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Social Influences on Use of Cigarettes, E-Cigarettes, and Hookah by College Students

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Abstract

Objectives—(1) Compare social norms and perceived peer use between college student cigarette, e-cigarette and/or hookah users and nonusers; and (2) Determine variables associated with social influences.

Participants—Undergraduate students attending a large university in the Southeast U.S. (*N*=511).

Methods—An April 2013 online survey assessed use of three types of tobacco, social norms, perception of peer use, number of smokers in life, exposure to secondhand smoke, and demographic characteristics.

Results—Participants indicated greater acceptance of emerging tobacco products than for cigarettes and consistently overestimated the percent of peers who use various tobacco products. Males and current users had higher social norm scores for all three forms of tobacco.

Conclusion—To counter marketing of alternative tobacco products, education about the dangers of their use needs to be implemented across college campuses as part of a comprehensive tobacco control strategy that also includes tobacco-free campus policies.

Keywords

social influences; college students; tobacco prevention

Tobacco use remains the leading preventable cause of death in the U.S.[1] Unfortunately, college students are at risk for tobacco initiation and use.[2,3] Of particular concern is the increasing use of emerging tobacco products like electronic cigarettes (e-cigarettes), and hookah[4,5] with resultant serious health risks.[6,7] College students may view non-conventional tobacco products as less harmful than traditional cigarettes.[4,8]

Although e-cigarettes are not yet regulated by the Food and Drug Administration, they are often marketed as safer than regular cigarettes. While the long-term health effects of e-cigarettes are not yet known,[9] e-cigarettes deliver toxic chemicals including carcinogens,[9] metals[10] and fine and ultrafine particles[11,12] into the lungs and may make bacterial infections resistant to antibiotics.[13] Lung damage may be similar to that caused by conventional tobacco smoke and e-cigarettes may cause an immediate rise in airway resistance.[14] Hookah smokers experience some of the same diseases as do cigarette smokers, such as cancer, reduced lung function and decreased fertility.[6] A single session of hookah smoking delivers as much tar as a pack of cigarettes.[15] Additionally, various chemicals are emitted through smoking hookah (e.g., nicotine, carbon monoxide, arsenic, lead, and other carcinogens). Short-term health effects of hookah include carbon monoxide toxicity, resulting in increased emergency room visits, and infectious disease transmission from sharing the mouthpiece.[16]

Social influences impact the adoption of cigarette use among young adults.[2,17] Less is known about the effects of social influences on e-cigarette and hookah use. Social influences, broadly defined, includes family and peer characteristics; involvement in school and civic activities; exposure to images (sexy, rebellious, etc.); perceived impacts of smoking (e.g., likely to die from smoking); amount of contact with smokers; attitudes toward family members/peers smoking; social norms (unwritten rules providing an expectation of how individuals behave); modeling (use by family members/peers) and exposure to family and/or friends who smoke.[2,8,17,18,19,20] Although social influences may be conceptualized in many ways, for the purpose of this study, social norms and perception of peer tobacco use were chosen as measures of social influences.

College students report higher acceptance of e-smoking in public than traditional tobacco.[3] Similarly, hookah use is more socially acceptable than cigarette or cigar use.[21,22,23] Peer use influences the use of cigarettes, e-cigarettes, and hookah among young adults.[2,17] College students who report lifetime hookah use, compared to never users, have a greater number of friends who have tried and approved of hookah,[22] and start using to conform to group norms.[24] Few studies on social influences related to e-cigarette or hookah use were found, indicating a need for research.

The study purposes were to: (1) compare perceived social norms and peer use (measures of social influences) between college students currently using cigarettes, e-cigarettes and/or hookah and those not using these tobacco products; and (2) determine personal factors and exposure indicators associated with social influences. We hypothesized that social influences indicator scores would be lower among nonusers compared to current tobacco users.

METHODS

Design and Sample

The study is descriptive, cross-sectional, and part of a larger project conducted at a state university in the Southeastern U.S. via online survey. In April 2013, the university registrar provided a sample of 4,050 randomly-selected, full-time undergraduate students age 18 or older. Students enrolled part-time, or in graduate or pre-professional programs (including medical, dental, law) were not included in this sample or the sampling frame used for this study. Of the 4,050 undergraduates who received an invitation to participate, 551 completed at least part of the survey. Of those who did so, 511 had sufficiently complete surveys (i.e., complete information on tobacco use and all indicators of social influences) to be included in this analysis; this yielded an effective response rate of 13%. Consistent with the population of undergraduate university students, the sample of students included 51% females and 49% males. There were no differences in the demographic characteristics of sex (male vs. female), race/ethnicity (White, non-Hispanic vs. other), academic status (lower undergraduate vs. upper undergraduate), location of residence (on-campus vs. off-campus), or tobacco use status (current user vs. nonuser) between the 551 with complete surveys and the 40 partial responses omitted from this analysis.

Procedures

Students were invited to participate via their university email account. Qualtrics software[25] was used to administer the survey and create a secure database. The software assigned each potential participant a unique identifier. Follow-up email reminders were sent to non-responders one week and two weeks after the initial email. Surveys not returned after three weeks were considered non-responders. All respondents completing the survey were prompted to a separate entry form link for a drawing to win a $25 gift card. Prior to data collection, the Institutional Review Board issued human subjects approval.

Measures

Current tobacco use—Current tobacco use was assessed by asking time since most recent use (i.e., ‘never’ included as an option) for each of three tobacco products: conventional cigarettes, e-cigarettes, and hookah.[26] Respondents were also asked if they had smoked 100 cigarettes in their lifetime (yes/no). Based on their responses, participants were categorized as current cigarette smokers if they had smoked 100 cigarettes in their lifetime and at least once during the last 30 days.[27] The 100-cigarette threshold is used by the CDC to differentiate current/former smokers from never smokers. Those who met this threshold and smoked in at last 30 days were current smokers, while those who had smoked less recently were former smokers. Although some students may have altered their smoking patterns due to spring break, this time away from school was only for one week so would have not changed their smoking category based on behavior over the previous 30-day period. Participants were classified as current e-cigarette users if they had used in the last 30 days and hookah users if their most recent use was within the last 30 days.

The category of current tobacco user was assigned if the participant was a current user of at least one of the three products. The definition of current tobacco user (i.e., use of any of the

three products in the last 30 days with a 100-cigarette threshold if conventional cigarettes were the only product used in the last month) was specifically chosen since previous research has demonstrated that use of one of these tobacco products is often associated with use of another, particularly among college students. For example, e-cigarette use is associated with conventional cigarette smoking among college students.[28] In this same population,current hookah use is associated with daily and nondaily cigarette smoking[29] and lifetime hookah use is associated with heavy cigarette smoking.[21] The propensity of tobacco-using college students to be polyusers suggests that a student who has used any of these products in the past month is likely at greater risk of using any of them in the future, compared with former or never tobacco users. This is the rationale for defining a student who had used any of the three products in the past month as a tobacco user.

For this analysis, nonusers included never users and former users (i.e., used at least one of these tobacco products in their lifetime, but not in the last 30 days).

Social influences—Social influences were assessed with two measures: (1) social norms associated with using three tobacco products (cigarettes, e-cigarettes, hookah); and (2) perception of percent of peers using these tobacco products.

Social norms for cigarettes, e-cigarettes and hookah: Three questions were adapted from previously validated scales to assess acceptance of cigarette smoking among peers as well as personal beliefs about smoking.[30,31] The first item was: ‘How would your best friend react if you smoked cigarettes?’ with response options (1) ‘Very Upset,’ (2) ‘Somewhat Upset,’ (3) ‘They would have no opinion,’ (4) ‘Somewhat Approving,’ and (5) ‘Very Approving.’ The other two items were: ‘People important to me think I should not smoke cigarettes’ and ‘It is OK for someone like you to smoke cigarettes.’ Response options for these items were: (1) ‘Strongly Agree,’ (2) ‘Agree,’ (3) ‘Not Sure,’ (4) ‘Disagree,’ and (5) ‘Strongly Disagree.’ Responses to the latter of these two items were reverse-coded so that all items would have the same polarity. The total score was the sum of the three items, with a potential range of 3-15; higher scores indicate greater acceptance of cigarette smoking. Cronbach's alpha for this sample was 0.65. The same format was used to assess social norms for e-cigarettes and hookah, with each instance of ‘smoke cigarettes’ replaced by either ‘use e-cigarettes’ or ‘use hookah.’ Cronbach's alphas for these two social norms measures were 0.74 and 0.72 for e-cigarettes and hookah, respectively.

Perception of cigarette, e-cigarette and hookah use by peers: Perception of peer cigarette use[26] was assessed with the items, ‘What percentage of men your age do you think smoke?’ and ‘What percentage of women your age do you think smoke?’ Open-ended response options allowed a range from 0 to 100. These two items were averaged for each respondent to determine perceived peer use. The word ‘smoke’ in each of the above two items was replaced by ‘use e-cigarettes’ and ‘use hookah’ to measure perceived peer use for each of the two tobacco products.

Number of smokers in life—A checklist assessed exposure to friends and family members who smoke cigarettes. The stem was ‘Do any of the following people in your life currently smoke cigarettes?’ with eight different options (‘husband,’ ‘wife,’ ‘partner

[boyfriend/girlfriend],' 'mother/stepmother,' 'father/stepfather,' 'any sibling (brothers or sisters),' 'children,' and 'roommates/housemates'; yes/no/does not apply). One point was assigned to each 'yes' response; the number of smokers in life score was the total number of 'yes' responses. While modeling smoking behavior by family and friends is often considered a social influences indicator,[17,20] this measure was not included as an indicator of social influences in the current study since only conventional cigarette use by family and roommates was assessed.

Exposure to secondhand smoke (SHS)—Participants rated their typical exposure to SHS with one item: 'On a scale of 0-10 with 0 being "not at all" and 10 being "extremely," how often would you say you are exposed to SHS on average?' with all 11 response options displayed on a visual analog scale.

Demographic variables—Sex, race/ethnicity, academic status (i.e., lower vs. upper undergraduate), and type of residence (on-campus vs. off-campus) were assessed. Since the majority of students identified as 'White, non-Hispanic,' race/ethnicity was dichotomized so the majority group formed one category and all other combinations formed the other. Freshmen and sophomores were classified as lower undergraduates while juniors and seniors were upper undergraduates.

Data Analysis

Descriptive statistics, including means and standard deviations or frequency distributions, were used to summarize study variables. Chi-square tests of association or two-sample t-tests were used, as appropriate, to compare demographic and personal characteristics between tobacco users and nonusers. Repeated measures analysis of variance (ANOVA) was used to assess whether the outcomes of social norms and perception of use differed by type of tobacco product (cigarettes vs. e-cigarettes vs. hookah) or by tobacco user status (current users vs. nonusers). This analysis comprised two models (one for social norms and the other for perception of use), and each included the main effects of product type (i.e., within-subject effect, given the ratings of each product by the same individuals using the same scale) and tobacco user status (between-subject effect). These two models also included the interaction term between product type and use status with post-hoc comparisons based on Fisher's least significant difference procedure.

Bivariate analysis, consisting of either the two-sample t-test or Pearson's product moment correlation, was done to evaluate the relationship of each personal or demographic factor, including current tobacco use, with social norms and perception of peer use. Multivariable linear regression was used to assess predictors of social norms and perception of peer use for each of the three products, with demographic variables, tobacco use, number of smokers in life, and exposure to SHS included in each model as possible predictors. Variance inflation factors were used to assess for the presence of multicollinearlity. All analysis was done using SAS, v. 9.3; an alpha level of 0.05 was used.

RESULTS

Of the 511 participants, 88 (17.2%) indicated they had used at least one of the three tobacco products in the past 30 days. Those who currently smoked cigarettes also reported smoking at least 100 cigarettes in their lifetime. The comparisons of current tobacco users and nonusers are shown in Table 1. Current users were more likely to be male and an upper undergraduate student (i.e., junior or senior), compared to nonusers. Current tobacco users were more likely to live off-campus than nonusers. Current tobacco users reported a greater average number of smokers in their lives and indicated they were more frequently exposed to SHS, on average, compared to nonusers. There was no difference between current tobacco users and nonusers in race/ethnicity distribution: 80.2% indicated they were White, non-Hispanic.

Group differences in social norms

For the outcome of social norms score, the repeated measures analysis of variance (ANOVA) model was significant overall ($p<0.0001$), as was the interaction between product type and tobacco use status ($p=0.027$). Given the significance of the interaction effect, the main effects of product type and use status were not considered.

As shown in Table 2, the social norms means for current tobacco users exceeded those of nonusers for each of the product types. In addition, for both users and nonusers, social norms scores were highest for hookah, followed by e-cigarettes. Cigarettes had the lowest social norms scores of the three products, and this was consistent for users and nonusers. Post-hoc analysis of the significant interaction effect in the repeated measures ANOVA demonstrated that all relevant pairwise comparisons between current tobacco users and nonusers (i.e., for a fixed product type), or among product types for fixed tobacco user status were significant ($p<0.0001$).

Group differences in perception of peer use

For the outcome of perception of peer use of tobacco products, the repeated measures analysis of variance was significant overall ($p<0.0001$), as was the interaction between product type and current use status ($p=0.0051$). The significance of the interaction effect precluded examination of main effects, so post-hoc analysis was considered for the interaction only.

The means for perception of peer use among current tobacco users and nonusers for each of the three products are displayed in Table 2. Cigarettes were perceived to be the most widely used among peers, followed closely by hookah. The perception of e-cigarette use among peers was about half as much as the other two products. Compared with nonusers, current tobacco users perceived a greater percentage of peers who smoke cigarettes. The two tobacco use groups had similar means for perception of e-cigarette and hookah use among peers. The post-hoc pairwise comparisons for the significant interaction effect indicated that while tobacco users and nonusers differed significantly on their perception of cigarette use ($p=0.014$, with higher perceived peer smoking indicated by current tobacco users), the difference in average perception between the tobacco use groups was not significant for

either e-cigarettes or hookah (p>.4 for both post-hoc tests). Among current tobacco users, the perception of use was highest for cigarettes, followed by hookah and e-cigarettes; each of the perceived use variables differed from the other two with p<0.005. Among nonusers, perception of peer use was highest for hookah, followed closely by cigarettes, with perceived e-cigarette use considerably less. Perceived e-cigarette use was significantly lower than the other two products (p<0.0001 for both comparisons), but the difference between hookah and cigarettes for this outcome was not significant (p=0.11).

Associations with and predictors of social norms score by product type

Each of the three regression models were significant overall (p<0.001 for each; see Table 3). The variance inflation factors were <1.3, suggesting that multicollinearity likely did not cause parameter distortions.

Potential predictors significantly related to cigarette social norms in the bivariate analysis were sex, current tobacco use, and number of smokers in life; these same variables were significant predictors of cigarette social norms in the multivariable regression. With cigarette social norms as the outcome, males scored an average of 1.19 points higher than females; and current tobacco users scored 1.55 more points, on average, compared with nonusers. For each additional smoker the respondent had in his/her life, the cigarette smoking social norms score increased by 0.21 points. In both the bivariate and regression analyses, cigarette social norms scores were not related to race/ethnicity, academic status, residence type, or SHS exposure.

E-cigarette social norms score was significantly associated with all potential predictors with the exception of race/ethnicity. Significant predictors of this outcome included sex, tobacco use, number of smokers in life, and rating of SHS exposure; academic status and on-campus residence did not retain significance in the multivariable model. On average, males rated e-cigarette social norms 0.57 points higher than females. Current tobacco users rated e-cigarette social norms 1.97 points higher than nonusers, and for each additional smoker the respondents had in their lives, the average score on this outcome was 0.36 points higher. Finally, for each 1-point increase in SHS exposure, the average increase in e-cigarette social norms was 0.12 points. In addition to academic status and residence status, the e-cigarette social norms score was not associated with race/ethnicity in this multiple regression model.

In the bivariate analysis, the hookah social norms score was associated with residence type, tobacco use, number of smokers in life, and reported exposure to SHS. In the multiple regression analysis, current tobacco use status and number of smokers in life were significant predictors, but none of the other potential predictors (including residence type and SHS exposure) was significant in the model. Current tobacco users scored 2.18 points higher on hookah social norms than nonusers, on average. For each additional smoker the respondents had in their lives, the average increase in hookah social norms score was 0.27.

Predictors of perceived peer use by product type

Each of the regression models by product type was significant overall, with p<0.001 for each model (see Table 4). With the same potential predictors as in the above series of social norms models, the variance inflation factors were all <1.3; multicollinearity was not a

concern for the prediction of perceived peer use. Unlike all three social norms models, current tobacco use status was not a predictor of perceived peer use for any of the three models.

In the bivariate analysis, perceived use of cigarettes was associated with sex, race/ethnicity, tobacco use, number of smokers in life, and SHS exposure. The significant predictors in the multivariable model were sex, race/ethnicity, number of smokers in life, and SHS exposure. This outcome was not associated with academic status, residence type, or tobacco use in the multiple regression analysis. Compared to females, males perceived 5.85% fewer peers their age smoking cigarettes, and White, non-Hispanic respondents perceived 6.53% fewer peers smoking compared to those of other racial/ethnic groups. For each additional smoker in their lives, respondents perceived 3.15% more peer smokers, and for each 1-point increase in exposure to SHS, the percent of peers perceived as cigarette smokers increased by 0.98%.

Perception of peer e-cigarette use was associated with sex and race/ethnicity in the bivariate analysis, but not with any other potential predictor. Similarly, in the multiple linear regression these two variables were the only significant predictors of peer e-cigarette use. Males perceived 3.54% fewer peers using e-cigarettes, relative to the estimate reported by females. White, non-Hispanic respondents perceived 8.49% fewer peers using this product, compared to respondents belonging to other racial/ethnic groups. Perception of peer e-cigarette use was not related to academic status, residence type, tobacco use, number of smokers in life, or SHS exposure, in either the bivariate or multiple regression analyses.

Finally, perception of peer hookah use was associated with sex, race/ethnicity, and exposure to SHS in the bivariate analysis; each of these was a significant predictor in the multiple regression, as was number of smokers in life. Academic status, residence type, and current tobacco use were unrelated to perception of peer hookah use in either the bivariate or multivariable analyses. In the multiple regression model, males perceived 12.84% fewer of their peers used hookah, compared to females. White, non-Hispanic respondents estimated 8.11% fewer of their peers used this product, relative to respondents of other races or ethnicities. For each additional smoker in the respondent's life, the perception of peer hookah use increased by 2.71%. For every 1-point increase in reported SHS exposure, the perception of the percentage of peers using hookah increased by 1.01%.

COMMENT

This study aimed to compare perceived social norms and peer use between college students currently using cigarettes, e-cigarettes and/or hookah and nonusers, and to determine personal factors and exposure indicators associated with social influences. Social norms scores were associated with tobacco use status and product type. Current tobacco users had higher social norms scores for all three products than nonusers, indicating a greater acceptance of tobacco use among users regardless of product type. This is consistent with previous research demonstrating a relationship between smoking cigarettes and social norms, particularly friends' approval.[20]

Social norms scores were lowest for cigarettes and highest for hookah, with e-cigarettes in between, indicating greater acceptance of emerging tobacco products than for cigarettes. The dangers of cigarettes have been well-publicized and advertising has been restricted while the harms of e-cigarettes and hookah have not nearly been so well-publicized and marketing has not been restricted. Further, research on health effects is more limited for e-cigarettes than for other tobacco products.[9] College students perceive these emerging products to be less risky[4,8] and use is increasing.[4] In addition, e-cigarette use is often promoted by manufacturers and/or marketers as a healthier alternative to cigarettes and as a way to stop smoking.[32] Furthermore, not all communities have policies prohibiting e-cigarette use,[33] making them more acceptable than cigarettes, which are restricted in many workplaces and public places. This underscores the demand for comprehensive smoke-free laws and tobacco-free campus policies restricting all types of tobacco use, as well as FDA regulation of e-cigarettes and hookah, particularly with the growing body of evidence of the dangers of these emerging products and the social influences findings reported here.

The most consistent predictors of social norms related to all three products were sex, tobacco use, and number of smokers in life. Males had significantly higher social norms scores for two of the three products and current users scored higher on social norms for all three tobacco products. Those with a greater number of smokers in their lives had significantly higher social norms scores for all three products. These findings indicate males, current users, and those exposed to more active smokers are more likely to perceive that peers would be more accepting of all forms of tobacco use. This research supports the need for interventions targeting these at-risk subgroups. College students in this study ranked perceived peer use in the following order (from most to least prevalent): hookah (1), cigarettes (2) and e-cigarettes (3), with the perceived use of hookah and cigarettes very similar. However, among college students, rates of reported annual use[34] and lifetime use[26] are higher for hookah than for cigarettes. Our findings are consistent with the limited research on perception of peer tobacco use among college students.[19] Comparing college students' perceptions of peer use to actual use, respondents consistently overestimated the percent of their peers who use various tobacco products.[26] Participants in the present study consistently overestimated how many of their peers used the three products. For example, the reported estimate was 40% for smoking cigarettes compared to 12-14% in national data;[26,34] the estimate was 41% for hookah compared to national estimates of 24% ever used and 9% last 30-day use;[26] and the estimate was 19% of peers use e-cigarettes compared to national estimates of 1.5 to 3% for 30-day use.[8,28] Previous research indicates that overestimations such as these can influence behavior.[35,36] When people misperceive that more of their peers use tobacco, this can influence personal use.[37]

Although tobacco use status did not predict perception of peer tobacco use, males and White, non-Hispanic students perceived fewer peers using all three tobacco products, compared with females and minority participants. For cigarettes and hookah, perception of use was also higher among those with more smokers in their lives and those with greater SHS exposure. These variations in views of both social norms and perception of peer tobacco use could be important information to guide on-campus education and programming. Correction of misperception of the norm could involve small student group approaches presenting the correct percentage of students who are using all three tobacco

products and discussing what influences the misperception of the norm, with an emphasis on why some students (e.g., women, minorities, and those living with smokers) might misperceive actual numbers of students using these products. Another approach could be to target specific groups using social marketing techniques in student newspapers, radio programs, and campus poster campaigns that publicize normative data.[38]

In this sample, current tobacco users were more likely than nonusers to be male, upper undergraduate and live off-campus. This is not surprising, given the tobacco-free policy on this university's campus.[39] The off-campus environment has fewer tobacco-free rules and there is likely to be more exposure to tobacco products. Current tobacco users reported a greater number of smokers in their lives, and indicated a higher level of SHS exposure, consistent with research indicating that those who live with a smoker or are around smokers are more likely to smoke.[17,18]

Limitations

Although the sample was chosen randomly from all eligible undergraduate students, one limitation is the low response rate (13%). This limitation is minimized by the fact that the sample was generally reflective of the underlying population. In addition, the study included college students from one university in the Southeast, limiting the generalizability of the findings to the population of college students across the U.S. Also, the study was limited by the cross-sectional design so the trajectory of use patterns over time cannot be examined. Finally, this study focused on peer norms and did not include other relevant social influences (e.g., family, teachers) who also may have an impact on social influences. Given the dearth of studies about social influences related to e-cigarettes and hookah, increasing use of emerging products by young adults, and the health risks of tobacco use, more research is needed on social influences relating to all forms of tobacco use.

Conclusions

Current tobacco users perceived that others are more accepting of tobacco use compared to nonusers. All college students, regardless of tobacco use status, indicated greater acceptance of emerging tobacco products than for cigarettes. To increase awareness, the dangers of e-cigarettes and hookah need to be more publicized in the media, in college health classes, and through on-campus health promotion programming. Informational and affective programs do not by themselves change behavior.[40] Since there are no known evidence-based methods for changing tobacco behaviors in college students, a suggested strategy would be to provide tobacco use information and then apply a social influences approach by correcting misperceptions of the norm, emphasizing short-term physical effects, cost of use, and overall lack of social desirability of cigarettes, e-cigarettes and hookah products.[40] Many campuses use a similar approach to alcohol prevention, and these programs have been shown to reduce alcohol consumption by college students.[41] Expanding the social norms approach to tobacco, particularly with emerging products, is warranted. Smoke-and tobacco-free campus policies need to restrict the use of all tobacco products, including e-cigarettes and hookah, since stronger restrictions on tobacco use can result in tobacco cessation among young adults. [40,42] While tobacco use status was associated with perceived social norms, it was not

related to perceived peer use. Persons implementing on-campus programming, education, and media appeals need to be aware of the possible differences in acceptability of tobacco product use between users and nonusers. As college-age males tend to accept the use of cigarettes and emerging tobacco products, which may put them at great risk of initiating or continuing with these products, they are a particularly vulnerable population who need to be targeted in future research.

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Table 1

Bivariate tests of association of current tobacco use status with sociodemographic and personal characteristics (*N*=511)[*]

	Current tobacco user		
	Yes (n=88)	**No (n=423)**	**p**
	n (%) or Mean (SD)	**n (%) or Mean (SD)**	
Sex			.037
Male	33 (37.5%)	112 (26.5%)	
Female	55 (62.5%)	311 (73.5%)	
Race/ethnicity			.91
White, non-Hispanic	71 (80.7%)	339 (80.1%)	
Other	17 (19.3%)	84 (19.9%)	
Academic status			.025
Lower undergraduate	64 (72.7%)	351 (83.0%)	
Upper undergraduate	24 (27.3%)	72 (17.0%)	
Residence			.005
On-campus	34 (39.1%)	234 (55.4%)	
Off-campus	53 (60.9%)	188 (44.6%)	
Number of smokers in life[t]	1.32 (1.30)	0.56 (0.85)	<.001
Reported exposure to secondhand smoke (SHS)[t]	4.32 (2.21)	3.48 (2.06)	<.001

[*] Chi-square tests of association for group comparisons

[t] Two-sample t-tests

Table 2

Means and standard deviations for social norms and perception of percent of peers using each product by type and current tobacco use (*N*=511).

Outcome	Tobacco Product					
	Cigarettes (n=506)		E-cigarettes (n=496)		Hookah (n=505)	
	Current Tobacco User		Current Tobacco User		Current Tobacco User	
	Yes	No	Yes	No	Yes	No
	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)
Social norms	6.85 (2.40)	5.09 (2.03)	8.90 (2.53)	6.48 (2.59)	10.33 (2.17)	7.84 (2.67)
Perception of percent of peers who use	44.66 (20.48)	39.11 (17.24)	20.04 (20.56)	18.23 (15.91)	39.27 (22.34)	40.65 (22.64)

Table 3

Bivariate tests of association and multiple linear regression modeling the association of tobacco product social norms with demographic and personal characteristics.

Potential predictor	Cigarettes (n=484)		E-cigarettes (n=476)		Hookah (n=486)	
	Bivariate test statistic (p)	Regression parameter estimate (p)	Bivariate test statistic (p)	Regression parameter estimate (p)	Bivariate test statistic (p)	Regression parameter estimate (p)
Male	6.45 (<.001)	1.19 (<.001)	3.09 (.002)	0.57 (.030)	1.86 (.064)	0.19 (.47)
White/non-Hispanic	0.06 (.95)	0.06 (.80)	1.26 (.21)	0.41 (.16)	1.04 (.30)	0.35 (.24)
Lower undergraduates	−1.07 (.28)	−0.15 (.57)	−2.74 (.006)	−0.48 (.14)	−1.38 (.17)	<0.01 (.99)
On-campus residence	−0.65 (.52)	0.05 (.82)	−2.20 (.028)	−0.14 (.58)	−2.67 (.008)	−0.37 (.15)
Current tobacco user	6.37 (<.001)	1.55 (<.001)	7.74 (<.001)	1.97(<.001)	9.22 (<.001)	2.18 (<.001)
Number of smokers in life[r]	0.20 (<.001)	0.21 (.036)	0.26 (<.001)	0.36 (.005)	0.20 (<.001)	0.27 (.038)
Reported exposure to SHS[r]	0.03 (.53)	−0.01 (.84)	0.17 (<.001)	0.12 (.033)	0.10 (.022)	0.04 (.47)
	MLR F=14.16, p < .001 R^2=0.17		MLR F=13.46, p<.001 R^2=0.17		MLR F=10.67, p<.001 R^2=0.14	

SHS=Secondhand smoke

MLR=multiple linear regression

Note. All bivariate comparisons based on two-sample t-tests except those denoted with ‘r,’ which are Pearson's product moment correlations.

Table 4

Bivariate tests of association and multiple linear regression modeling the association of perception of percentage of peers using tobacco products with demographic and personal characteristics.

Potential predictor	Cigarettes (n=486)		E-cigarettes (n=484)		Hookah (n=488)	
	Bivariate test statistic (p)	Regression parameter estimate (p)	Bivariate test statistic (p)	Regression parameter estimate (p)	Bivariate test statistic (p)	Regression parameter estimate (p)
Male	−3.01 (.003)	−5.85 (.001)	−2.15 (.032)	−3.54 (.037)	−6.10 (<.001)	−12.84 (<.001)
White/non-Hispanic	−3.03 (.001)	−6.53 (.001)	−3.60 (<.001)	−8.49 (<.001)	−3.44 (<.001)	−8.11 (.001)
Lower undergraduates	−1.12 (.16)	−1.31 (.54)	1.26 (.21)	2.67 (.20)	1.71(.089)	4.46 (.098)
On-campus residence	−1.54 (.12)	−1.07 (.53)	−0.26 (.80)	−0.75 (.65)	0.27 (.79)	0.34 (.87)
Current tobacco user	2.36 (.009)	2.84 (.20)	0.76 (.44)	1.91 (.37)	0.52 (.61)	−3.10 (.25)
Number of smokers in life[r]	0.21 (<.001)	3.15 (<.001)	0.04 (.34)	0.55 (.51)	0.09 (.058)	2.71 (.011)
Reported exposure to SHS[r]	0.18 (<.001)	0.98 (.011)	0.06 (.21)	0.35 (.34)	0.13 (.003)	1.01 (.035)
	MLR F=8.32, p<.001 R^2 = 0.11		MLR F=4.14, p<.001 R^2=0.06		MLR F=9.22, p<.001 R^2=0.12	

SHS=Secondhand smoke

MLR=multiple linear regression

Note. All bivariate comparisons based on two-sample t-tests except those denoted with ‘r,’ which are Pearson's product moment correlations.