

# Smoking frequency among current college student smokers: distinguishing characteristics and factors related to readiness to quit smoking

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## Abstract

Given the increased prevalence of non-daily smoking and changes in smoking patterns, particularly among young adults, we examined correlates of smoking level, specifically motives for smoking, and readiness to quit smoking among 2682 college undergraduates who completed an online survey. Overall, 64.7% ( $n = 1736$ ) were non-smokers, 11.6% ( $n = 312$ ) smoked 1–5 days, 10.5% ( $n = 281$ ) smoked 6–29 days and 13.2% ( $n = 353$ ) were daily smokers. Ordinal regression analyses modeling smoking level indicated that correlates of higher smoking level included having more friends who smoke ( $\beta = 0.63$ , 95% CI 0.57–0.69) and more frequent other tobacco use ( $\beta = 0.04$ , 95% CI 0.02–0.05), drinking ( $\beta = 0.04$ , 95% CI 0.02–0.07) and binge drinking ( $\beta = 0.09$ , 95% CI 0.06–0.13). Bivariate analyses indicated that daily smokers (versus the subgroups of non-daily smokers) were less likely to smoke for social reasons but more likely to smoke for self-confidence, boredom, and affect regulation. Controlling for sociodemographics, correlates of readiness to quit among current smokers included fewer friends who smoke ( $P = 0.002$ ), less frequent binge drinking ( $P = 0.03$ ), being a social smoker ( $P < 0.001$ ), smoking less for self-confidence ( $P = 0.04$ ), smoking more for boredom ( $P = 0.03$ ) and less frequent smoking ( $P = 0.001$ ).

Specific motives for smoking and potential barriers to cessation particularly may be relevant to different groups of college student smokers.

## Introduction

Smoking remains one of the leading causes of preventable disease in the United States [1]. Despite efforts to decrease its prevalence, 18.1% of Americans continue to smoke [2]. While daily smoking is declining [3], non-daily smoking (smoking on some days but not every day) is increasing [4]. Estimates from the 2008 National Survey on Drug Use and Health [5] and from the 2006 Behavioral Risk Factor Surveillance Survey [6] indicate that between a fourth and a third of adults report non-daily smoking. While non-daily smoking may be a transitory condition between daily smoking and quitting [7–9] or a transitional phase to heavier or regular cigarette use [10], some research shows that this pattern of smoking may continue indefinitely [11–13]. Additionally, although most non-daily smokers report motivation to quit, research has documented that they may show signs of physiological addiction [14, 15], have difficulty quitting [16, 17], and are less likely to receive or seek treatment compared with heavier smokers [18–20].

Unfortunately, non-daily smokers suffer from significant smoking-related morbidity and mortality

compared with never smokers [21–23]. The 2004 US Surgeon General's report on the health consequences of smoking indicates that even low levels of exposure carry substantial risks, particularly for cardiovascular disease, lung and gastrointestinal cancers, lower respiratory tract infections, cataracts, compromised reproductive health and osteoporosis [24]. Moreover, smoking on as few as 5 days month<sup>-1</sup> is associated with symptoms of cough and sore throat and smoking on as few as 20 days month<sup>-1</sup> is associated with shortness of breath and fatigue among college students [25]. Thus, promoting cessation among non-daily smokers is critical.

Young adults have been particularly affected by the increase in non-daily smoking [26]. One form of non-daily cigarette use particularly prevalent among young adults is 'social smoking', which implies smoking predominantly in the presence of others, typically at parties, bars or nightclubs [26, 27] and often times when consuming alcohol [10]. Social smokers generally do not define themselves as smokers [27], believe they are addicted [27], perceive negative consequences of their smoking [28] or show interest in quitting, as they often believe that they could stop at any time [27]. In addition, non-daily smoking may be associated with binge drinking, particularly on US college campuses [29, 30].

A recent study of college student smokers [31] identified five subclasses of smokers: heavy smokers (28%), moderate smokers (22%), social smokers (19%), puffers (26%) and no-context smokers (4%). Puffers were more likely to be younger students than heavy and social smokers, indicating a transition to regular use after experimentation. Moderate and social smokers were more likely to be current drinkers and to have engaged in binge drinking in the past month than were heavy smokers. While this research elucidates the differing subgroups of college student smokers, it remains uncertain how motives for smoking differ among subgroups of smokers.

In another recent study of college student smokers [32], having made a recent quit attempt among daily smokers was associated with smoking <20 cigarettes per day, not smoking within 30 min of waking and having a usual type of cigarette. Having made a recent quit attempt among non-daily smokers

was associated with being female, non-Hispanic and smoking a usual type of cigarette. Moreover, lower socio-economic status was associated with less intention to quit. Although this study identified sociodemographic and specific smoking-related characteristics associated with recent quit attempts among college students, research is warranted regarding how contextual factors and motives for smoking might impact readiness to quit.

Given the gaps in the existing literature, the present study examined (i) the association of motives for smoking and smoking level among current smokers and (ii) correlates of readiness to quit, particularly motives for smoking, among current college student smokers.

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## Methods

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### Procedure

The University of Minnesota Institutional Review Board approved this study, IRB# 0712S22941. In 2008, a random sample of 5500 students at the 4-year university and all young adults (aged 18–25 years) enrolled at least part-time at the 2-year college ( $N = 3334$ ) were invited to complete the survey (total invited  $N = 8834$ ). Students received an e-mail containing a link to the consent form with the alternative of opting out. Students who consented were directed to the online survey, which detected their individual URL links and prevented participation more than once. To encourage participation, students received up to three e-mail invitations, and all students who completed the survey received entry into a drawing for cash prizes of \$2500 (one), \$250 (one) and \$100 (five) at each school.

Of students invited to participate, 2700 (30.6%) completed the survey. The response rates at the 2-year college and the 4-year college were 30.1% ( $N = 1004$ ) and 30.8% ( $N = 1696$ ), respectively.

### Measures

The 108-item online survey assessed a variety of health topic areas. For this study, only sociodemographic, psychosocial, health behavior and smoking-related characteristics were examined.

### *Sociodemographic characteristics*

We assessed included students' age, gender, ethnicity, highest parental educational attainment, type of school attended (2-year technical college versus 4-year university), marital/cohabitation status, whether children were present in the home and whether parents smoked. Ethnicity was dichotomized as non-Hispanic White versus Other due to the homogeneity of the study sample. Highest parental educational attainment was dichotomized as < Bachelor's degree versus  $\geq$  Bachelor's degree based on the distribution of parental educational attainment. Other categorizations and cut-off points were examined, but yielded similar results. Thus, for ease of interpretation, these dichotomizations were chosen.

### *Smoking status and level*

Being a non-smoker was defined as no smoking in the past 30 days. Daily smoking was defined as smoking every day in the past 30 days. Non-daily smoking was considered smoking less than 30 days of the past 30 days. This is in line with how American College Health Association (ACHA), substance abuse and Mental health association and others have defined daily versus non-daily smokers [33, 34]. Based on the distribution of the data, we created two subcategories of non-daily smokers: those who smoked between 1 and 5 days in the past 30 days versus those who smoked between 6 and 29 days. We also asked, 'On the days that you smoke, how many cigarettes do you smoke on average?' Finally, we asked 'Have you ever smoked at least 100 cigarettes in your lifetime?'

### *Other substance use*

To assess other substance use, students were asked, 'In the past 30 days, on how many days did you: Use other forms of tobacco? Drink alcohol? Drink more than five alcoholic drinks on one occasion?' These questions have been used to assess tobacco use in the ACHA surveys, National College Health Risk Behavior Survey and Youth Risk Behavior Surveillance Survey (YRBSS) [35, 36]. In addition, repeated measures of the YRBSS

over a 2-week period have supported the reliability of these assessments [37]. Specifically, Kappas for each behavior in the past 30 days were as follows: tobacco use, 0.82; drinking alcohol, 0.71 and drinking five or more drinks on one occasion, 0.68 [38].

### *Readiness to quit*

Readiness to quit was assessed by asking, 'what best describes your intentions regarding quitting smoking: never expect to quit; may quit in the future, but not in the next 6 months; will quit in the next 6 months and will quit in the next month' [39]. This variable was dichotomized as intending to quit in the next month versus other responses. Readiness to quit smoking in the next month has been previously used as a measure of being in the preparation or action stages of change [39, 40] and predicts successful cessation [41].

### *Quit attempts*

Participants were asked, 'During the past 12 months, how many times have you stopped smoking for 1 day or longer because you were trying to quit smoking?' [42].

### *Confidence and motivation to quit smoking*

Confidence to quit smoking was assessed by asking, 'On a scale of 0–10 with 0 being 'not at all confident' and 10 being 'extremely confident', assuming you want to, how confident are you that you could quit smoking cigarettes starting this week and continuing for at least one month?' Motivation to quit smoking was assessed by asking, 'On a scale of 0–10 with 0 being 'I do not want to at all' and 10 being 'I really want to', how much do you want to quit smoking cigarettes?' [43, 44].

### *Social smoking*

Social smoking was assessed by asking, 'In the past 30 days, did you smoke: mainly when you were with other people; mainly when you were alone, as often by yourself as with others, or not at all' [28]. This 'social smoking' variable was dichotomized as either

smoking mainly when with other people versus other responses. The use of this assessment to establish social smoking has been used extensively [26–28, 45]. We also asked ‘Out of your five closest friends, how many of them smoke cigarettes?’ [44].

### *Smoking motives*

The motives for smoking scale [46, 47] assesses the extent to which each of 15 smoking-related motives is true for the participant (1 = not at all true and 5 = very true). The measure contains questions about four common motives: social (4 items, e.g. ‘Smoking helps you fit in with other people’; range 4–20), self-confidence (4 items, e.g. ‘Smoking makes you feel more self-confident’; range 4–20), boredom relief (2 items, e.g. ‘Smoking is something to do when you are bored’; range 2–10) and affect regulation (5 items, e.g. ‘Smoking helps you calm down when you are feeling tense or nervous’, ‘Smoking cheers you up when you’re in a bad mood’; range 5–25). Higher scores indicate that the motive is more relevant. Alphas for each motive subscale have ranged from 0.88 to 0.93, and the scale has demonstrated strong validity [46, 47]. In the current study, alphas for the total scale, the social subscale, the self-confidence subscale, the boredom relief subscale and the affect regulation subscale were 0.91, 0.88, 0.84, 0.92 and 0.90, respectively.

### **Data analysis and statistical consideration**

We examined differences in sociodemographics and other substance use among non-smokers and current (past 30 day) smokers, using the three categories of smoked 1–5 days of the past 30 days, smoked 6–29 days and smoked all 30 days. For bivariate analyses, *t*-tests and analysis of variance (ANOVA) were used for continuous variables, and Chi-squared tests were used for categorical variables. The association between smoking status/level and these factors were examined using ordinal regression, with non-smokers being the reference group for the model, smokers smoking between 1 and 5 days of the past 30 days being coded as 1, smokers smoking between 6 and 29 days being

coded as 2 and daily smokers being coded as 3. Sociodemographics and other substance use variables were entered into the model.

We then examined differences in smoking characteristics and motives among current smokers using the three categories of smoked 1–5 days of the past 30 days, smoked 6–29 days and smoked all 30 days, using Chi-squared for categorical variables and ANOVA for continuous variables. Finally, we investigated readiness to quit in the next month among current smokers. We forced important sociodemographic variables (i.e. age, gender, ethnicity and type of school) into the model and used backwards stepwise entry including other psychosocial variables significant at a  $P < 0.10$  level, allowing only those variables to remain in the model that contributed at a  $P < 0.05$ . We also examined interactions between subgroup of smoking level and other factors. SPSS 19.0 was used for all analyses.

## **Results**

Table I highlights the participant characteristics. Overall, 64.7% ( $n = 1736$ ) were non-smokers, 22.1% ( $n = 593$ ) were non-daily smokers and 13.2% ( $n = 353$ ) were daily smokers. Among current smokers in this sample, 29.8% smoked 1–5 days, 9.6% smoked 6–10 days, 5.0% smoked 11–15 days, 6.4% smoked 16–20 days, 5.6% smoked 26–29 days and 39.3% smoked every day of the past 30 days.

### **Differences among non-smokers, non-daily smokers and daily smokers**

Table I depicts the differences among non-smokers and current smokers smoking 1–5 days in the past 30 days, 6–29 days in the past 30 days and all 30 days, with the overall  $P$ -value for the four-way comparison, using Chi-squared statistics for categorical variables and ANOVA for continuous variables. The ordinal regression analyses modeling smoking level (Nagelkerke  $R^2 = 0.347$ ) indicated that significant ( $P < 0.05$ ) factors predicting higher level of smoking included being male ( $\beta = -0.36$ , 95% CI  $-0.57$  to  $-0.16$ ), lower parental education ( $\beta = -0.31$ , 95% CI  $-0.50$  to  $-0.12$ ), attending a 2-year school

**Table I.** Participant characteristics and analyses indicating association of sociodemographic and health-related variables to being a non-smoker, non-daily smoking and daily smoking among college students

Variable	All (N =2682)	Non-smoker (N = 1736)	Smokes 1–5 days (N = 312)	Smoked 6–29 days (N = 281)	Daily smoker (N = 353)	P*
	N (%) or mean (SD)	N (%) or mean (SD)	N (%) or mean (SD)	N (%) or mean (SD)	N (%) or mean (SD)	
<b>Sociodemographics</b>						
Age (SD)	22.44 (6.09)	22.52 (6.32)	21.48 (5.55)	21.69 (4.16)	23.47 (6.50)	<0.001
Female (%)	1683 (63.0)	1083 (62.7)	193 (62.5)	173 (61.6)	234 (66.5)	0.53
Non-Hispanic white (%)	2306 (86.3)	1469 (85.1)	258 (83.2)	250 (89.0)	321 (91.2)	0.03
Parental education $\geq$ BA (%)	963 (36.1)	617 (35.7)	123 (39.8)	118 (42.1)	105 (29.7)	0.04
Two-year (versus 4-year) college (%)	1000 (37.3)	581 (33.5)	109 (34.9)	101 (35.9)	209 (59.2)	<0.001
Married or living w/partner (%)	720 (27.0)	451 (26.1)	73 (23.5)	69 (24.6)	127 (36.1)	<0.001
Children in the home (%)	601 (22.8)	396 (23.2)	55 (18.0)	48 (17.3)	102 (29.2)	0.001
Parents smoked (%)	1,151 (43.7)	648 (38.0)	135 (44.4)	140 (50.4)	228 (65.5)	<0.001
Number of friends that smoke (SD)	1.89 (1.60)	1.34 (1.39)	2.18 (1.37)	3.03 (1.33)	3.44 (1.32)	<0.001
<b>Substance use variables</b>						
Days in the past 30 days						
Used other tobacco (SD)	1.63 (5.83)	0.80 (4.10)	2.41 (6.48)	4.09 (8.58)	3.12 (8.32)	<0.001
Consumed alcohol (SD)	4.24 (5.01)	3.17 (4.22)	5.67 (5.33)	6.88 (5.43)	6.14 (6.19)	<0.001
Binge drank (SD)	2.21 (3.63)	1.34 (2.62)	3.22 (3.82)	4.29 (4.54)	3.96 (5.10)	<0.001

Bonferroni post hoc tests indicated significant differences ( $P < 0.05$ ) in age between non-smokers and 1–5 day smokers and daily smokers, between 1 and 5 day smokers and daily smokers, and between 6 and 29 day smokers and daily smokers; proportion of females between non-smokers and daily smokers; proportion of whites between non-smokers 6–29 day smokers and daily smokers; proportion of those with more educated parents between non-smokers and all current smokers, between 1 and 5 day smokers and daily smokers and between 6 and 29 day smokers and daily smokers; proportion of 2-year school students between daily smokers and all other groups; proportion of those married between daily smokers and all other groups; proportion of those with children in the home between non-smokers and all current smokers and between daily smokers and those smoking 1–5 days or 6–29 days; proportion of parents who smoked among all groups; number of friends that smoke among all groups; number of days of using other tobacco products between non-smokers and all current smokers and between 1 and 5 day smokers and 6–29 day smokers; number of days of alcohol consumption between non-smokers and all current smokers and between 1 and 5 day smokers and 6–29 day smokers and number of days of binge drinking among all groups except 6–29 day smokers and daily smokers.

\*Denotes overall  $P$ -value for the four-way comparison.

( $\beta = -0.38$ , 95% CI  $-0.58$  to  $-0.19$ ), greater likelihood of parental smoking ( $\beta = 0.46$ , 95% CI  $0.28$ – $0.65$ ), having more friends that smoke ( $\beta = 0.63$ , 95% CI  $0.57$ – $0.69$ ), more days of other tobacco use ( $\beta = 0.04$ , 95% CI  $0.02$ – $0.05$ ), more days of drinking ( $\beta = 0.04$ , 95% CI  $0.02$ – $0.07$ ) and more days of binge drinking ( $\beta = 0.09$ , 95% CI  $0.06$ – $0.13$ ). No other significant associations were found.

### Factors associated with smoking level among current smokers

Table II displays factors associated with various levels of smoking among current smokers, using Chi-squared for categorical variables and ANOVA for continuous variables. In these analyses, we included

only the 857 current smokers (of the total 946) who completed the battery of questions regarding smoking characteristics, as some participants did not accurately follow the skip pattern or had incomplete data relevant to these analyses. Interestingly, both subgroups of non-daily smokers were more likely to smoke for social reasons in comparison to daily smokers; however, daily smokers were more likely to smoke for self-confidence, boredom and affect regulation.

### Readiness to quit among current smokers

Table III shows the logistic regression model that was developed to predict readiness to quit among current smokers. Candidate predictors were those variables that were significantly associated with

**Table II.** Association of smoking-related variables to smoking level among college students

Variable	All smokers ( <i>N</i> = 857; 100%)	Smoked 1–5 days ( <i>N</i> = 255; 29.8%)	Smoked 6–29 days ( <i>N</i> = 265; 30.9%)	Daily smoker ( <i>N</i> = 337; 39.3%)	<i>P</i>
	<i>N</i> (%) or Mean (SD)	<i>N</i> (%) or Mean (SD)	<i>N</i> (%) or Mean (SD)	<i>N</i> (%) or Mean (SD)	
Days smoked in past 30 (SD)	17.14 (12.33)	2.38 (1.46)	17.53 (7.49)	30.00 (0.00)	<0.001
Cigarettes per day (SD)	5.81 (5.39)	1.94 (2.13)	4.53 (3.88)	9.50 (5.65)	<0.001
Smoked ≥100 cigarettes in life (%)	678 (79.2)	115 (45.1)	229 (86.7)	334 (99.1)	<0.001
Ready to quit in next month (%)	236 (29.0)	128 (59.0)	78 (30.1)	30 (8.9)	<0.001
Quit attempt in the past year (%)	480 (59.3)	107 (48.0)	179 (70.2)	194 (58.4)	0.39
Confidence to quit (SD)	6.25 (3.70)	9.15 (2.14)	6.77 (3.08)	3.44 (3.00)	<0.001
Motivation to quit (SD)	7.34 (3.25)	8.94 (2.24)	7.46 (2.78)	5.97 (3.57)	<0.001
Social smoker (%)	406 (49.2)	184 (80.0)	161 (61.7)	61 (18.2)	<0.001
Motives (SD)					
Social	7.69 (2.14)	7.78 (3.79)	8.10 (3.64)	7.30 (3.56)	0.02
Self-confidence	6.30 (1.79)	5.79 (2.97)	6.32 (3.02)	6.70 (3.11)	0.001
Boredom	4.88 (1.50)	4.00 (2.36)	4.91 (2.37)	5.67 (2.62)	<0.001
Affect regulation	13.12 (3.31)	11.01 (5.58)	12.85 (4.91)	15.31 (5.46)	<0.001

Bonferroni post hoc tests indicated significant differences among all groups on all dimensions, with the exception of Motives—Social which was only significant in the comparison of 6–29 days versus 30 days ( $P = 0.02$ ) and Motives—Self-confidence which was only significant in the comparison of 1–5 days versus 30 days ( $P = 0.001$ ).

readiness to quit in the next month at a  $P < 0.10$ . However, we chose to exclude recent quit attempts, confidence to quit and motivation to quit as these variables are highly related to the outcome variable of interest (i.e. readiness to quit). Factors associated with readiness to quit included being younger ( $P = 0.04$ ), attending a 4-year school ( $P = 0.007$ ), being married or living with a partner ( $P = 0.004$ ), having non-smoking parents ( $P = 0.001$ ), having fewer friends that smoke ( $P < 0.001$ ), fewer days of binge drinking ( $P = 0.007$ ), fewer days of smoking in the past 30 days ( $P < 0.001$ ), smoking fewer cigarettes per day ( $P < 0.001$ ), not smoking within 30 min of waking ( $P < 0.001$ ), being a social smoker ( $P < 0.001$ ) and being less likely to smoke for self-confidence ( $P = 0.003$ ), boredom ( $P = 0.002$ ) or affect regulation ( $P < 0.001$ ). Controlling for age, gender, ethnicity and highest parental education, correlates of readiness to quit among current smokers included fewer friends that smoke ( $P = 0.002$ ), fewer days of binge drinking in the past 30 days ( $P = 0.03$ ), being a social smoker ( $P < 0.001$ ), being less likely to smoke for self-confidence ( $P = 0.04$ ), being more likely to smoke for boredom ( $P = 0.03$ ) and fewer days of smoking in the past 30 days ( $P = 0.001$ ). We explored this last variable both as a categorical and

as a continuous variable; minimal differences in the results were found. Thus, for ease of interpretation, we chose to present this variable as a categorical variable. No interactions between subgroup of smoking level and other factors were found.

## Discussion

The current research examined factors associated with smoking level and motives for smoking among current college student smokers and how these factors are associated with readiness to quit smoking across current college student smokers smoking at various levels (i.e. 1–5 days of the past 30, 6–29 days of the past 30 and daily). This study documented that, in general, the use of other tobacco products and alcohol increases with any smoking and more frequent use of cigarettes, which has been previously documented among college students [31, 48]. Moreover, we found that both subgroups of non-daily smokers were more likely to smoke for social reasons in comparison to daily smokers; however, daily smokers were more likely to smoke for self-confidence, boredom and affect regulation. Finally, the present study documented that readiness to quit among current smokers was associated

**Table III.** Binary logistic regression indicating factors associated with readiness to quit among current smokers in college

Variable	OR	95% CI	P
Sociodemographics			
Age	1.01	0.9–1.05	0.71
Gender			
Male	Ref	—	—
Female	1.35	0.92–1.99	0.13
Ethnicity			
Non-hispanic white	Ref	—	—
Other	0.79	0.44–1.42	0.42
Type of college			
Two years	Ref	—	—
Four years	0.87	0.60–1.28	0.49
Number of friends that smoke	0.81	0.71–0.92	0.002
Substance use variables			
Days binge drinking in past 30	0.63	0.42–0.95	0.03
Smoking-related variables			
Social smoker			
No	Ref	—	—
Yes	2.25	1.48–3.43	0.001
Motives—Self-confidence	0.93	0.87–0.99	0.04
Motives—Boredom	1.09	1.01–1.18	0.03
Days smoked in past 30			
1–5 days	Ref	—	—
6–29 days	0.38	0.25–0.57	<0.001
30 days	0.11	0.06–0.20	<0.001

Nagelkerke  $R^2 = 0.309$ .

with not only fewer days of smoking in the past 30 days but also having fewer friends that smoke, fewer days of binge drinking, being a social smoker, being less likely to smoke for self-confidence and being more likely to smoke for boredom. These findings are novel and have important implications.

Non-daily smokers in this sample were more likely to be social smokers and were more likely to smoke for social reasons. However, 42% of non-daily smokers in this college sample did not report smoking mostly in social situations, which suggests that being a non-daily smoker is not synonymous with being a social smoker [12]. Daily smokers were more likely to report smoking for self-confidence, boredom or affect regulation. These are novel findings not previously documented among college student smokers. This suggests distinct motives for smoking and, thus, specific barriers to cessation among smokers consuming cigarettes at varying frequencies.

More frequent smoking was associated with being less ready to quit in the next month, which supports prior research [49–51]. In line with existing literature [52, 53], having fewer friends that smoke was associated with greater readiness to quit smoking. Prior research indicates that social smokers are more likely to be contemplating or preparing to quit, particularly if smoking bans were implemented in social settings, which is common in most states [49], making it more difficult to smoke in some social situations (e.g. bars, restaurants). Our findings reflect a similar phenomenon. Less frequent binge drinking was also associated with greater readiness to quit smoking, which is in line with literature indicating that a greater length of abstinence from alcohol predicts better cessation rates [54–56]. Also, those who were less likely to smoke for self-confidence and those who were more likely to smoke for boredom were more likely to be ready to quit smoking, which has not previously been documented. It may be that college students using cigarettes for self-confidence may be getting more benefit from their smoking in terms of overall coping and functioning, whereas those using cigarettes more recreationally, such as in social situations or when they are bored, are benefitting less from the use of their cigarettes. This is likely given prior research documenting that perceiving greater benefit of smoking is associated with less readiness to quit smoking [57, 58].

The current study has implications for research and practice. Particularly, notable from the current study are the findings indicating that college students who smoke less frequently were more likely to smoke for social reasons, whereas daily smokers were more likely to smoke for self-confidence, boredom and affect regulation. Thus, cessation efforts should differentially target these motives and barriers to cessation among these different groups of college student smokers. For example, cessation interventions for non-daily smokers should focus on social dimensions of smoking, whereas interventions for daily smokers should target emotional coping, developing alternatives to smoking in the context of boredom and increasing

self-confidence. Moreover, it is critical to attend to the fact that these motives are related readiness to quit, such that smoking for self-confidence was associated with being less ready to quit smoking, whereas smoking for boredom was associated with being more ready to quit. Continued research in this area might elucidate other targets for intervention specific to different levels of smoking among the college student population.

## Limitations

Limitations to this study include limited generalizability due to drawing the sample from two colleges in the Midwest, with participants being primarily female and Caucasian. This is particularly important because minority populations are more likely to be non-daily smokers. Second, the survey response rate was 32.0%, which may seem low and might suggest responder bias. However, previous online research has yielded much lower response rates (29–32%) among the general population [59] and a wide range of response rates (17–52%) among college students [60]. In addition, our prior work has demonstrated that, despite lower response rates, Internet surveys yield similar statistics regarding health behaviors compared with mail and phone surveys [61]. Another limitation to generalization is that, among college students, some individuals may be living in unusually restrictive smoking environments due to campus restrictions, which might account for a high prevalence of non-daily smoking. Thus, our sample may not be representative of other young adults or the adult population in general. Also, the large sample size (a strength of the study) allowed for use to detect subtle differences in psychosocial and smoking-related characteristics. Finally, our decision to categorize non-daily smokers into those that smoked 1–5 days and those that smoked 6–29 days did not allow for us to account for the variability within these two groups. However, we felt that it was critical to maintain the daily smokers as a distinct category but examine some variability within the non-daily smoking population. In particular, those smoking between 26 and 29 days of the past 30 were difficult to categorize, as they may be daily smokers who

attempted to quit in the past month or may have not smoked on a particular day for another reason. However, this segment only constituted 5.6% of the current smoker population and thus was not likely to substantially impact our overall findings. We also did not assess the length of time participants had been engaging in their current smoking pattern. Despite these limitations, these findings provide strong support for continued investigation of differences in smoking-related characteristics among young adults.

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## Conclusions

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Daily smokers were less likely than more infrequent smokers to be social smokers and to smoke for social reasons; however, daily smokers were more likely to smoke for self-confidence, boredom and affect regulation. In addition, less frequent smoking was associated with greater readiness to quit smoking in the next month than daily smokers. Moreover, the predictors of readiness to quit smoking among current college student smokers (i.e. smoking motives, binge drinking, smoking frequency) suggest specific intervention targets, which may inform the tailoring of interventions. Because the rise of non-daily smoking in comparison to daily smoking, tobacco control efforts must focus more fully understanding the nuances in smokers consuming cigarettes at various frequencies in order to successfully address this growing concern.

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## Conflict of interest statement

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None declared.



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