Subjective experiences at first use of cigarette, e-cigarettes, hookah, and cigar products among Texas adolescents

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Abstract

Introduction—Subjective experiences ("SEs") at first cigarette use have been thoroughly examined; however, limited research has examined SEs at first use of non-cigarette products. This study addresses this gap in the literature.

Methods—Cross-sectional data from 6th, 8th and 10th grade students in four metropolitan areas of Texas (n = 3907/N = 461,069). Nausea, coughing, relaxation, rush/buzz, and dizziness at first use were assessed for cigarettes, e-cigarettes, hookah, and cigar products. Chi-square analyses examined differences in the prevalence of first use SEs by product. Weighted multiple logistic regression analyses examined the association of SEs and current product use. Covariates were grade, gender, race/ethnicity, and current other tobacco product use.

Results—Exploratory factor analysis of SEs determined differing factor structures across tobacco products. For example, the following items loaded onto the positive SE factor: 1) relaxation, rush, and dizziness for cigarettes, and 2) relaxation and rush for e-cigarettes, hookah, and cigar products. Prevalence of negative SEs (coughing and nausea) were higher for cigarette and cigar products compared to e-cigarettes and hookah. Positive SEs for cigarettes were associated with increased odds of current cigarette use (AOR = 1.51); similarly positive SEs for cigars were associated with increased odds of current cigar use (AOR = 2.11). Feeling nauseous at first use of cigars was associated with decreased odds of current cigar use (AOR = 0.18). No SEs were associated with current e-cigarette or hookah use.

Conclusions—Subjective experiences at first use differ by tobacco product. Longitudinal studies are needed to examine temporal relationships between SEs at first use and sustained tobacco use.

Keywords

Subjective experiences; Adolescents; Tobacco

1. Introduction

Short- and long-term tobacco use is initiated and sustained by several types of factors including pharmacological, genetics, learned and conditioned behaviors, social and environmental influences, and subjective experiences during use (Karch, 2007; Benowitz, 2010). Nearly 90% regular adult cigarette smokers began to smoke by age 18 (U.S. Department of Health and Human Services, 2012, 2014). Experimentation is a first step towards established use, partially due to nicotinestimulating regions of the brain associated with pleasure and reward (De Biasi and Dani, 2011), as well as other factors associated with long-term tobacco use, such as social reinforcement (Benowitz, 2010). Existing research has examined psychosocial risk factors for adolescents tobacco use such as depression (Patton et al., 1996), family and peer influence (Hoffman et al., 2006; Leonardi-Bee et al., 2011), and marketing exposure (U.S. Department of Health and Human Services, 2012) across diverse tobacco products (Holman et al., 2013; Mantey et al., 2016). However, there has been a limited examination of subjective experience at first use, particularly among adolescent users, across the diverse array of tobacco products available on the market today.

Nicotine is the primary psychoactive component of tobacco (Henningfield et al., 2009), though the psychoactive effects may be enhanced or otherwise altered by other chemicals present in the product being used (Fowler et al., 1996a, 1996b). The psychopharmacological properties of nicotine can result in a number of possible positive or negative subjective experiences at first and continued use, though repeated exposure can lead to higher tolerance of these properties (Henningfield et al., 2009), resulting in diminished perceived negative effects with sustained use (Pomerleau, 1995). Studies reveal common effects and subjective experiences of nicotine exposure include pleasure/euphoria, comfort, relaxation, and "jittery" (Henningfield et al., 2009) and that naïve nicotine users are more susceptibile to these subjective experiences (Perkins et al., 2009). However, it is important to note nicotine alone may not be responsible for these experiences (Henningfield et al., 2009).

Studies of subjective experiences during initial cigarette use have identified "positive" (i.e., euphoria, relaxation), "negative" (i.e., nausea, coughing) (Zabor et al., 2013), and "neutral" subjective experiences (i.e., "dizziness") (Ríos-Bedoya et al., 2009). This research suggests a positive association between pleasant subjective experiences during the initial experience and later adult smoking (Ursprung et al., 2011) and the number of cigarettes smoked by adult smokers (DiFranza et al., 2004). However, other studies have also found a positive association between unpleasant subjective experiences at first smoking experience and progression to regular smoking (DiFranza et al., 2004; Ríos-Bedoya et al., 2009; Klein et al., 2013; Zabor et al., 2013). Chemical additives in cigarettes (Rabinoff et al., 2007) may influence the number and degree of subjective experiences at first use, as some individuals may be more sensitive to nicotine exposure than others. Further, biological factors, such as nicotine metabolism by liver enzymes may also influence individual responses to nicotine

exposure (Benowitz et al., 2009), with studies showing differences in subjective experiences at first use by race and sex (Sherva et al., 2008; Haberstick et al., 2011), Overall, subjective experiences appear to be a critical element in the abuse potential of any substance (Karch, 2007), including nicotine (DiFranza et al., 2004; Ríos-Bedoya et al., 2009; Klein et al., 2013; Zabor et al., 2013), and so are important to investigate to understand the onset and maintenance of tobacco use.

Study of subjective experiences at cigarette intiation among adolescents reveal sustained cigarette use into adulthood is associated with either the lack of or fewer negative subjective experiences at initiation (Nonnemaker et al., 2013). Specifically, longitudinal study found low rates of negative subjective experiences during cigarette smoking initiation via menthol cigarettes in adolescence increased nicotine dependence, a switch to non-menthol cigarettes, and sustained use of conventional cigarettes in adulthood (Nonnemaker et al., 2013). The observed differences of subjective experiences among different cigarette types (i.e., menthol vs. non-menthol) and differing impact on sustained tobacco use highlights the need to further subjective experiences of lesser studied tobacco products.

Current trends in adolescent tobacco use behaviors, as well as the diversity of product availability, highlight the importance of examining subjective use experiences of products other than cigarettes. Specifically, while cigarette smoking has declined among adolescents in recent years, use of other tobacco products has increased nationwide (Singh et al., 2016). In 2015, 25.3% of high school and 7.4% of middle school students were current tobacco product users (Singh et al., 2016), with electronic cigarettes (e-cigarettes) being the most commonly used product, at 16.0% and 5.3% of high school and middle school students nationwide, respectively. The prevalence of other product use, like hookah and cigars, is now on par with cigarette smoking (Singh et al., 2016). Given the rapidly changing landscape of tobacco product use by adolescents, it is imperative to understand factors associated with the uptake and sustained use of these products over time.

Along with the increased use of these products, significant differences in the composition of these products warrant separate studies of subjective experiences for each product. Specifically, there is significant variance in nicotine concentration (Henningfield et al., 1995; Stanfill et al., 2011; Rostron et al., 2015) and delivery (Lopez et al., 2016) as well as presence of carbon monoxide (Raub et al., 2000; Djulan i et al., 2013; Penney, 2008) and other chemicals (U.S. Department of Health and Human Services, 2012) in these products. Furthermore, products such as e-cigarettes produce no CO (McRobbie et al., 2015), are available in zero nicotine concentrations (Dawkins et al., 2016), and vary substantially nicotine delivery capability (Farsalinos et al., 2014; Wagener et al., 2016). All of these customizable options for e-cigarettes may contribute to subjective experiences during e-cigarette use. Other characteristics that may influence subjective experiences during use include differences between products, variations within each product group (Seidenberg et al., 2016), and user puff topography (i.e., strength and frequency of inhalation) (Koszowski et al., 2014; Talih et al., 2015; Lopez et al., 2016).

However, little is known about subjective experiences of tobacco products other than cigarettes, particularly among adolescent naïve users (i.e., at first use). Most research that

has examined subjective experiences related to use of electronic cigarettes (Dawkins and Corcoran, 2014), hookah (Shishani et al., 2014), clove cigarettes (Malson et al., 2003), and even nicotine replacement therapy (NRT) products (Kaufmann et al., 2004), has been done among established, adult, nicotine users. An example of one such study included an examination of subjective effects of electronic cigarette (e-cigarette) use among a cohort of adult cigarette smokers. This study found low reporting of adverse effects or negative subjective experiences during ongoing e-cigarette use (Dawkins and Corcoran, 2014). However, possible differences in user experiences could stem from product type, inhalation techniques, and metabolism of nicotine (Benowitz et al., 2009; Vansickel and Eissenberg, 2013; Dawkins and Corcoran, 2014). Along with product and user differences, chemical additives and flavorings may lessen or remove negative subjective experiences (Rabinoff et al., 2007; Nonnemaker et al., 2013). For example, a longitudinal study found that low rates of negative subjective experiences during tobacco use initiation (e.g., via menthol cigarettes) increased nicotine dependence as well as sustained use of conventional cigarettes (e.g., non-menthol cigarettes) in adulthood (Nonnemaker et al., 2013). While substantial literature exists on subjective experiences of tobacco use, to our knowledge, *no* studies have examined subjective experiences at *initiation* for cigar products, e-cigarettes, and hookah among adolescents. This study begins to fill this important gap.

2. Material and methods

2.1. Study design and participants

This study analyses data from the Texas Adolescent Tobacco and Marketing Surveillance System (TATAMS), a multi-component, rapid response surveillance system (Koh and Sebelius, 2012) focused on the five counties that surround the four largest cities in Texas (i.e., Austin, Dallas/Fort Worth, Houston, and San Antonio). TATAMS is a longitudinal cohort study of students who were in the 6th, 8th and 10th grade (n = 3907; N = 461,069) at baseline, from which data are used here. More details about its complex sampling design can be found elsewhere (Pérez et al., 2017). The baseline (wave 1) survey was administered at 79 schools between October 2014 and June 2015 using a computerized form on tablets (Delk et al., 2017). The University of Texas Health Science Center at Houston's Institutional Review Board approved this study (reference number: HSC-SPH-13-0377). For participating schools, district and principal approval, and where appropriate, school Institutional Review Board approval, were obtained.

2.2. Measures

2.2.1. Subjective experiences of first use—Subjective experiences of first use were assessed among ever users of any nicotine product. Ever use was assessed by the question "Have you EVER tried [product], even once? Remember, marijuana DOES NOT count." with those responding "yes" defined as "ever users." Participants who reported ever use of cigarettes, e-cigarettes, hookah, large cigars, or little filtered cigars (LFC) or cigarillos, were asked if they experienced five different subjective experiences at first use. All data associated with large cigars, little filtered cigars (LFC), and cigarillos were collapsed into one category (cigar products). Students were asked, "Think back to the FIRST time you smoked/used a [product]. Did you experience any of the following? Dizziness, Coughing,

Sick to Your Stomach, Felt a Pleasurable Rush or Buzz, and Felt Relaxed or Good." For each subjective experience, response options included: "No," "Yes," or "Don't Remember." These items were adapted from the Early Smoking Experiences questionnaire (Pomerleau et al., 1998). Participants who indicated "Don't Remember" were coded as "No" for the analyses. Five dichotomous subjective experiences of first use variables were created corresponding to ever users of each product who indicated that they experienced each subjective experience versus those who did not.

2.2.2. Current use of cigarettes, e-cigarettes, hookah, cigar products—Current use was assessed for all four tobacco products and was defined as use of the product within the past 30 days. The specific questions were, "During the past 30 days, on how many days did you use…(e-cigarettes, cigarettes, hookah, cigars, little filtered cigars/cigarillos)? Please enter the number of days (0–30 days)." Response options, therefore, could range from 0 days to 30 days. Participants who indicated at least 1 day of use in the past 30 days were classified as current users, while those who indicated 0 days of use in the past 30 days were classified as non-current users. Due to small sample sizes, cigars and little filtered cigars/cigarillos were collapsed into one variable ("cigar products"); thus if a participant indicated that they had used a cigar, cigarillo, or little filtered cigar in the past 30 days they were classified as current users of cigar products.

2.2.3. Covariates—Covariates included sex, race/ethnicity (white/other, Hispanic/Latino, African American), grade level (6th/8th versus 10th), and the current use of other e-cigarette/tobacco products (no other product used in the past 30 days versus one or more other products used in the past 30 days). Other e-cigarette/tobacco products included cigarettes, cigar products, hookah, and e-cigarettes.

2.3. Statistical analysis

Exploratory factor analysis was conducted to empirically identify latent factors present with respect to five items specific to subjective experiences of first use, for each tobacco product (Pomerleau et al., 1998; Rodriguez and Audrain-McGovern, 2004; Pomerleau et al., 2005; Urbán, 2010). The Bartlett's test of sphericity and the Kaiser-Meyer Olkin (KMO) were evaluated to determine if the items were intercorrelated and shared a common factor. Next, principal component analysis with varimax rotation was conducted (DeVellis, 2016); items with factor loadings greater than 0.30 were retained and items were included in factors for which they had the highest loadings. Eigenvalues and proportions of variance explained were examined to determine the number of factors to retain for each tobacco product (Loehlin, 1998). Two factors were retained for each product, one for Positive subjective experiences and one for Negative subjective experiences.

Next, weighted prevalence of each SE of first use for each of the tobacco products was calculated, among the ever users of each product. Weighted multiple logistic regression analyses were conducted to examine the association of first use subjective experiences with current use of each e-cigarette/tobacco product, controlling for sex, race/ethnicity, grade level, and current use of other e-cigarette/tobacco products. All SEs were product specific, thus, all analyses examined whether SEs of a specific product were associated with current

use of the same product. Separate models were conducted for each of the five different first use subjective experiences and the two SE subscales (*Total Positive Subjective experiences* and *Total Negative Subjective experiences*). Sampling weights were applied to these analyses to generalize findings to all 6th, 8th and 10th graders living in these metropolitan areas of Texas (Pérez et al., 2017). All analyses were conducted using Stata 14.0 (College Station, TX).

3. Results

3.1. Sample characteristics

Weighted demographic characteristics of the sample are as follows: 49% of participants were female and 66.9% were middle school students (6th or 8th graders); 54.5% of participants were Hispanic/Latino, 27.9% were White, non-Hispanic/Other, and 17.6% were African American. The weighted prevalence rates of ever use of/tobacco products were: 19.5% for e-cigarettes, 10.9% for cigarettes, 6.3% for hookah, and 6.0% for cigar products. With respect to current use, 7.4% of participants reported using e-cigarettes, 3.5% used cigarettes, 2.5% used hookah, and 1.9% used cigar products. Of those who reported current use of at least one tobacco product (n = 324/N = 47,341), 62.4% reported current use of only one product, 28.5% used two products, 7.4% used three products, and 1.7% used all four products.

3.2. Exploratory factor analysis

Results of the EFA are presented in Table 1. For all products except e-cigarettes, two factors were retained for the subjective experiences scales. There were important differences in the factors with respect to the dizziness variable; for cigarettes, dizziness loaded onto the positive SE factor (pleasurable rush/buzz and relaxed/good), while for hookah and cigar/cigarillo/LFCs, dizziness had higher factor loadings on the negative SE factor (coughing and sick/nausea). With respect to e-cigarettes, only one factor emerged for positive subjective experiences (pleasurable rush/buzz and relaxed/good). Based on the results of the EFA, new subscales were created corresponding to positive (*Total Positive Subjective experiences*) and negative subjective experiences (*Total Negative Subjective experiences*). For e-cigarettes, only a positive subjective experience subscale was created as the results of the EFA indicated only one underlying factor. For each product, the subscales were generated by summing the number of subjective experiences reported; thus, the values could range from 0 to 2 for subscales with two items and 0–3 for subscales with three items.

3.3. Subjective experiences at first use

As seen in Table 2, the prevalence of negative (coughing, sick/nausea) and neutral first use subjective experiences (dizziness) was highest among ever cigar and ever cigarette users. Differences in the prevalence of positive subjective experiences were less pronounced between tobacco product types. E-cigarette ever users had the lowest reported rates of almost all subjective experiences, including dizziness, coughing rush/buzz and relaxed/good, although ever hookah users had the lowest prevalence of sick/nausea.

3.4. Subjective experiences at first use and current product use

As seen in Table 3, the total positive subjective experiences subscale was significantly associated with both current use of cigarettes and cigar products after controlling for covariates. Specifically, after adjusting for covariates, each additional positive first use SE was associated with an increase in the odds of current use of cigarettes by 51%, while the odds of current cigar product use increased by 111% (adjusted odds ratio "AOR" = 1.51, 95% CI = 1.16, 1.97; AOR = 2.11, 95% CI = 1.00, 4.42, respectively). Experiencing a "buzz" or rush at first use was associated with current use of cigar products (AOR = 3.15, 95% CI = 1.24, 8.02) while dizziness at first use was significantly associated with current cigarette use (AOR = 2.55, 95% CI = 1.25, 5.22) after adjusting for covariates. Finally, feeling sick or nauseous at first use was significantly associated with decreased odds of current cigar product use after adjusting for covariates (AOR = 0.18, 95% CI = 0.04, 0.74). No first use subjective experiences were significantly associated with increased odds of using e-cigarettes or hookah.

4. Discussion

To our knowledge, this study is the first to investigate subjective experiences of e-cigarettes, cigar products, and hookah at first use among adolescents. Our findings highlight differences in subjective experiences at first use by product type and suggest possible differences in subjective experience categories (e.g., positive experiences and negative experience) among tobacco products. Further, this study examines the association of reported first use subjective experiences of each tobacco product with current use of corresponding products, providing a contemporary understanding of adolescent tobacco use experiences in the context of the rise in use of alternative products (Singh et al., 2016).

Latent factors (e.g., positive/negative experiences) of subjective experiences at first use have been examined for cigarette smoking (Ríos-Bedoya et al., 2009). However, to our knowledge, this is the first to explore these categories for e-cigarettes, hookah, and cigar products. Results differed by product. Possible reasons for the loading of "dizziness" at first use as a positive experience among cigarette users, a negative experience for hookah and cigar product users, and neither (i.e., neutral) for e-cigarette users could be differences in genetics (Benowitz et al., 2009; Ray et al., 2006) or puff topography (Koszowski et al., 2014; Talih et al., 2015; Lopez et al., 2016) among users or differences in product design (Seidenberg et al., 2016) between tobacco products. While the cause remains unclear, these differences in classification of dizziness as well as the prevalence of subjective experiences at first use by product highlight the need for study and evaluation of the causes of these differences and their impact on onset and progression of these tobacco use behaviors.

Adolescents who report e-cigarette use may have higher odds of initiating combustible tobacco as compared to non-e-cigarette users (Leventhal et al., 2015; Primack et al., 2015; Wills et al., 2016); however, the reason for this transition remains unknown. One explanation could be that the use of e-cigarettes offers adolescents a subtle initiation to nicotine, similar to menthol cigarettes (Nonnemaker et al., 2013), as evidenced by the lower rates of first use subjective experiences, particularly negative subjective experiences such as dizziness, coughing, and nausea. The findings of this study suggest both e-cigarette and hookah have

fewer negative subjective experiences at initiation, raising concerns that these products could pave the way for progression to combustible product use and sustained nicotine use in a manner similar to menthol cigarettes, above.

Findings from this study add to existing literature demonstrating an association between subjective experiences and past 30-day cigarette smoking. Given this relationship between subjective experiences and cigarettes, findings from this research as the first to suggest cigar products may share a similar relationship. While this relationship was not observed for hookah or e-cigarette use, longitudinal studies are needed to determine if subtle initiation to nicotine (i.e. few subjective experiences at first use) may result in continued experimentation and/or sustained use. This research raises questions about use trajectories of non-cigarette products like e-cigarettes and hookah, as the subtle initiation to nicotine and the lack of association observed in this research may suggest a slowed and/or unique pathway to sustained use of these products. Future longitudinal studies are needed to clarify the temporal relationship between subjective experiences of first use experiences and progression in non-cigarette product use over time. Examination of their relative importance compared with social influences to use would be helpful.

4.1. Study limitations

Study limitations include a small sample of hookah and cigar product users. Other limitations included the subjectivity of assessed experiences, possible recall bias for self-reported subjective experiences, and variability in nicotine dosage in each product. A second limitation is that the single-item measures used to assess subjective experiences at first use of each product may be less psychometrically robust than multiple-item measures with Likert-scale responses. However, having a large, representative sample of youth in Texas, and their reports of first use, provides a unique look at potential paths for the onset of tobacco use in multiple products. The age of the sample population removes a significant limitation outlined by similar literature, as the preponderance of first use experience studies relies on adult recall (DiFranza et al., 2004; Rabinoff et al., 2007; Ríos-Bedoya et al., 2009; Zabor et al., 2013; Klein et al., 2013). By examining adolescents, this study is able to reduce the amount of time that elapses between initial experience and time of assessment. Further research should examine the longer-term effects of first use experiences in youth and young adults, especially in the context of a rapidly-changing tobacco product landscape.

Acknowledgments

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Table 1

Exploratory Factor Analyses of Subjective Experiences of First Use by Product Type.

Cigarettes			
Subjective Experience	**n**	**Positive**	**Negative**
Relaxed/Good	329	**0.65**	−0.14
Rush/Buzz	329	**0.68**	0.05
Dizziness	332	**0.40**	0.27
Coughing	334	−0.11	**0.38**
Sick/Nausea	324	−0.03	**0.55**
Alpha/correlation for scales[¥]		0.65	0.31
E-Cigarettes			
Subjective Experience	n	Positive	Negative
Relaxed/Good	688	**0.59**	−0.09
Rush/Buzz	672	**0.65**	−0.02
Dizziness	669	0.28	0.06
Coughing	670	0.14	0.27
Sick/Nausea	665	0.06	0.25
Alpha/correlation for scales[¥]		0.50	n/a
Hookah			
Subjective Experience	n	Positive	Negative
Relaxed/Good	204	**0.65**	0.00
Rush/Buzz	204	**0.69**	0.23
Dizziness	197	0.22	**0.61**
Coughing	200	0.16	**0.47**
Sick/Nausea	196	0.04	**0.54**
Alpha/correlation for scales[¥]		0.57	0.55
Cigar/Cigarillo/LFC			
Subjective Experience	n	Positive	Negative
Relaxed/Good	198	**0.56**	0.02
Rush/Buzz	197	**0.60**	0.13
Dizziness	196	**0.32**	**0.40**
Coughing	198	0.14	**0.43**
Sick/Nausea	195	−0.01	**0.43**
Alpha/correlation for scales[¥]		0.46[a]	0.49[b]

Bolded indicates factor loading >0.30.

[¥] alpha for scales with >2 items, pearson correlation for scales with 2 items.

[a] correlation for rush and relaxed.

[b] alpha for dizziness, coughing, sick to stomach.

n = number of ever users of the product with non-missing data for the item; answered "yes" or "no".

Table 2

Prevalence of subjective experiences of first use of e-cigarettes/tobacco products among Texas adolescents (TATAMS, Wave 1, 2014–15).

Product	Age of Initiation Mean (sd)	Relaxed % Yes (95% CI)	Rush/buzz % Yes (95% CI)	Dizziness % Yes (95% CI)	Coughing % Yes (95% CI)	Sick/nausea % Yes (95% CI)
E-Cigarettes (n = 682/N = 88,925)	13.78 (1.43)	45.06 (40.90, 49.30)	19.35 (15.47, 23.93)	4.05 (2.29, 7.07)	14.65 (12.11, 17.62)	3.76 (2.16, 6.45)
Cigarettes (n = 332/N = 48,772)	12.35 (2.41)	52.11 (44.06, 60.05)	25.77 (19.29, 33.52)	17.80 (13.15, 23.64)	44.40 (36.91, 52.15)	12.24 (8.29, 17.70)
Hookah (n = 207/N = 28,856)	13.69 (1.77)	50.70 (38.70, 62.62)	33.54 (22.60, 46.59)	12.05 (7.26, 19.35)	25.13 (18.08, 33.81)	3.57 (1.14, 10.58)
Large Cigar/Cigarillo/LFCs (n = 201/N = 27,807)	12.97 (2.16)	58.55 (48.82, 67.65)	25.58 (17.50, 35.76)	21.98 (14.47, 31.94)	45.65 (35.99, 55.64)	15.36 (9.05, 24.89)

n = sample size; N = weighted population size.

CI = confidence interval.

Table 3

Association between subjective experiences of first use and current use of e-cigarette/tobacco products among Texas adolescents (TATAMS, Wave 1, 2014–15).

	Current E-Cigarette Use Adj OR (n = 682)	Current Cigarette Use Adj OR (n = 332)	Current Hookah Use Adj OR (n = 207)	Current Cigars/Cigarillo/LFC Adj OR (n = 201)
Subjective Experience Type				
Total Positive Subjective Experiences[a,b]	1.21 (0.84, 1.73)	1.51[**] (1.16, 1.97)	0.88 (0.49–1.61)	2.11[*] (1.00 – 4.42)
Total Negative Subjective Experiences[c]	n/a	1.30 (0.62, 2.73)	1.66 (0.59, 4.67)	1.86 (0.43, 8.03)
Individual Subjective Experiences				
Relaxed	1.28 (0.75, 2.18)	2.01 (0.99, 4.07)	1.11 (0.34, 3.62)	2.51 (0.60, 10.45)
Rush/buzzed	1.26 (0.72, 2.20)	1.79 (0.88, 3.61)	0.59 (0.24, 1.40)	3.15[*] (1.24, 8.02)
Dizzy/Lightheaded	1.45 (0.64, 3.25)	2.55[*] (1.25, 5.22)	1.11 (0.66, 1.87)	0.98 (0.59 – 1.61)
Coughing	1.41 (0.79, 2.52)	1.26 (0.48, 3.28)	0.87 (0.13, 5.96)	0.18[*] (0.04, 0.74)
Sick/nausea	0.43 (0.12, 1.53)	1.68 (0.57, 4.94)	0.70 (0.26, 1.89)	0.94 (0.36 – 2.48)

[***] = $p < 001$;

[**] = $p < 0.01$;

[*] = $p < 0.05$.

n = sample size; N = weighted population size.

CI = confidence interval.

All analyses adjusted for gender, grade level, race, and current use of any other e-cigarette/tobacco products.

[a] Items included vary by product and reflect the total count of SEs per product (conventional cigarettes: relaxed, rush, dizziness (0–3); e-cigarettes, hookah, and cigar products: relaxed, rush (0–2)).

[b] Items included vary by product and reflect the total count of SEs per product (conventional cigarettes: coughing, sick/nausea (0–2); hookah and cigar products: coughing, sick/nausea, dizziness (0–3); scale was omitted for e-cigarette.