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Nondaily smoking patterns in young adulthood

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Abstract

Purpose—Many young adult smokers routinely smoke less than daily. Prospective, longitudinal data are needed to describe and predict the influences on smoking patterns among nondaily young adult smokers.

Methods—Latent class growth analysis was used to examine developmental trajectories and predictors of nondaily cigarette smoking among young adults aged 18 to 21 in the Upper Midwestern United States.

Results—There were three distinct groups of nondaily smokers during young adulthood ($n=519$). College status, previous quit attempts, attitudes toward the meanings of cigarettes, and situational factors influencing smoking were significant predictors of group membership.

Conclusions—Nondaily smoking in young adulthood may result in several discrete patterns of smoking between age 18 and 21. Predictors that differentiate smoking trajectories may be useful to promote cessation or reduction in young adult smoking.

Keywords

nondaily; intermittent; smoking; longitudinal; trajectory; young adult

1. Introduction

Tobacco use is the most significant cause of disease and premature death in the U.S., resulting in nearly 1 out of every 5 deaths per year (Centers for Disease Control and Prevention, 2008; Danaei et al., 2009). Since tobacco use initiation occurs by age 26 for 99% of adult smokers, early intervention is critical for tobacco use prevention (U.S.

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Author Disclosures

EGK led the manuscript development, conducted analyses, writing and revision of the article.

DHB contributed to the study concept, supported analysis, and writing. KML contributed to the literature review, writing and revision.

JLF designed the study, contributed to the study concept, and provided feedback on draft and revised versions of the manuscript. All authors contributed to and have approved the final manuscript. None of the authors have a conflict of interest to disclose.

Department of Health and Human Services, 2012). Young adults, in particular, represent an important population due to high smoking prevalence, with 35.7% of 18-25 year olds reporting past month smoking (US Dept of Health and Human Services, 2009).

Evidence is emerging that some young adult smokers are routinely smoking less than daily (Pierce, White, & Messer, 2009; Shiffman & Paty, 2006; Trinidad et al., 2009). Prior to the 1990s, this behavior may not have been sufficiently captured by the measurements collected in national surveys, the perception that this was an exceptional circumstance, or because nondaily smoking was a “challenge to the standard model of smoking behavior” (Shiffman, 2009).

Previous longitudinal studies have characterized the patterns of smoking behavior among youth and adolescents (Bernat, Erickson, Widome, Perry, & Forster, 2008; Colder et al., 2001; Karp, O’Loughlin, Paradis, Hanley, & Difranza, 2005; Lessov-Schlaggar et al., 2008; Stanton, Flay, Colder, & Mehta, 2004). Most recently, longitudinal investigations focused during young adulthood depict smoking patterns that differ from those among younger smokers (Brook et al., 2008; Chassin, Presson, Pitts, & Sherman, 2000; Juon, Ensminger, & Sydnor, 2002; Orlando, Tucker, Ellickson, & Klein, 2004; Riggs, Chou, Li, & Pentz, 2007; White, Pandina, & Chen, 2002). These studies have labeled these patterns as nonsmokers, occasional or experimental smokers, late starters, continuous smokers, and quitters. Studies focused on nondaily smoking during young adulthood into later adulthood have observed a persistence of the occasional, or nondaily, smoking pattern. White et al. found that nondaily smoking in young adulthood was not stable, as individuals moved in and out of this smoking pattern between late adolescence and young adulthood (White, Bray, Fleming, & Catalano, 2009). Another study suggested that two groups-- low- and high-frequency smokers-- diverge by age 23 (Orlando, et al., 2004). Other studies suggest that nondaily smoking may be maintained for several years throughout adolescence and young adulthood (Brook, et al., 2008; McDermott, Dobson, & Owen, 2007). More research is needed to identify and predict nondaily smoking patterns within this age group.

As with adolescents, young adults rely on their peer groups and peer environment to cue whether tobacco use is normative or acceptable. Across numerous studies and populations, individual and environmental factors have been identified that influence young adult smoking behaviors, including factors such as friend smoking, smoke-free policies in place of residence, college attendance, race/ethnicity, previous quit attempts, as well as alcohol use (Oksuz, Mutlu, & Malhan, 2007; Pierce, et al., 2009; Trinidad, et al., 2009; Wortley, Husten, Trosclair, Chrismon, & Pederson, 2003). College attendance has been associated with nondaily use (Thompson et al., 2007), but less is known about whether these smoking patterns are equivalent in young adults who do not attend college (K. Lenk et al., 2012). Young adult nondaily smoking may also be distinct regarding cessation intention and behavior. Although rates of smoking are higher among young adults than older smokers, this population has similar (Solberg, Boyle, McCarty, Asche, & Thoele, 2007) or slightly higher rates (Messer, Trinidad, Al-Delaimy, & Pierce, 2008) of successful quitting to their older counterparts. Yet, studies on nondaily smokers suggest this group may be less motivated to quit smoking (Kotz, Fidler, & West, 2012) than daily smokers.

Descriptions and predictors of young adult nondaily smoking trajectories would be informative to devise interventions to prevent smoking initiation and target smoking cessation efforts among young adults. A limitation of the current longitudinal research is the use of lengthy intervals (e.g., 1 year or more) between surveys (Chassin, et al., 2000; Riggs, et al., 2007) thus limiting the detail with which individual progression in smoking behavior over time can be described. The main goals of the present study are to (a) identify distinct developmental trajectories of nondaily cigarette smoking among young adults aged 18 to 21

and (b) examine factors associated with trajectory group membership. Based on previous research, we hypothesized that there would be more than one developmental trajectory within this group of nondaily smokers, and that social-ecological factors would distinguish the resulting trajectories. This study extends previous research in two important ways. First, this study includes more frequent observations (6 month intervals) than much of the past longitudinal research. More observations allow for greater precision in characterizing trajectories of tobacco use during this critical time period. Second, this study specifically examines a population-based sample of young adults, which includes those in college and those not attending college.

2. Methods

2.1 Minnesota Adolescent Community Cohort (MACC) Study Design

This study includes data from the Minnesota Adolescent Community Cohort (MACC) Study. MACC is a population-based cohort study that began in 2000 ($n=4,241$). In 2000, participants were between 12 and 16 years of age and included youth living in Minnesota, as well as four other upper Midwest states (North Dakota, South Dakota, Kansas, and Michigan). An additional cohort of 12-year-old participants ($n=584$) were recruited in 2001, for a total sample of 4,825 participants.

Prior to participant recruitment in Minnesota, the state was divided into 129 areas thought to reflect the local tobacco control environment, from which 60 were randomly selected. A combination of probability and quota sampling methods (to assure equal age distribution) was then used to recruit participants. Recruitment was conducted by telephone by Clearwater Research, Inc., using modified random digit dial sampling. Households were called to identify those with at least one teenager between the ages of 12 and 16, and within eligible households, respondents were selected at random from among age quota cells that were still open (response rate: 58.5% of known eligible individuals). Additional details regarding the study design and measures used are published elsewhere (Forster, Chen, Perry, Oswald, & Willmorth, 2011).

The University of Minnesota Institutional Review Board approved this study and participants provided informed consent. Participants completed a telephone survey every six months that included questions about smoking-related attitudes and behaviors. The interviews lasted 10 to 20 minutes, depending on the smoking status of the participant. Participants received \$15 (which increased to \$20 at age 18) for completion of each survey. The interview was structured so that spoken responses would not be revealing to anyone overhearing the participant. As of the most recent point of data collection (round 17) for the MACC cohort of eligible participants, response rates were 78%.

The present study includes eight rounds of data collected from all eligible participants when participants were between 18 and 21 years of age; this equates to roughly four years of longitudinal data collected, starting in 2003. Participants who completed three or more interviews between the ages of 18 and 21, and reported smoking at least once in the past month at age 18 were included in the present study.

2.2 Measures

2.2.1 Outcome Variable—At age 18, smoking was assessed with the item, “Thinking about the last 30 days, on how many of those days did you smoke a cigarette, even one or two puffs?” Consistent with Husten’s review of the current light smoking definitions found in the literature, we have used the label “nondaily” smoking for this analysis, defined as smoking between one and 29 days in past month as a valid and valuable means to

differentiate this smoking pattern from regular use (Husten, 2009; Tong, Ong, Vittinghoff, & Perez-Stable, 2006). As such, participants responses to this survey item ranged from 0 to 30 days.

2.2.2. Predictor Variables—Seventeen predictor variables were selected from the social-ecological model as well as attitudinal factors associated with smoking behavior within this age group, organized into demographic, behaviors and attitudes, and environmental factors. These measures represent a portion of those collected as part of the MACC study (Forster, et al., 2011). All predictor variables except for education level were assessed using survey data at age 18, and all predictor variables were dichotomized for data analyses.

Demographics: Three demographic predictors were measured: sex (male/ female), race/ ethnicity (White/other) and education level (attending a four-year college/no four-year college attendance) at age 19.

Behaviors & attitudes: Eleven predictor variables pertained to behaviors and attitudes. Three variables pertained to quitting and addiction. Quit attempts was measured by one survey item in which participants were asked if they ever attempted to quit smoking (yes/ no). To assess self-reported addiction participants were asked “On a scale from 1 to 5, where 1 is ‘not addicted at all’ and 5 is ‘very addicted’, how addicted are you to cigarettes?” which was dichotomized into somewhat/very addicted or otherwise. To assess self-reported confidence in quitting, participants were asked, “On a scale from 1 to 5 where 1 is ‘not at all sure’, and 5 is ‘very sure’, how sure are you that you can quit smoking totally and for good if you wanted to?” which was dichotomized into somewhat/very sure or otherwise. Two predictor variables pertained to settings where smoking frequently occur. Participants were asked about smoking at bars, with an endorsement of smoking dichotomized as ‘usually or sometimes’ versus ‘rarely or never.’ Participants were asked about smoking at parties, with an endorsement of smoking dichotomized as ‘usually or sometimes’ versus ‘rarely or never.’ Three variables pertained to the functional meaning of tobacco --“When a person is feeling down, a cigarette can really make them feel better,” “Cigarettes can help people control their weight,” and “When someone’s angry or nervous, a cigarette can calm them down.” Each item included response categories on a five-point Likert-type scale ranging from strongly agree (1) to strongly disagree (5). Higher scores on each variable represent greater perceived utility of tobacco use. Each functional meaning measure was dichotomized into somewhat/strongly agree versus other. Three attitudinal items regarding tobacco companies were used as predictor variables--“Cigarette companies get too much blame for young people smoking,” “Cigarette companies are making too much money off of young people,” and, “Cigarette companies are trying to get young people to smoke.” Each item included response categories in a five-point Likert-type scale ranging from strongly agree (1) to strongly disagree (5). To reflect negative attitudes toward tobacco companies, the latter two variables were dichotomized into somewhat/strongly agree versus other and the first variable was dichotomized into somewhat/strongly disagree versus other.

Environmental: Three environmental variables pertaining to smoking were used as predictors. Household smoking was measured from several survey questions on whether the participant’s mother, father, and/or siblings smoke cigarettes (dichotomized as having at least one family member who smokes versus no family members smoke). The number of four closest friends who smoke cigarettes was dichotomized as having no close friends versus one or more friends who smoke. Presence of a household smoking ban was measured by two survey items about whether residents and guests are prohibited from smoking inside the participant’s home (defined as all residents/guests prohibited from smoking inside home versus other).

2.3 Data analysis

From our sample of young adults who reported nondaily past month smoking (defined as smoking between 1 and 29 days in the past month) at age 18, we conducted latent class growth analyses (LCGA) for the purpose of categorizing patterns of smoking over time (Nagin, 2005); this approach has been demonstrated to be effective for classifying distinct groups based on behavioral longitudinal data. Based on *a priori* assumptions of the authors, previous studies using the MACC samples, and studies of longitudinal smoking patterns among young adults, one to four latent classes were tested using the study sample. The best fitting model was selected based on the Bayesian Information Criteria (BIC), which has been noted to serve as the best among the information criteria-based indices of model fit (Jung & Wickrama, 2008), and model parsimony. Next, the LCGA-assigned group membership for each participant was used as an outcome measure in multivariate logistic regression models (run individually for planned comparisons between the three groups) to identify significant predictors for each latent class group membership ($p < 0.05$) during young adulthood; all predictors were compared simultaneously within a single multivariate model. All data analyses were generated using in SAS software, Version 9.2.

3. Results

From the LCGA analyses, the best fitting model was a 3-class solution. Conditional probabilities of class membership were suggestive of reasonable model fit – 0.95, 0.87 and 0.91 for classes 1, 2, and 3 respectively. The resulting three classes, or groups, are shown in Figure 1, described as the pattern of smoking frequency observed over time using the group names “Low Frequency” ($n=248$), “Medium Frequency” ($n=144$), and “High Frequency” ($n=127$). As depicted in Figure 1, the Low Frequency group had mean of 6 days of past month smoking that slowly declined to 1.5 days over time. The Medium Frequency group ranged between a mean of 12 and up to 17 days of past month smoking. The High Frequency group had a mean of 18 days of past month smoking which increased to a mean of 27 days over time.

Table 1 shows a description of the study sample characteristics ($n=519$) for the entire sample as well as by resulting smoking frequency groups. The sample included slightly more females than males (51.2% female) and was predominantly white (91.5%), and most participants (76.9%) attended a 4-year college at some point between the ages of 18 and 21.

In the multivariate logistic regression analyses shown in Table 2 ($n=512$; sample size reduced due to missing data), odds ratios are shown to compare Low and High Frequency, as well as Medium and High Frequency groups to determine whether any descriptive predictors at age 18 were associated with the resulting patterns of smoking frequency. The only demographic factors that distinguished smoking frequency groups was attending a 4-year college which was associated with a 2.8 times higher odds of being in the Low versus High frequency group (CI: 1.5-5.0). In other comparisons between Low and High frequency groups, among the behavioral and attitudinal factors, ever trying to quit, smoking at parties, endorsement of being somewhat or very addicted, and agreement that tobacco companies try to make money off of youth significantly decreased the odds of being in the Low versus High frequency group ($p < 0.05$ for all factors); endorsement of being sure you can quit significantly increased the odds of being in the Low versus High Frequency group. For the environmental factors, having a household ban on smoking nearly doubled the odds of being in the Low compared to High Frequency group. All remaining factors were not statistically significant.

In comparing the Medium to High Frequency groups, among the behaviors and attitudes, young adults who self-reported being addicted to cigarettes or endorsed the statement that

cigarettes can help a person lose weight were less likely to be in the Medium compared to High Frequency group. Agreeing that smoking calms a person down increased the odds of being in the Medium Frequency by 2.5 times, compared to the High Frequency group ($p < 0.01$). None of the environmental factors significantly distinguished between group members.

4. Conclusions

In the present study, three distinct longitudinal smoking patterns emerged for individuals who were nondaily smokers at age 18. Other longitudinal studies of young adult nondaily smokers have also found distinct patterns of smoking patterns, although consensus has not been achieved on the total number (Chassin, et al., 2000; Levy, Biener, & Rigotti, 2009; Orlando, et al., 2004). Previous studies have found between four and six distinct trajectories, but some included nonsmokers in their analyses. Riggs et al. found that lower level smokers in adolescence had some risk of becoming an addicted smoker in young adulthood (Riggs, et al., 2007). Although White et al. (White, et al., 2009) found instability in nondaily smoking patterns, our study on nondaily smokers with lower levels of smoking frequency remained relatively stable over time, although those who started at a higher frequency increased in their daily frequency of smoking over the study period. While more longitudinal studies are warranted, the results demonstrate the need for improved understanding of potential predictors that may disrupt a pattern of escalating smoking and addiction during young adulthood, as this population has proved a difficult target for effective smoking cessation interventions (Cengelli, O'Loughlin, Lauzon, & Cornuz, 2011). The present study provides a measurement of smoking behavior every six months, which gives a robust description of tobacco usage over this critical period when smoking behaviors may be in transition (Riggs, et al., 2007).

These results suggest that a pattern of nondaily smoking may persist during young adulthood. Using longitudinal data, we have an enhanced understanding of young adults as "social smokers," or those individuals who primarily smoke when in social situations (Song & Ling, 2011). While social smoking behavior is common in young adulthood, there is evidence to suggest that nondaily young adult smokers are using cigarettes in non-social as well as social settings (K. M. Lenk, Chen, Bernat, Forster, & Rode, 2009; Schane, Glantz, & Ling, 2009; Song & Ling, 2011). Our study supports nondaily smoking as a persistent pattern among young adults; more longitudinal research is warranted to investigate the social and environmental circumstances, including policies, that promote or prevent smoking in social and non-social settings over time.

There are several individual as well as social and environmental factors that were significant predictors of the resulting patterns of smoking observed in the present study. Attending a 4-year college at any point during the period of study (ages 18 to 21) was strongly associated with membership in the lower frequency smoking category versus the high frequency category, which is consistent with other studies, our study found that college attendance appeared to have a protective effect on smoking behavior (White, et al., 2009) and as a factor relevant to smoking patterns during young adulthood (White, et al., 2009). Interviews with nondaily smokers on college campuses have demonstrated that students use tobacco as a means to structure some otherwise ambiguous time (Stromberg, Nichter, & Nichter, 2007); this type of use may not be as relevant to non-college attending peers.

The functional meanings of cigarettes informed some distinctions between groups. In particular, endorsement of the concept that cigarettes help to calm a person down was associated with medium (versus high) frequency of smoking, and the belief that cigarettes can help you lose weight is associated with high (versus medium) frequency of smoking.

Key roles in smoking uptake and progression in adolescence and young adulthood include familial, peer, environmental, and personality factors (Flay, Petraitis, & Hu, 1999; Giovino, 1999; Thrasher & Bentley, 2006). Therefore, it is possible that an individual may change their opinions about the functional meaning of cigarettes as that individual increases in the frequency and/or quantity of smoking.

Negative attitudes toward tobacco companies have been identified with lower smoking levels (Ling, Neilands, & Glantz, 2009). Further, such attitudes are also associated with greater quit intentions among young adults (Ling, Neilands, & Glantz, 2007). Agreement with the statement that “tobacco companies try to make money off of youth” was significantly associated with being in the high frequency smoking group compared to the low frequency group. It is possible that negative attitudes toward tobacco companies may be more consistently strong predictors of smoking intention, but the scale of these differences may yield smaller, yet perhaps still meaningful, differences among smokers. It is possible young adults who smoke may endorse some anti-industry attitudes, particularly if those individuals have quit intentions. Further investigation into tobacco industry attitudes among nondaily young adult smokers compared to other smoking and nonsmoking groups is warranted.

Previous studies have found that banning smoking in the home was associated with lower smoking frequency (Pierce, et al., 2009). While this association was not statistically significant in the current study, this may be due to the relatively high prevalence of smoke-free home policies (ranging from 61% to 78% of households banning indoor smoking), resulting in too little variance to achieve statistical significance among medium compared to high frequency smokers.

Our study focused on several levels of influence to identify the role played by these proximal and distal factors. In particular, our results support that various elements of the social-ecological model interact differently depending on smoking frequency. Tobacco control policies, such as clean indoor air policies and tobacco taxes, have other known benefits to prevent and reduce tobacco use in this age group (U.S. Department of Health and Human Services, 2012); further research into how more distal policy influences may strengthen anti-tobacco attitudes and behaviors is warranted in this population to prevent escalation of tobacco use and promote smoking cessation.

We acknowledge that results from the application of a novel method such as LCGA require cautious interpretation. The appropriate method to determine the number latent trajectory classes has been debated (Bauer, 2003a, 2003b; Jung & Wickrama, 2008). At issue is the application of LCGA to non-normally distributed data and how the model allows for variability within trajectories. In the present study, we applied a parsimonious approach based on the available evidence in the literature that best addresses our stated research question. We acknowledge that the technique of LCGA ultimately relies on fit statistics to determine the appropriate number of trajectories, and that when data are non-normally distributed too many classes may be extracted and the relationships may be spurious (Bauer, 2003a). Yet, the BIC has performed well in growth mixture model simulation studies to select the best fit between models (Jung & Wickrama, 2008; Nylund, Asparouhov, & Muthén, 2007), and provides reassurance that the appropriate number of trajectories was identified in our analysis. One additional challenge of our LCGA model is that it does not allow for variability within trajectories, which may present two problems. First, this restriction of within class variability to zero could lead to an overestimation of the number of trajectories. In our study, however, the conditional probability of membership in the selected trajectory ranged from 87% to 95%, suggesting that trajectories were reasonably distinct. Second, this restriction treats individuals within a trajectory equally, regardless of

whether they had a high or weak probability of fit. The identification of factors predictive of class membership was a goal of the present study; therefore the allocation of participants into trajectories addresses our study question with a less cumbersome interpretation of results. We agree with the statement by Hoepfner et al. that, “Much can be learned from a focus on empirically identified sub-groups rather than fitting global trajectories to pre-defined groups” (Hoepfner, Goodwin, Velicer, Mooney, & Hatsukami, 2008).

Several other limitations are important to consider when interpreting the results. First, all predictor variables but college attendance were assessed at age 18, which may not capture some of the variability over the study period. Yet, these factors provide some important distinctions between groups, giving valuable insight into an important population group. Second, some additional variables of interest – including the number of cigarettes per day, alcohol and other substance consumption levels, self-reported identification as a smoker, and anxiety and depressive symptoms – were not included in this evaluation because the questions were not asked at early rounds of data collection. Future studies should include these important measures to quantify their relationship to group membership. Lastly, the present study is limited in generalizability to more racially and ethnically diverse populations, and across different geographic regions.

In conclusion, three distinct patterns of nondaily smoking patterns were observed over a three-year period of emerging young adulthood between ages 18 to 21 years. Both attitudinal and behavioral factors contributed to significant distinctions between these nondaily smoking groups. Given that nondaily smokers continued to exhibit some degree of smoking behavior throughout young adulthood, these factors may be useful to create multi-component interventions to promote smoking cessation to this target population. For example, promoting opposition to tobacco companies’ target marketing of young adult smokers might support a reduction in smoking frequency. Our findings suggest a divergence in smoking patterns as young adults got older, which underscores the need to develop effective, evidence-based smoking cessation interventions for young adults (Butler, Fallin, & Ridner, 2012). Quitting smoking among today’s young adults is projected to result in a substantial reduction in the health burden of tobacco-related illnesses (Gilpin, White, White, & Pierce, 2009), so improved understanding of behaviors that lead to nondaily smokers may help to inform and improve anti-tobacco marketing and cessation efforts.

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Highlights

We examined a cohort of young adults on smoking behaviors every six months between ages 18 and 21 (n=519).

Longitudinal analyses of those smoking less than daily at age 18 identified three distinct patterns of smoking behavior.

Demographic, behavioral, attitudinal, and environmental factors were significant predictors of different nondaily smoking groups.

Figure 1. Smoking patterns over time during young adulthood for nondaily smokers at age 18: Results from the Minnesota Adolescent Community Cohort study

Table 1

Description of nondaily young adult smokers at age 18 (n=519)

Predictors*	Total (n=519)	Low (n=248)	Medium (n=144)	High (n=127)
Demographics				
Male	48.8%	46.0%	50.0%	52.8%
White	91.5%	91.5%	91.0%	92.1%
Attending 4 yr college anytime between 18-21 yrs of age	76.9%	85.5%	74.3%	63.0%
Behaviors & attitudes				
Ever tried to quit	50.9%	37.1%	57.6%	70.1%
Somewhat/very sure you can quit	75.9%	87.9%	72.9%	55.9%
Somewhat/very addicted	9.1%	2.0%	7.6%	24.4%
Smoke at bars	14.1%	7.7%	20.1%	19.7%
Smoke at parties	41.0%	28.2%	52.8%	52.8%
Agree that smoking calms you down	64.3%	53.2%	79.2%	69.1%
Agree that smoking is good when you are down	20.4%	18.6%	22.2%	22.1%
Agree that cigarettes can help you lose weight	27.9%	28.2%	22.9%	33.1
Agree that tobacco companies are to be blamed for youth smoking	54.5%	58.1%	52.8%	49.6%
Agree that tobacco companies try to make money off of youth smokers	83.4%	81.9%	83.3%	86.6%
Agree that tobacco companies try to get youth to smoke	78.0%	79.0%	77.1%	77.2%
Environmental				
Anyone in household smokes	47.8%	39.3%	53.2%	58.3%
Any close friend smokes	89.0%	87.1%	90.3%	91.3%
Household ban on smoking	71.1%	78.1%	67.4%	61.4%

* All factors were self-reported at age 18, except college attendance

Table 2Predictors of smoking patterns in young adulthood, ages 18 to 21 (n=512)[‡]

Predictors [*]	Low (n=246) vs. High (n=126) OR (CI)	Medium (n=140) vs. High (n=126) OR (CI)
Demographics		
Male	0.68 (0.41 – 1.12)	0.84 (0.50 – 1.53)
White	0.77 (0.32 – 1.90)	0.81 (0.32 – 2.04)
Attending 4 yr college anytime between 18-21 yrs of age	2.78 (1.54 – 5.03)	1.66 (0.93 – 2.98)
Behavior & attitudinal		
Ever tried to quit	0.47 (0.27 – 0.80)	0.81 (0.46 – 1.43)
Somewhat/very sure you can quit	2.49 (1.32 – 4.71)	1.53 (0.82 – 2.84)
Somewhat/very addicted	0.15 (0.05 – 0.46)	0.24 (0.05 – 0.46)
Smoke at parties	0.40 (0.23 – 0.71)	1.06 (0.59 – 1.87)
Smoke at bars	0.63 (0.28 – 1.38)	0.93 (0.45 – 1.91)
Agree that smoking calms you down	0.73 (0.42 – 1.29)	2.59 (1.39 – 4.83)
Agree that smoking is good when you are down	1.31 (0.68 – 2.55)	1.04 (0.54 – 2.00)
Agree that cigarettes can help you lose weight	0.77 (0.44 – 1.36)	0.47 (0.26 – 0.86)
Agree that tobacco companies are to be blamed for youth smoking	1.36 (0.80 – 2.31)	1.12 (0.65 – 1.93)
Agree that tobacco companies try to make money off of youth smokers	0.43 (0.20 – 0.94)	0.51 (0.23 – 1.13)
Agree that tobacco companies try to get youth to smoke	1.32 (0.68 – 2.54)	1.37 (0.70 – 2.68)
Environmental		
Anyone in household smokes	0.77 (0.44 – 1.32)	1.10 (0.62 – 1.94)
Any close friend smokes	0.94 (0.41 – 2.17)	1.07 (0.44 – 2.61)
Household ban on smoking	1.78 (1.01 – 3.17)	1.25 (0.70 – 2.22)

Note: Figures bolded are significant at $p < 0.05$ [‡]Total sample was reduced by n=7 due to missing data^{*}All factors were self-reported at age 18, except college attendance