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Identifying “Social Smoking” U.S. Young Adults Using an Empirically-Driven Approach

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Abstract

The phenomenon of “social smoking” emerged in the past decade as an important area of research, largely due to its high prevalence in young adults. The purpose of this study was to identify classes of young adult ever smokers based on measures of social and contextual influences on tobacco use. Latent class models were developed using social smoking measures, and not the frequency or quantity of tobacco use. Data come from a national sample of young adult ever smokers aged 18–24 (Truth Initiative Young Adult Cohort Study, $N = 1,564$). The optimal models identified three latent classes: Class 1 – Nonsmokers (52%); Class 2 – Social smokers (18%); and Class 3 – Smokers (30%). Nearly 60% of the “social smoker” class self-identified as a social smoker, 30% as an ex-smoker/tried smoking, and 12% as a non-smoker. The “social smoker” class was most likely to report using tobacco mainly or only with others. Past 30-day cigarette use was highest in

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Contributors

AV designed the study. AJ conducted the statistical analysis, with feedback from all study authors. AV and AJ wrote the first draft of the manuscript and all authors contributed to and have approved the final manuscript.

Conflict of Interest

The authors declare that they have no conflicts of interest.

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the “smoker” class. Hookah use was highest in the “social smoker” class. Other tobacco and e-cigarette use was similar in the “social smoker” and “smoker” classes. Past 30-day tobacco and e-cigarette use was present for all products in the “non-smoker” class. Young adult social smokers emerge empirically as a sizable, distinct class from other smokers, even without accounting for tobacco use frequency or intensity. The prevalence of hookah use in “social smokers” indicates a group for which the social aspect of tobacco use could drive experimentation and progression to regular use.

Keywords

Models; Statistical; Population Surveillance; Smoking/epidemiology; Tobacco; Young Adult

1. Introduction

The phenomenon of “social smoking,” or smoking primarily in social contexts (Schane, Glantz, & Ling, 2009b), emerged in the past decade as an important area of research, largely due to the high prevalence of this behavior in college students, a group of young adults who often engage in a variety of health-risk behaviors at high rates (Schane, Glantz, & Ling, 2009a). More broadly, social smoking young adults comprise a subset of nondaily (occasional) smokers who report cigarette use in social situations or when drinking alcohol with others (Berg et al., 2012; Berg et al., 2009; Hoek, Maubach, Stevenson, Gendall, & Edwards, 2013; Moran, Wechsler, & Rigotti, 2004; Schane et al., 2009a; Shiffman, Kirchner, Ferguson, & Scharf, 2009) and national surveys estimate the prevalence of social smoking between 51% and 80% in young adult (college and non-college) smokers (Jiang, Lee, & Ling, 2014; Lisha, Delucchi, Ling, & Ramo, 2015; Moran et al., 2004; Song & Ling, 2011; Villanti, Rath, & Vallone, 2012). There are two main concerns with the long-term tobacco use behaviors of social smoking young adults: (1) that, like light and intermittent young adult smokers, approximately half will become heavy smokers in a short period (H. R. White, Bray, Fleming, & Catalano, 2009); or (2) that they will maintain a stable low-level smoking pattern throughout adulthood (Schane et al., 2009b). Both smoking patterns can lead to tobacco-related disease or death (Schane, Ling, & Glantz, 2010; U.S. Department of Health and Human Services, 2014). To the extent that they resist identifying themselves as “smokers” (Berg et al., 2009; Choi, Choi, & Rifon, 2011; Hoek et al., 2013; Levinson et al., 2007; Ridner, Walker, Hart, & Myers, 2010), young adult “social smokers” will continue to elude traditional tobacco prevention or cessation interventions.

Primary socialization theory (PST) posits that individuals learn normative and deviant behavior from a small number of social influences that change dynamically with development from childhood to adolescence and young adulthood (Oetting, 1999). In line with this theory, recent studies have identified a number of social influences on smoking behavior in young adults, including: living with a smoker (Klein, Forster, & Erickson, 2013), having close friends who smoke (Klein et al., 2013), and the number of one’s friends who smoke (Dietz, Sly, Lee, Arheart, & McClure, 2013). A study of smoking trajectories among college student smokers also showed positive associations between perceived close-friend approval of smoking, exposure to a social smoking environment, and large increases in

number of cigarettes smoked (Colder, Flay, Segawa, & Hedeker, 2008). Similarly, a systematic review of longitudinal population-based studies of adolescent and young adult smokers showed that *not* having friends who smoke and being able to resist peer pressure to smoke were robust predictors of quitting in these age groups (Cengelli, O'Loughlin, Lauzon, & Cornuz, 2012).

The social context is another important influence on smoking in young adults. Studies on cue reactivity in adult and young adult smokers indicate that non-daily smokers are more highly influenced to smoke by situational contexts, including smoking by others and drinking alcohol, compared to daily smokers (Ferguson, Shiffman, Dunbar, & Schuz, 2016; Shiffman, Dunbar, & Ferguson, 2015; Shiffman et al., 2014; Shiffman, Li, et al., 2015; Thrul, Buhler, & Ferguson, 2014). Bar/club attendance and alcohol use in young adults have also been associated with current smoking (Dietz et al., 2013) and reduced cessation behavior among very light smokers (Jiang & Ling, 2013).

Several studies have identified latent subgroups of cigarette smokers (Rose et al., 2007; Sutfin, Reboussin, McCoy, & Wolfson, 2009) or polysubstance users, including tobacco users (Conway et al., 2013; Quek et al., 2013; A. White et al., 2013) in adolescent and young adult samples. Other studies have focused on multiple tobacco product use in a national sample of adolescents (Nasim, Blank, Cobb, & Eissenberg, 2012) and in a Midwestern sample of young adults (Erickson, Lenk, & Forster, 2014). Our previous work has identified latent classes of combustible tobacco users, including a class of non-daily light social smokers (Villanti, Pearson, Cantrell, Vallone, & Rath, 2015), but none of these studies have examined whether social smoking emerges as a distinct class when looking at social and contextual influences on tobacco use in young adults.

The extent to which social influences drive the development – or deterrence – of smoking behavior in young adulthood is key to understanding the phenomenon of “social smoking.” The purpose of this study was to identify clusters of ever smokers in a recent cohort of young adults based on measures of social and contextual influences on tobacco use and to determine common characteristics of these clusters, particularly social smoking young adults. Findings from this study were expected to identify the measures most relevant to identifying “social smokers” and inform intervention approaches to mitigate or harness social and contextual influences to reduce smoking in young adults.

2. Material and Methods

The current study leverages data from seven consecutive, bi-annual waves of the Truth Initiative Young Adult Cohort Study (YA Cohort; July 2011–October 2014), a large contemporary cohort of U.S. young adults that includes information on trajectories of smoking behavior, social influences on smoking, and social and contextual influences on smoking behavior among young adults. The detailed methods of this study have been described elsewhere (Rath, Villanti, Abrams, & Vallone, 2012). The cohort is comprised of a nationally representative sample of young adults ages 18–34 drawn from GfK's KnowledgePanel® which is recruited via address-based sampling to provide a statistically valid representation of the U.S. population, including cell phone-only households. African

American and Hispanic young adults were oversampled to ensure sufficient sample sizes for subgroup analyses and the survey was administered online in English and Spanish. This methodology has been reported previously (Chang & Krosnick, 2009; Yeager et al., 2011), and it has been used broadly in the peer-reviewed medical literature (Fowler, Gerstein, & Barry, 2013; Grande, Mitra, Shah, Wan, & Asch, 2013; Kumar, Quinn, Kim, Daniel, & Freimuth, 2012; Rhodes, Radecki Breitkopf, Ziegenfuss, Jenkins, & Vachon, 2015). The cohort is refreshed at each wave to retain the initial sample size.

The panel recruitment rate (RECR; The American Association for Public Opinion Research, 2015) ranged from 13.9%–14.9% across the seven waves. In 64 to 66% of the identified households, one member completed a core profile survey in which key demographic information was collected (profile rate—PROR). At each wave, 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 completion rate (COMR) ranged from 46.2%–68.4% across waves. The cumulative response rate (CUMRR1) (a product of these three rates) ranged from 4.4%–6.6% (Callegaro & DiSogra, 2008). This study was approved by the Independent Investigational Review Board, Inc. for Waves 1–3 (Protocol #20036-007) and Chesapeake Institutional Review Board, Inc. for Waves 4–7 (Protocol #20036020). Online consent was collected from participants before survey self-administration. The present analysis focused on a subset of participants 18–24 at study entry ($N = 1,564$) who entered at any of the seven waves of data collection, reported ever smoking a cigarette, and provided complete responses on social smoking-related measures.

Among young adults aged 18–24 at study entry who had ever smoked a cigarette ($n = 1,564$), 69% were aged 21 or older and 61% were female (Table 3). The majority of respondents were White, non-Hispanic (60%). Twelve percent were Black, non-Hispanic, 2% were Hispanic, and 7% reported another race. Most participants had completed some college education (59%), with 29% reporting high school education, and 12% less than high school education. Twenty percent of the sample reported depressive symptoms and 22% reported anxiety symptoms in the past two weeks.

2.1. Measures

2.1.1. Variables in the latent class model—In line with PST, six social smoking measures comprised the latent class model: self-identified smoking status; confidence in resisting smoking in social situations; smoking at parties or social events; smoking at bars or restaurants; social smoking behavior; and alcohol use. All social smoking measures were assessed at study entry, regardless of wave of entry. Subgroups of participants based on self-identified smoking status were identified using the following item: “Which of the following best describes how you think of yourself?” with response choices of “smoker,” “social smoker,” “occasional smoker,” “ex-smoker,” “someone who tried smoking,” and “nonsmoker.” For analyses, self-identified “social smoker” and “occasional smoker” were collapsed into one category. Additionally, “ex-smoker” and “tried smoking” were collapsed into one category. Confidence in resisting smoking in social situations was assessed using a 4-point scale (“Not at all confident,” “somewhat confident,” “moderately confident,” and “very confident”). Participants who selected “very confident” were defined as having the

ability to resist social smoking. Participants were also asked if they now use any tobacco products “not at all”, “some days”, or “every day.” Those who reported “some days” or “every day” use were defined as current tobacco users. Current tobacco users were asked where they used tobacco products, including parties/social events and bars/restaurants (yes/no). Participants who reported using tobacco “not at all” were included with those who reported “no” to using tobacco at parties/social events or at bars/restaurants. As a result, 66% of participants were classified as not smoking at parties/social events and of those, 73% had not used a tobacco product in the past 30 days. Similarly, 79% of participants classified as not smoking at bars/restaurants and of those, 63% had not used a tobacco product in the past 30 days. Current tobacco users were asked about the frequency of using tobacco products alone relative to using tobacco with others (“alone”, “equally alone and with others”, “mainly with others”, “only with others”). For analyses, “mainly with others” and “only with others” were collapsed into a single category. Participants who did not report current tobacco use were coded in a new category as “not a current smoker.” Current alcohol use was defined as “every day” or “some days” use for Waves 1–6. In Wave 7, current alcohol use was defined as past month use of alcohol among past year drinkers. Those who were not current users could either be never users or not have used in the past 30 days; participants with missing data on alcohol use were also classified as non-current users.

2.1.2. Other correlates—As part of the KnowledgePanel® routine data collection, participants provided information at study entry on age, gender, race/ethnicity (White, non-Hispanic; Black, non-Hispanic; Other, non-Hispanic; and Hispanic) and educational attainment (less than high school, high school, and some college or greater). Current depressive and anxiety symptoms were assessed using two-item Patient Health Questionnaire (PHQ-2; Kroenke et al 2003) or the two-item Generalized Anxiety Disorder (GAD-2; Kroenke et al 2007) scale, respectively. Current marijuana and other drug use (cocaine, ecstasy, meth, etc.) were defined as “some days” or “every day” use; participants who reported “not at all” or had missing data were defined as non-current users. Participants were asked about past 30-day use (yes/no) of seven tobacco products including cigarettes, cigars (traditional cigars, little cigars, cigarillos, and bidis), electronic cigarettes (e-cigarettes), smokeless tobacco (chew, dip/snuff), and snus.

2.2 Data analysis

Latent class analyses were conducted in 2015 using Mplus 7.0 (www.statmodel.com) to identify subgroups based on social smoking measures in both samples of young adults. Selection of variables for the latent class model was informed by available measures in each study and by consensus agreement among all study authors. Full information maximum likelihood estimation (FIML) was used based on the assumption that the probability of missingness may depend on data that are observed (Enders & Bandalos, 2001). The optimal number of classes was determined by running models with a successive number of classes from two to five and comparing model fit indices, the odds of correct classification (OCC), entropy, and interpretability. Model fit indices included the log likelihood (−2LL), the Akaike Information Criterion, the Bayesian Information Criterion (BIC), and the sample size adjusted BIC, as well as Pearson and likelihood ratio chi-square statistics, and the Lo-Mendell-Rubin and Vuong-Lo-Mendell-Rubin likelihood ratio tests (Collins & Lanza,

2010). The optimal model was selected with the number of classes that minimized BIC, based on evidence showing that BIC outperformed other model fit indices in a simulation study (Nylund, Asparouhov, & Muthén, 2007), demonstrated odds of correct classification greater than five across all classes (Nagin, 2005), and was interpretable. Sensitivity analysis examined the extent to which the self-identified smoking status measure included in the model drove the formation of the latent classes.

Bivariate analyses were conducted in Mplus (version 7.4) to estimate the prevalence of the social smoking measures in the final latent class model, as well as the relationship between other correlates and latent class assignment. Chi-square tests were employed to identify differences in characteristics across latent class assignment with significance at $p < 0.05$.

3. Results

3.1 Selection of the latent class model

Table 1 presents model fit statistics for all latent class models. In the YA Cohort data, the three-class solution was chosen as the best model. The two- through five-class models yielded entropy greater than 0.85 and significant LMR-LRT and VLMR-LRT test statistics at $p < 0.0001$. Since the four- and five-class models did not report adequate latent class separation ($OCC < 5$), these models were not considered for the final model. The three-class model was selected over the two-class model due to the minimized BIC and retained odds of correct classification greater than five across all classes.

3.2 Identification of latent classes

Response to the social smoking measures by latent class, along with the unweighted probability of class membership, and class size are presented in Table 2. In this sample, the three latent classes are described as: nonsmokers (Class 1, $n=820$, 52%); social smokers (Class 2, $n=275$, 18%); and smokers (Class 3, $n=469$, 30%). Average latent class probabilities for most likely latent class membership were 97% (Class 1), 88% (Class 2), and 91% (Class 3).

In the full sample, self-identified smoking status was roughly evenly distributed among the four categories, though the distribution of responses varied by latent class. The “non-smoker” class largely identified as non-smokers (44%) or ex-smokers/tried smoking (43%), while 74% of the “smoker” class self-identified as smokers and 57% of the “social smoker” class self-identified as “social or occasional smokers.” Confidence to resist smoking in social situations was greatest in the “non-smoker” class and lowest in the “smoker” class. The “non-smoker” class did not endorse smoking at parties or social events (0%), bars or restaurants (0%), but prevalence of these behaviors was similar in the “smoker” and “social smoker” classes. The “social smoker” class was most likely to endorse that they smoked “mainly or only with others” (66%), while the smoker class largely reported that they smoked “equally alone and with others” (82%). However, 29% of respondents in the “social smoker” class reported smoking “equally alone and with others” and 5% “alone.” The majority of the full sample had used alcohol every day or some days (72%), with the non-

smoker class least likely to endorse alcohol use (67%) and the social smoker class most likely (89%).

3.3 Correlates of latent class

Table 3 presents the bivariate analyses of the sociodemographic, mental health, and tobacco use correlates of latent class. There were significant differences in gender and education across the latent classes, with nonsmokers being the most likely to be female and college-educated and social smokers reporting similarly high levels of education. Social smokers were the most likely to be under age 21 compared to the other two classes and were similar to nonsmokers with respect to white vs. non-white racial/ethnic composition. Smokers and social smokers were equally likely to be female and report a similar prevalence of depressive and anxiety symptoms, marijuana use, and other drug use, which were higher than the nonsmoker class. Social smokers were equally likely as smokers to report smoking at parties or social events and smoking at bars or restaurants. With respect to tobacco, the prevalence of past 30-day cigarette use was highest in the smoker class, followed by the social smoker class. The social smoker class had a higher prevalence of hookah use compared to the smoker class, with a similar prevalence of all other product use in these two groups. Past 30-day tobacco and e-cigarette use was present (i.e., non-zero) for all products in the “non-smoker” class.

3.4 Sensitivity analysis

Sensitivity analyses removing self-identified smoking status from the latent class model highlighted that the classes were largely defined by this variable. When latent class models were run without the self-identified smoking status measure, the best fitting model was a 2-class model with “smokers” and “non-smokers” (Supplemental Table 1). However, when comparing the distribution of responses to the social smoking measures in the final three-class model (Table 2) versus using the self-identified smoking status variable alone, the latent class model was better at differentiating patterns of social smoking behavior, with “social smokers” (Class 2) most likely to report smoking “mainly or only with others” (66%) and “smokers” (Class 3) most likely to report smoking “equally alone and with others” (82%). Using only the self-identified smoking status variable, those who identified as “social smokers” were more likely to report smoking “equally alone and with others” (39%) than “mainly or only with others” (33%; $p < 0.001$).

4. Discussion

Using a recent national sample of U.S. young adults, this study highlights three latent classes of ever cigarette smokers: nonsmokers, social smokers, and smokers. In line with primary socialization theory, these classes were characterized by the social context in which they smoked cigarettes, confidence resisting smoking in social situations, self-identified smoking status, and a common element in young adult smoking contexts – alcohol use. When examining past 30-day tobacco use as correlates of these three latent classes, past 30-day cigarette use was highest in the “smoker” class and past 30-day non-cigarette tobacco and e-cigarette use was higher or similar for most products in the “social smoker” class compared to the “smoker” class. These findings indicate that there is a group of young adults for which

the social aspect of tobacco use could drive experimentation and progression to regular use. Consistent with previous research (Hassmiller, Warner, Mendez, Levy, & Romano, 2003; Sutfin et al., 2012; Wortley, Husten, Trosclair, Chrismon, & Pederson, 2003), social smokers were less likely to be white and more likely to be educated compared to smokers.

Previous studies have defined social smoking based on measures of behavior (Shiffman, Li, et al., 2015), identity (Moran et al., 2004), or both (Lisha et al., 2015; Song & Ling, 2011). In our study, a single measure of self-identified smoking status drove the formation of latent classes, with the “social smoker” class having the largest percentage of self-identified “social smokers.” Interestingly, 12% of respondents in the “social smoker” class identified as being a “non-smoker” and 30% as being an “ex-smoker” or having “tried smoking.” Nearly 60% of respondents in the “social smoker” class reported past 30-day cigarette use. Additionally, use of tobacco products and e-cigarettes was present in the “non-smoker” class. Recently, the term “phantom smoker” has emerged to characterize young adults who report smoking cigarettes, but do not self-identify as a smoker (Choi et al., 2011; Guillory, Lisha, Lee, & Ling, 2016). Among past 30-day young adult cigarette smokers recruited from 2012–2014 in U.S. bars and nightclubs, phantom smokers were 60% more likely to identify as social smokers than regular smokers (Guillory et al., 2016). Identifying as a social smoker seems to have utility for young adult smokers in dissociating their smoking behavior from the known harms of smoking. Since they do not see themselves as “smokers” or their smoking as problematic (Choi et al., 2011; Hoek et al., 2013), social smoking young adults may experience little pressure from others to quit smoking or feel reluctant to change their behavior. Identification of intervention strategies to prevent smoking escalation or increase cessation in this group is greatly needed.

The social nature of today’s young adults (Solomon, 2014) may partially explain the growth of “social smoking” in this group. This is reflected in the tobacco products used by “social smoker” young adults and the social nature of tobacco use in this group. Findings from our study highlight that past 30-day hookah use was nearly twice as high in the “social smoker” class as in the “smoker” class in line with studies noting the social nature of hookah use in young adults (Castaneda, Barnett, Soule, & Young, 2016; Sharma, Beck, & Clark, 2013; Sharma, Clark, & Sharp, 2014) and the depiction of social aspects of hookah use on social media (Carroll, Shensa, & Primack, 2013; Primack, Carroll, Shensa, Davis, & Levine, 2016). Of note, recent qualitative research supports the role of social modeling in hookah initiation among young adults (Castaneda et al., 2016). Respondents in the “social smoker” class endorsed smoking or using tobacco “mainly or only with others,” reinforcing the social utility of tobacco use in this group.

One strength of the current study is use of a contemporary cohort of young adults who came of age following the Master Settlement Agreement and increases in state-level tobacco control efforts. One limitation of the study was that latent class models run without the self-identified smoking status item did not produce the same number of classes, nor the distinct classes identified when the item was included. Another is the low cumulative response rate across survey waves.

5. Conclusions

The current study demonstrates that “social smokers” emerge as a distinct class from “smokers” based on contextual influences, even without accounting for tobacco use frequency or intensity. In this national sample of U.S. young adults, the “social smoker” class is sizable, accounting for 18% of young adults who have ever tried cigarettes. “Social smokers” look remarkably similar to “smokers” with respect to past 30-day cigar, e-cigarette, smokeless tobacco, and snus use, though they had a higher prevalence of hookah use. Findings from this study highlight the importance of the self-identified smoking status measure in identifying social smokers. They also indicate that interventions targeting hookah are likely to have a greater impact on “social smokers” than smoking. This study suggests that future interventions addressing contextual influences on smoking, including building confidence to resist smoking in social situations and decoupling smoking from alcohol use, may be particularly effective in reducing tobacco use among “social smokers.”

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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Highlights

- Three latent classes were identified from six social smoking measures.
- Classes included young adult Nonsmokers, Social smokers, and Smokers.
- Social smokers were most likely to report using tobacco mainly or only with others.
- Smokers and Social smokers had similar prevalence of tobacco and e-cigarette use.
- Social factors may drive progression to regular tobacco use in Social smokers.

Table 1Optimal number of latent classes: assessment statistics^a

<i>Model fit</i>							
Latent classes	Number of free parameters	LL	BIC	Sample size adjusted BIC	LMR p-value	VLMR LRT p-value	Entropy
1	10	-7882.5	15838.6	15806.9	-	-	-
2	21	-6536.0	13226.5	13159.8	<0.0001	<0.0001	0.93
3	32	-6374.1	12983.5	12881.9	<0.0001	<0.0001	0.86
4	47	-6551.0	13447.8	13298.5	<0.0001	<0.0001	0.87
5	59	-6481.9	13397.8	13210.4	<0.0001	<0.0001	0.87

<i>Odds of correct classification^b</i>					
	Class 1	Class 2	Class 3	Class 4	Class 5
1	∞				
2	51.6	54.6			
3	7.1	36.0	9.5		
4	4.6	14.6	7.7	24.6	
5	37.5	6.1	30.3	3.7	7.3

LL Log likelihood; BIC Bayesian Information Criteria; LMR Lo-Mendell-Rubin; VLMR Vuong-Lo-Mendell-Rubin; LRT likelihood ratio test for k (H0) versus $k-1$ classes^aThree class model highlighted as best fit^bOdds of correct classification (OCC) > 5 indicates a model with good latent class separation (Collins & Lanza, p. 74); ∞ Indicates perfect classification

Table 2

Response to the social smoking measures by latent class, Truth Initiative Young Adult Cohort Study (N = 1,564)

	Class 1	Class 2	Class 3	
	Non smokers	Social smokers	Smokers	Full sample
	%	%	%	%
Self-identified smoking status				
Smoker	1%	1%	74%	22%
Social or occasional smoker	12%	57%	22%	24%
Ex-smoker/tried smoking	43%	30%	4%	29%
Non-smoker	44%	12%	0%	25%
Confident can resist smoking in social situations^a	82%	56%	11%	57%
Smoke at parties or social events	0%	71%	71%	34%
Smoke at bars or restaurants	0%	41%	47%	21%
Social smoking behavior^a				
Not current smoker	85%	0%	0%	44%
Smoke alone	6%	5%	12%	8%
Smoke equally alone and with others	4%	29%	82%	31%
Smoke mainly or only with others	5%	66%	6%	17%
Alcohol use, every day or some days^b	67%	89%	71%	72%
Pr(Class membership), unweighted	52%	18%	30%	100%
Class size, unweighted	820	275	469	1564

^aMissingness: Confidence to resist smoking in social situations (n=2, 0.1%), social smoking behavior (n=12, 0.8%).

^bIndividuals with missing alcohol use frequency (n = 3, 0.2%) were defined as non-current users.

Table 3

Characteristics of the latent classes, unweighted

	Total	Class 1 Nonsmokers N = 820 (52%)	Class 2 Social smokers N = 275 (18%)	Class 3 Smokers N = 469 (30%)	p*
Age	N = 1,564 21.72 (0.05)	21.73 (0.06)	21.47 (0.11)	21.87 (0.08)	
18–20	31.3%	31.2%	39.3%	26.7%	0.25
21+	68.7%	68.8%	60.7%	73.4%	
Gender					
Male	38.9%	35.7%	41.8%	42.6%	0.01
Female	61.1%	64.3%	58.2%	57.4%	
Race					
White, non-Hispanic	59.5%	57.0%	57.8%	64.8%	<0.001
Black, non-Hispanic	12.0%	11.1%	9.1%	15.1%	
Other, non-Hispanic	6.5%	6.0%	8.4%	6.2%	
Hispanic	2.2%	26.0%	24.7%	13.9%	
Education					
Less than high school	12.3%	9.1%	9.1%	19.6%	<0.001
High school	28.5%	24.0%	26.9%	37.1%	
Some college or greater	59.3%	66.8%	64.0%	43.3%	
Mental health/substance use					
Depression ^a	20.3%	17.8%	21.5%	23.9%	0.01
Anxiety ^b	22.1%	19.0%	22.5%	27.3%	0.001
Marijuana ^c	25.3%	17.3%	35.3%	33.3%	<0.001
Other drug use ^d	4.3%	3.0%	5.8%	5.8%	0.02
Past 30-day tobacco use					
Cigarette use	41.2%	4.9%	58.9%	94.5%	<0.001
Cigar use ^e	11.8%	2.7%	22.5%	21.5%	<0.001
Hookah use	6.6%	2.2%	16.4%	8.5%	<0.001
E-cigarette use	4.9%	1.8%	8.4%	8.1%	<0.001
Smokeless use ^f	4.0%	1.2%	8.4%	6.4%	<0.001

	Total	Class 1 Nonsmokers	Class 2 Social smokers	Class 3 Smokers	<i>p</i> *
	N = 1,564	N = 820 (52%)	N = 275 (18%)	N = 469 (30%)	
Snus use	1.6%	0.4%	2.9%	3.0%	<0.001

P-values are from the chi-square test for difference across groups.

^aDepressive symptomatology is defined as a score of at least 3 on the PHQ-2.

^bAnxiety symptoms are defined as a score of at least 3 on the GAD-2.

^cMarijuana use is assessed in the past 30 days. Participants with missing data on marijuana use (n=9, 0.6%) were defined as non-current users.

^dOther drug use is assessed in the past 30 days. Participants with missing data on other drug use (n = 6, 0.4%) were defined as non-current users.

^eCigar use includes use of little cigars, cigarillos, and large cigars.

^fSmokeless use includes dip, snuff, and chewing tobacco.