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**Examining Social Norm Beliefs about Traditional Cigarettes
and Electronic Cigarettes among U.S. Sexual Minority College Students**

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Abstract

Examining Social Norm Beliefs about Smoking Tobacco and Electronic Cigarettes among U.S. Sexual Minority College Students

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Objective: Sexual Minority (SM) young adults, 18 – 24 year olds who identify their sexuality as anything other than heterosexual, are one minority that is well documented to have higher tobacco use rates than heterosexual young adults. However, very little research examines the social norm beliefs associated with smoking cigarettes or vaping electronic nicotine delivery systems (ENDS; commonly referred to as e-cigarettes, JUULs, vape pens, etc.), held by the SM college age population compared to heterosexual peers. The purpose of the present study was to determine if 1) SM young adults have more favorable social norms about cigarette and ENDS use than heterosexual peers and 2) if social norms account for, or potentially mediate, the disparity in cigarette and ENDS use in SM young adults. More accepting injunctive and descriptive social norms were each hypothesized to explain, or mediate, the association between SM identity and subsequent cigarette or ENDS use.

Methods: In spring 2018, online surveys were administered via email to college students at seventeen public universities in Texas; 10,213 18-24 year old young adults (*M age* = 20.4; 64.6% female sex assigned at birth; 48.3% Hispanic, 27.5% non-Hispanic White, 7.2% non-Hispanic Black, 12.7% non-Hispanic Asian, and 4.2% other race/ethnicity) met criteria to be

included in this study. Surveys assessed current/past-30 day tobacco use behavior (cigarettes and ENDS), SM identity, injunctive normative perceptions of tobacco use (perceived acceptability of behavior), and descriptive normative perceptions of tobacco use (perceived peer behavior). Path analysis was used to determine if the potential association between SM status and current cigarette or ENDS use is mediated by social norm perceptions (injunctive norms and descriptive norms) about cigarette or ENDS use. Separate models were examined for current cigarette use and for current ENDS use.

Results: SM young adults reported higher prevalence of cigarette and ENDS use, and more accepting injunctive norm beliefs about cigarette or ENDS use than their heterosexual peers. There were no differences between the two groups on descriptive norm beliefs. Results from path analyses indicated that only injunctive norm beliefs about cigarette or ENDS use significantly mediated the associations between SM identity and current cigarette or ENDS use, respectively, while controlling for age, sex, race and other tobacco product use. Descriptive norm beliefs were significantly associated with current cigarette or ENDS use, but SM status was not associated with descriptive norm beliefs.

Conclusion: Findings from this study suggest that it is important to address tobacco use among the SM young adult population. Tobacco prevention and control initiatives should focus efforts on changing injunctive norm beliefs, or perceived peer acceptability of cigarettes or ENDS, about tobacco use in the community of SM young adults instead of allocating more resources to address descriptive norm beliefs, or prevalence of peer use of cigarettes or ENDS.

Keywords: LGBT smoking disparities; young adults; college; risk for tobacco use; normative beliefs

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Introduction

A growing body of evidence suggests there are disproportionately higher rates of smoking cigarette use and vaping Electronic Nicotine Delivery Systems (ENDS) among the sexual minority (SM) population relative to the non-minority, heterosexual population (Centers for Disease Control and Prevention, 2016; US Department of Health and Human Services, 2014; Jamal et al., 2018; Johnson et al., 2016, Wheldon et al., 2018). The SM is comprised of anyone who identifies their sexuality as anything other than heterosexual or “straight”; some common SM identities are “gay”, “lesbian”, “bisexual”, “pansexual”, and “asexual”; however, these terms are not all encompassing of the diverse identities included in the SM. Nationally representative data indicate that 20.5% of SM adults smoke cigarettes, compared to 15.3% of heterosexual adults (Jamal et al., 2016). The use of ENDS, commonly referred to as e-cigarettes, JUULs (a vape pod ENDS product that contains nicotine levels similar to cigarettes), vape pens, etc., is also significantly higher for SM adults than for heterosexual adults - 7.9% of SM men and 12.4% of SM women use ENDS, compared to only 4.7% of heterosexual men and 3.4% heterosexual women (Johnson et al., 2016). Sexual minority college students may be more vulnerable to tobacco use because of more permissive social norms experienced by members of the SM (Mereish et al., 2017) and members of the college demographic (Arnett, 2005). Despite the high rates of tobacco use among SM college students, relatively little research examines the social norm beliefs associated with smoking cigarettes or vaping ENDS held by members of this population. The purpose of the present study was to determine if 1) SM young adults have more favorable social norms about cigarette and ENDS use than heterosexual peers and 2) social norms account for, or potentially mediate, the disparity in cigarette and ENDS use in SM young adults.

College students have historically been influencers of prevalent substance use trends in popular culture (Johnston et al., 2008). As such, it is likely that college students are at the forefront of using new and emerging products, such as ENDS. Spindle and colleagues (2017) argue that examining young adult college student ENDS use is important, because research may explain the characteristics of who will be more likely to use ENDS in the future. ENDS use is rapidly increasing among 18-24 year old college students; a 10% increase in ever use of ENDS products was measured from 2015 to 2017 among college students (26% to 36%, respectively; Johnston et al., 2018). College student current use of ENDS increased 2.5% from 2015 – 2017 (8.8% in 2015, 11.3% in 2017; Johnston et al., 2018). Prevalence of ENDS use may be even higher now given increasing sales of JUUL (Huang et al., 2019).

While college student use rates of ENDS have been rapidly increasing, use rates of traditional cigarettes among college students have been decreasing. Among college students, current/past-30 day use of traditional cigarettes decreased from 11.3% in 2015 to 8.0% in 2017 (Johnston et al., 2018). The observed trend of college student ENDS use rapidly increasing while cigarette use is slowly decreasing is potentially a positive trend, since ENDS are likely to be less harmful than cigarettes (Hecht et al., 2015). However, the trend is also concerning because of a growing body of evidence that suggests ENDS users, who are also never-users of other traditional tobacco products, are more likely to initiate use of cigarette smoking than nonusers of any tobacco product (Loukas et al., 2018; Primack et al., 2015; Spindle et al., 2017). Moreover, even though there is limited research regarding the health effects associated with ENDS use, and there is no consensus about long-term risk, ENDS products have been found to contain highly addictive nicotine and other toxicants that may cause health problems (Hess et al., 2017). It is, however, well known that use of cigarettes increases risk for morbidity and mortality. A study by

Taghizadeh and colleagues (2016) studied the mortality rate of individuals who smoke cigarettes and found that current smoking and persistent smoking were associated with increased risk of mortality commonly associated with tobacco use or tobacco exposure.

Johnson and colleagues (2016) studied the use rates of different tobacco products among subsets of the SM and found that tobacco use is higher among members of the SM, relative to the non-minority heterosexual population. They found that cigarette smoking was highest among bisexual women (36.0%), followed by women who identified as lesbian or gay (22.2%), and lowest for straight-identifying women (14.3%). Sexual minority women also used other tobacco products at higher rates: ENDS (12.4%), hookah (10.3%), and cigar use (7.2%); more than three times higher than rates observed for heterosexual women (3.4%, 2.5%, and 1.3%, respectively). Similarly, SM men's ENDS (7.9%) and hookah (12.8%) use were higher than straight peers' (4.7% and 4.5%, respectively); while, cigar use was similar across groups. SM men (i.e., gay men (27.0%) and bisexual men (25.9%)), also reported rates of cigarette smoking higher than straight-identifying peers (21.3%).

Despite the understanding that smoking cigarettes is dangerous, and ENDS are addictive and potentially harmful, many people in the SM continue to engage in these risky tobacco use behaviors. One factor that may explain the high prevalence of tobacco use in the SM is social norm beliefs and perceptions about use among peers. The social norms theory describes that social norms are comprised of injunctive norms (perceived acceptability of behavior) and descriptive norms (perceived peer behavior). The theory suggests that social norms have influence on changing individual behavior based on peer behavior and beliefs. That is to say that, the occurrence of an individual incorrectly perceiving the beliefs of peers to be different from their own beliefs may lead an individual to adjust their own behavior to account for the perceived

norm. The misperception of attitudes of peers can also cause expression of problem behavior and the inhibition of healthy behavior (Berkowitz, 2003). This applies to tobacco use behavior in that, individuals who overestimate peer acceptability of tobacco use behavior often use their misperceptions to justify their own overuse of tobacco. The social norms theory suggests that interventions can change perceptions held by a group about peer use, or acceptance, of a substance by revealing the actual popularity of the healthier norm (Perkins, 2003). The theory is also applied to situations in which individuals who feel discomfort for peer engagement in a behavior choose to remain silent about their dissent because of their misperception that majority of peers are accepting of the behavior. From this perspective, revealing the collective peer discomfort for a behavior may lead to more peers speaking up about their dissent (i.e., bystander intervention) and may change the perceived collective social acceptance of the behavior (Berkowitz, 2003).

Social norms theory has been used in the past to explain alcohol abuse and sexual assault/violence among a college demographic. However, there is interest in expanding the theory to other areas of social justice and health through research and application (Berkowitz, 2003). One study found that higher descriptive norms and more permissive injunctive norms held by close friends were significant mediators of the association between sexual orientation and recent and lifetime cigarette use among racially diverse adolescents in grades 6 through 12 (Mereish et al., 2017). The study by Mereish and colleagues (2017) was also one of the first to apply the social norms theory to examine the role of social norms and stigma from homophobic bullying experiences on substance use by sexual minority adolescents. Currently, there are no studies that apply the social norms theory to examine social norms about cigarette use or ENDS use held by SM college students, even though the college years represent a time of permissive

social norms and identity exploration (Arnett, 2005). The present study extends the findings in the Mereish study by examining the social norms of SM and non-SM college students and examining if social norms account for, or mediate, the association between SM status and current cigarette and ENDS use.

In summary, SM college students are at elevated risk for tobacco use, including smoking cigarettes and vaping ENDS, yet little research examines the social norm beliefs held by this population about current cigarette or ENDS use. To address this gap in the literature, the current study sought to determine if social norm perceptions account for, or potentially mediate, the elevated prevalence of tobacco use among SM young adults. Two hypotheses were tested: 1) SM college students will hold more positive social norm beliefs (i.e., injunctive norms and descriptive norms) about smoking cigarettes and vaping ENDS than heterosexual peers, and 2) social norm beliefs (i.e., injunctive norms and descriptive norms) about tobacco use held by 18-24 year old college students would mediate the association between SM status and current traditional cigarette use or current ENDS use, even after controlling for other tobacco product use, race, and biological sex (see Figure 1).

Methods

PARTICIPANTS

This study included 10,213 college students (64.6% female sex assigned at birth) aged 18 to 24 years old ($M = 20.4$; $SD = 1.8$), attending one of 17 public universities (3 2-year and 14 4-year) in Texas during the spring of 2018. The sample was ethnically diverse with 48.3% Hispanic students, 27.5% non-Hispanic White students, 7.2% non-Hispanic Black students, 12.7% non-Hispanic Asian, and 4.2% who reported another race/ethnicity; 13.6% of the sample identified their sexual orientation as part of the SM (“gay or lesbian”, “bisexual”, or “other”).

PROCEDURE

Approval to conduct this study was obtained from the Institutional Review Board from the University leading the study. In fall 2017, undergraduate enrollment at the seventeen universities ranged from 1,237 to 42,704, summing a total of 290,225 students (Texas Higher Education Coordinating Board, 2018). Student e-mail addresses were systematically collected through open records requests, authorized by the Public Information Act, from thirteen of the seventeen universities. Almost 231,000 (230,954) student e-mails were provided through the open records request for thirteen of the schools. For four of the schools, an administrator was sent an anonymous link to the survey and asked to send it to their student body (a total of 11,297 students across four schools). After removal of 166 bounce-backs, the adjusted sampling frame was 242,085 students. In early spring 2018, students received an introductory e-mail to the study and an embedded link to participate in the survey. Students who did not participate in the survey, or started but did not finish the survey, were sent a reminder e-mail seven days after the

invitation e-mail and a final reminder five days later. The survey was closed three days after the final reminder. Students who completed the online survey had an opportunity to enter into a prize drawing to win one of fifty \$20 gift certificates. Of the 242,085 students who received an e-mail invitation to participate in the survey, 17,802 agreed to participate. After excluding those who were not 18-24 years of age or missing responses to the age item (n=7,206), were missing more than three responses to injunctive norms items (n=55), were missing responses to descriptive norms items (n=188), provided inappropriate responses or were missing responses to the sexual orientation item (n=95), were missing responses to sex assigned at birth item (n=4), were missing responses to race/ethnicity item (n=31), and in the instance that a respondent indicated that they had never used a tobacco product *and also* indicated that they had used that product in the last 30-days (n=10), the final sample was 10,213.

MEASURES

Current Cigarette and ENDS Use

Current cigarette and ENDS use were assessed with a question modeled after an item developed by The Centers for Disease Control and Prevention Behavioral Risk Factor Surveillance System Survey, asking students, “During the past 30 days, how many days did you use the following?” For ENDS use, we included the following product examples: e-cigarettes, vape pens, e-hookahs, or JUUL. For both cigarettes and ENDS, participants selected the number of days from a drop-down menu with options ranging from ‘0’ to ‘30’. The items were recoded into dichotomous variables, with ‘0’ indicating that participants did not use the product on any of the past 30 days and ‘1’ that participants used the product at least once in the previous 30 days.

Overall, 9.0% of the participants reported current traditional cigarette use and 13.4% reported current ENDS use (see Table 1).

Sexual Minority Status

An item adapted from Badgett (2009), assessed participants' self-described sexual orientation. Students were asked, "Do you consider yourself to be:"; response options were 'Heterosexual or straight', 'Gay or lesbian', 'Bisexual', 'other (please specify)' (participants that selected 'other' had the opportunity to provide more information in a text entry field). Similar to previous research by Mereish and colleagues (2017), this variable was recoded into a dichotomous variable, with '0' indicating that participants identified as 'heterosexual or straight' and '1' that participants were a member of the 'SM' (or a sexual orientation other than heterosexual or straight); approximately 14% of the sample identified as a member of the SM.

Injunctive Norms

Participants' perceived peer acceptability about use (injunctive norms beliefs) of traditional cigarettes and ENDS were assessed with four items also adapted from Mereish and colleagues (2017). The four items asked participants - "How wrong would your four best friends feel it would be for you to use the following tobacco products:"; "How wrong would you feel it would be for your four best friends to use the following tobacco products:"; "How wrong would other students at your campus (not just friends you are closest to) feel it would be for you to use the following tobacco products:"; and "How wrong would you feel it would be for other students at your campus (not just friends you are closest to) to use the following tobacco products:". Response options for each tobacco product were a Likert scale of '1' ('Very Wrong'), to '4' ('Not Wrong at All'). All four items were averaged so that higher scores reflected more favorable injunctive norms for each tobacco product, cigarettes, or ENDS.

Descriptive Norms

One item adapted from Mereish and colleagues (2017) assessed participants' perceived peer tobacco product use (descriptive norm beliefs). Students were asked, "When you think of your four best friends (the friends you are closest to and spend the most time with), in the past year (12 months) how many of your best friends have used the following tobacco products:". Response options for each of the two tobacco products (traditional cigarettes, ENDS) were '0 Friends', '1 Friend', '2 Friends', '3 Friends', or '4 Friends' coded 0 to 4, respectively. Higher scores reflected a higher perceived number of close friends using a tobacco product in the past year.

Results

DESCRIPTIVE ANALYSIS

Prior to testing study hypotheses, descriptive information for current cigarette and ENDS use variables and all covariates (other tobacco product use, biological sex, race/ethnicity, age) were examined. As displayed in Table 1, chi-square analyses indicated that SM college students were significantly more likely than their heterosexual peers to be female sex assigned at birth, non-Hispanic white compared with another race/ethnicity, current cigarette or ENDS users, and to report other tobacco product use. There were no differences between the two groups on mean age.

Independent samples T-Test analyses were conducted to test the first study hypothesis that SM college students would hold more positive social norm beliefs (i.e., injunctive and descriptive norms) about smoking cigarettes and vaping ENDS than heterosexual peers. As shown in Table 2, SM participants reported significantly more accepting injunctive norm beliefs about cigarettes and ENDS than heterosexual peers. Also, SM participants were significantly more likely to report a close friend using cigarettes in the past year (descriptive norms), but there was not a significant difference between the two groups on descriptive norm beliefs about perceived peer use of ENDS products.

Path analysis was used to test the second study hypothesis that social norm beliefs (i.e., injunctive norms and descriptive norms) about tobacco use held by 18 to 24 year old college students would mediate the association between SM status and current traditional cigarette use or current ENDS use, even after controlling for other tobacco product use, biological sex, race, and age. Two structural models were conducted in M-Plus, version 7.4 (Muthén & Muthén, 1998-2012), to assess each tobacco product - cigarettes and ENDS - independently (see Figure 2 &

Figure 3). Biological sex, age, other tobacco product use, and race/ethnicity were included as covariates in both path models and weighted least squares mean and variance adjusted estimates were generated to accommodate the dichotomous outcomes (current cigarette and ENDS use).

Each model included paths from SM status to the injunctive norms and descriptive norms mediator variables, which in turn had paths to current tobacco use (cigarettes or ENDS). In addition, paths from each covariate to SM status were included in both models, to control for the associations between sex, race/ethnicity, and other tobacco product use and SM status. Note that for the cigarette model, other tobacco use included current use of hookah, cigars/cigarillos, smokeless tobacco, and ENDS; whereas for the ENDS model, other tobacco use included current use of hookah, cigars/cigarillos, smokeless tobacco, and traditional cigarettes.

Initial analyses indicated that the fit was poor for both models. The chi-square was significant for the cigarette model: $X^2(13, N = 10,213) = 2635.091, p < .001$ and ENDS model: $X^2(13, N = 10,213) = 2394.647, p < .001$, the RMSEA was greater than .05 for the cigarette (0.141 [0.136, 0.145]) and ENDS models (0.134 [0.129, 0.138]), and the CFI was smaller than .95 for the cigarette (0.452) and ENDS models (0.490) (Hu & Bentler, 1999). Given the poor fit of each model, modification indices were examined. Modification indices suggested four additional paths be added to both models to achieve the best possible model fit. These paths included other tobacco product use on descriptive norms and on injunctive norms, and biological sex assigned at birth on descriptive norms and on injunctive norms. Despite a significant chi-square after modifications, each model had excellent fit (see Figure 2 & Figure 3); for the cigarette model: $X^2(9, N = 10,213) = 187.345, p < .001$ and ENDS model: $X^2(9, N = 10,213) = 226.257, p < .001$, the RMSEA was less than .05 for the cigarette (0.044 [0.039, 0.050]) and ENDS models (0.049

[0.043, 0.054]), and the CFI was larger than .95 for the cigarette (0.963) and ENDS models (0.953).

As shown in Figures 2 and 3, SM status was associated only with the injunctive norms beliefs mediator, but not with the descriptive norms mediator, for both models. However, both injunctive norms and descriptive norms were associated with the outcomes - current cigarette and current ENDS use. Regarding the covariates, in both models, biological sex was associated with injunctive norms and SM status; other tobacco product use was associated with injunctive norms, descriptive norms, and SM status; race was associated with descriptive norms and SM status. Given these findings, only injunctive norm beliefs appear to mediate the associations between SM status and current cigarette or ENDS use. A test of indirect effects confirmed that injunctive norms explained the relationship between SM status and current use of either cigarette (estimate = -.03 [.01, -5.25] $p \leq .001$) or ENDS (estimate = -.07 [.01, -8.58] $p \leq .001$). The final model for cigarettes accounted for 23.6% of the variance in current cigarette use, while the final model for ENDS accounted for 32.1% of the variance in current ENDS use.

Discussion

The present study expands upon the existing body of social norms research by examining the role of social norm beliefs, separated into injunctive and descriptive norms, on current cigarette or ENDS use during the period of young adulthood when tobacco use is solidified (Johnston et al., 2008; Mereish et al., 2017). The findings in this study are consistent with existing research showing that individuals in the SM are more accepting of tobacco use than heterosexual peers (injunctive norm beliefs); and that more accepting social norms about tobacco use (Mereish et al., 2017) account for the association between SM status and both cigarette and ENDS use. Contrary to expectations, there was not a significant difference between SM college students and their heterosexual peers about perceived prevalence of peer use of ENDS, descriptive norms; and descriptive norms did not mediate the associations between SM status and current cigarette or ENDS use. We hypothesized that the prevalence of ENDS in popular culture, especially within the culture of the college age demographic, may affect the perceived peer use rates of the product by oversaturating the visibility of ENDS use and consequently inflating perceived peer use. Findings in the present study suggest that one potential reason SM college students use cigarettes and ENDS at elevated rates is because they perceive more accepting peer norms toward each product than their heterosexual peers. Thus, to reduce high use prevalence, colleges should develop programs that focus on changing perceptions about peer acceptability of using cigarettes or ENDS in the SM student population.

In the final models, perceptions about peer acceptability of tobacco use (injunctive norms) mediated, or accounted for, the disparity in current cigarette and ENDS use between the SM and heterosexual population of college students. The mediating effect was present while also controlling for the presence of other tobacco product use, biological sex, race, and age. The

social norms theory suggests that normative beliefs have a significant role in influencing behavior; especially among minority populations. The findings in this study reflect the central constructs of the social norms theory that suggest that incorrectly perceived beliefs about peer acceptability and engagement in a specific behavior is positively associated with individual initiation in the said behavior (Berkowitz, 2003). Perceptions about peer acceptability of cigarettes or ENDS use may be partially influenced by promotional marketing of these products (Dilley et al., 2008); consequently, students who perceive more accepting peer norms about tobacco use may have a higher prevalence of tobacco use. Prior research indicates that SM students are more likely to report exposure to tobacco marketing (Dilley et al., 2008) and for this reason, may also report more cigarette and ENDS use. Additional research should examine the role of marketing on SM college students' normative beliefs about tobacco use.

In contrast to injunctive norms, descriptive norms did not mediate the relationship between SM status and current cigarette or ENDS use in either of the final models. Although SM students did perceive more of their peers using cigarettes (descriptive norms) than heterosexual students, there was no difference in descriptive norms about peer ENDS use between both groups (SM and heterosexual). The prevalence of marketing of cigarettes and ENDS to the college age demographic may partially explain why descriptive norms were not a mediating factor in either model. This marketing normalizes tobacco use behavior by reinforcing the belief that peers are using these products more than they actually are (Brown & Moodie, 2009). The college age demographic may be unique from other age groups in that descriptive norm perceptions about peer tobacco use have been found to be a mediator between SM status and current tobacco use in similar studies. Mereish and colleagues (2017) found that descriptive norms and injunctive norms were mediators for adolescent SM tobacco use. Moreover, it appears

that when injunctive norms are taken into consideration, the number of peers who use cigarettes or ENDS does not act as a mediator of the associations between SM status and current tobacco use. Thus, perceived acceptability of tobacco use is potentially a better explanation for the disparity than is perceived number of friends who use tobacco. This conclusion suggests a potential best practice for future tobacco control interventions: to prioritize addressing the affirmative beliefs about peer acceptability of tobacco use, or injunctive norms, held by this group instead of perceptions about peer use, or descriptive norms.

LIMITATIONS

Like all studies, limitations were present; one limitation in this study is that it only assessed the college age demographic of students in one state. While the sample was large and diverse, it may not be generalizable to a larger population of individuals who are not college students, not young adults, or are outside of Texas. Future studies should utilize a more representative and generalizable sample. Another limitation is the cross-sectional design; it is possible that current tobacco use also influences one's tobacco use intentions (Noonan & Kulbok, 2012). Additional research should be conducted to analyze the effect of current tobacco use on college student, and SM, normative beliefs (injunctive and descriptive norms) about tobacco use. A potential limitation in this study is that the majority of the sample was female; and when separated into the two predictor groups by SM status, the SM was over-represented by biological females (71.3%), compared to the heterosexual group. Also, future research may consider reproducing this study for the gender minority (GM) population, that is individuals whose gender identity is different from their sex assigned at birth (e.g., transgender, gender nonconforming, gender queer, etc.), since it is also a disparate population with strikingly high tobacco use. Often, research in this area groups the SM with the GM (Sexual & Gender Minority

[SGM]), expanding this study design to the GM will make these findings more comparable to existing research on the SGM. Despite these limitations, we know little about why the disparity in tobacco use exists and the present study extends existing research by examining the roles of injunctive and descriptive norms in explaining the disparity for young adult SM students; a minority population with an alarmingly high prevalence of tobacco use and an age period when tobacco use is solidified.

Conclusions

The findings in this study emphasize that more accepting social norm beliefs about tobacco use held by SM young adults may result in higher tobacco use; specifically, cigarette and ENDS use. The documented outcomes in the present study suggest that, to have an effect on current tobacco use behavior, increased public health efforts are needed to change the normative beliefs about tobacco use held by SM young adults. What's more, injunctive norm beliefs are more likely than descriptive norms to explain the disparity in tobacco use observed in the young adult population; incorrect perceptions about peer use have less of a mediating effect on tobacco use behavior than perceptions about peer acceptability about tobacco use behavior. These findings have not been documented in previous research on young adults and more research should be conducted in this area to better understand the observed trends in this study.

Previous research has concluded that the college age demographic is a crucial demographic to consider when addressing tobacco use behavior. This study sought to expand upon existing research by assessing social norm beliefs as a potential mediator of current tobacco use behavior, cigarettes and ENDS, for one subset of the college student population - the SM. Future research should assess other risk factors experienced by disparate populations within the college age demographic to discover best practices for tobacco control interventions. Based on the results in the present study, a best practice is that all college students, and more specifically the SM student population, should be informed about peer disapproval of tobacco use behavior (injunctive norms) instead of solely educated about the actual prevalence of peer tobacco use (descriptive norms).

Table 1. Descriptive Examination of Demographics and Tobacco Use Prevalence for the Entire Sample and by Sexual Minority Status

	Total, (descriptive) N = 10213	Sexual Minority (LGB+) n = 1385	Heterosexual (Straight) n = 8828	Pearson's Chi-Square or t-test
Mean Age	20.4 (SD=1.76)	20.2 (SD=1.74)	20.4 (SD=1.77)	10.54
Sex (assigned at birth)				30.90**
Female	64.6%	71.3%	63.6%	
Male	35.4%	28.7%	36.4%	
Race/Ethnicity				63.05****
Non-Hispanic White	27.5%	32.5%	26.8%	
Hispanic	48.3%	46.9%	48.5%	
Non-Hispanic Other	24.1%	20.6%	24.7%	
Current ENDS Use	13.4%	18.0%	12.7%	29.16****
Current Cigarette Use	9.0%	14.4%	8.2%	55.38****
OTP - ENDS Use^a	7.9%	11.0%	7.4%	22.43****
OTP - Cigarette Use^b	6.1%	9.8%	5.6%	37.41****

Note: * $p \leq .05$, ** $p \leq .01$, *** $p \leq .001$.

^a Other Tobacco Products (OTP) assessed for the ENDS Use model include current use of hookah, cigars/cigarillos, smokeless tobacco, and traditional cigarettes.

^b Other Tobacco Products (OTP) assessed for the Cigarette Use model include current use of hookah, cigars/cigarillos, smokeless tobacco, and ENDS.

Table 2. Comparison of Social Norm Beliefs between Sexual Minority and Heterosexual/Straight Students

	Sexual Minority (LGB+), <i>n</i> = 1385 Mean (SD)	Heterosexual/ Straight, <i>n</i> = 8828 Mean (SD)	t(df)
Injunctive Norms ENDS	2.67 (.88)	2.39 (.94)	-10.14 (10211)***
Injunctive Norms Cigs	2.02 (.82)	1.86 (.81)	-6.70 (10211)***
Descriptive Norms ENDS	.87 (1.20)	.84 (1.21)	-1.01 (10211)
Descriptive Norms Cigs	.77 (1.10)	.67 (1.07)	-3.11 (10211)**

Note: * $p \leq .05$, ** $p \leq .01$, *** $p \leq .001$.

Figure 1: Hypothesized Mediation Model

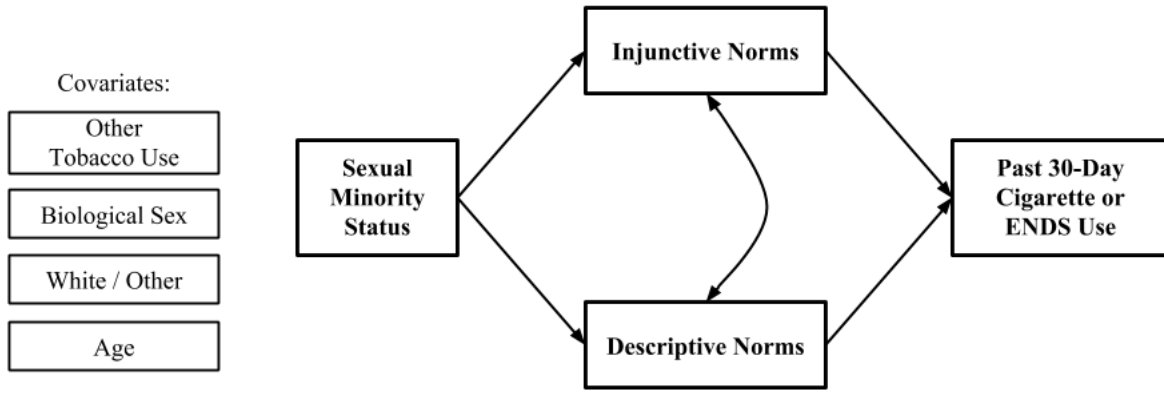
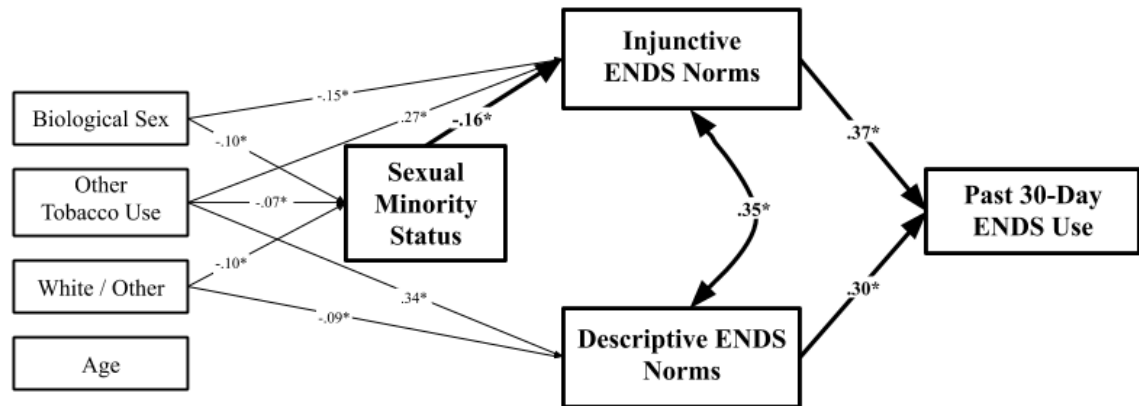
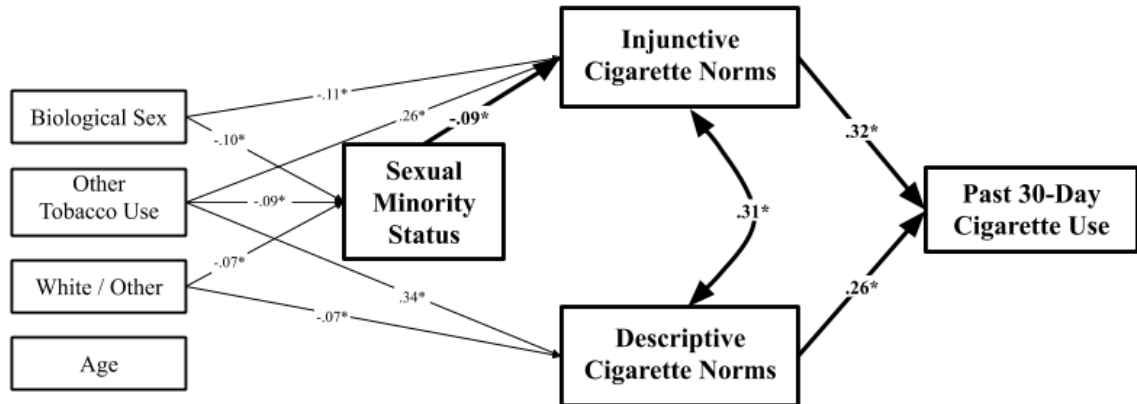


Figure 2: Final Model Showing Social Norm Beliefs Mediating Association Between Sexual Minority Status and ENDS Use with Significant Paths Displayed^a



^aModel fit was excellent: $X^2(9, N = 10,213) = 226.257, p < .001, RMSEA = 0.049 [0.043, 0.054], CFI = 0.953$. Showing only significant standardized coefficients. $*p < .001$

Figure 3: Final Model Showing Social Norm Beliefs Mediating Association Between Sexual Minority Status and Cigarette Use with Significant Paths Displayed^a



^aModel fit was excellent: $X^2(9, N = 10,213) = 187.345, p < .001, RMSEA = 0.044 [0.039, 0.050], CFI = 0.963$. Showing only significant standardized coefficients. $*p < .001$

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