drinkers (at risk for persistent, problematic use). Religiosity construct included assessments of importance and frequency of practice. Three weighted logistic regressions examined associations of religiosity with alcohol use initiation, reinitiation, and persistence, while controlling for baseline substance use and sociodemographic characteristics. Results: Compared to those not attending religious services, frequent attenders exhibited lower odds of initiating alcohol use, reinitiation after prior use, and persistent drinking (ORs=0.25, 0.50, 0.56, respectively;  $ps<.01$ ). Those identifying religious beliefs as very important exhibited lower odds of initiation and reinitiation of alcohol use (both ORs=0.61,



ps<.05). Conclusions: Religiosity plays an important role in preventing/delaying alcohol initiation, reinitiation into alcohol use, and persistence of alcohol consumption. In particular, the protective effect of religiosity seems dose-dependent. Incorporating religiosity aspects (e.g., meditation) into alcohol prevention and control programs may serve to increase protective effects. Future studies should seek to delineate what religiosity factors can be leveraged and embedded into secular prevention programs that can be delivered to youth and adolescents.

### **Board 132**

#### **College Students' Physical Activity, Diet, and Alcohol and Marijuana Use: Using Structural Equation Modeling to Assess Multiple Health Behaviors**

Elizabeth Sohns, Rose Marie Ward, and Jay Kimiecik

Purpose: College students typically fall short of public health guidelines for healthy diet and physical activity (PA), and a significant percentage engage in binge drinking and marijuana use. The purpose of the current study was to explore underlying psychosocial processes and motivation for engagement in these four health and risk behaviors. Specifically, it examined the association of general well-being (basic psychological needs [BPN], eudaimonia, subjective vitality, and life aspirations) with diet, PA, and substance use. Method: Students (n=363) completed online questionnaires measuring BPN, eudaimonic well-being, subjective vitality, and intrinsic and extrinsic life aspirations as well as diet, PA, and substance use. Results: The four health and risk behaviors were related, reflecting patterns of interaction or 'bundled' health behaviors. Bivariate correlations and structural equation modeling were used to assess the variable relationships. The global fit indices suggest the data fit the model,  $\chi^2(n = 334, 241) = 504.65, p < .001, CFI = .96, TLI = .95, RMSEA = .057$ . BPN significantly predicted alcohol use, intrinsic and extrinsic life aspirations, subjective vitality, diet, and PA. To a lesser extent, eudaimonia predicted the previously mentioned outcomes besides alcohol use. Conclusion: BPN was significantly related to risk and health behaviors with eudaimonia exhibiting less of a role. In contrast to previous literature, BPN was positively related to drinking behavior and marijuana use. However, our findings suggest BPN may not only indirectly impact multiple health behaviors via subjective vitality and life aspirations, but also through a direct path. This potential dual impact of BPN complements research beginning to explore conscious and nonconscious mechanisms involved in behavior change processes. To be more successful, multiple health behavior interventions targeting college students should consider the role of general well-being processes involved in the motivation underlying sustainable behavior change.

### **Board 133**

#### **Examining Alcohol-Related Blackouts and Sexual Assault in the Context of Drinking to Cope**

Rose Marie Ward, Ying Guo, Shannon Speed, Lauren Sherrard, and Elizabeth Sohns

Purpose: Alcohol use and sexual behaviors are two health behaviors that have a complex relationship. Alcohol-Related Blackouts (ARBs) are a form of memory impairment due to heavy



alcohol consumption. There is high frequency of ARB and sexual assaults (SA) among college students. The purpose of the current study is to examine ARB and SA in the context of drinking to cope. Methods: Undergraduates students (n=4430) were recruited for a multiple health behavior study. Participants were predominantly Caucasian and middle class; average age of participants was 19.97 (SD=1.70). Results: Approximately half of the sample had a history of ARBs; 25% of women had a history of SA; less than 10% of men had a history of SA. Women, who reported rape or attempted rape experiences, were more likely to have a history of ARB use than non-victims,  $\chi^2(n=2266, 10)=267.83, p<.001$ . Men, who have a history of rape, attempted rape, or unwanted sexual contact, were more likely to have a history of ARB than non-victims,  $\chi^2(n=1273, 10)=44.92, p<.001$ . A threeway ANOVA examined drinking to cope across gender identity, ARB history, and SA history (adjusted  $R^2=.16$ ). The threeway interaction was significant,  $F(8, 3334)=1.93, p=.05$ . Women with histories of ARB and some types of SA (rape and coercion) were more likely to report drinking to cope. The twoway interactions between SA history and gender,  $F(5, 3334)=2.34, p=.04$ , and between gender and ARB,  $F(2, 3334)=2.71, p=.01$ , were significant. People who have ARB and SA histories are more likely than non-victims to drink to cope. Conclusions: Students who experience ARB and SA are more likely to report drinking to cope. People who reported more severe types of SA were more likely to report experiencing an ARB than non-victims. Knowledge of the participant's ARB and SA history can inform health behavior interventions.

#### **Board 134**

##### **Evaluating the Effectiveness of a Peer-Enforced Tobacco- and Smoke-Free Policy at a Large Urban University**

Amy Gatto, Emily Walters, and Rita DeBate

Purpose: To evaluate the enforcement, opinions, and effectiveness of the University of South Florida's tobacco free policy one year following implementation. By assessing psychosocial and behavioral variables and using geographic information system (GIS) mapping this study sought to introduce a unique and effective way of evaluating college tobacco free policies. Methods: A cross-sectional survey was administered to students, faculty, and staff to assess knowledge of policy and resources, tobacco use observations, stage change regarding policy enforcement, self-efficacy to enforce, and policy impact on perceived campus tobacco use (n = 5,242). Additionally, using ArcGIS Collector volunteers collected geospatial data on current tobacco following policy implementation and new signage. Results: Moderate knowledge of the current policy was observed with only 67.5% of respondents identifying the correct policy and low beliefs for policy enforcement as only 19.6% of respondents indicated policy enforcement. Approximately half (49.5%) of students, faculty, and staff identified that they were exposed to secondhand smoke following implementation and 74.3% witnessed tobacco use on campus. Majority of respondents were not currently approaching violators to remind them of the policy and did not intend to do so in the future. The mapping of observed violations revealed continued tobacco use on campus with 158 data points. The centralized mean and median suggested that tobacco free policy violations occurred across campus, and the distributional analysis revealed no clear directional trends indicating noncompliance is not geographically limited, nor did it reflect former smoking areas. Conclusions: From both the geospatial and survey findings, the



current policy reveals areas for improvement. With rapidly increasing numbers of smoke and tobacco free universities, new and innovative evaluation tools are needed so institution leaders can efficiently evaluate their implementation.

### **Board 137**

#### **Physiological Determinants of Chronic Stress in Relation to Substance Use and Neighborhood Crime among African American Young Adults**

Christine Smith, Ann Chen, Sarah Childress, Sandra Yan, Krystal Christopher, Chaniqua Mazyck, and Ezemenari Obasi

Background African Americans (AAs) are more likely to report greater levels of perceived stress (PSS) and are susceptible to suffering from chronic stress and the negative outcomes due to poorer environments they live in and daily stressors they experience due to racism, discrimination, and socioeconomic status. This study examines the effects of chronic stress, specifically the contribution of neighborhood crime and substance use in AAs, and how chronic stress manipulates overall cortisol levels and the cortisol awakening response (CAR). Results are examined on an area under the curve (AUC). Methods Participants (N=241; Mage=20.43, 72.03% female) were administered measures including self-reported neighborhood crime, substance use, and PSS. Study procedures included the provision of seven saliva samples for cortisol analysis (at wakeup, 30 and 90 minutes post-wakeup, 1:00PM, 2:30PM, 4:00PM, and pre-bedtime). Five measures of the repeated measures of cortisol awakening response (CAR) were computed for each individual. The measures using Area Under the cortisol Curve (i.e., AUC0, AUC1, and AUC7) were calculated by the trapezoid formula. Results PSS was significantly negatively related to AUC0 ( $p=0.020$ ) and Cortisolmean ( $p=0.017$ ), while daily alcohol use was positively correlated with AUC7 ( $p=0.046$ ). Results of multiple regression analyses showed that PSS was a significant negative predictor for AUC0 ( $p=0.020$ ) and Cortisolmean ( $p=0.017$ ), daily drinking amount was a significant positive predictor ( $p=0.040$ ) for AUC7 after controlling for age and sex. Discussion As levels of PSS increased, the AUC and overall cortisol levels decreased. This association suggests those who experience high levels of PSS likely become 'resilient' to their environmental stressors that influence increased cortisol production. Daily alcohol use was associated with an increase in pre-bedtime cortisol levels, suggesting that excessive alcohol consumption influences stress symptomology and cortisol production, consistent with previous findings that high pre-bedtime cortisol is the greatest predictor of overall cortisol levels and stress.

### **Board 138**

#### **"I do not stand alone": An Assessment of Social Support Types in an Online Peer Social Support Intervention to Improve ART Adherence**

Christina J. Sun, Thembekile Shato, Ashlynn Steinbaugh, Sharanya Pradeep, Ketzela Marsh, Rivet Amico, and Keith Horvath

Purpose: Approximately 1.1 million people live with HIV in the United States. Consistent adherence to antiretroviral therapy (ART) reduces excess morbidity and mortality; however, only



16%-42% of men who have sex with men (MSM) maintain suppressed viral load (VL). Social support is a key theoretical driver for improved ART and VL outcomes. The purpose is to describe supportive interactions about ART adherence, HIV care and healthcare in an online intervention, called Thrive With Me (TWM). Methods: TWM is a theory-based virtual behavioral intervention that includes peer-to-peer communication, tailored ART and HIV information, and ART self-monitoring. MSM are encouraged to engage one another in asynchronous conversation. The topics are left to the participants' discretion. The first month of "upvoted" posts from the 200 intervention participants were double-coded and analyzed. Results: 1,751 posts were coded (intercoder reliability: 0.94). 10.7% of posts were focused on ART adherence (3.1%), HIV care (5.3%), and healthcare (2.3%). Among ART adherence, HIV care, and healthcare posts, informational (33.3%, 22.6%, and 30.0%, respectively) and emotional (1.9%, 4.3%, and 10.0%, respectively) support were provided. 24.1% and 50.0% of ART adherence posts were focused on adherence problems and strategies, respectively. 12.9%, 25.8%, and 23.7% of HIV care posts were focused on HIV lab results, medication side effects, and medication regimen changes, respectively. 95.0% and 70.0% of healthcare posts were focused on healthcare systems and providers, respectively. Conclusions: Adult MSM spontaneously sought and provided support that are relevant to ART adherence, HIV care, and healthcare. High levels of informational support and relatively low levels of emotional support were provided. These results may inform future trials to improve ART adherence and quality of life using existing or new social media platforms.

### **Board 139**

#### **Impact of Ambient Fine Particulate Matter Air Pollution on Health Behaviors: A Longitudinal Study of University Students in Beijing, China**

Ruopeng An and Hongjun Yu

Objectives: Poor air quality has become a national public health concern in China. This study examines the impact of ambient fine particulate matter (PM<sub>2.5</sub>) air pollution on health behaviors among college students in Beijing, China. Methods: Health surveys were repeatedly administered among 12,000 newly admitted students at Tsinghua University during 2012–2015 over their freshman year. Linear individual fixed-effect regressions were performed to estimate the impacts of ambient PM<sub>2.5</sub> concentration on health behaviors among survey participants, adjusting for various time-variant individual characteristics and environmental measures. Results: Ambient PM<sub>2.5</sub> concentration was found to be negatively associated with time spent on walking, vigorous physical activity, sedentary behavior in the last week, but positively associated with time spent on nighttime/daytime sleep among survey participants. An increase in ambient PM<sub>2.5</sub> concentration by one standard deviation (36.5  $\mu\text{g}/\text{m}^3$ ) was associated with a reduction in weekly total minutes of walking by 7.3 (95% confidence interval=5.3, 9.4), a reduction in weekly total minutes of vigorous physical activity by 10.1 (8.5, 11.7), a reduction in daily average hours of sedentary behavior by 0.06 (0.02, 0.10), but an increase in daily average hours of nighttime/daytime sleep by 1.07 (1.04, 1.11). Conclusions: Ambient PM<sub>2.5</sub> air pollution was inversely associated with physical activity level but positively associated with sleep duration among college students. Future studies are warranted to replicate study findings in other



Chinese cities and universities, and policy interventions are urgently called to reduce air pollution level in China's urban areas.

### **Board 141**

#### **Eating Behaviors in Early Childhood: Lunch Time Observations with Preschool Students**

Laura J. Rolke, Jacqueline Forrester, Mackenzie R. Stuenkel, Kerry McKenzie, Sarah F. Griffin, and Kerry K. Sease

In 2014, 12% of two to four-year-old Women Infant and Children (WIC) participants in South Carolina (SC) were obese. Preschool lunches are a well-situated environment where children of diverse backgrounds and family eating styles are provided with the same opportunity to eat a healthy lunch. The purpose of this study was to determine whether the lunch environment, specifically, the level of teacher and peer encouragement or discouragement, has an impact on the likelihood of children to try vegetables. Over two lunches in Fall 2018, 173 preschool students (300 total observations) were observed eating lunch at their SC Head Start site. Observers used a structured form to record how much students ate, as well as how children interacted with their food, with each other, and with their teachers. Observers took photographs of lunch plates before and after the children ate lunch. Four researchers reviewed lunch photos, observer notes, and independently scored how much of beets, Brussels sprouts, and carrots were eaten (92% agreement). Qualitative analysis of observational notes produced nine categories of verbal interaction, which were later dichotomized for analysis. Mann-Whitney U tests were used to understand if social behaviors influenced how much a preschooler ate. Approximately 32% of the preschoolers tried beets, 27% tried Brussels sprouts, and 41% tried carrots. If positive comments were made by either the student or a student at their table, there was significant differences in the amount eaten of beets ( $z=-2.29$ ,  $p=0.02$ ), Brussels sprouts ( $z=-4.6$ ,  $p<0.00$ ), and carrots ( $z=-3.14$ ,  $z<0.01$ ). However, teacher encouragement to try vegetables only showed significant differences in the amount eaten of beets ( $z=-3.44$ ,  $p<0.01$ ) and Brussels sprouts ( $z=-3.6$ ,  $z<0.01$ ). Findings suggest positive social interactions by teachers and peers about food impact the likelihood preschoolers will try and eat vegetables, particularly those less commonly recognized or eaten by children this age.

### **Board 142**

#### **Analyses into Socio-Demographic Variables Linked with Depressive Symptoms among U.S. adults.**

Nicole A. Khan, Ehikowoicho E. Idoko, Ann O. Amuta-Jimenez, and Idethia S. Harvey

Introduction: Depression, among other mental disorders, requires urgent public health attention due to its severe impact on individuals' quality of life. A progressive understanding of how social conditions and individual characteristics are associated with depression is critical for managing the dire resultant health outcomes. This study examined depression and depressive symptoms associated with socio-demographic variables. Methods: Secondary cross-sectional data from the nationally representative survey, 2017 Health Information National Trends Survey ( $n = 3285$ , males = 1,303 and females = 1,914), was used. Descriptive statistics and multiple linear





regression analysis using SPSS 25.0 explored the factors associated with socio-demographic characteristics and depressive symptoms. After making jackknife survey adjustments, multiple linear regressions modelled all results. The demographic variables examined were age, gender, education level, marital status, income and BMI. Depressive symptoms were analyzed by asking participants how often (daily to never) they feel 'little interest or pleasure in doing things', and 'feeling down, depressed or hopeless'. Results: The mean age of participants was 53 years. Based on socio-demographics characteristics, results indicated that individuals who were female ( $\beta = .052$ ;  $p=.006$ ), elderly ( $\beta = .107$ ;  $p=.000$ ), and married ( $\beta = .052$ ;  $p=0.014$ ) were more likely to report depressive symptoms. In addition, the higher the level of education, the more likely participants reported being depressed ( $\beta = .066$ ;  $p=0.003$ ). Finally, individuals within higher annual income ranges ( $\beta = .226$ ;  $p=0.000$ ) and individuals with lower BMI ( $\beta = -.080$ ;  $p=0.000$ ) reported more severe depressive symptoms. Conclusion: The biopsychosocial model may explain for the interaction of specific demographic variables with depressive symptoms. Such understanding of how socio-demographics may influence predisposition to depression can be helpful in informing effective public health programs. For example, mental health education programs should consider marital status, gender, body image or age-specific programs in the design and implementation phases respectively.

### **Board 143**

#### **Health Lifestyles and Suicidal Behaviors among Asian American Adolescents**

Yunyu Xiao and Wenhua Lu

Purpose: This study aims to identify the typologies of lifestyles and explore their associations with suicidal behaviors among a nationally representative sample of Asian American high school students. Methods: Data on 755 Asian American adolescents in grades 9th-12th were obtained from the 2017 National Youth Risk Behaviour Survey (YRBS). Latent class analysis was conducted to identify homogeneous subgroups among 13 health behaviors, including diet, physical activities, sleep, and social media use. Suicidal behaviors were measured by three dichotomized variables on suicidal ideation, plan, and attempt. Multivariate multinomial logistic regression was conducted to explore the relationships between latent classes and suicidal behaviors, controlling for demographic profiles (e.g., age, gender) and psychological distress. Results: Four classes of health lifestyles were identified. Class 1 ("Unhealthiest", 16.0%) engaged in most health risk behaviors (HRBs, e.g., not eating breakfast, infrequent exercise, insufficient sleep, high internet use). Class 2 (32.6%) engaged in physical activities frequently but had insufficient sleep and watched TV frequently. Class 3 (40.8%) had low engagement in HRBs but frequent Internet use. Class 4 ("Healthiest", 10.6%) had the lowest engagement in HRBs. Adolescents in Class 2 were more likely to attempt suicide (OR = 14.56) in relative to Class 1. Females were more likely to be in the Unhealthiest group (Class 1) than males (OR = 6.13). Conclusions: Findings from this study reveal extensive gender disparities with regard to unhealthy lifestyles. Special attention should be paid to promote healthy lifestyles among female adolescents. Asian American youth with insufficient sleep and high media use emerge as a unique group at risk for suicidality. Identifying health lifestyle subgroups provides information on non-psychiatric risks of suicide among Asian American adolescents and constitutes a critical step for early prevention.



**Board 144**

**Perceptions of Informal Payments to Physicians among Chinese Patients and Health Care Providers**

Shinduk Lee, Wenxin Wang, David J. Washburn, and Jay E. Maddock

Background: Informal payments from patients to healthcare providers can be seen as an expression of gratitude, but they can also undermine the equal care principle and patients' trust in the healthcare system. Market-driven Chinese healthcare reforms during the late-20th century may have contributed to the rise in informal payments, called hongbao, while more recent reforms are attempting to reverse that trend. This study aims to examine Chinese patients' and healthcare providers' perceptions of hongbao and the characteristics of those who find the practice to be either ethical or unethical. Methods: Cross-sectional surveys were collected from patients (n=4733), doctors (n=1169), and nurses (n=1776) in 12 Chinese regional hospitals. The survey included participants' sociodemographic characteristics and perceptions about doctors receiving hongbao and patient-provider trust. Separate multi-level mixed effects models were conducted for patients, doctors, and nurses, to examine the factors contributing to their perception about whether doctors receiving hongbao was unethical. Results: The majority of patients (79%), doctors (73%), and nurses (86%) thought that it was unethical for doctors to receive hongbao. Patients (Odds ratio=1.3), doctors (OR=1.5), and nurses (OR=2.0), who believed that transparent hospital charges could promote patients' trust, were significantly more likely to consider doctors receiving hongbao as unethical. Patients (OR=1.4) and doctors (OR=1.7), who perceived patient-doctor trust as good, were also likely to consider doctors receiving hongbao as unethical. Furthermore, compared to doctors in departments of medicine, doctors in surgical departments (OR=0.6) were significantly less likely to think that receiving hongbao was unethical. In addition, age, sex, marital status, religion, and satisfaction with life were also significantly associated with participants' perception about hongbao. Discussion: Multiple factors, including demographic factors, department culture, and attitudes toward patients-doctor or patient-hospital trust relationship, should be considered in designing and targeting policies or interventions for addressing informal payments in China's health system.