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Alternative Tobacco Use among College Students: Who is at Highest Risk?

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Abstract

Objective—To examines smoking status, substance use, sociodemographics, and psychosocial characteristics in relation to alternative tobacco use among college students.

Methods—Current tobacco use (cigarettes, cigar-like products, hookah, chew, snus) and correlates (sociodemographics, sensation-seeking, attitudes toward tobacco and smokers, social factors) were assessed among students aged 18-25 at 6 Southeastern US colleges using an online survey.

Results—Those who were younger, male, black, cigarette and marijuana users, and demonstrating at-risk psychosocial factors were at increased risk of alternative tobacco product use ($p < .001$). Among current smokers, never daily nondaily smokers were 3 times as likely as former daily non-daily smokers and daily smokers to use alternative tobacco products ($p < .001$).

Conclusions—Important risk factors for alternative tobacco use included important sociodemographic and psychosocial characteristics.

Keywords

alternative tobacco; never-daily nondaily smokers; former-daily nondaily smokers; young adults

Tobacco use remains the leading cause of preventable morbidity and mortality in the US[1] with tobacco-related illness responsible for over 400,000 deaths annually.[23] The predominant form of tobacco use in the US is cigarette smoking, with an estimated 44.5 million adult current cigarette smokers.[4,5]

Alternative tobacco products, which include cigars, chewing tobacco, and snuff (smokeless tobacco), as well as newer products such as hookah (waterpipe) are highly available in the US market and are increasingly being promoted as potentially less harmful cigarette alternatives.[4] These other forms of tobacco product are increasingly being used as a substitute for cigarette smoking or in addition to cigarettes.[6-8] A greater tobacco product variety, increased promotion, and explicit or implicit claims of harm reduction may encourage the use of other tobacco products in addition to or as a substitute for cigarettes.[7]

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Data from O'Connor et al[7] revealed that use of other tobacco products was most strongly related to beliefs about the reduced harm of these products. Furthermore, policies designed to preserve clean indoor air may have a further impact on the types of tobacco products that smokers choose.[4] Unfortunately, however, all of these tobacco products contain carcinogens and are associated with important health consequences as no tobacco product is free of harm.[4,6,9,10]

Alternative tobacco use, however, occurs more often in combination with cigarette smoking than in isolation.[11] Among college students aged 18–24 years, 51.3% of students who used tobacco reported concurrent use.[4,11] Between 2.5% and 5.0% of US cigarette smokers also use smokeless tobacco (SLT), and 3%–4% concurrently smoke cigarettes and cigars.[7,12] Rigotti et al[11] found among current smokeless tobacco users that 30.6% used only smokeless tobacco, whereas 62.3% also smoked cigarettes. Of current cigar smokers, 33.4% smoked only cigars, whereas 61.4% smoked both cigars and cigarettes.[11] Concurrent users experience higher intermediate levels of mortality, are more likely to ingest more nicotine on a daily basis, are less likely than single-form users to stop using tobacco,[4,13] and are at higher risk for acute myocardial infarction.[14] Thus, the consequences of using multiple forms of tobacco may be additive or synergistic.[4,13]

Whereas daily tobacco consumption in the US is declining,[8,15] nondaily smoking (smoking on some days but not every day) is increasing in prevalence.[15,16] Among the categories of cigarette smokers, nondaily smokers have been shown to be more likely than daily smokers or nonsmokers to use alternative tobacco products concurrently.[17] Nondaily smoking comprises about one fourth of all smokers (and growing).[15,18-20] Furthermore, nondaily smoking may be a stable pattern of chronic low-level consumption, a transitory condition between daily smoking and quitting,[21-23] or a transitional phase to heavier or regular cigarette use.[19,24] Little is known about differences in alternative tobacco product use among subsets of nondaily smokers – that is, those nondaily smokers who were previously daily smokers (ie, former daily nondaily smokers [FDNS]) versus those nondaily smokers who were never daily smokers (ie, never daily non-daily smokers [NDNS]). FDNS make up as many as half of nondaily smokers and have been linked with increased readiness to quit cigarette smoking when compared to NDNS.[25] In addition, prior studies have reported similar smoking behaviors among FDNS and NDNS across all situations regardless of whether the situations were social and sporadic or more routine.[26]

Despite what is known about concurrent use of cigarettes and alternative tobacco products, little research has focused on concurrent use among nondaily versus daily cigarette smokers, concurrent use among several differing tobacco products, or use of alternative tobacco products in relation to more unique psychosocial factors not frequently assessed in larger national data sets (eg, perceptions of smokers, attitudes about tobacco, sensation seeking). Given the aforementioned literature and the gaps in the literature, this study aims to: (1) examine concurrent use of cigarettes, alternative tobacco products, and marijuana among college students; and (2) examine smoking status (ie, nonsmoker, nondaily smoker [former daily vs. never daily], daily smoker) and psychosocial characteristics in relation to alternative tobacco product use, controlling for other substance use and sociodemographics

among college students. By so doing, the current research will identify the categories of college students at highest risk for alternative tobacco use.

Methods

Students at 6 colleges in the Southeastern US were recruited at random to complete an online survey in October 2010.[27] Random samples of 5000 students at each school (with the exclusion of 2 schools that had enrollment less than 5000) were invited to complete the survey. In the schools that had less enrolment, all students were invited to participate in the study (total invited N = 24,055). Students received an email containing a link to the consent form with the alterna tive of opting out. Students who consented to participate were directed to the online survey. To encourage participation, stu dents received up to 3 email invitations to participate. Online survey took about 20-25 minutes to complete. As an incentive for participation, all students who completed the survey received entry into a drawing for cash prizes of $1000 (one prize), $500 (2 prizes), and $250 (4 prizes) at each participating school.[27] Of the students who received the invitation to participate, 4840 (20.1%) returned a completed survey. However, only the college students who were 18-25 years of age and had complete data on their smoking behavior were included in this study (N = 4348).

Measures

The measures were part of an online survey containing 230 questions assessing a variety of health topic areas, which took approximately 20–25 minutes to com plete.[27] For the current investigation, only questions related to sociode mographic characteristics, alternative tobacco use, smoking behavior, psychosocial factors, and alcohol and marijuana use were included.

Sociodemographics—Sociodemographic characteristics assessed included students' age, sex, ethnicity, and school type. Ethnicity was categorized as non-Hispanic White, Black, or Other due to the small numbers of participants who reported other race/ethnicities.[27] Type of school was categorized as 4-year or 2-year (community college) depending on the type of degree program predominantly offered.[28]

Tobacco use—To assess smoking status, students were asked: “In the past 30 days, on how many days did you smoke a cigarette (even a puff)?” This question has been used to assess tobacco use in the American College Health Association (ACHA) surveys, National College Health Risk Behavior Survey, and Youth Risk Behavior Survey, with well documented reliability and validity.[25,27,29,30] They also were asked: “Have you ever smoked cigarettes daily, that is, at least one cigarette every day for 30 days?” Students were considered current smokers if they reported smoking at least once in the past 30 days. Among the current smokers, students were categorized as daily smokers if they reported smoking on all 30 days versus nondaily smokers (ie, those who smoked from 1 to 29 days of the past 30 days). This definition is consistent with how ACHA, Substance Abuse and Mental Health Association, and others have defined “daily smokers.”[27,31,32] In addition, using these questions we further created 4 subgroups: (1) nonsmokers; (2) nondaily smokers who had never been daily smokers (ie, never daily nondaily smokers [NDNS]); (3) nondaily

smokers who were former daily smokers (ie, former daily nondaily smokers [FDNS]); and (4) daily smokers. Similar smoking categorizations have been used in prior studies to asses smoking behaviors.[25,26]

The alternative tobacco products assessed in the survey were chewing tobacco, snuff, dip, cigars, little cigars, cigarillos, water pipe tobacco (hookah), snus, and electronic cigars. Participants were asked: "During the past 30 days, on how many days did you: (1) use chewing tobacco, snuff, or dip, such as Beechnut, Skoal, Skoal Bandits, or Copenhagen? (2) Smoke cigars? (3) Smoke little cigars (such as Black and Milds)? (4) Smoke cigarillos (such as Swisher Sweets cigarillos)? (5) Smoke tobacco from a water pipe (hookah)? (6) Use snus?"[29,30] They were categorized as users if they answered 'yes' to any of the questions, whereas nonusers were those who did not use any of the alternative tobacco products in the last 30 days.

Social aspects of smoking—To access participants' social experiences with smoking, students were asked: "Out of your 5 closest friends, how many of them smoke?"[27,33] and "Do you live with anyone who smokes cigarettes?"[3]

Smoking attitudes—Attitudes toward smoking was assessed using the Smoking Attitudes Scale,[34] a 17-item questionnaire that asks participants to rate on a 7-point scale how strongly they agree (1=*strongly disagree*, 7 = *strongly agree*) with 17 smoking-related statements across 4 dimensions – interpersonal relationships with smokers, laws and societal restrictions on smoking in public places, health concerns, and the marketing and sale of cigarettes.[27,34] Higher scores indicate more negative attitudes regarding smoking. The scale has good construct validity with significantly different scores produced for smokers and nonsmokers, such that smokers consistently report more favorable attitudes toward smoking.[27,34] The scale has good reliability and subscale alphas ranging from 0.69 to 0.88 in this sample, which is similar to prior research.[34]

Classifying a smoker scale—The Classifying a Smoker Scale[27] is a 10-item scale designed to assess the rigidity or inclusiveness of individual schemas of what constitutes the label of "smoker." Participants are asked to describe the extent to which they agreed with statements regarding which criteria needed to be met for an individual to be considered a smoker in terms of: (1) smoking frequency; (2) contextual factors, such that smoking alone indicates being a smoker rather than smoking among others; (3) time since initiation; (4) whether one purchases or borrows cigarettes; (5) addiction and being able to easily quit; (6) whether smoking is habitual; and (7) personality and physical characteristics (1=*strongly disagree*, 7=*strongly agree*).[27] Scale scores range from 10-70 with higher scores indicating stricter criteria in classifying a smoker. This scale demonstrates good construct, face, and concurrent validity; higher Classifying a Smoker Scale scores are also related to being non-daily versus daily smokers and were significant predictors of current smoking.[27] In this study, this scale yielded a Cronbach's alpha of 0.91.

Depression—Students were asked to complete items from the Patient Health Questionnaire-2 (PHQ-2). The PHQ-2 is a 2-item version of the PHQ depression module based on the DSM-4 diagnostic criteria, which assesses symptoms of "little interest or

pleasure in doing things" and "feeling down, depressed, or hopeless" in the past 2 weeks (0=*not at all* to 3=*nearly every day*). The overall score ranges from 0 to 6 with a total score ≥ 3 signifying clinical depression.[35] The construct and criterion validity of this scale as a measure for depression screening has been established.[35]

Sensation seeking—The Brief Sensation Seeking Scale-4 was used to assess sensation seeking among participants. Participants were asked to indicate the extent to which they agree or disagree with items on the scale on a 5-point Likert scale (1=*strongly disagree* to 5=*strongly agree*). Higher scores indicate a greater tendency to be a sensation seeker. The reliability and validity of this scale for screening and large scale surveys have been documented.[36] Cronbach's alpha in this study was 0.75.

Alcohol and marijuana use—To assess the use of alcohol and binge drinking, participants were asked: "In the past 30 days, on how many days did you drink alcohol?" and "In the past 30 days, on how many of those days did you drink more than 5 alcoholic drinks on one occasion?" Participants were also asked: "During the last 30 days, on how many days did you use marijuana (pot, weed, hashish, hash oil)?"[29]

Data Analysis

Bivariate comparisons between alternative tobacco product users and nonusers were conducted using the chi-square test for categorical variables and the t-test and ANOVA for continuous variables. To examine concurrent use of cigarettes, alternative tobacco products, and marijuana, we summarized the proportions of past 30-day use of various tobacco products and marijuana and examined their concurrent use using descriptive statistics. Then, sequential logistic regression analyses were conducted to examine the association between current smoking status and alternative tobacco product use. The crude regression model (Model A) examined the relationship between alternative tobacco product use and cigarette smoking status (daily vs. nondaily). We then entered age, sex, ethnicity, type of school, number of friends that smoke, living with a smoker, depressive symptoms, attitudes toward smoking, classifying a smoker scale scores, sensation seeking, number of days of alcohol use in past 30 days, and any marijuana use in the past 30 days into the adjusted model (Model B). Finally, we built a sequential multiple logistic regression model to examine NDNS, FDNS, and daily smokers (excluding nonsmokers) in relation to alternative tobacco products use (model A: crude model; model B: adjusted model). PASW 19.0 statistical software was used for all data anal yses. Significance level was set at $\alpha = .05$ for all statistical tests.

Results

Table 1 presents participant characteristics and bivariate comparisons between alternative tobacco product users and nonusers. Overall, 18.0% (N = 781) of all participants reported use of alternative tobacco products within the last 30 days (users). The most common alternative tobacco product used was little cigars (10.0%), followed by cigarillos (5.0%), hookah (4.3%), cigars (3.7%), chew (2.9%), and snus (0.9%).

Bivariate Analyses

Current smokers were more likely than non-smokers to be alternative tobacco product users ($p < .001$). Other predictors of using alternative tobacco products included being younger, being male, having more friends that smoke, living with a smoker, lower attitudes toward smoking scores (exhibiting less negative attitudes toward smoking), higher classifying a smoker scale scores (exhibiting stricter criteria for classifying smokers), significant depressive symptoms, higher sensation seeking scores, more frequent alcohol consumption, and greater likelihood of binge drinking and marijuana use ($p < .001$).

Table 2 examines concurrent past 30-day use of various tobacco products and marijuana among participants. Results show that 66.9% of chew or snus users; 57.2% of cigars, little cigars, cigarillos users; 61.4% of hookah users; and 50.4% of marijuana users were also concurrent cigarette smokers. Similarly, participants who reported using one form of tobacco product also used other alternative tobacco products concurrently.

Multivariate Analyses

Our regression examining alternative tobacco product use among all participants is displayed in Table 3. The crude model (Model A) demonstrated that nondaily and daily smokers were at increased risk of alternative tobacco use (OR=9.70, 95% confidence interval [CI]: 7.87-12.07; $p < .001$; OR=4.33, CI: 3.39-5.54; $p < .001$, respectively). After adjusting for the aforementioned covariates (Model B), the odds of using alternative tobacco products was higher among nondaily smokers and daily smokers in comparison to nonsmokers (OR=6.43, CI: 4.92-8.40; $p < .001$; OR=2.79, CI: 1.92-4.05; $p < .001$, respectively). In addition, younger age ($p < .001$), being male ($p < .001$), being Black ($p < .001$), lower attitudes towards smoking scores ($p < .001$), higher classifying a smoker scale scores ($p = .004$), higher sensation seeking scores ($p = .008$), more frequent alcohol use ($p < .001$), and recent marijuana use ($p < .001$) were all significantly associated with alternative tobacco product use.

Table 4 presents the binary logistic regression examining factors associated with alternative tobacco product use among current cigarette smokers. Alternative tobacco product use was associated with being NDNS vs. FDNS (OR=0.47, CI: 0.31, 0.73, $p = .001$) or daily smokers (OR=0.34, CI: 0.21, 0.54, $p < .001$), after controlling for all possible covariates in the adjusted model (Model B). In addition, younger age ($p < .001$), being male ($p < .001$), being Black ($p < .001$), and any marijuana use in the past 30 days ($p = .002$) were associated with alternative tobacco product use among current smokers.

Discussion

The current study presents novel findings on alternative tobacco product use among college students, indicating that NDNS are the group of current smokers most at risk for alternative tobacco product use, with FDNS and daily smokers being more at risk than nonsmokers. In fact, over half of nondaily smoking participants (52.2%) reported using other forms of tobacco within the last 30 days compared with about one third of daily smokers and approximately one tenth of nonsmokers, in line with prior findings.[17,37] Among current

smokers, NDNS were significantly more likely to use alternative tobacco products than FDNS and daily smokers. NDNS may be exposed to higher levels of tobacco and nicotine consumption through using alternative tobacco products concurrently, thereby potentially increasing their risk of progressing to regular or daily tobacco use.[11,13,38] In addition, the increased likelihood of FDNS to use alternative tobacco products in comparison to nonsmokers is of concern given the potential to relapses to higher levels of tobacco use.[11] Furthermore, concurrent use of alternative tobacco products was common, which is line with prior research.[11]

In terms of other substance use, consistent with prior research,[6,11,39] more frequent alcohol use was significantly associated with alternative tobacco product use. This study is unique among similar investigations in that it assessed a wider variety of alternative tobacco products. In addition, marijuana use was the second greatest predictor of alternative tobacco use next to nondaily cigarette smoking. Prior studies have documented similar associations with individual tobacco products including hookah,[39] cigars, and smokeless tobacco.[11] Prior studies also have documented that the effects of marijuana could either be substitution (where tobacco use is replaced with marijuana) or facilitation leading to increased tobacco consumption.[40] In addition, it is highly likely that cigar papers and pipes are being used to deliver both tobacco and marijuana, perhaps within the same smoking session. Unfortunately, youths have been shown as most likely to relapse into tobacco use while smoking marijuana.[40,41] In addition, studies have implicated tobacco use as a gateway drug to the use of marijuana and other illicit drugs.[40,42] Thus, the temporal relationship between alternative tobacco use and marijuana deserves further research in future longitudinal studies.

Regarding psychosocial factors, participants who exhibited stricter criteria for classifying smokers had higher odds of using alternative tobacco products. One possibility for this finding may be that young adults who use alternative tobacco products do not perceive themselves to be smokers; therefore, they hold stricter criteria for defining smokers to ensure that the label does not apply to them. In addition, consistent with previous studies on attitude towards smoking,[25,34] we found that a more favorable attitude toward smoking-related topics among college students was associated with the use of alternative tobacco products, which is in line with prior research.[17] Furthermore, significant levels of depressive symptomatology was associated with alternative tobacco product use, which is in line with prior research.[43-48] However, after controlling for confounding variables, no relationship was found between depression and alternative tobacco use.

In terms of sociodemographics, our findings were largely in line with prior research. For example, we found that younger age[4,6,49] and being male[4,6,11,17] was significantly associated with the use of alternative tobacco product. Furthermore, the current study found that Blacks were significantly more likely to use alternative tobacco products.

Implications for Research and Practice

Most existing tobacco control interventions primarily address cigarette smoking and do not address the use of other tobacco products.[6,50] Future tobacco control programs may be required to target increasingly other forms of tobacco use, given the recent proliferation of

alternative tobacco products such as hookah use among US young adults.[8,39,51,52] Moreover, given the concurrent use of multiple tobacco products along with alcohol and marijuana, there is a growing need to address these substance use patterns collectively through interventions, particularly given the common associated factors such as depression and sensation seeking. In addition, this study provides evidence that college students who use alternative tobacco products may not consider themselves to be smokers. Similarly, young adult perceptions toward alternative tobacco product use may differ from perceptions toward cigarette smoking. However, previous smoking scales measuring individual attitudes towards smoking,[34] social aspects of smoking,[33,53] and schemata for classifying a smoker[27] have been inclined to focus on cigarette smoking. Future researchers may consider refining the existing language used in these smoking scales or incorporate measures specific to alternative tobacco use in the development of scales measuring tobacco smoking constructs. This may provide further validation for these scales.

Limitations

Despite the important findings reported, the current study has some limitations. First, the response rate of 20.1% may raise concerns about responder bias. However, several studies have documented similar response rates (29%-32%) with Internet surveys[54] among the general population. We were unable to determine students who had inactive email accounts or did not open the invitation email. This may have impacted the true “denominator” for what this response rates might have been. In addition, studies have shown that Internet surveys, despite their low response rates, are comparable to mail and phone surveys, producing similar statistics regarding health behaviors.[54,55] Second, the survey sample was made up largely of women and selection of participants was limited to colleges in the Southeast. Although this sample was reflective of the characteristics of each school's population, our results may not generalize to other college populations in the US.[27] Third, in terms of nicotine dependence, we examined frequency of use of cigarettes, the most commonly used tobacco product. Frequency of use of cigarettes is one of the major questions indicating dependence on the Fagerstrom Test for Nicotine Dependence (FTND).[56] Moreover, the other most important factor involved in the FTND is time to first cigarette after waking,[56] which is not a particularly relevant assessment of tobacco use for nondaily cigarette users or users of alternative tobacco products, which are not commonly used daily by young adults. In addition, the assessments of tobacco products did not include use of electronic nicotine delivery systems (or electronic cigarettes) that are growing in popularity;[57] however, these findings may be relevant to this group of tobacco products. Finally, the current study is limited in its ability to infer causation due its cross-sectional nature.

Conclusion

Alternative tobacco product use is an increasingly common practice among college students in the US. The present findings indicate that never-daily nondaily smokers and marijuana users, as well as those who are younger, male, and Black, are at highest risk for alternative tobacco product use. Future public health and clinical interventions should target alternative tobacco product use in its tobacco cessation efforts, particularly given the high rate of alternative tobacco use among young adults. Moreover, research should focus on tobacco

use among young adults in its emerging form – that is, as a low level pattern of use largely in the context of other substance use.

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Table 1

Participant Characteristics and Bivariate Comparisons between Alternative Tobacco Product Users and Nonusers

Variable	All participants N = 4348 (100.0%)	No alternative tobacco product use N = 3567 (82.0%)	Alternative tobacco product use N = 781 (18.0%)	p-value
Sociodemographics				
Age (SD)	23.50 (7.10)	23.78 (7.32)	22.25 (5.79)	<.001
Sex (%)				
Male	1,247 (28.7)	875 (24.5)	372 (47.6)	
Female	3,101 (71.3)	2,692 (75.5)	409 (52.4)	<.001
Ethnicity (%)				
White	1,984 (45.6)	1,611 (45.2)	373 (47.8)	
Black	1,692 (38.9)	1,407 (39.4)	285 (36.5)	
Other	672 (15.5)	549 (15.4)	123 (15.7)	.30
School type (%)				
4-year	2,710 (62.3)	2,206 (61.8)	504 (64.5)	
2-year	1,638 (37.7)	1,361 (38.2)	277 (35.5)	.16
Tobacco Use, Past 30 Days				
Smoking status (%)				
Nonsmoker	3,323 (76.4)	2,984 (83.7)	339 (43.4)	
Nondaily smoker	581 (13.4)	278 (7.8)	303 (38.8)	
Daily smoker	444 (10.2)	305 (8.6)	139 (17.8)	<.001
Chew	125 (2.9)	--	--	--
Snus	39 (0.9)	--	--	--
Cigars	162 (3.7)	--	--	--
Little cigars	436 (10.0)	--	--	--
Cigarillos	216 (5.0)	--	--	--
Hookah	186 (4.3)	--	--	--
Psychosocial Factors				
Number of friends that smoke (SD)	1.47 (1.57)	1.33 (1.52)	2.10 (1.63)	<.001
Live with a smoker (%)				
No	3,267 (75.1)	2,739 (76.8)	528 (67.6)	
Yes	1,081 (24.9)	828 (23.2)	253 (32.4)	<.001
Attitudes toward smoking (SD)	88.08 (18.07)	90.23 (17.41)	78.24 (17.78)	<.001

Variable	All participants N = 4348 (100.0%)	No alternative tobacco product use N = 3567 (82.0%)	Alternative tobacco product use N = 781 (18.0%)	p-value
Classifying a Smoker Scale (SD)	39.02 (16.74)	38.09 (17.17)	40.97 (14.48)	<.001
PHQ-2: Depressive symptoms (%)				
No	3588 (91.4)	3003 (92.2)	585 (87.6)	
Yes	336 (8.6)	253 (7.8)	83 (12.4)	<.001
Sensation seeking (SD)	3.32 (0.90)	3.26 (0.90)	3.59 (0.86)	<.001
Substance Use, Past 30 days				
Number of days of alcohol use (SD)	3.28 (5.16)	2.71 (4.65)	5.86 (6.43)	<.001
Any binge drinking (%)				
No	3371 (77.5)	2927 (82.1)	444 (56.9)	
Yes	977 (22.5)	640 (17.9)	337 (43.1)	<.001
Any marijuana use (%)				
No	3738 (86.4)	3281 (92.4)	457 (56.8)	
Yes	588 (13.6)	268 (7.6)	320 (41.2)	<.001

Table 2

Concurrent Past 30-day Use of Various Tobacco Products and Marijuana

Tobacco Product (%)	Cigarettes N = 1,025 23.6%	Chew or snus N = 148 3.4%	Cigars, little cigars, cigarillos N = 605 13.8%	Hookah N = 186 4.3%	Marijuana N = 588 13.6%
Cigarettes	--	9.5	33.6	11.1	29.3
Chew or Snus	66.9	--	36.3	13.6	30.3
Cigars, Little Cigars, Cigarillos	57.2	8.8	--	15.2	45.9
Hookah	61.4	10.7	49.2	--	46.5
Marijuana	50.4	7.3	46.9	14.5	--

Note. Column proportions indicate proportion of users represented by column header (eg, 66.9% of chew or snus users are also cigarette users).

Table 3

Binary Logistic Regression Indicating Factors Associated with Alternative Tobacco Product Use among College Students

	Model A			Model B		
Variable	**OR**	**CI**	**p**	**OR**	**CI**	**p**
Smoking Status						
Nonsmoker	Ref	--	--	Ref	--	--
Nondaily smoker	9.74	7.87, 12.07	<.001	6.43	4.92, 8.40	<.001
Daily smoker	4.33	3.39, 5.54	<.001	2.79	1.92, 4.05	<.001
Age				0.96	0.94, 0.98	<.001
Sex						
Male				Ref	--	--
Female				0.41	0.33, 0.51	<.001
Ethnicity						
White				Ref	--	--
Black				1.73	1.37, 2.24	<.001
Other				1.36	1.01, 1.84	.02
Type of School						
4-year				Ref	--	--
2-year				0.95	0.75, 1.22	.71
Number of Friends that Smoke				1.06	0.98, 1.15	.13
Live with a Smoker						
No				Ref	--	--
Yes				0.87	0.68, 1.11	.26
Attitudes Toward Smoking				0.98	0.97, 0.99	<.001
Classifying a Smoker Scale				1.02	1.01, 1.03	.004
PHQ-2: Depressive Symptoms						

	Model A			Model B		
Variable	**OR**	**CI**	**p**	**OR**	**CI**	**p**
No				Ref	--	--
Yes				1.15	0.83, 1.60	.41
Sensation Seeking				1.14	1.02, 1.27	.008
Number of Days of Alcohol Use, Past 30 Days				1.05	1.03, 1.07	<.001
Marijuana Use, Past 30 Days				4.00	3.13, 5.12	<.001

Note. Model A: Nagelkerke R^2 = 0.195; Model B: Nagelkerke R^2 = 0.351

Table 4

Binary Logistic Regression Indicating Factors Associated with Alternative Tobacco Product Use among Current Smokers

	Model A			Model B		
Variable	**OR**	**CI**	**p**	**OR**	**CI**	**p**
Smoking Status						
Never daily nondaily smoker	Ref	--	--	Ref	--	--
Former daily nondaily smoker	0.45	0.31, 0.65	<.001	0.47	0.31, 0.73	.001
Daily smokers	0.31	0.22, 0.44	<.001	0.34	0.21, 0.54	<.001
Age				0.93	0.91, 0.96	<.001
Sex						
Male				Ref	--	--
Female				0.29	0.21, 0.41	<.001
Ethnicity						
White				Ref	--	--
Black				2.86	1.81, 4.54	<.001
Other				1.29	0.81, 2.07	.29
Type of School						
4-year				Ref	--	--
2-year				1.04	0.73, 1.50	.82
Number of Friends that Smoke				1.05	0.93, 1.18	.47
Live with a Smoker						
No				Ref	--	--
Yes				1.08	0.77, 1.51	.66
Attitudes Toward Smoking				0.99	0.98, 0.99	.05
Classifying a Smoker Scale				1.01	1.00, 1.02	.13
PHQ-2: Depressive Symptoms						

	Model A			Model B		
Variable	**OR**	**CI**	**p**	**OR**	**CI**	**p**
No				Ref	--	--
Yes				1.10	0.69, 1.77	.68
Sensation Seeking				1.12	0.94, 1.35	.21
Number of Days of Alcohol Use, past 30 days				1.00	0.98, 1.03	.96
Any Marijuana Use, Past 30 Days				1.78	1.24, 2.57	.002

Note. Model A: Nagelkerke R^2 = 0.076; Model B: Nagelkerke R^2 = 0.290