College Student Smokers
Former Versus Current and Nonsmokers

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Background: Little is known about how former smokers are different from nonsmokers and current smokers in the young adult population.

Purpose: Intra- and inter-personal factors associated with former smoking status were examined among a college student sample.

Methods: Undergraduate students (N=8834) were contacted at a 2-year college and a 4-year university in 2008; 2700 completed the online survey (30.6% response rate). Current analyses, conducted in 2011, focused on 2589 students aged 18–30 years. Current (past 30-day) smoking prevalence was 35.3% (*n*=918); 9.2% (*n*=244) were former smokers.

Results: Multinomial logistic regression found that compared to former smokers, nonsmokers were younger (OR=0.91, CI=0.89, 0.92); less frequently used other tobacco products (OR=0.97, CI=0.94, 0.99); less frequently limited their dietary fat intake (OR=0.98, CI=0.97, 0.99); had more negative attitudes regarding smoking (OR=1.03, CI=1.02, 1.04); had lower levels of hope (OR=0.97, CI=0.94, 0.99); and had fewer friends who smoked (OR=0.74, CI=0.67, 0.83). Compared to former smokers, current smokers were younger (OR=0.94, CI=0.92, 0.96); more frequently binge drank (OR=1.11, CI=1.05, 1.18); less frequently limited their dietary fat intake (OR=0.98, CI=0.96, 0.99); had less negative attitudes toward smoking (OR=0.97, CI=0.96, 0.98); had lower levels of hope (OR=0.96, CI=0.94, 0.99); were more likely to live with other smokers (OR=2.09, CI=1.45, 3.00); and had more friends who smoked (OR=1.20, CI=1.07, 1.34).

Conclusions: Intrapersonal factors (hope, attitudes toward smoking); interpersonal factors (living with smokers, friends' smoking); and use of other substances (alcohol, alternative tobacco products) are associated with differing smoking behaviors.
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Introduction

The 2012 U.S. Surgeon General's Report highlighted the importance of promoting cessation among young adult smokers.[1] This is particularly critical because individuals who quit before the age of 30 reduce their chances of dying prematurely from smoking-related diseases by 90%.[2,3] Little research has been done to determine how former smokers differ from current smokers and nonsmokers among the young adult population, which may inform cessation interventions for this group.

The social ecologic model (SEM) is a framework to examine the multiple effects and interrelatedness of social elements in an environment on individual behavior.[4–6] The SEM integrates multiple levels of influence that affect health behavior and ultimately health outcomes,[4–6] which include intra- and inter-personal factors; community and organizational factors (or institutional); and public policies.[4–6] Drawing from this perspective, the current study focuses on intrapersonal and interpersonal factors potentially associated with smoking status among young adults.

A number of intrapersonal factors were assessed in the current study, including sociodemographics, engaging in other health behaviors, attitudes toward smoking, depressive symptoms, and level of hope. Research has documented differences in other health behaviors like alcohol or substance use in relation to smoking.[7,8] Less negative attitudes toward smoking are associated also with smoking initiation.[9] Moreover, it is well documented that a history of major depression is positively

related to smoking initiation,[10–14] smoking intensity,[12–14] less likelihood of quitting,[11,15] and nicotine withdrawal during quit attempts.[16,17] Despite these findings, less has been documented in terms of how former smokers differ in terms of these factors from nonsmokers and current smokers among young adults.

Hope may play a role in smoking behavior in the college population. According to Snyder and colleagues, hope is the perception of having both the routes to reach one's goals (pathways) and the motivation (agency) to use those routes[18–22] and goals, which are targets of action.[23] Pathways thinking reflects the ability to generate multiple plausible routes or ways to reach goals and to choose new routes when an obstacle blocks the attainment of a desired goal. Agency thinking reflects the ability to initiate and sustain movement and motivation toward goals, particularly in the face of obstacles. It may be that nonsmokers, former smokers, and current smokers demonstrate different levels of hope. Specifically, perhaps nonsmokers have the highest level of hope, given their continuous abstinence from cigarettes, with former smokers having a higher level of hope than current smokers, because of the ability to overcome this addiction or habit. It also is quite likely that these relationships hold for both pathways and agency thinking, because these factors, albeit distinct, are highly correlated with one another.

Several interpersonal factors may influence smoking behavior, including parental smoking, living with smokers, and having friends who smoke. Parental smoking has been shown to increase smoking initiation among their offspring.[24–26] Moreover, having more friends who smoke[27] and living with smokers[26,27] has been associated with being a smoker. However, little is known about how former smokers differ from nonsmokers and current smokers among young adults in relation to these factors.

The current study examined differences in intrapersonal and interpersonal factors among college students representing these groups. It is hypothesized that current smokers will demonstrate the highest-risk profiles in terms of high health risk behaviors, less negative attitudes toward smoking, greater depressive symptomatology, lower levels of hope, being more likely to have parents who smoke, being more likely to have other smokers in the home, and having more friends who smoke, whereas nonsmokers will demonstrate the lowest-risk profile related to these factors. Of particular interest, it is hypothesized that former smokers will have a higher-risk profile than nonsmokers but a lower-risk profile than current smokers, either because of ultimately changing their intra- and inter-personal factors to achieve or sustain cessation or because they already had lower risk profiles than other current smokers, making it easier to quit smoking.

Methods

Procedure

In October 2008, a random sample of 5500 students at a 4-year university and all young adults enrolled at least part-time at a 2-year college ($n=3334$) in the Midwest were invited to complete an online survey (total invited N=8834). This different recruitment approach was aimed at obtaining roughly equal responses from 2- and 4-year college students. Students received up to three e-mails containing a link to the consent form with the alternative of opting out. Students who consented were directed to the online survey. As an incentive for participation, students completing the survey received entry into a drawing for cash prizes of $2500 (one); $250 (one); and $100 (five) at each school. Of those invited to participate, 2700 (30.6%) completed the survey (2-year college: 30.1%, $n=1004$; 4-year college: 30.8%, $n=1696$). Prior research using online survey administration has documented similar rates (e.g., 29%–32% among the general population[28] and 17%–52% among college students[29]). The current analyses, conducted in 2011, focused on students aged 18–30 years; thus, 2598 participants are included in these analyses.

Measures

The online survey contained 108 questions assessing various health topics, taking approximately 20–25 minutes to complete. For the current investigation, only the variables highlighted below were included.

Intrapersonal Factors

Sociodemographic characteristics. Age, gender, race/ethnicity, and type of school attended (2-year college versus 4-year university) were assessed. Race/ethnicity was dichotomized as non-Hispanic white versus Other because of the homogeneity of the sample.

Smoking behaviors. Participants were asked: *In the past 30 days, on how many days did you smoke a cigarette (even a puff)?* and *Have you smoked at least 100 cigarettes in your lifetime?* These questions have been used in previous research and have been shown to be reliable and valid.[30–32] Students who reported smoking at least one day in the past 30 days were considered current smokers, those reporting no smoking in the past 30 days but having smoked at least 100 cigarettes in their lifetime were considered former smokers, and those reporting no cigarettes in the past 30 days and smoking fewer than 100 cigarettes in their lifetime were considered nonsmokers. We also assessed average number of cigarettes smoked on smoking days (cpd) among current smokers. Former smokers were asked: *When was the last time you smoked a cigarette?* with response options of *more than 1 year ago*, *more than 6 months ago but less than 1 year ago*, and *within the past 6 months*.

Health-related behaviors. Participants were asked: *In the past 30 days, on how many days did you: Drink alcohol? Drink more than five alcoholic drinks on one occasion? Exercise for at least 20 minutes? Limit the amount of fat in your diet? Use some other form of tobacco (like cigars, smokeless tobacco)?* For the alcohol use items, they were told, "Throughout these questions, by a 'drink,' we mean a can or bottle of beer, a glass of wine or a wine cooler, a shot of liquor, or a mixed drink with liquor in it." These questions have been used in previous research (e.g., American College Health Association surveys,

Youth Risk Behavior Surveillance System [YRBSS]). These measures have been investigated by repeated measures of the YRBSS and have been shown to be reliable and valid.[33] Specifically, Kappas for each assessment were as follows: drinking alcohol, 0.71; drinking five or more drinks on one occasion, 0.68; exercising at least 20 minutes, 0.41; and limiting dietary fat, 0.53.[34,35]

Smoking attitudes. The Smoking Attitudes Scale[9] asks participants to rate on a 7-point scale how strongly they agree (1 = strongly disagree, 7 = strongly agree) with 17 smoking-related statements across four dimensions—interpersonal relationships with smokers, laws and societal restrictions on smoking in public places, health concerns, and the marketing and sale of cigarettes.[9] For example, items included "secondhand smoke is a legitimate health risk" and "nonsmokers should be more tolerant of smokers." Higher scores indicate more negative attitudes regarding smoking. The scale produces significantly different scores for smokers and nonsmokers, with smokers possessing consistently more favorable attitudes toward smoking-related topics.[9] The scale has good construct validity, as well as good internal consistency, with subscale Cronbach's alphas ranging from 0.69 to 0.88.[8] Cronbach's alpha in the current study was 0.88.

Depressive symptoms. Participants were asked to complete the Patient Health Questionnaire (PHQ-2),[36] a two-item depression screening tool, based on DSM-IV diagnostic criteria, assessing frequency of depressed mood—"feeling down, depressed or hopeless"—and anhedonia—"little interest or pleasure in doing things"— over the past 2 weeks. Responses are rated on a 4-point Likert-type scale and range from *not at all* (0) to *nearly every day* (3). A total score ≥3 has been used to reflect clinical depression.[36]

Hope. Hope was assessed using the six-item State Hope Scale,[37] composed of two factors reflecting agency and pathways thinking, which mirrors the dispositional Hope Scale.[20] This scale assesses how respondents describe themselves *right now* (versus *in general*) using an 8-point Likert-type scale (1 = definitely false to 8 = definitely true). For example, one agency item is "At the present time, I am energetically pursuing my goals," and one pathways item is "If I should find myself in a jam, I could think of many ways to get out of it." Possible scores range from 6 to 48 for the overall scale, with each subscale having a range of 3 to 24. In the present study, the scale had an alpha of 0.87, and the agency and pathways subscales had alphas of 0.85 and 0.74, respectively.

Interpersonal Factors

Participants were asked, *Did either of your parents smoke when you lived with them?*[38] *Out of your five closest friends, how many of them smoke cigarettes?*[39] and *Do you live with anyone that smokes cigarettes?*[39] to determine the extent to which their social network includes smokers.

Data Analyses

Participant characteristics were examined using descriptive statistics. Differences among nonsmokers, former smokers, and current smokers were examined with ANOVA (continuous) and chi-squared tests (categorical). Post hoc tests were conducted to examine significant differences in pair-wise comparisons. A nominal logistic regression model was then developed to examine distinct characteristics of former smokers compared to nonsmokers and compared to current smokers. The correlates of interest, including

each of the intrapersonal and interpersonal factors, were entered into the model. Analyses were conducted in SPSS, version 19.0. Significance was set at $\alpha = 0.05$ for all tests.

Results

Participant characteristics and bivariate analyses are presented in Table 1. The vast majority (86.4%) were non-Hispanic white, with 159 Asian/Pacific Islander, 74 (2.9%) black, 43 (1.7%) Hispanic, 20 (0.8%) American Indian/Alaskan Native, and 57 (2.2%) reporting "other." Of the 2598 participants included in these analyses, 1442 (55.5%) were nonsmokers, 238 (9.2%) were former smokers, and 918 (35.3%) were current smokers. Current smokers smoked an average of 5.53 (SD=5.35) cpd. Among former smokers, 147 (62.0%) last smoked more than a year ago; 40 (16.9%) last smoked more than 6 months ago but less than a year ago; and 50 (21.1%) smoked within the past 6 months. Bivariate analyses indicated that the three groups were significantly different in terms of all factors except race/ethnicity and depressive symptoms (see note in Table 1 for post hoc comparisons).

Multinomial logistic regression was used to examine differences between (1) former and nonsmokers and (2) former and current smokers (Table 2). We chose to include days of binge drinking rather than alcohol use to examine the relationship of high-risk levels of alcohol consumption in relation to smoking status. Only the total scores are included for the Attitudes Toward Smoking Scale and the Hope Scale, given that subscale scores reflected similar relationships to the total scores for each scale. Compared to former smokers, nonsmokers were younger, less frequently used other tobacco products, less frequently limited their dietary fat intake, had more negative attitudes regarding smoking, had lower levels of hope, and had fewer friends who smoked. Compared to former smokers, current smokers were younger, more frequently binge drank, less frequently limited their dietary fat intake, had less negative attitudes toward smoking, had lower levels of hope, were more likely to live with other smokers, and had more friends who smoked.

Discussion

Framed by the SEM,[4–6] several intrapersonal and interpersonal factors were associated with being a former smoker versus a nonsmoker or current smoker. In terms of intrapersonal factors, these results demonstrated that former smokers were older than both nonsmokers and current smokers. This likely reflects the natural trajectory of smoking among a subgroup of young adults that are likely to quit smoking prior to middle adulthood.[26] Also, women were less likely to be former smokers than current smokers.

Table 1. Participant characteristics and bivariate analyses examining differences in sociodemographic, health-related, and psychosocial factors among college students who are nonsmokers, former smokers, and current smokers, *n* (%) unless otherwise noted

Variable	All participants N=2598	Nonsmokers n=1442	Former smokers n=238	Current smokers n=918	p
SOCIODEMOGRAPHICS					
Age (M [SD])	22.43 (6.07)	21.71 (5.55)	27.62 (8.77)	22.21 (5.27)	<0.001
Gender					0.93
Female	1634 (63.0)	912 (63.3)	149 (62.9)	573 (62.6)	
Male	959 (37.0)	528 (36.7)	88 (37.1)	343 (37.4)	
Ethnicity					0.007
White	2241 (86.4)	1217 (84.5)	213 (89.5)	811 (88.5)	
Other	353 (13.6)	223 (15.5)	25 (10.5)	105 (11.5)	
Type of school					<0.001
2-year	969 (37.3)	442 (30.7)	118 (49.6)	409 (44.6)	
4-year	1629 (62.7)	1000 (69.3)	120 (50.4)	509 (55.4)	
OTHER SUBSTANCE USE, PAST 30 DAYS (M [SD])					
Alcohol use	4.24 (5.01)	3.09 (4.16)	3.86 (4.85)	6.15 (5.59)	<0.001
Binge drinking	2.21 (3.63)	1.33 (2.71)	1.60 (2.76)	3.79 (4.52)	<0.001
Other tobacco products use	1.63 (5.82)	0.72 (3.77)	1.60 (6.12)	3.18 (7.92)	<0.001
Exercised	10.60 (9.25)	11.15 (9.34)	9.76 (9.07)	9.96 (9.04)	<0.001
Limited dietary fat intake	9.63 (11.12)	9.69 (11.18)	11.96 (11.90)	8.86 (10.63)	<0.001
PSYCHOLOGICAL FACTORS (M [SD])					
Attitudes toward smoking—total	82.25 (18.15)	89.93 (14.80)	83.37 (16.43)	70.13 (16.54)	<0.001
Interpersonal	20.53 (8.33)	24.50 (6.77)	20.74 (7.05)	14.31 (6.87)	<0.001
Laws/restrictions	34.81 (7.99)	36.99 (6.62)	35.05 (7.53)	31.42 (8.81)	<0.001
Health concerns	17.85 (3.92)	18.79 (3.54)	18.11 (3.85)	16.40 (4.13)	<0.001
Marketing	12.24 (4.91)	13.40 (4.75)	12.75 (4.77)	10.34 (4.64)	<0.001
Depressive symptoms					0.89
No	1311 (50.6)	733 (50.9)	121 (51.3)	457 (50.0)	
Yes	1279 (49.4)	707 (49.1)	115 (48.7)	457 (50.0)	
Hope—total (M [SD])	39.02 (6.13)	39.24 (5.95)	40.09 (6.00)	38.47 (6.33)	<0.001
Agency	19.40 (3.56)	19.57 (3.42)	19.90 (3.57)	19.05 (3.70)	<0.001
Pathways	19.62 (3.10)	19.67 (3.04)	20.19 (3.11)	19.42 (3.14)	0.002
INTERPERSONAL FACTORS					
Parents smoked					<0.001
No	1459 (56.4)	914 (63.6)	117 (49.4)	486 (53.2)	
Yes	1130 (43.6)	524 (36.4)	120 (50.6)	428 (46.8)	
Other smokers in the home					<0.001
No	920 (35.5)	1095 (76.0)	175 (73.5)	405 (44.2)	
Yes	1675 (64.5)	346 (24.0)	63 (26.5)	511 (55.8)	
Number of friends who smoke (M [SD])	1.89 (1.60)	1.26 (1.35)	1.89 (1.50)	2.86 (1.46)	<0.001

Note: Bonferroni post hoc comparisons indicated significant differences in all comparisons among continuous variables except the following: age between nonsmokers and current smokers; binge drinking among nonsmokers and former smokers; limiting dietary fat intake among nonsmokers and current smokers; exercise among nonsmokers and former smokers and among former smokers and current smokers; Hope–total scores among nonsmokers and former smokers; agency subscale scores among nonsmokers and former smokers; and pathways among nonsmokers and current smokers. Among categorical variables, significant differences were found among all variables except the proportion of whites among former and current smokers and having other smokers in the home among nonsmokers and former smokers.

Table 2. Nominal logistic regression model examining differences in sociodemographic, health-related, and psychosocial factors among college students who are former smokers to nonsmokers and to current smokers

Variable	Nonsmokers		Current smokers	
	OR (95% CI)	*p*	OR (95% CI)	*p*
SOCIODEMOGRAPHICS				
Age	0.91 (0.89, 0.92)	<0.001	0.94 (0.92, 0.96)	<0.001
Gender		0.90		0.01
Female	ref		ref	
Male	0.98 (0.70, 1.37)		0.63 (0.44, 0.91)	
Ethnicity		0.20		0.20
White	ref		ref	
Other	1.42 (0.84, 2.42)		1.44 (0.82, 2.51)	
Type of school		0.08		0.64
2-year	ref		ref	
4-year	1.34 (0.97, 1.85)		1.08 (0.77, 1.53)	
OTHER SUBSTANCE USE, PAST 30 DAYS				
Binge drinking	0.95 (0.90, 1.01)	0.08	1.11 (1.05, 1.17)	<0.001
Other tobacco products use	0.97 (0.94, 0.99)	0.04	1.01 (0.98, 1.04)	0.54
Exercised	1.02 (1.00, 1.04)	0.08	1.01 (0.99, 1.03)	0.17
Limited dietary fat intake	0.98 (0.97, 0.99)	0.02	0.98 (0.96, 0.99)	0.005
PSYCHOLOGICAL FACTORS				
Attitudes toward smoking—total	1.03 (1.02, 1.04)	<0.001	0.97 (0.96, 0.98)	<0.001
Depressive symptoms		0.43		0.38
No	ref		ref	
Yes	0.88 (0.64, 1.21)		0.86 (0.62, 1.20)	
Hope—total	0.97 (0.94, 0.99)	0.03	0.96 (0.94, 0.99)	0.01
INTERPERSONAL FACTORS				
Parents smoked		0.34		0.68
No	ref		ref	
Yes	0.86 (0.62, 1.18		0.93 (0.67, 1.31)	
Other smokers in the home		0.13		<0.001
No	ref		ref	
Yes	1.33 (0.92, 1.91)		2.09 (1.45, 3.00)	
Number of friends who smoke	0.74 (0.67, 0.83)	<0.001	1.20 (1.07, 1.34)	0.002

Nagelkerke $R^2 = 0.475$

Regarding health behaviors, nonsmokers versus former smokers demonstrated marginally less frequent binge drinking, lower levels of other tobacco product use, and marginally more frequent exercise. Prior research has shown that nonsmokers versus former smokers less frequently engage in high-risk drinking[40]; however, these findings in regard to use of other tobacco products or exercise have not been shown previously. Current findings might suggest that former smokers place less emphasis on their health in general compared to nonsmokers. On the other hand, current smokers, compared to former smokers, more frequently binge drank, a finding supported by prior research.[40] Binge drinking may play a role in continued smoking; however, it also is possible that

there are common factors (e.g., high negative affectivity) that predispose an individual to both smoking and drinking. Both nonsmokers and current smokers less frequently limited their dietary fat intake in comparison to former smokers, which has not been found previously. It may be that former smokers are attuned to the risk of weight gain associated with smoking cessation. This finding deserves more investigation.

In terms of attitudinal factors, former smokers had more negative attitudes toward smoking and public policies around smoking than current smokers but less negative attitudes toward smoking than nonsmokers.[9] This stands to reason, as prior research has documented that nonsmokers have more negative attitudes toward smoking than current smokers. However, less research has documented this association among former smokers and current smokers in the college student population.[41]

Former smokers also had higher levels of hope than both nonsmokers and current smokers, while significant depressive symptoms did not differ among these groups. This is an interesting and important finding given the vast literature regarding the association of depressive symptoms and depression to smoking status[11–17] alongside the little prior research examining hope's relationship to smoking status.[42] Hope theory posits that hopeful people have agency and pathways to reach goals. Thus, it is not surprising that former smokers who have been able to quit successfully are more hopeful than current smokers. Contrary to our prediction, former smokers had greater levels of hope than nonsmokers. It may be that by overcoming a difficult addiction, former smokers enhanced their level of agency (which includes self-efficacy and motivation) and practiced their pathways thinking in order to problem-solve their way to their goal of cessation. Given these findings, it is plausible that interventions aimed at increasing hope[43,44] may be applied to the goal of increasing cessation attempts and successful cessation.

In terms of interpersonal factors, former smokers reported having more friends who smoke than nonsmokers, but fewer friends who smoke when compared with current smokers. This is in line with prior research.[27] In addition, former smokers were less likely to live with other smokers than current smokers. Although the cross-sectional nature of the current study does not allow us to determine causality, it is possible that either the individual quit smoking and then chose living or social situations that supported their abstinence or that they found themselves in living or social situations that encouraged cessation and abstinence. This finding could be explored more comprehensively in longitudinal research. Parental smoking in the home was not a significant differentiating factor either between nonsmokers and former smokers or

between current and former smokers, a finding that differs from existing literature.[24–26]

The present study has important implications for research and practice. First, it highlights that former smokers have risk profiles lower than that of current smokers while higher than those of nonsmokers. This may be a result of former smokers ultimately changing their intra- and inter personal factors to achieve or sustain cessation or because they already had lower risk profiles than other current smokers making it easier to quit smoking. Longitudinal studies are needed to establish the causality of these findings. Further examination of the magnitude of these findings also is needed to determine which factors may warrant the most attention in interventions. In terms of practice, clinicians working with the young adult population should assess for both current and former smoking status to address the risk profiles associated with both to increase cessation and sustain successful cessation among former smokers.

Study Limitations

The current study included only two colleges in the Midwest, with participants being primarily female and white/Caucasian. Although these characteristics reflect the demographics of the colleges from which the sample was selected, they may not reflect the demographics of all American colleges, limiting generalizability. Second, the survey response rate was 32.0%. However, previous online research has yielded similar response rates (29%–32%) among the general population[28] and a wide range of response rates (17%–52%) among college students.[3,29] In addition, because nonrespondent information was not assessed, it cannot be inferred how this sample differs from nonrespondents. Further, the cross-sectional nature of this research limits the extent to which causal relationships can be drawn from this research. Last, smoking status was assessed using self-reported data. However, there is no reason to assume differential rates of biased reporting of smoking status. Nonetheless, these findings provide strong support for continued investigation of differences in young adults with differing smoking status.

Conclusion

Social factors (i.e., living with other smokers or having friends who smoke) as well as overall attitudes toward smoking may affect smoking behavior. In addition, binge drinking is associated with current smoking, whereas lower rates of binge drinking are associated with being a former smoker. Finally, hope may play a role in cessation or may be increased as a result of successfully quitting smoking. Current findings may inform cessation inter-

ventions targeting intrapersonal and interpersonal factors that might promote cessation.

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