



# The association between alcohol, marijuana use, and new and emerging tobacco products in a young adult population



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## HIGHLIGHTS

- Examine correlates of emerging tobacco product use in young adults
- Alcohol use was related to e-cigarette, hookah, and little cigar/cigarillo use.
- Marijuana use was related to e-cigarette, hookah, and little cigar/cigarillo use.
- Sensation seeking moderated alcohol use associations to tobacco product use.

## ARTICLE INFO

Available online 11 April 2015

### Keywords:

Alcohol  
 Marijuana  
 Emerging tobacco products  
 Sensation-seeking  
 e-Cigarettes  
 Hookah

## ABSTRACT

**Background:** Young adults have the highest rates of alcohol, tobacco, and other drug use relative to any other age group. Few studies have examined the co-occurrence of substance use with new and emerging tobacco products in this vulnerable group, or the underlying personality factors that may explain these associations. To address this gap, this study examined the association of current alcohol and marijuana use with the use of cigarettes and emerging tobacco products in a nationally representative sample of young adults.

**Methods:** Data were drawn from 18 to 24 year olds in Wave 4 (January 2013;  $n = 1609$ ) of the Legacy Young Adult Cohort, a nationally-representative sample of men and women. Never, ever (lifetime), and past 30-day use of little cigars/cigarillos (LCCs), hookah, e-cigarettes, and cigarettes were assessed separately in current (everyday or some days) alcohol and marijuana users.

**Results:** Using weighted estimates, multivariable multinomial logistic regression models showed that current alcohol and marijuana use were associated with lifetime and past 30-day use of cigarettes, LCCs, e-cigarettes, and hookah, with different magnitudes of association found across each product. Post-hoc exploratory analyses showed that sensation-seeking traits moderated the relationship of alcohol (but not marijuana) use to current use of select tobacco products.

**Discussion:** Marijuana and alcohol use may enhance risk for emerging tobacco products use in young adulthood. Prevention and intervention programs may need to target poly-use of alcohol, marijuana, and tobacco rather than focusing on a single risk behavior during these critical years.

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## 1. Introduction

The transition into young adulthood (18–24) from adolescence is an important developmental period during which young adults are

confronted with a variety of life changes (i.e., fertility, residential mobility, marriage, educational shifts, and employment) and a diversity of roles (i.e., student, worker, other), often for the first time. These significant life transitions mark an increased susceptibility to engaging in a variety of health-risk behaviors, most notably alcohol, tobacco, and other drug use. As a result, young adults have some of the highest rates of substance use relative to any other age group (Dawson, Grant, Stinson, & Chou, 2004; Grant, 1996, 1997; Grant et al., 2004; Pearson,

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Richardson, Niaura, Vallone, & Abrams, 2012; Rath, Villanti, Abrams, & Vallone, 2012).

In recent years, the use of new and emerging tobacco products, like e-cigarettes, little cigars/cigarillos (LCCs), and hookah has been on the rise among young adults (Barnett et al., 2013; Cobb, Ward, Maziak, Shihadeh, & Eissenberg, 2010; Richardson, Williams, Rath, Villanti, & Vallone, 2014; Smith et al., 2011), despite a modest decline in cigarette use (Agaku, King, & Dube, 2014). Eighteen percent of individuals aged 18 to 24 report using a new and emerging tobacco product at least once in their lifetime (King, Dube, & Tynan, 2012; McMillen, Maduka, & Winickoff, 2012). Recent data suggest that 2%–8% of young adults have ever used e-cigarettes, 10%–25% have ever used hookah (McMillen et al., 2012; Rath et al., 2012; Smith et al., 2011) and 26% have ever used LCCs (Rath et al., 2012). Using the National Adult Tobacco Survey, King et al. (2012) examined current tobacco use among US adults 18 years of age or older and found that nearly 16% of young adults were current LCC users and almost 8% were current hookah users. These rates were much higher than older adult-age groups that were examined. Further, there is some data to suggest that hookah use is surpassing cigarette smoking, particularly among young adult college students (Barnett et al., 2013). Rising trends in the use of new and emerging tobacco products are of concern, as evidence suggests that some of these products portend similar negative health consequences as regular cigarette smoking (Akl et al., 2010; American Lung Association, 2007; Nonnemaker, Rostron, Hall, MacMonegle, & Apelberg, 2014).

Similarly, epidemiological evidence indicates rates of alcohol and other substance use disorders are higher in young adults than any other age group; where past year DSM-IV alcohol use disorder diagnoses are 6.6% for dependence and 8.5% for abuse (Dawson et al., 2004; Grant et al., 2004; National Institute on Alcohol Abuse and Alcoholism, 2008), and past-year substance use disorders are 1.6% for dependence and 3.6% for abuse (Compton, Thomas, Stinson, & Grant, 2007). Tobacco use, including use of new and emerging tobacco products, also frequently co-occurs with alcohol and drug use (Falk, Yi, & Hiller-Sturmhöfel, 2006; Fix et al., 2014; Grant, Hasin, Chou, Stinson, & Dawson, 2004; Smith-Simone, Maziak, Ward, & Eissenberg, 2008; Soule, Barnett, & Curbow, 2012; Weitzman & Chen, 2005). LCC and large cigar use have been found to be significantly related to alcohol use, as well as lifetime and current daily marijuana use (Richardson, Rath, Ganz, Xiao, & Vallone, 2013; Schuster, Hertel, & Mermelstein, 2013). Quantity of alcohol use and frequency of marijuana use prior to college entry have been shown to predict hookah initiation and frequency of hookah use, respectively, during the first year of college (Fielder, Carey, & Carey, 2013). Current and sustained use of hookah (over the course of several years) in young adult samples have also been linked to past 30-day alcohol and marijuana use (Dugas, O'Loughlin, Low, Wellman, & O'Loughlin, 2014; Sutfin et al., 2011). Alcohol and marijuana use in this age group enhance the risk of tobacco use (Patton, Coffey, Carlin, Sawyer, & Lynskey, 2005), and could lead to greater nicotine dependence and worse smoking cessation outcomes in later adulthood (Anthony & Echeagaray-Wagner, 2000; Falk et al., 2006; Kahler, Spillane, & Metrik, 2010; Kahler et al., 2008; Richter, Ahluwalia, Mosier, Nazir, & Ahluwalia, 2002).

Given the high prevalence of substance use in young adults, and the negative impact of alcohol and drug use on later adult tobacco use trajectories, additional research is needed to understand their association with new and emerging tobacco products. Evidence shows that alcohol use, one's first experience of drunkenness, and marijuana use in junior high and high school may be gateways to tobacco initiation and nicotine dependence in young adulthood (Collins, 2002; Ellickson, Hays, & Bell, 1992; Graham, Collins, Wugalter, Chung, & Hansen, 1991; Patton et al., 2005; Tarter, Vanyukov, Kirisci, Reynolds, & Clark, 2006; Vaughn, Wallace, Perron, Copeland, & Howard, 2008). The role of marijuana as a gateway to tobacco initiation and use is particularly noteworthy given recent state-level changes in the legalization of marijuana (Office of National Drug Control Policy & The White House, 2014). It is unclear how alcohol

and marijuana use are differentially related to the spectrum of new and emerging tobacco products (LCCs, hookah, e-cigarettes) and, to our knowledge, no data on this association has been collected from a population-based sample of young adults both in and out of college.

Substance use in young adults may be conditioned upon a personality trait that is commonly associated with high-risk behaviors. Sensation-seeking traits have been consistently linked to a variety of health risk behaviors, are frequently reported in individuals who use or abuse alcohol or other substances (Carlson, Johnson, & Jacobs, 2010; Charnigo et al., 2013; Ersche, Turton, Pradhan, Bullmore, & Robbins, 2010; Ersche et al., 2012, 2013; Fix et al., 2014; Hampson, Tildesley, Andrews, Barckley, & Peterson, 2013; Weiland et al., 2013), and have recently been linked to the use of new and emerging tobacco products in college students (Enofe, Berg, & Nehl, 2014). Predominant theories suggest that a desire to seek out novel experiences, having a preference to engage in pleasurable activities with high reward output, and being low on harm avoidance, which are all facets of sensation-seeking, may link substance use behavior to the use of new and emerging tobacco products (Cloninger, 1987; Finn, Sharkansky, Brandt, & Turcotte, 2000; Wills, Vaccaro, & McNamara, 1994). Understanding the intricacies of the relationship between alcohol/marijuana use and the spectrum of new and emerging products, including potential moderating factors, will enhance our ability to develop targeted interventions and refine tobacco use policies that may help deter the uptake of certain products associated with heightened risk for other negative health behaviors.

The primary aim of this study was to examine the association of alcohol and marijuana use with use of cigarettes and several new and emerging tobacco products (LCCs, e-cigarettes, and hookah) in a nationally representative sample of young adults. As a secondary aim, we examined whether a link between alcohol/marijuana use and emerging tobacco product use would be moderated by sensation-seeking. We proposed that alcohol and marijuana use would be associated with the greatest odds of emerging tobacco product use among those with higher, rather than lower levels of sensation-seeking.

## 2. Method

### 2.1. Participants and procedure

Data were taken from the subgroup of 18–24 year olds ( $n = 1609$ ) participating in Wave 4 of the Legacy Young Adult Cohort, a nationally-representative sample of men and women aged 18 to 34 ( $n = 4288$ ) drawn from the GfK KnowledgePanel®. Wave 4 was fielded in January 2013. The cohort was recruited via address-based sampling, which accounted for US-based representations by race/ethnicity and cell-phone only households. GfK provided households without internet access with a free netbook computer and internet service to reduce response bias in typical online survey samples. African-American and Hispanic individuals were oversampled to ensure sufficient sample sizes for subgroup analyses. Additional details on the survey methodology are published elsewhere (Rath et al., 2012). The household recruitment rate for the Wave 4 survey was 14.7% and in 65.5% of these households, one member completed a core profile survey in which the key demographic information was collected. For this particular study, only one panel member per household was selected at random to be part of the study sample and no members outside the panel were recruited. The study completion rate was 65.7% and thus, the cumulative response rate for this wave was 6.3%. This study was approved by the Independent Investigational Review Board, Inc., and online consent was collected from participants before survey self-administration.

### 2.2. Measures

#### 2.2.1. Tobacco use outcomes

The separate use of four different tobacco products was explored as the outcome in the current study: use of cigarettes, little cigars/

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