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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.

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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 nicotinstimulating 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 con-

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tinued 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 susceptible 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 initiation 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; Djulančić 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.

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