

2017 VCBH CONFERENCE POSTER ABSTRACTS

1. Why a Ban on Flavored Cigars is Long Overdue

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When FDA released its final deeming rule in May 2016, the agency stated a proposed rule banning flavors from cigars was forthcoming. The agency in July 2017 stated it would seek public comment on the role that flavors in tobacco products, including menthol, play in attracting youth, as well as the role they may play in helping some smokers switch to potentially less harmful forms of nicotine delivery. However, it has still not done either. An updated review of the science is necessary to better understand the issues surrounding flavors in cigars now that FDA can regulate these products.

This study consisted of a systematic review via a PubMed search of all scientific literature on cigars published after the 1998 National Cancer Institute's Tobacco Control Monograph 9, Cigars: Health Effects and Trends.

Data from national surveys shows that the prevalence of flavored cigar use is higher in youth and young adults than adults. 65.4% of youth ever users of any cigar type reported that the first product they had used was flavored and 73.8% of these youth reported product flavoring as a reason for use. Among current cigar smokers, 64.7% of high school students and 56.6% of middle school students used a flavored cigar in the past 30 days. Among youth cigar smokers, flavored use is associated with lower intentions to quit smoking. Internal industry studies confirm that flavors increased the appeal of little cigars and cigarillos to new tobacco users by masking the heavy cigar taste, reducing throat irritation, and making the smoke of little cigars and cigarillos easier to inhale.

The cigar market is the most heavily flavored market of tobacco products and flavored cigar use is especially high among youth and young adults. FDA should immediately prohibit the sale of flavored cigars. Until FDA does so, state and local governments can and should enact policies that restrict the sale of flavors in tobacco products, including cigars.

2. Cigarettes Aren't the Only Threat to Our Youth: What We Need to Know About Cigars

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The Tobacco Control Act of 2009 gave the FDA the authority to regulate tobacco products, but not cigars, among other products. In May 2016, FDA issued a final rule on deeming tobacco products, which included regulating cigars. An updated review of the science is necessary for the tobacco control community to better understand the issues surrounding cigars and youth and young adults.

This study consisted of a systematic review via a PubMed search of all scientific literature on cigars published after the 1998 National Cancer Institute's Tobacco Control Monograph 9, Cigars: Health Effects and Trends.

Major findings from the review of the science were: 1) cigar consumption and prevalence among youth has increased since 2000 and could be undermining progress made in reducing cigarette prevalence, 2) prevalence of little cigar and cigarillo use among youth is likely underestimated due to misreporting, 3) youth believe cigar smoking to be less harmful and more socially acceptable than cigarette smoking, 4) cigar smokers are likely to experiment or be current users of other tobacco products and marijuana, 5) cigars are the most heavily flavored market of tobacco products and flavored cigar use is especially high among youth, and 6) tobacco industry advertising and promotional activities of cigar products cause youth to start smoking.

While the prevalence of cigarette use has decreased in the US, the tobacco control community and FDA should be concerned about cigar use among youth and young adults and work on policies to address the use of these products among these populations.

3. Reduction in Cigarettes per day Prospectively Predicts Making a Quit Attempt: A Fine-grained Secondary Analysis of a Natural History Study

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Reducing cigarettes per day (CPD) increases quitting when aided by nicotine replacement therapy (NRT). However, it is unclear whether this is due to NRT use, reduction in CPD, or both. If this is due to reduction per se, then the magnitude and duration of reduction in CPD should prospectively predict quit attempts (QA). We tested this in a sample of smokers not receiving NRT.

Smokers who intended to quit in the next 3 months completed nightly calls to report CPD and QAs over 12 weeks. We provided no treatment. An overall mean CPD was calculated for each subject based on regular smoking days (i.e., days not trying to quit or reduce). We identified episodes of reduction (i.e., reduced CPD by $\geq 10\%$) and tested whether the magnitude or the duration of the reduction predicted participants' self-reported QAs.

130 participants provided 1,338 reduction episodes and made 175 QAs (many lasted < 24 hours) during the 12 weeks. Participants reduced CPD by a median of 20% and reductions lasted a median of 1 day. In a multilevel logistic regression, both greater magnitude ($F=71.1$, $p<.0001$) and longer duration ($F=26.5$, $p<.0001$) of reduction in CPD predicted increased likelihood of QAs. There was also an interaction in which a greater magnitude and longer duration of reduction in CPD had a synergistic effect to predict an increased likelihood of QAs ($F=8.0$, $p<.01$). For example, a magnitude of reduction of 25% CPD for a duration of 1 day was associated with a 6.1% probability of making a QA and a reduction of 25% CPD for 5 days was associated with a 9.6% probability of making a QA. A magnitude of reduction of 50% CPD for a duration of 1 day was associated with a 12.4% probability of making a QA and a reduction of 50% for 5 days was associated with a 32.1% probability of making a QA.

Although analyses are based on self-selected groups, greater and longer reductions in CPD prospectively predict QAs. Reducing CPD per se may be an effective strategy for smokers who intend to quit at some point in the next 3 months.

4. "If You Are Old Enough to Die for Your Country, You Should Be Able to Get a Pinch of Snuff": Views of Tobacco 21 Among Appalachian Youth

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Tobacco 21 legislation targets youth tobacco use by attempting to obstruct two main tobacco sources: stores and older friends. Although these sources are common ones for youth tobacco access across the nation, regional differences have not been explored. Further, youth perspectives about Tobacco 21 legislation have not been considered. Youth may identify challenges to implementing tobacco control measures, helping to shape successful tobacco control policies.

This study examined perspectives on the effect of Tobacco 21 legislation and identified common sources of tobacco products among Appalachian middle and high school students.

A survey with questions concerning perspectives on Tobacco 21 legislation and youth sources of tobacco products was conducted with students in Appalachia (N=426). Participants expanded upon their Tobacco 21 opinions in an open-ended format. Descriptive statistics characterized participants by Tobacco 21 perspectives.

Most (58.7%) participants responded that the same number of youth would use tobacco if Tobacco 21 were implemented, followed by responses that fewer (28.9%) and more (12.4%) would use. Almost half (46.1%) of participants listed family members as sources of tobacco for youth. In addition, respondents cited poor tobacco legal sale age enforcement by stores, access to tobacco from family, and the abundance of tobacco in their communities as potential barriers to implementation.

Fewer than one-third of participants believed Tobacco 21 legislation would reduce the prevalence of youth tobacco use. Responses identified obstacles in implementing Tobacco 21 legislation in Appalachia. Future research should consider youth perspectives useful to policy design and implementation.

5. Generally Recognized as Safe: Uncertainty Surrounding E-cigarette Flavoring Safety

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Despite scientific uncertainty regarding the safety of electronic cigarette flavorings, some consumers regard the US Food and Drug Administration's "generally recognized as safe" (GRAS) designation as evidence of flavoring safety. In this study, we assessed how college students' perceptions of e-cigarette flavoring safety are related to understanding of the GRAS designation.

During spring 2017, an online questionnaire was administered to college students. Chi-square p-values and multivariable logistic regression were employed to compare perceptions among participants considering e-cigarette flavorings as safe and those considering e-cigarette flavorings to be unsafe.

The total sample size was 567 participants. Only 22% knew that GRAS designation meant a product is safe to ingest, not inhale, inject, or use topically. Of participants who considered flavorings to be GRAS, the majority recognized that the designation meant a product is safe to ingest but also considered it safe to inhale. In the multivariable regression model adjusting for overall perception of e-cigarette safety, participants considering flavorings as GRAS were more likely to believe that it is safe to inhale flavorings in e-cigarettes compared to those considering it to be unsafe (OR= 6.1; 95% CI= (3.9, 9.6)).

Although scientific uncertainty on the overall safety of e-cigarettes remains, health messaging can educate the public about the GRAS designation and its irrelevance to e-cigarette safety. In particular, the FDA and similar bodies should consider developing educational campaigns to combat the misapplication of the GRAS designation to e-cigarette flavorings and constituents.

6. Initial Laboratory Validation of E-cigarette Purchase Tasks in Advanced Generation E-Cigarette Users

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Behavioral economic purchase tasks, which estimate the reinforcing efficacy of drugs by asking participants how much they would purchase of a drug in one day at increasing prices, have been widely used to predict real-world outcomes in substance users. However, a validated purchase task does not yet exist for e-cigarettes. E-cigarette devices have changed over time, and advanced generation devices differ from previous e-cigarette device types in that users purchase both the device and separate e-liquid; and this may impact which unit is more relevant for a purchase. Thus, based on focus group feedback we developed and examined two versions of the E-Cigarette Purchase Task in the laboratory: one which described use in terms of e-cigarette puffs and one which described use in terms of milliliters of e-liquid, and compared these versions within-subject in a sample of advanced-generation device users (N=23). Participants attended a single laboratory session during which they completed a battery of questionnaires and vaped their own device for 1 hour. Indices derived from these two task versions were compared with e-cigarette dependence and vaping behavior and across cigarette smoking status. Preliminary results suggest that the milliliter version may be most appropriate for this group of users as it was more closely correlated with dependence; however, important differences across smoking status were also observed. Research is underway to further extend and confirm these findings. A validated E-CPT will be an important tool for nicotine researchers in future applications.

7. Analyzing Tobacco Cessation Program Data to Promote Discussion on the Effectiveness of Nicotine Replacement Therapy

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Nicotine Replacement Therapy (NRT) is promoted as a tobacco cessation aid that supplies the body with nicotine at a reduced rate to counter withdrawal and cravings. Extensive research supports that claim, including a study that reviewed 150 NRT trials and found that overall NRT increased an individual's chance of successfully quitting by 50-70%. However, an analysis of a tobacco cessation client database found contradictory results. Health Promotion Council, primary contractor of the Southeastern Pennsylvania Tobacco Control Project, is responsible for identifying and eliminating tobacco-related disparities and promoting smoking cessation. As part of this effort, community based tobacco dependency treatment classes are offered throughout the region. Participant data is collected through surveys administered at baseline, end-of-class, one-, and six-month follow-up. This data was analyzed as part of an ongoing effort to improve program outcomes, the results of which showed that clients who reported using NRT as part of their cessation strategy were slightly less likely to report having quit at six months compared to clients that did not use NRT (N=805, 44.5% quit compared to 55.8%). In an attempt to explain these results, other factors that could influence outcomes were controlled for, including tobacco dependency at baseline, demographics, education, insurance status, and follow-up rates. None of the controlled variables produced significantly different results. This presentation will demonstrate the methods used and results of this analysis, which will inform a discussion with audience members about the nuances of NRT's effectiveness, with potential to inform tobacco cessation programming decisions and outcomes.

8. Addressing Tobacco Use Among Adults with Mental Illness: Impact of an Integrated Primary Care Program in a Community Behavioral Health Clinic

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Approximately 30% of tobacco users are individuals with psychiatric conditions. Tobacco-related illnesses are the leading cause of death among this population. This problem is perpetuated greatly by limited availability of treatment resources and misperceptions among smokers about mental health benefits associated with quitting.

In 2014, a primary and behavioral health care integration program was initiated in an outpatient, community mental health clinic. The program (STIR) serves to promote patients' overall well-being via multidisciplinary efforts, including interventions to reduce patients' use of tobacco.

Over the course of 12-months, three medical assessments are conducted. Tobacco use is measured using a carbon monoxide (CO) monitor. Survey items about tobacco use are also embedded in a comprehensive health interview, also administered at the time of the medical assessments.

Preliminary results ($N = 411$) indicated 29.5% ($n=121$) of STIR patients smoke tobacco ($CO > 4$). A significant decrease in CO [Wilks' Lambda = .892, $F(2, 71) = 4.31$, $p = .017$] was observed among smokers that completed the 12-month program ($n = 73$). Additional analyses will evaluate change in tobacco use among patients engaged in treatment offered via STIR in comparison to other smokers in STIR.

Findings suggest that integrated, collaborative medical and psychiatric care is associated with reduction in tobacco use among patients with mental illness.

9. Impact of Question Type and Question Order on Tobacco Prevalence Estimates in U.S. Young Adults: A Randomized Experiment

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From 2013 to 2015, the National Youth Tobacco Survey noted significant changes in the prevalence of some tobacco products among youth; this coincided with changes in question type and order. The purpose of this study was to identify the effects of question type, order, and inclusion of product images on tobacco use estimates.

Young adult participants aged 18-34 (n = 4,100) in the Truth Initiative Young Adult Cohort Study were randomized to one of five groups based on question type: 1) “check all that apply” list of products (standard list, SL), 2) breakout items for each product (B), 3) breakout + images (B+I), 4) SL and B, and 5) SL and B+I. Order of question type was randomized. Bivariate analyses estimated product-specific prevalence by question type/order.

Question type/order influenced product-specific prevalence estimates. Compared to prevalence estimates from SL, ever cigarette and cigar use increased significantly and ever e-cigarette use decreased in B and B+I. Ever hookah use increased when images were added. Adding images resulted in an 8.3% increase in past 30-day e-cigarette prevalence and a 13.0% increase in smokeless prevalence compared to SL. In groups 4 and 5, higher prevalence of ever cigarette, cigar, hookah, and past 30-day smokeless use were observed compared to SL when the breakout items were presented first.

Question type, order, and inclusion of images impact prevalence estimates of tobacco use; trend analyses in repeated cross-sectional and longitudinal studies must account for changes in survey items across waves.

10. Oxidative Stress Biomarkers While Smoking Usual Brand Cigarettes versus Usual Nicotine Content Research Cigarettes

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Glutathione (GSH) is a major antioxidant that protects against oxidative stress and damage to cells and tissues. Cigarette smoke is a major source of free radicals and leads to the oxidation of GSH forming GSH disulfide (GSSG) and GSH-protein mixed disulfides (GSSP). Researchers are using Usual Nicotine Content (UNC) research cigarettes as comparators to study reduced nicotine content (RNC) research cigarettes. This study examined whether GSH and its oxidized metabolites change when smokers are put on a universal UNC research cigarette.

A total of 235 adult smokers were taken from two multisite clinical trials on RNC research cigarettes. Smokers provided blood samples for GSH measures while smoking their usual brand cigarettes (time 1) and while smoking UNC research cigarettes for 2 weeks (time 2). GSH and its oxidized products were measured in blood using a 5,5'-dithio-bis-[2-nitrobenzoic acid]/enzymatic recycling method and results were expressed as $\mu\text{mol/g}$ hemoglobin. Paired t-tests were used to study differences in GSH measures at time 1 and time 2.

No changes were observed for GSH (mean difference= 0.06, $p= 0.75$), GSSG (mean difference= -0.003, $p= 0.64$), GSSP (mean difference= 0.002, $p= 0.93$) when smokers switched from usual brand cigarettes to UNC cigarettes. Likewise, no changes in the ratios of oxidized:reduced GSH were observed after switching.

When switching smokers from a wide variety of commercially available cigarettes to a universal UNC cigarette no increase in harm from free radical exposure from cigarette smoke was apparent based on the oxidative stress biomarkers tested in these two clinical trials.

11. Role of Propylene Glycol and Vegetable Glycerin Concentration on the Behavioral Effects of Electronic Cigarette Aerosol

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The rapidly increasing prevalence of electronic nicotine delivery systems (ENDS) use, and specifically the subset of ENDS termed 'electronic cigarettes' (ECs), is a major concern for public health. While nicotine has been demonstrated to influence the abuse liability of ECs, the effects of two primary ingredients — propylene glycol (PG) and vegetable glycerin (VG) — on tastes, sensations, and reinforcing effects of ECs has yet to be assessed. The current ongoing study uses a crossover design to examine the effects of five concentrations of PG or VG, (100:0, 75:25, 50:50, 25:75, and 0:100 PG/VG) each containing a 1.2% nicotine concentration, on the reinforcing and physiological effects of the aerosol, as well as subjective ratings of aerosol taste and inhalation sensations. Twelve regular EC users have completed this five session study, which includes one practice day and four test days. On each test day, following one hour of EC deprivation, participants administer two puffs from each concentration of PG and VG and taste, sensations, and reinforcing effects (multiple-choice procedure) are measured. Preliminary results indicate that there are no significant differences between concentrations on heart rate, mean arterial blood pressure, choices on the multiple-choice questionnaire, or inhalation sensations. All conditions except 100:0 PG/VG decreased desire or urge to use the EC again. Participants also reported that 100% VG liquids produced significantly less visible aerosol than 100% PG liquids. These interim results suggest that liquids containing 100% PG may have less abuse liability than those containing some VG.

12. The Influence of E-cigarette Use and Regulatory Environment on Cigarette Demand

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Government regulations of e-cigarettes (ECs) have evolved rapidly over the past 10 years. In Australia (AU) and Canada (CA) the sale of nicotine containing ECs are prohibited while their sale is allowed in England (EN) and the United States (US). The impact of regulatory environment on cigarette demand is unknown. Behavioral economics offers a time- and cost-efficient approach to assess product demand. Hypothetical cigarette purchase tasks quantify participants' cigarette consumption across escalating levels of cost, such that greater consumption/insensitivity to price indicate higher demand. Elevated demand is associated with higher levels of nicotine dependence, lower motivation to quit, and greater difficulty quitting. Only two studies have examined the influence of e-cigarette use on cigarette demand, and no study has tested cross-country comparisons. The current study will fill these gaps by examining cigarette demand among smokers from the US/EN/CA/AU in the largest cigarette purchase task study to date.

Data for this study were from 6,261 adult smokers who participated in the 2016 International Tobacco Control (ITC) 4-country study. The web-based survey recruited representative samples.

Cigarette demand varied by smoking status, vaping status, and country. As expected, daily smokers had greater demand relative to nondaily smokers (weekly/<weekly). For daily smokers, daily and weekly vapers had lower cigarette demand than <weekly and non-vapers. Among nondaily smokers, daily vapers had higher cigarette demand. Smokers from AU showed the highest cigarette demand, followed by US, and then CA/EN.

EC use and regulatory environment appear to have marked impact on cigarette demand.

13. E-cigarettes to Reduce Tobacco Smoking among Individuals with Serious Mental Illness

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Individuals with serious mental illness (SMI) smoke at significantly higher rates, have difficulty quitting, and have on average 30 years reduced life span due to tobacco cigarette smoking. While quitting tobacco smoking is an ideal target, tobacco smoking reduction may also result in viable health gains. In the current pilot study, we assessed the feasibility and acceptability of reducing tobacco cigarette smoking among adults with SMI (i.e., schizophrenia, schizoaffective disorder, bipolar disorder, post-traumatic stress disorder) by providing 4-weeks access to electronic cigarettes (e-cigarettes). Participants were randomized to receive access to either e-cigarettes (36 mg/ml nicotine) and nicotine patch or patch alone. To date, 6 individuals have completed the study with no dropouts. Attendance rates were also high, with only one session missed thus far. Results from repeated measures ANOVA revealed no significant differences in breath CO and a significant effect of time in self-reported tobacco cigarettes smoked per day. However, smoking-related results should be interpreted with caution given the small sample size. Overall, our results demonstrate that individuals with SMI are amenable to the use of e-cigarettes to assess smoking reduction.

14. Disparities in the Prevalence and Importance of Tobacco Benefit and Harm Perceptions among U.S. Youth

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Beliefs about the benefits and harms of tobacco are important factors driving cigarette use. To address cigarette use disparities it is important to understand whether prevalence of key beliefs, and the strength of the association between these beliefs and cigarette use also varies by race/ethnicity.

We analyzed Wave 2 PATH (Population Assessment of Tobacco and Health) study data. Beliefs about the harms of tobacco were two variables measuring perceived harm and addictiveness of cigarettes. Beliefs about the benefits of tobacco were five variables rating agreement with statements that tobacco would (a) be energizing, help the participant (b) reduce stress, (c) calm down when angry, (d) control weight, and (e) feel more comfortable at parties.

Non-Hispanic white (NHW) youth were more likely to believe using tobacco would help them feel comfortable at parties (8.3%), control weight (3.7%), calm down (14.4%), reduce stress (14.3%) and energize them (4.7%). Non-Hispanic black (NHB) and Hispanic youth were less likely than NHW youth to believe cigarettes were addictive (78.6%, 79.02% vs. 86.0%). Perceived harm, addictiveness, and benefits had main effects on use; the strength of these relationships varied by race/ethnicity. Perceived addictiveness was more strongly associated with abstinence from cigarettes among Hispanic than NHW youth. The perceived benefit of stress reduction was a particularly important predictor of tobacco use among NHB and Hispanic youth.

Focusing tobacco prevention efforts on the beliefs most prevalent and most strongly associated with tobacco use among each racial/ethnic group could help reduce disparities in tobacco use.

15. The Association of E-cigarette Use Motivations and Combustible Tobacco Use Overtime among Exclusive E-cigarette and Multiple Product Users

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As e-cigarette and multiple tobacco product use has increased, understanding user's motivations for e-cigarette use patterns may be important to tailor effective messages about tobacco use cessation and/or harm reduction. Little is known about use motivations and long-term usage patterns for multiple product and exclusive e-cigarette users, or whether motivations vary by region (urban/rural). Longitudinal data from a sample of Ohio urban and rural adult tobacco users were evaluated. Eligibility criteria included self-reporting either "daily" or "some day use" per week of e-cigarettes within two user types; exclusive e-cigarette users reported using other tobacco products less than some days (n=131), and multiple product users reported using any other tobacco product at least some days per week (n=117). At baseline, participants rated 21 independent factors motivating e-cigarette use. Current use of tobacco products was collected at baseline, 6, 12, and 18 months. Logistic regression models evaluated combustible tobacco use (yes/no) at any time point with each motivation as predictors, accounting for region stratified by user type. Analyses revealed no significant variations by region or region/motivator interactions. Individuals in the exclusive e-cigarette user group who endorsed using e-cigarettes because they help people quit smoking cigarettes (OR: 0.25, 95% CI: 0.07 – 0.94) and that e-cigarettes feel like smoking cigarettes (OR: 0.34, 95% CI: 0.13 – 0.91) had significantly lower odds of transitioning to combustible cigarette use over 18 months. Multiple product users who endorsed using e-cigarettes because they feel like smoking cigarettes had 5 times the odds of quitting combustible product use (OR: 4.99, 95% CI: 1.03 – 24.10). All multiple product users who quit using combustible products endorsed that e-cigarettes might be less harmful than cigarettes, that they use e-cigarettes as a way of cutting down on cigarettes, and that they use e-cigarettes as an alternative to quitting tobacco altogether. Differential behavioral motivations predicted patterns of combustible tobacco use in exclusive e-cigarette and multiple product users. These findings highlight that motivations for e-cigarette use are associated with combustible product use over time among these adult tobacco users.

16. Smokers' Misperceptions about Toxicity of Very Low Nicotine Cigarettes

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FDA has expressed interest in promulgating a very low nicotine content standard for cigarettes. Because many people incorrectly believe that nicotine is the main toxic agent in cigarettes, they may also believe that very low nicotine content (VLNC) cigarettes are less carcinogenic than other cigarettes.

A nationally-representative sample of 650 US adult smokers participated in our online survey about safety of VLNC cigarettes. We report preliminary findings from adjusted weighted analyses.

Overall, 47% of smokers believed that smoking very low nicotine cigarettes for 30 years would be less likely to cause cancer than smoking other cigarettes. This misperception was more common among smokers ages 55 or older (57%) than those ages 18-34 (42%, $p < .05$), and more common among black (57%) than white (45%, $p < .05$) smokers.

Almost half of smokers have the misperception that smoking VLNC cigarettes is less likely to cause cancer than smoking other cigarettes, an unintended consequence that could undermine quitting. A communications campaign to emphasize that VLNC cigarettes are as toxic as other cigarettes may be a useful adjunct to a new nicotine standard.

17. Queer & Quitting: Tobacco Cessation Among LGBTQ People

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LGBTQ populations have long been vulnerable to health risks, and often considered hard to reach. The largest health risk to the LGBTQ community is tobacco. As the leading cause of death, tobacco-use among LGBTQ is disproportionately higher than that of the general population. Tobacco companies' targeting of LGBTQ persons is among the many reasons for these disparate rates. A sense of community may increase smoking as a social act or pressure, and stress from discrimination may increase tobacco use, making quitting more difficult. Since 2011, Southeastern Pennsylvania Tobacco Control Project (SEPA TCP) has enrolled over 10,000 clients in tobacco cessation classes. Of these clients, 257 reported identifying as either "gay/lesbian," "bisexual," "transgender," "other" sexual orientation, or "other" gender. Clients complete surveys at intake and at three follow-up points. Analysis of survey data demonstrates quit trend differences between LGBTQ and straight clients. While LGBTQ and straight clients enter cessation classes with similar tobacco-use characteristics, at six-month follow up, LGBTQ clients are more likely to report having recently smoked than straight clients ($P < .05$). Other social factors – such as insurance status ($P < .05$) – significantly affect LGBTQ tobacco-use and likelihood to quit. Lower quit rates among LGBTQ clients indicate that current cessation programming should be enhanced to equitably provide care for this disparately impacted population. LGBTQ persons may benefit from different, culturally competent services. Findings from this study can be used by Health Promotion Council, the primary contractor for SEPA TCP, to improve programs for LGBTQ and increase reach.

18. Implications of Raising the Minimum Tobacco Sales Age to 21 Years

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Raising the minimum age of purchasing tobacco products from 18 to 21 is a rising strategy to reduce smoking rates and prevent people from initiating tobacco use. Three U.S. states and 254 cities raised their sales age to 21, and tobacco cessation advocates are working in many other states to follow this trend. In general, young people are a key vulnerable population to support through brain develop. Health Promotion Council is the primary contractor for the Southeastern Pennsylvania (PA) Tobacco Control Project, the primary source of coordinated tobacco cessation services across seven counties in PA. Since 2011, the project has enrolled over 10,000 clients in community based tobacco dependency treatment classes. Based on clients' intake, end-of-class, 1-month, and 6-month follow up surveys, we analyzed factors related to the impact of raising the sales age to 21. On average, clients seeking help to quit began smoking at age 17. A larger percentage of clients began smoking in the three-year period between 18 and 20 years of age (21.1%) than in the following three-year period (ages 21-24; 6.3%), suggesting that an increased sales age of 21 may affect a large number of prospective smokers. Additionally, the mode age at which clients began smoking is 16 years old, the typical age of High School sophomores. A sales age above that of most high school students would decrease tobacco products on high school campuses, reducing the chance of early exposure. Further analysis will explore quit rate differences between age groups.

19. Brief Assessment of Cigarette Demand (BACD): Initial Development and Validation Results

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Developing briefer behavioral economic measures is an important priority to ensure these measures can be used in a variety of different contexts and to reduce participant burden. We developed and sought to validate a Brief Assessment of Cigarette Demand (BACD).

A 17-item Cigarette Purchase Task (CPT) and a 3-item BACD were completed concurrently in two community samples of smokers (study 1: adult smokers ($n=80$) with substance use disorders (SUD); study 2: teenage smokers ($n=81$)). Responses on the CPT and BACD were compared for three facets of demand: 1) intensity (the number of cigarettes requested at no cost), 2) o_{max} (the maximum hypothetical expenditure on cigarettes in a 24-hour period), and 3) breakpoint (the point at which consumption is totally suppressed/no cigarettes are purchased). Correlations of demand indices with cigarettes/day and nicotine dependence were also calculated.

Measures of cigarette demand on the CPT and BACD were significantly correlated for all three indices in the adult sample (intensity = .86, breakpoint = .28, and o_{max} = .43) and for two of the indices in the teen sample (intensity = .97, breakpoint = .33). The CPT and BACD relationships with smoking and nicotine dependence were similar for breakpoint and intensity but not for o_{max} .

Although initial analyses show promise for a brief assessment of cigarette demand, additional work is needed to improve psychometric properties before adoption. Development of brief measures of demand could help advance the scientific understanding and treatment of addictive disorders.

20. FDA Compliance Inspections on Retail Sales to Minors of Cigars and Electronic Cigarettes in the United States: 2016-2017

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The recently finalized "Deeming Rule" expanded the FDA authority to regulate over e-cigarettes, cigars, and other newly deemed tobacco products. The first round of new rules, including ID checks and no sales to minors under 18, were effective on August 8, 2016. A few studies have investigated the FDA retail inspections of cigarette sales [ENREF 18](#) but no study has evaluated the FDA inspections of newly regulated products, including e-cigarettes and cigars.

This study will examine the retail violation rate for sale to minors (RVRm) of newly regulated tobacco products using the FDA compliance inspection database. We will text mine the FDA decision letters ($n \approx 15,000$) from August 8, 2016 to June 30, 2017 to obtain the violated tobacco product information (e.g., cigarettes, cigars, e-cigarettes, smokeless). RVRm is calculated by dividing the number of violations per tobacco product by the number of inspections. We will test the hypotheses of whether 1) state level tobacco control policies; 2) census tract level socio-economic status (SES), urbanicity and tobacco retailer density, are associated with RVRm. All variables will be linked through the Geographic Information Systems. Multi-level regression models will be performed to predict the propensity of RVRm for cigars and e-cigarettes at the neighborhood level.

The results show that sales to minors for cigars and e-cigarettes were prevalent. Cigarettes, cigars and e-cigarette products accounted for 40.1%, 33.1%, and 23.3% of total warning letters, respectively. The findings demonstrate the needs to fully understand the likelihood of retail violation for these newly regulated products at the neighborhood level.

21. Impact of Flavorants and Sweeteners on Waterpipe Tobacco Smoking

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Waterpipe tobacco smoking (WTS), a practice likely as dangerous as cigarette smoking, is proliferating in the US. One possible reason for increases in WTS is the inclusion of flavorants and sweeteners in the tobacco. Only one in-laboratory study has examined the impact of flavors on WTS; however, no studies have examined the impact of sweeteners.

WP smokers ($N=6$) completed three, 1-hour WTS sessions [flavored + sweetened (FS) vs. unflavored + sweetened (US) vs. unflavored + unsweetened(UU)] in a counterbalance fashion. Study visits were completed in dyads. Participants completed surveys assessing subjective smoking experience post-session and exhaled carbon monoxide testing pre- and post-session. WTS patterns were measured continuously throughout the smoking session. Data collection is ongoing.

While not significant, reports of intentions for regular use were greater for the FS than the UU preparations ($p < .10$). Participants reported an enhanced smoking experience, including greater desire, liking, enjoyment, interest in continued use, and willingness to use again for the FS preparation ($p < .10$). No significant differences were observed for topography measures or eCO between preparations.

The current study is the first to investigate the impact of an unflavored tobacco compared to a preferred flavor and the first to examine the role of sweeteners in WTS. If replicated in the full trial, the results may have implications for regulations of flavorants and sweeteners in WTS.

22. Effect of Alcohol Consumption on Waterpipe Tobacco Smoking Patterns, Toxicant Exposure, and Smoking Experience

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Concurrent alcohol consumption and waterpipe tobacco smoking (WTS) is common. WP smokers are more than twice as likely to use alcohol and alcohol use during WTS sessions is associated with greater smoke exposure. However, no research has directly examined the impact of alcohol consumption on smoking patterns, toxicant exposure, and subjective smoking experience in a controlled laboratory setting.

Dyads of WP smokers ($N = 28$) completed two in-laboratory smoking sessions (placebo vs. active drink [BrAC = .08]) in a randomized crossover design. Following drink consumption, participants smoked WP for up to 2 hours. Exhaled carbon monoxide (eCO) was assessed pre- and post-smoking session. Questionnaires assessed subjective smoking experience at post-session and smoking patterns were measured continuously throughout each smoking session.

When consuming the active drink, participants reported a greater desire/urge and need to experience the session again ($ps < .05$). While eCO boost did not differ significantly between sessions, participants smoked significantly longer during the active session ($p = .001$). While not significant, measures of total puff time, number of puffs, and total inhaled volume were also approaching significance ($ps < .10$) with all greater during the active drink session.

The current study is the first to assess the impact of alcohol consumption on WTS patterns, toxicant exposure, and subjective smoking experience. Findings that alcohol consumption was consistently associated with an enhanced and longer smoking experience, indicates a potential need for regulations of alcohol sales in WP lounges.

23. Associations between Opioid and Nicotine Dependence in Nationally Representative Samples of United States Adult Daily Smokers

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University of Vermont

Prevalence of smoking among adults with opioid dependence is six-fold that of the general population. Further, while most opioid-dependent smokers report a desire to quit, success rates are one-fourth that of smokers without a substance use disorder. We sought to better understand the prevalence and severity of nicotine dependence among opioid-dependent individuals relative to those not dependent on opioids using nationally representative samples of adult daily smokers.

Data were derived from multiple years of the National Survey on Drug Use and Health (NDSUH, 2006-2014; n=59,978). Nicotine dependence was measured by (1) the Nicotine Dependence Syndrome Scale (NDSS) and (2) the first item of the Fagerström Test for Nicotine Dependence (time to first cigarette; FTND). Opioid dependence was assessed using the Diagnostic and Statistical Manual of Mental Disorders criteria (DSM-IV).

After accounting for sociodemographic and smoking characteristics that differed between the groups, opioid-dependent daily smokers were about twice as likely to be dependent on nicotine than were adult daily smokers not dependent on opioids. This relationship was consistent across NDSS and FTND measures of nicotine dependence (p -values <0.05). In addition, opioid-dependent smokers exhibited greater severity of nicotine dependence compared to nondependent smokers, as evidenced by higher mean NDSS scores ($p<0.05$).

Opioid dependence is significantly associated with increased odds and severity of nicotine dependence among daily smokers. Considering the disproportionate societal and economic burdens of smoking and smoking-related consequences in this vulnerable smoker population, continued investigations are needed to better understand opioid-dependent individuals' elevated smoking rates and poor cessation outcomes.

24. Characterizing Nicotine Withdrawal across Vulnerable Populations: Data from a Trial Examining Reduced Nicotine Content Cigarettes

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Individuals with socioeconomic, psychiatric or other disadvantages bear a disproportionate burden of smoking and smoking-related consequences. Recent research by the UVM TCORS indicates that disadvantaged smokers may respond to reductions in the nicotine content of cigarettes with reductions in cigarette demand and other measures of addiction potential. However the withdrawal experienced by these vulnerable smokers has not been characterized. Here we examine withdrawal severity following acute exposure to cigarettes with varying nicotine content and its association with the characteristics widely associated with vulnerability to smoking (opioid dependence, anxiety, depression, education, gender).

Methadone- or buprenorphine-maintained patients (n=68), individuals with affective disorders (n=80) and economically-disadvantaged women (n=82) completed five sessions in this within-subjects laboratory study. In each session, they smoked a single research cigarette varying in nicotine content (0.4, 2.4, 5.2, 15.8 mg/g) or their usual brand cigarette under double-blind, acute abstinence ($CO_{50} < 50\%$ baseline) conditions. Participants completed the Minnesota Nicotine Withdrawal Scale (MNWS) before and every 15 minutes post-cigarette for the hour following smoking. Our primary aim was to characterize the contribution to withdrawal of individual characteristics often indicative of smoking risk (opioid dependence, anxiety, depression, education, gender). MNWS AUC scores were calculated across sessions using an ANOVA and then also analyzed using multivariate regression models that adjusted for several variables that have historically predicted withdrawal severity (i.e., nicotine dose, age, FTND score, and cigs/day).

Depression was the only significant predictor of MNWS AUC scores ($p < .001$) while opioid dependence approached significance ($p = .07$). Additionally, there were significant anxiety x dose, depression x dose and gender x dose interactions on MNWS AUC ($p < .05$).

Depression severity may be associated with levels of nicotine withdrawal experienced by disadvantaged smokers across a range of nicotine content cigarettes.

25. Examining Interrelationships between Delay Discounting and Simulated Demand for Cigarettes Among Pregnant Women

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Two of the more common applications of behavioral economics tasks used in the study of cigarette smoking are delay discounting (discounting of the value of rewards as a function of delay to obtaining them) and simulated demand for cigarette smoking using the Cigarette Purchase Task (CPT). However, few studies have evaluated whether combining delay discounting and CPT performance may enhance understanding of smoking beyond observations with either alone. The current investigation served an initial evaluation of the interrelationship between delay discounting and CPT performance by examining associations with the likelihood of making quit attempts upon learning of a pregnancy. Antepartum quit attempts are a reliable predictor of successfully quitting smoking during antepartum and served as a marker for quitting in the present study.

Data from 114 women who were enrolled in a smoking-cessation trial were analyzed. Women were separated into 4 groups based on baseline CPT intensities (estimated consumption at \$0 cost) and discounting rates (i.e., high intensity, steep discounters; high intensity, shallow discounters; low intensity, steep discounters; low intensity, shallow discounters). Together, these categories were used to evaluate individual differences in the likelihood of making a quit attempt prior to entering prenatal care using a chi-square test and odds ratios to evaluate the magnitude of associations.

Women with low intensity were significantly ($\chi^2(1) = 8.62, p < .01; OR = 4.13, CI = 1.54 - 11.08$) more likely to make a quit attempt during their current pregnancy than those with high intensity. Although shallow discounters were more likely than steep discounters to make a quit attempt, these findings were not statistically significant ($p = .159$). Similarly, no statistically significant interaction between intensity and discounting was observed.

Decisions about quitting smoking during early pregnancy appear to be dominated by the influence of factors controlling intensity for smoking, which is highly correlated with smoking rate. Any influence of discounting on quit attempts appears to be quite modest.

26. Characterizing Responses to Cigarettes with Varying Levels of Nicotine in Women Vulnerable to Smoking During Pregnancy

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Approximately 11% of women (~17 million) are smokers when they become pregnant, but prevalence can exceed 33% among especially vulnerable women. Smoking during pregnancy causes catastrophic pregnancy complications and adverse effects on fetal development that can compromise health throughout the lifespan. A national policy of reducing the nicotine content of cigarettes has the potential to be an effective method of reducing the prevalence of cigarette smoking and smoking-related adverse health outcomes in this highly vulnerable population. This secondary analysis characterized how women of child bearing age at increased risk for continuing to smoke during pregnancy respond to cigarettes with varying levels of nicotine.

Ninety-five women (18-44 years) with risk factors for continuing to smoke during pregnancy (socioeconomic disadvantage, opioid use disorder, affective disorder) completed four sessions where they sampled cigarettes with varying levels of nicotine (0.4, 2.4, 5.2, 15.8 mg/g). Participants smoked cigarettes through a desktop smoking topography device, completed the modified Cigarette Evaluation Questionnaire (mCEQ) after smoking each cigarette and completed measures of withdrawal before and every fifteen minutes in the hour after smoking.

Women had significantly smaller total puff volume, mean maximum flow and total puff number when smoking 0.4 mg/g cigarettes compared to the 15.8 mg/g cigarette mCEQ subscale scores (Satisfaction, Psychological Reward, Aversion, Enjoyment of Respiratory Tract Sensations and Craving Reduction) decreased across doses (p 's < .05). While all doses produced U-shaped withdrawal curves over time, the highest dose produced the greatest decreases immediately and one hour after smoking (dose X time, p < .01).

Women vulnerable to smoking during pregnancy report cigarettes with very low nicotine content are less satisfying and rewarding, suggesting lower abuse potential. Furthermore, acute exposure to cigarettes with very low nicotine content does not produce compensatory smoking but does largely alleviate withdrawal.

27. It's a Trap! An Examination of Waterpipe Smokers and Non-Smokers' Reactions to Anti-Waterpipe PSAs

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Waterpipe (WP) smoking can lead to negative health outcomes, and while cigarette smoking has decreased among youth and young adults, WP smoking is increasing. In order to communicate the risks of WP smoking, public service announcements (PSAs) have been employed. Little research has examined these PSAs' effects.

Current WP smokers (n = 20) and non-WP smokers (n = 25) were randomized 2:1 (PSA:Control) to view either three anti- WP PSAs, created by the Truth campaign, or three control videos. Participants answered questions after each message pertaining to reactance, perceived risk, message acceptance, and motivations.

In general, results showed that WP non-smokers reacted more positively toward the PSAs in terms of message acceptance and attitude towards the message ($p < .001$). Interestingly, even though WP smokers who saw the PSAs felt quitting was less important ($p < .001$) and were less ready to quit ($p < .001$), they had increased confidence and commitment to quit over the course of the three PSAs ($p < .05$).

Anti-WP PSAs may deter WP non-smokers from initiation, and while WP smokers may not respond positively toward the message, over time they may increase their confidence and commitment to quit the more they are exposed to the PSAs. This shows that WP smokers may be harder to persuade, but over time and with increased messaging, may be more open to quitting or avoiding WP.

28. Persistence and Amplitude of Tobacco Demand among Cigarette Smokers with Clinical Depression: An Experimental Comparison with Non-depressed Smokers

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The Cigarette Purchase Task (CPT) is a valid instrument that multidimensionally quantifies nicotine reinforcement. Recently, evidence has shown that its bi-factorial internal structure (i.e., Persistence and Amplitude) better characterizes CPT data in adult smokers compared to individual CPT indices (i.e., breakpoint, O_{max} , P_{max} , elasticity and intensity). Despite previous studies examining the relative reinforcing efficacy of nicotine among different populations of smokers, to date no study has assessed cigarette demand among individuals with clinical depression.

This study sought to provide new evidence on nicotine reinforcing efficacy among treatment-seeking smokers with severe depression. A total of 145 participants took part in this study. We compared Amplitude and Persistence among samples of smokers with ($n=70$, $BDI-II=36.79\pm 6.14$) and without clinical depression ($n=79$, $BDI-II=4.76\pm 3.11$). Depression was assessed by using the SCID-I/CV and the Beck Depression Inventory-Second Edition (BDI-II).

Statistically significant differences were observed in Persistence; individuals with clinical depression ($M = 0.176$, $SD = 0.902$) scored higher in this latent factor than the non-depressed group ($M = -0.163$, $SD = 1.07$). Depression was associated with the Amplitude factor over and above nicotine dependence, number of cigarettes per day and years of regular smoking [$R^2 = .15$; $F(7, 124) = 6.66$, $p = \leq .001$].

Depressed smokers reported a greater resistance to reducing their tobacco consumption as prices increased compared to non-depressed smokers. This study extends previous evidence on the nicotine reinforcing efficacy in the population of smokers with depression by suggesting this latter condition might hinder cessation attempts. Further, this study provides a preliminary examination of a novel clinical variable that should be considered when examining treatment response in this population.

29. Characterization of Subjective, Physiological, and Behavioral Responses among Experience E-cigarette Users

Irene Pericot-Valverde, Diann E. Gaalema & Steve T. Higgins

Previous studies have demonstrated that an acute laboratory stress induction heightens the reinforcing value of different drugs, such as alcohol and cigarettes, as well as increases subjective craving, stress, and arousal among users. Several prior studies have examined the reinforcing value of e-cigarettes. Little is known, however, about the effect of stress on the reinforcing value of e-cigarettes. Thus, the aim of this study is to examine the effects of an acute psychological stress on e-cigarette craving, stress, heart rate, and reinforcing effects of e-cigarettes among e-cigarette users.

Participants of this ongoing study will be 62 experienced e-cigarette users between the ages of 18-65. Participants will attend two laboratory sessions in which they will be exposed to the Trier Social Stress Test (TSST) or a non-stress control condition. Self-reported reactivity (craving and stress), physiological responses (heart rate), and reinforcing effects of e-cigarettes (e-cigarette purchase task) will be assessed before and after the TSST or the control task.

It is hypothesized that participants will exhibit higher levels of craving, stress, and heart rate in response to the acute psychological stressor compared to the control task. It is also expected that participants will show the largest e-cigarette demand in the purchase task after the stress task.

The results of this study will reveal the unknown effects of stress on motivation for e-cigarette use using the innovative approach of behavioral economics. This study will also provide new knowledge regarding the reinforcing value of e-cigarettes that have the potential to be helpful for future regulation of this novel tobacco product.

30. Examining the Influence on Mentholation on Relative Reinforcing Efficacy of Cigarettes at Varying Nicotine Doses

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When evaluating the potential of a nicotine reduction policy, it is important to examine the impact mentholation could have on the relative reinforcing efficacy of nicotine dose, as one-third of cigarette smokers report a mentholated product as their usual brand cigarette. We examine this in the present study using a concurrent choice task to determine if there are differences by menthol status in the relative reinforcing efficacy of cigarettes with varying nicotine doses.

Participants were 169 current smokers from three populations especially vulnerable to tobacco addiction dichotomized as menthol (n=59) or non-menthol (n=110) smokers. After brief exposure to four research cigarettes (Spectrum, 22nd Century Group; menthol status consistent with usual brand) varying in nicotine content (0.4mg/g, 2.4 mg/g, 5.2 mg/g, 15.8 mg/g), participants completed six 3-hr sessions in which they chose between two of the research cigarettes on a concurrent choice schedule (FR-10). All six possible dose combinations were tested once in separate sessions. A repeated measures ANOVA was used to examine differences in preference among all possible dose pairs by menthol status. Potentially confounding demographic variables were controlled for in the analyses.

There was a main effect of dose ($p < .0001$), indicating that the higher nicotine dose cigarette was chosen significantly more than the lower nicotine dose cigarette across dose pairs. There was no effect of menthol status ($p = .94$) and no menthol status x dose interaction ($p = .09$), suggesting that the menthol status did not have an impact on the relative reinforcing effects of nicotine dose.

These results suggest that across the six different dose pairs both menthol and non-menthol smokers respond similarly, preferring the higher nicotine dose over the lower nicotine dose. This finding suggests that mentholation does not have an impact the relative reinforcing efficacy of nicotine dose and in both menthol and non-menthol smokers reducing nicotine content may reduce addiction potential of cigarettes.

31. Household Smoking Rules: Effects on Nicotine Exposure and Birth Outcomes among Pregnant Women

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Household-smoking bans may be particularly important for pregnant smokers, as data suggests that pregnant smokers who also report secondhand smoke exposure (ShSE) are more likely to experience negative birth outcomes compared to pregnant smokers who do not report ShSE. The current study prospectively assessed smoking bans over the antepartum (AP) and postpartum (PP) period and examined their association with nicotine exposure and birth outcomes.

Participants (N = 289) were current smokers at the start of prenatal care who participated in controlled trials on smoking cessation. Participants were followed through 24-weeks PP. Household smoking rules and biochemically-validated nicotine exposure and smoking status were measured repeatedly. Birthweight was abstracted from the medical record.

At baseline, approximately half of women reported a home smoking ban. Allowing smoking in the home was associated with less education, younger age of smoking initiation, and zero pre-pregnancy quit attempts. There was a strong effect of delivery on the use of smoking bans, such that prevalence increased from ~50% in AP to ~80% in PP. Having a ban in early/mid-pregnancy (but not baseline or late-pregnancy) was associated with lower urinary cotinine and increased birthweight, even after controlling for cigarettes per day and smoking status, respectively.

The current data replicates and extends recent research indicating that home smoking bans are more prevalent in PP relative to AP. As smoking bans in early pregnancy were prospectively associated with birth outcomes, these data provide additional rationales for coaching pregnant smokers to adopt and maintain smoking bans.

32. Promoting Smoking Abstinence Among Patients with COPD: A Novel Extension of Evidence-based Treatment.

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Chronic Obstructive Pulmonary Disease (COPD) is currently the third leading cause of death worldwide, and the majority of COPD deaths are attributable to smoking. Smokers with COPD may also represent a recalcitrant group of smokers as previous research has suggested they have lower abstinence rates and higher relapse rates relative to the general population of smokers. Contingency Management (CM) may represent a promising smoking cessation intervention for this difficult to treat subgroup with concomitant pulmonary disease.

The present study examined the initial efficacy of a 14-day CM intervention in promoting initial smoking abstinence among smokers with COPD. Daily smokers were randomized into Contingent (n=13) or Noncontingent (n=16) experimental conditions for a 14-day study. Participants in the Contingent condition received vouchers based on biochemically confirmed abstinence from smoking, while individuals in the Noncontingent condition received voucher earnings independent of smoking status.

Participants in the Contingent group provided a significantly higher percentage of biochemically-confirmed abstinent samples vs. the Noncontingent group (51% vs. 33%, $p<0.001$). More specific results on other smoking-related outcomes, including expired breath carbon monoxide and urinary cotinine levels, will be presented at the October VCBH conference.

These results are promising and demonstrate the initial efficacy of a brief CM intervention for promoting smoking abstinence in a difficult-to-treat group of smokers with COPD. Important next steps include efforts to sustain abstinence over the longer term, as well as to characterize abstinence-related improvements in pulmonary function.

This trial is funded through NIH/NIGMS P20GM103644 and T32 DA007242 grants.

33. Examining the Ability of Purchase Tasks in Distinguishing Risky Populations of Substance Users

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Purchase Tasks (PT) are behavioral economic instruments that identify the reinforcing value of a commodity. These hypothetical tasks have been increasingly utilized in substance use research and show promise in distinguishing populations that have increased risk for problematic use, are more vulnerable to adverse outcomes (e.g., health, interpersonal, or psychological), and have poor response to interventions or regulatory policy. The primary aim of this review is to investigate which PT indices are more sensitive in distinguishing populations with these risk factors.

Reports were identified using PubMed and entering the search term “purchase task”. For inclusion, reports had to be in English, be published in a peer-reviewed journal through July 2017, and examine PT indices and their relationship to the aforementioned risk factors. Two authors reviewed search results to determine study inclusion.

37 reports met inclusion criteria and identified significant associations between PT indices and problematic use, adverse outcomes, and poor response to interventions and regulatory policy. Intensity (consumption at zero price) was the most frequently reported index, with 83% of the articles reporting significant associations with the aforementioned risk factors ($p < .05$). Omax (maximum expenditure) was the second most reported index, with significant associations found in 57% of the articles ($p < .05$). Elasticity (sensitivity to changes in price) was the third most reported index, with significant associations found in 50% of the articles ($p < .05$). Breakpoint (last price with any demand) and Pmax (price with maximum response output) only yielded significant associations in 28% and 13% of the articles, respectively.

These preliminary results suggest that volumetric measures of demand (i.e. Intensity and Omax) and overall sensitivity to price (i.e. Elasticity) may have the most predictive utility in identifying risky populations. Overall, PT indices have the potential to provide insightful information about the association of demand for substances and socially important outcomes.