



Published in final edited form as:

Drug Alcohol Depend. ; 211: 107964. doi:10.1016/j.drugalcdep.2020.107964.

Longitudinal Associations between Marijuana and Cigar Use in Young Adults

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Abstract

Background—We assess the longitudinal associations between marijuana and cigar (little cigars and cigarillos [LCCs] and large cigars) use on subsequent initiation of marijuana and cigar use.

Methods—Data are from a cohort study of 2,189 young adults recruited in fall 2010 from 11 colleges in the Southeast. We used discrete-time survival analysis to examine whether ever use of marijuana at baseline (spring 2011, freshman year) predicted initiation of LCCs and large cigars and whether ever use of these cigar products predicted initiation of marijuana use across 10 waves of data collection (2011–2018).

Results—The sample was 65.3% female, 83.6% White, 5.9% Hispanic, and 61.8% had college-educated mothers. At baseline, 70% reported never using LCCs, 71% reported never using large cigars, and 74% reported never using marijuana. Ever use of marijuana at baseline was associated with an increased risk of LCC initiation (Incident rate ratio [IRR]=1.6, 95%CI=1.0, 2.5) but not large cigar initiation. Ever use of LCCs (IRR=1.4, 95%CI=1.1, 1.8) and ever use of large cigars (IRR=1.3, 95%CI=1.1, 1.8) at baseline both predicted initiation of marijuana use.

Conclusions—Our findings support growing evidence that marijuana and LCCs are strongly associated and use of one substance predicts use of the other. In contrast to studies of adults, we also found that young adults who have tried large cigars may be at increased risk for subsequent

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Contributors

JCR and BR conceptualized the study; BR conducted data analysis. JCR, BR, and SW wrote the manuscript; ES, MW, and CS provided edits and feedback to manuscript drafts. All authors contributed to and approved the final version of the manuscript.

Conflict of Interest

No conflicts declared.

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marijuana use. These findings highlight the need to consider each product as a potential gateway of the other when developing interventions for young adults.

Keywords

marijuana; cigars; cigarillos; tobacco; young adults

1. Introduction

Although cigarette smoking rates have declined among young adults, the use of cigars, including little cigars and cigarillos (LCCs) and large cigars, remains common, particularly among young adults. According to the 2013–2014 Population Assessment of Tobacco and Health survey, among young adults ages 18–24, current use of cigars is 14.1%; 5.9% traditional cigars, 10.7% cigarillos, and 3.5% little cigars (Kasza et al., 2017). Similarly, marijuana use is highly prevalent among young adults and increasing. Rates of current marijuana use from the National Survey on Drug Use and Health increased significantly from 17.3% in 2002 to 22.1% in 2017 (Azofeifa, 2016; Center for Behavioral Health Statistics and Quality, 2018). Similarly, use of marijuana has increased among young adults, with daily or almost daily use increased from 14.5% in 2002 to 21.9% in 2017 (Azofeifa, 2016; Center for Behavioral Health Statistics and Quality, 2018).

Both products pose significant health risks. Cigar use, including large cigars and LCCs, causes several types of cancers, heart disease, lung disease, and nicotine addiction (Chang et al., 2015), and their smoke contains harmful constituents, such as tobacco-specific nitrosamines, ammonia, and carbon monoxide (Baker F et al., 2000; Hoffmann and Hoffmann, 1998). Additionally, marijuana has important acute and long-term health effects, such as impaired short-term memory and motor impairment, reduced educational attainment, addiction, chronic bronchitis, respiratory problems, and increased risk of chronic psychosis disorders (Volkow et al., 2014).

There is strong evidence of that young adults co-use cigars (large cigars and LCCs) and marijuana (Schauer et al., 2016; Strong et al., 2018). Research has shown that 50.1% of established young adult cigar users (large cigars and LCCs) also report past 30-day marijuana use (Strong et al., 2018). In addition, 20.6% of past 30-day adult marijuana users report past 30-day cigar use (large cigars and LCCs) compared to 4.2% of non-marijuana users (Schauer et al., 2016). Studies show that rates of co-use are highest among young adults; 13.7% of young adults report past month co-use. Despite lower rates of co-use among adults ages 26–34, rates are increasing among this age group (6.6% to 8.0% 2003–2012) (Schauer et al., 2015). Co-use can also mean concurrent use (i.e. use at the same time). Blunts are a common mode of concurrent use. Blunts are hollowed out cigars filled with marijuana). Rates of blunt use among current marijuana users are also highest among those 18–24 (60.4% vs 43.0% for 25–34 year olds) (Schauer et al., 2016). Although users may not perceive they are using tobacco when smoking a blunt, blunts may expose marijuana users to residual nicotine in the wrapper and therefore the propensity for tobacco use (Bélanger et al., 2013; Patton et al., 2005; Rosenberry et al., 2017; Schauer et al., 2017, 2016).

Nicotine may reinforce and enhance the effects of marijuana and vice versa (behaviorally, cognitively, and pharmacologically), but research is limited (Ramo et al., 2013, 2012; Viveros et al., 2006). Understanding the reasons for co-use of marijuana and tobacco is important because co-use has been shown to be associated with additive health effects (Badiani et al., 2015; Meier and Hatsukami, 2016; Rooke et al., 2013; Strong et al., 2018), higher levels of dependence, and lower intentions to quit and less successful cessation attempts for both marijuana and tobacco (Peters et al., 2012; Ramo et al., 2013, 2012; Schauer et al., 2017; Strong et al., 2018). As marijuana becomes legalized in more states and increasingly accepted across the U.S. (Hartig and Geiger, 2018), it will be important to monitor the impact of potential increases in marijuana use on the prevalence of cigar use and the underlying reasons for co-use of both.

A few studies have characterized cross-sectional patterns of marijuana and cigar co-use (Cohn et al., 2016; Soldz et al., 2003). However, there is limited research to examine their longitudinal associations. In one 4-year longitudinal study, it was found that marijuana use predicted past month LCC use among adults ages 18–34, but did not predict past month large cigar use; similarly, any cigar use did not predict past month marijuana use (Cohn et al., 2018). It is also important to examine the role that marijuana and cigars have on initiation of one another. Initiating cigars may serve as an introduction to nicotine, increasing the potential for addiction and lifelong tobacco use (DiFranza and Wellman, 2005; McMillen et al., 2012). Further, initiation of marijuana can lead to long-term use and health consequences (Fairman et al., 2019; Patrick et al., 2016; Volkow et al., 2014). A better understanding of the role that marijuana use has on cigar use initiation as well as the role that cigar use has on marijuana initiation is needed to inform the development of appropriate interventions to prevent initiation, and, ultimately, regular consumption of nicotine and marijuana. Our study adds to the literature by assessing the influence of marijuana and cigar use on the *initiation* of the other in a large cohort of young adults followed for 8 years.

2 Material and Methods

2.1 Study Design

Data were collected from 2010–2018, representing 11 waves of online survey data collection, from the *Assessment of the College Experience (ACE) Study* (previously referred to as the *Smokeless Tobacco Use in College Students* study) (Spangler et al., 2014; Wolfson et al., 2015). Students from 11 colleges and universities participated in this study. Seven of the colleges were in North Carolina and four were in Virginia; nine were public and two were private; five were in rural communities, four in suburban communities, and two in urban communities (Wolfson et al., 2014). Undergraduate enrollment ranged from about 4,000 to just over 23,000. In fall 2010, a tobacco screener survey was emailed to all first-year students at these colleges. A total of 10,528 students completed the screener. A subsample from the screener survey was invited to participate in a cohort study. Lifetime smokeless tobacco users, current smokers, and males were oversampled. There were 4902 eligible students who were invited to participate in the longitudinal cohort study of which 3146 (64.2%) completed the baseline (Wave 1) survey. Because the mode of contact was via email and data collection was web-based, every effort was made to contact participants each

wave regardless of their academic status (e.g. no longer enrolled in college, moved to a different state) or participation in previous waves. Surveys were completed in the spring of 2011 (Wave 2, n=2520), fall 2011 (Wave 3, n=2459), spring 2012 (Wave 4, n=2507), fall 2012 (Wave 5, n=2516), fall 2013 (Wave 6, n=2500), fall 2014 (Wave 7, n=1855), fall 2016 (Wave 8, n=1966), spring 2017 (Wave 9, n=1896), fall 2017 (Wave 10, n=1914), spring 2018 (Wave 11, n=1927) and fall 2018 (Wave 12, n=1960). Through Wave 6, we retained approximately 80% of the original cohort (65.4% completed all 6 waves and 75.5% completed 5 or more). Wave 7 was the first post-college wave for most participants. Through Wave 12, after 8 years of data collection, we have retained 62.3% of the original cohort. The study protocol was approved by the Wake Forest School of Medicine Institutional Review Board, and additional privacy protection was provided by obtaining a Certificate of Confidentiality from the U.S. Department of Health and Human Services. In the current study, we use Wave 2 (spring 2011) as our baseline because questions for cigar use did not differentiate between large cigars and LCCs until Wave 2.

2.2 Measures

2.2.1 Tobacco use—At each wave, participants were asked whether they had ever smoked each of the following tobacco products: little cigars or cigarillos (LCC), large cigars, waterpipe tobacco, e-cigarettes or other vaping devices, cigarettes, and smokeless tobacco (SLT). They were considered current users of a product if they reported using it at least once in the past 30 days. Similarly, at each wave participants were considered ever users of these products if they reported ever trying the product.

2.2.2 Marijuana use—Marijuana use was measured by asking participants if they had ever used marijuana. If yes, they were then asked to select how many days they had used it out of the last 30 (range: 0–30). Those reporting using at least one day in the past 30 days were considered current users. We did not ask participants about modes of marijuana consumption (e.g., blunts, edibles) until Wave 10.

2.2.3 Demographics—Demographic characteristics included sex (male, female), race (coded as White vs. Non-White), ethnicity (coded as Hispanic vs. Non-Hispanic), and mother's highest level of education as an indicator for socioeconomic status (coded as at least a college degree vs. less than a college degree).

2.2.4 Other behaviors—We asked participants at baseline whether they were a member of Greek life during college (coded as member or pledge vs. not). We also assessed religiosity at baseline (coded as attend religious services at least 2x/month vs. less than 2x/month). We asked about past 30-day alcohol drinking, with data from this question being used in every wave reported in this manuscript.

2.3 Analyses

A series of discrete-time survival analysis models were fit to examine 1) the impact of baseline ever marijuana use on time to first LCC use among never cigar users, 2) the impact of baseline ever marijuana use on time to first large cigar use among never cigar users, 3) the impact of baseline ever LCC use on time to first marijuana use among never marijuana

users, and 4) the impact of baseline ever large cigar use on time to first marijuana use. “First use” was defined as the first wave after baseline at which the participant reported ever using the product. Models controlled for sex, race, ethnicity, mother’s education, Greek society membership, religiosity, past 30-day alcohol use, and past 30-day use of other tobacco products (e-cigarette, waterpipe, SLT, cigarettes). Models including LCC as a predictor or outcome additionally adjusted for past 30 day large cigar use and vice-versa. Past 30-day use variables were included as time-varying covariates while other variables were treated as time-constant factors. Participants could have gaps in waves of participation, in which case person-periods of unknown risk were not included in the analyses. Analyses were performed using PROC SURVEYLOGISTIC in SAS V9 to account for the complex sampling design, specifically oversampling of lifetime smokeless users, current smokers and males and the sampling of individuals nested within-schools. Results were reported as incident rate ratios (IRR). The IRR is the incidence rate of the outcome in those with the exposure of interest during the time at risk divided by the incidence rate in those without the exposure.

3. Results

The sample was 65.3% female, 83.6% White, 5.9% Hispanic, and 61.8% had college-educated mothers. At baseline (spring 2011, freshman year), 70% of the sample reported never using LCCs, 71% reported never using large cigars, and 74% reported never using marijuana. See Table 1 for demographic, behavioral, and tobacco use characteristics.

Among those never having tried LCCs or large cigars at baseline, ever use of marijuana at baseline was associated with an increased risk of LCC initiation (IRR=1.6, CI=1.01, 2.5) but not large cigar initiation (IRR=1.2, CI=0.8, 1.8) in fully adjusted models. Among those never having tried marijuana at baseline, ever use of LCCs (IRR=1.4, CI=1.1, 1.9) and ever use of large cigars (IRR=1.3, CI=1.1, 1.8) at baseline both predicted initiation of marijuana use in fully adjusted models (Table 2).

We also found demographic factors associated with initiation of LCCs, large cigars, and marijuana in fully adjusted models (see Table 2). In the model of *LCC use predicting marijuana initiation*, females were more likely than males to initiate marijuana (IRR=1.2, CI 1.1, 1.4), and non-Whites were more likely than Whites to initiate marijuana (IRR=1.3, CI 1.1, 1.5). Those who reported attending religious services at least twice per month were less likely than those who attended religious services less frequently to initiate marijuana (IRR=0.6, CI 0.5, 0.8). We also found that past 30-day users of cigarettes (IRR=1.9, CI 1.3, 2.9) and waterpipe tobacco (IRR=2.2, CI 1.7, 2.9) were more likely to initiate marijuana compared to nonusers of those products. Similarly, past 30-day users of alcohol were more likely to initiate marijuana (IRR=6.6, CI 4.3, 10.1).

In the model of *large cigar use predicting marijuana initiation*, the same covariates predicted marijuana initiation as they did in the LCC model, with the exception of Greek Life participation. Those who participated in Greek Life during college were less likely to initiate marijuana compared to those who did not participate (IRR=0.8, CI 0.6, 0.9).

In the model of *marijuana use predicting LCC initiation*, females were less likely than males to initiate LCCs (IRR=0.8, CI 0.6, 1.0). Past 30-day users of cigarettes (IRR=2.0, CI 1.2, 3.5), e-cigarettes (IRR=3.0, CI 1.8, 5.0), waterpipe tobacco (IRR=2.8, CI 1.5, 5.3), and large cigars (IRR=5.5, CI 3.8, 8.0) were more likely to initiate LCCs compared to nonusers of those products. Similarly, past 30-day users of alcohol were more likely to initiate LCCs compared to those who did not use alcohol in the past 30 days (IRR=2.5, CI 1.5, 4.0).

In the model of *marijuana predicting large cigar initiation*, the same covariates that predicted initiation of LCC use also predicted initiation of large cigar use, with the exception of four covariates. Hispanics were less likely to initiate large cigar use compared to non-Hispanics (IRR=0.7, CI 0.5, 0.9). Those who participated in Greek Life during college were more likely to initiate large cigars compared to those who did not participate (IRR=1.7, CI 1.3, 2.3). Religiosity also served as a protective factor, with those attending religious services at least twice per month being less likely to initiate large cigars compared to those who attended fewer than 2x per month (IRR=0.7, CI 0.5, 0.9). Finally, those who used SLT in the past 30 days were more likely to initiate large cigars than those who did not use SLT in the past 30 days (IRR=3.2, CI 1.3, 7.9).

4. Discussion

Overall, we found a strong longitudinal association between marijuana use and use of LCCs and large cigars. Consistent with the study of Cohn et al. (2018) in a national sample of 18–34 year olds, we found that marijuana use at college entry predicts later LCC use, even after adjustment for sociodemographics and other tobacco product and alcohol use. However, in contrast to Cohn et al. 2018, we found that young adults who reported having tried LCCs or large cigars were at increased risk for subsequent marijuana use. The lack of findings for large cigars in Cohn et al. may be due to differences in the study populations. Our study assesses a cohort of students as they are entering college whereas Cohn et al. (2018) follows a nationally representative sample of adults ages 18–34 at study entry. Prior studies have found that large cigar use is more common among affluent and college-educated populations (Cohn et al., 2016; Richardson et al., 2013), which more closely reflects our study population. Marijuana use predicting later LCC use but not large cigar use may be due to product characteristics of LCCs compared to large cigars. Qualitative research findings have shown that LCCs are sometimes used to enhance marijuana smoking through blunts, creating a unique flavor profile from the LCC flavor in combination with the marijuana flavor as well as providing an extra buzz (Jolly, 2008; Sterling et al., 2015). It is possible that LCC use may have been initiated while also using marijuana. Many large, premium cigars are tobacco flavored, so it is unlikely that these more high-end products, which cost more money, are used as blunts compared to flavored LCCs, which are cheaper (Corey et al., 2018).

We also found in our four models that use of alcohol and other tobacco products was associated with initiation of LCCs, large cigars, and marijuana. Past month cigarette smoking, waterpipe tobacco smoking, and alcohol use were all associated with initiation of LCCs, large cigars, and marijuana. We also found that past month LCC use predicted initiation of large cigar use, and vice versa. Past month e-cigarette use predicted LCC and

large cigar initiation, but not marijuana initiation. Finally, past month SLT use predicted large cigar initiation, but not LCCs or marijuana. These findings are consistent with other research that has found that the majority of marijuana users also use tobacco or use certain tobacco products as a vehicle to use marijuana (Sterling et al., 2016; Strong et al., 2018; Sutfin et al., 2014). Research has also found that those who co-use marijuana and tobacco are less likely to report intentions or attempts to quit smoking tobacco because of their reinforcing effects on each other (Agrawal et al., 2012; Strong et al., 2018). This further enforces the importance of considering use of both marijuana and tobacco use when developing interventions.

We found additional demographic factors associated with initiation of marijuana, LCCs, and large cigars. Females were more likely than males to initiate marijuana use, but less likely to initiate LCCs and large cigar. This finding is similar to previous research showing that female tobacco users are more likely than male tobacco users to use other substances (e.g., marijuana) (Conway et al., 2018; Goodwin et al., 2017). Non-Whites were more likely than Whites to initiate marijuana use, but no association was found for race and large cigar initiation. Findings were marginally significant for LCCs with non-Whites more likely to initiate LCC use. The lack of significance may reflect our small sample of non-Whites. Those who were Hispanic compared to non-Hispanic were less likely to initiate large cigar use, but no association was found for initiation of LCCs or marijuana. These findings reflect the relative prevalence estimates found in other studies, extending the body of knowledge for LCC and large cigar initiation (Kasza et al., 2017; Strong et al., 2018). Interventions should consider these factors to target these at-risk populations, including through public education efforts, such as communication campaigns, where messages can be tailored to different demographic groups that are at most risk. No relationship was found for socioeconomic status (mother's education) for initiation of LCCs, large cigars, or marijuana. This finding contrasts with other research, which has found that those with lower socioeconomic status are more likely to be users of tobacco and other substances, but may reflect our higher SES sample (Pacek et al., 2018; Wang, 2018). Studies have shown that peer characteristics, familial substance use, and juvenile delinquency are also associated with substance use during young adulthood (Redonnet et al., 2012). Further research is needed to determine if these or other traits play a role in current young adult marijuana and cigar use and how they may facilitate initiation of different products.

Furthermore, we found participation in social organizations to be associated with initiation. In our study, we found a strong association between Greek life and use of large cigars in fully adjusted models. Overall, the prevalence of both LC and LCC use was higher among those involved in Greek life than those who were not (Table 1). This is consistent with common stereotypes of fraternity houses in particular. However, we also found that those participating in Greek life were less likely to smoke marijuana than those not involved in Greek life. This finding is in contrast to studies which have found a positive correlation between Greek life and marijuana use (McCabe et al., 2018, 2005; O'Brien et al., 2018). However, other studies have also found marijuana use to be lower among those involved in Greek Life (Phillips et al., 2017). It is possible that those involved in Greek Life are more likely to smoke large cigars for celebratory events, such as new member initiation. Use of marijuana might also lead to punishment such as being expelled from their fraternity or

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Highlights

- Examined cigar and marijuana use in college students followed into young adulthood.
- Cigar product use was associated with marijuana initiation.
- Marijuana use was associated with little cigar/cigarillo initiation.
- Marijuana use was not associated with large cigar initiation.

Table 1. Baseline Demographic, Behavioral, and Tobacco Use Characteristic By Ever Use of Marijuana, LCCs, and Large Cigars

	Baseline Ever Marijuana Use		Baseline Ever Little Cigar and Cigarillo Use		Baseline Ever Large Cigar Use		Total
	Yes N=736	No N=1453	Yes N=935	No N=1254	Yes N=918	No N=1271	
Age	18.5 (0.03)	18.6 (0.02)	18.6 (0.03)	18.6 (0.02)	18.6 (0.03)	18.5 (0.02)	18.6 (0.02)
Sex							
Male	396 (40.7)	713 (32.6)	542 (48.7)	567 (28.8)	605 (56.8)	504 (25.7)	1109 (34.7)
Female	340 (59.3)	740 (67.3)	393 (51.3)	687 (71.2)	313 (43.2)	767 (74.3)	1080 (65.3)
Race							
White	651 (88.8)	1202 (81.8)	808 (85.1)	1045 (83.0)	821 (89.3)	1032 (81.2)	1853 (83.6)
Non-White	85 (11.2)	251 (18.2)	127 (14.9)	209 (17.0)	97 (10.7)	239 (18.7)	336 (16.4)
Hispanic							
Yes	58 (9.1)	80 (4.8)	66 (7.5)	72 (5.2)	58 (7.1)	80 (5.5)	138 (5.9)
No	678 (90.9)	1373 (95.2)	869 (92.5)	1182 (94.8)	860 (92.9)	1191 (94.5)	2051 (94.1)
Past 30 day use							
Marijuana	615 (78.2)	NA	471 (45.3)	144 (9.4)	444 (41.7)	171 (11.3)	615 (20.1)
Little cigars and cigarillos	202 (24.2)	119 (5.0)	321 (33.3)	NA	242 (22.6)	79 (4.8)	321 (9.9)
Large cigars	149 (15.8)	100 (4.4)	206 (19.8)	43 (2.0)	249 (25.1)	NA	249 (7.3)
Cigarettes	341 (32.9)	176 (6.2)	408 (32.0)	109 (5.0)	388 (31.2)	129 (5.6)	517 (13.1)
Waterpipe	221 (26.7)	124 (5.6)	274 (25.6)	71 (4.8)	249 (23.9)	96 (5.8)	345 (11.1)
E-cigarettes	32 (3.0)	19 (0.7)	38 (2.7)	13 (0.7)	40 (3.0)	11 (0.6)	51 (1.3)
Smokeless tobacco	87 (7.4)	62 (1.8)	124 (9.2)	25 (0.8)	130 (9.7)	19 (0.6)	149 (3.3)
Alcohol	698 (93.7)	743 (46.0)	799 (82.1)	642 (48.1)	799 (83.7)	642 (47.8)	1441 (58.2)
Ever Use							
Marijuana	NA	NA	548 (54.5)	188 (13.5)	518 (51.3)	218 (15.2)	736 (25.7)
Little cigars and cigarillos	548 (63.2)	387 (18.3)	NA	NA	688 (68.3)	247 (14.1)	935 (29.8)
Large cigars	518 (57.9)	400 (19.1)	688 (66.5)	230 (13.1)	NA	NA	918 (29.1)
SES							
Mom less than college degree	266 (37.0)	556 (38.5)	370 (39.3)	452 (37.7)	330 (34.6)	492 (39.6)	822 (38.1)
Mom at least college degree	470 (63.0)	897 (61.5)	565 (60.7)	802 (62.3)	588 65.4)	779 (60.4)	1367 (61.8)
Greek Affiliation	167 (23.5)	209 (12.8)	183 (19.6)	193 (13.9)	200 (22.0)	176 (13.0)	376 (15.6)

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	Baseline Ever Marijuana Use	Baseline Ever Little Cigar and Cigarillo Use	Baseline Ever Large Cigar Use	Total
	Yes N=736	Yes N=935	Yes N=918	N=2189
	No N=1453	No N=1254	No N=1271	
Attend religious service 2x+ per month	100 (14.0)	169 (19.9)	171 (20.8)	598 (31.6)
	498 (37.7)	429 (36.6)	427 (36.1)	

Note. Cells are N (%) except for Age, which is M (SD)

Table 2.

Multivariable Discrete-Time Survival Analysis

Predictor	Marijuana Initiation IRR (95% CI)	Marijuana Initiation IRR (95% CI)	LCC Initiation IRR (95% CI)	Large Cigar Initiation IRR (95% CI)
Ever LCC Use at Baseline	1.40 (1.1, 1.8)			
Ever Large Cigar Use at Baseline		1.3 (1.1, 1.8)		
Ever Marijuana Use at Baseline			1.6 (1.01, 2.5)	1.2 (0.8, 1.8)
Demographics				
Female vs. Male	1.2 (1.1, 1.4)	1.3 (1.1, 1.5)	0.80 (0.6, 1.0)	0.5 (0.4, 0.6)
Hispanic vs. Non-Hispanic	0.8 (0.5, 1.3)	0.8 (0.5, 1.3)	1.1 (0.8, 1.4)	0.7 (0.5, 0.9)
Non-White vs. White	1.9 (1.1, 1.5)	1.3 (1.1, 1.5)	1.3 (0.9, 1.8)	1.04 (0.8, 1.3)
Mom college educated	1.2 (0.9, 1.4)	1.1 (0.9, 1.4)	0.9 (0.7, 1.2)	1.2 (0.9, 1.6)
Greek affiliation (member or pledge)	0.8 (0.6, 1.03)	0.8 (0.6, 0.9)	1.2 (0.7, 1.9)	1.7 (1.3, 2.3)
Attends religious services at least 2x month	0.6 (0.5, 0.8)	0.6 (0.5, 0.8)	0.8 (0.7, 1.04)	0.7 (0.5, 0.9)
Time-Varying Covariates				
Past 30-day drinking	6.6 (4.3, 10.1)	6.7 (4.5, 10.1)	2.5 (1.5, 4.0)	2.8 (2.1, 3.9)
Past 30-day cigarette use	1.9 (1.3, 2.9)	1.9 (1.3, 2.9)	2.0 (1.2, 3.5)	1.9 (1.3, 2.9)
Past 30-day e-cigarette use	1.8 (0.9, 3.3)	1.8 (0.9, 3.3)	3.0 (1.8, 5.0)	2.5 (1.5, 4.0)
Past 30-day waterpipe use	2.2 (1.7, 2.9)	2.2 (1.6, 2.9)	2.8 (1.5, 5.3)	1.8 (1.2, 2.8)
Past 30-day smokeless use	0.8 (0.5, 1.2)	0.8 (0.5, 1.3)	2.8 (0.9, 8.0)	3.2 (1.3, 7.9)
Past 30-day large cigar or LCC use	1.3 (0.9, 1.9)	1.3 (0.70, 2.3)	5.3 (3.8, 8.0)^a	4.6 (2.4, 8.6)^b

Note. Bold values are statistically significant.

^aPast 30 day large cigar use predicted LCC initiation

^bPast 30-day LCC use predicted large cigar initiation