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Sexual orientation, minority stress, social norms, and substance use among racially diverse adolescents

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Abstract

Background—Sexual minority adolescents are more likely than their heterosexual peers to use substances. This study tested factors that contribute to sexual orientation disparities in substance use among racially and ethnically diverse adolescents. Specifically, we examined how both minority stress (i.e., homophobic bullying) and social norms (i.e., descriptive and injunctive norms) may account for sexual orientation disparities in recent and lifetime use of four substances: tobacco, alcohol, marijuana, and prescription drugs.

Procedures—A probability sample of middle and high school students (N = 3012; aged 11–18 years old; 71.2% racial and ethnic minorities) using random cluster methods was obtained in a mid-size school district in the Southeastern United States.

Results—Sexual minority adolescents were more likely than heterosexual adolescents to use substances, experience homophobic bullying, and report higher descriptive norms for close friends and more permissive injunctive norms for friends and parents. While accounting for sociodemographic characteristics, multiple mediation models concurrently testing all mediators indicated that higher descriptive and more permissive injunctive norms were significant mediators of the associations between sexual orientation and recent and lifetime use of the four substances, whereas homophobic bullying was not a significant mediator of the associations between sexual orientation and recent and lifetime use of any of the substances.

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Conflict of interest

There are no conflicts of interest by any author.

Contributors

E. H. Mereish conceptualized the project, conducted all analyses, and wrote most of the manuscript. J. T. Goldbach provided feedback on the analyses and wrote parts of the manuscript. C. Burgess and A. DiBello provided feedback on the results and drafts of the manuscript. All authors contributed to and have approved the final manuscript.

Conclusions—Descriptive and injunctive norms, in conjunction with minority stress, are important to consider in explaining sexual orientation disparities in substance use among racially diverse adolescents. These results have implications for substance use interventions among sexual minority adolescents.

Keywords

Sexual minority adolescents; Social norms; Descriptive norms; Injunctive norms; Minority stress; Substance use

1. Introduction

Numerous studies have found that sexual minority adolescents (SMA; e.g., lesbian, gay, bisexual) are at high risk of substance use and misuse. A meta-analysis found that SMA are 190% more likely to report a history of substance use compared to their heterosexual peers (Marshal et al., 2008). This disparity was recently highlighted by the Centers for Disease Control and Prevention, which found SMA at higher risk than their heterosexual counterparts of 11 of 13 tobacco use indicators and 18 of 19 alcohol and other drug use behaviors (Kann et al., 2016). Sexual orientation disparities in substance use are significant, especially because early age of onset is associated with an increased likelihood of addiction later in life (Grant et al., 2001). Moreover, research examining sexual minority substance use lacks racially and ethnically diverse samples (Institute of Medicine, 2011).

One prominent framework for understanding sexual orientation substance use disparities is minority stress theory (Meyer, 2003). This theory suggests that victimization, perceived and experienced discrimination, and internalized stigma related to their stigmatized sexual identity places SMA at risk of negative outcomes (Hatzenbuehler, 2009; Meyer, 2003), including substance use (Goldbach et al., 2014; Marshal et al., 2009). A recent meta-analysis by Goldbach et al. (2014) found that minority stressors, such as negative reactions to sexual orientation disclosure, sexual identity distress, internalized homophobia, and victimization, were positively correlated with substance use.

Although minority stress theory has been tested in numerous studies, including meta-analyses (Goldbach et al., 2014), it has been critiqued for a lack of attention to other factors that may influence the relationship between sexual identity and behavioral health outcomes. For example, Hatzenbuehler (2009) argued that while minority stressors lead to poor outcomes, factors such emotional dysregulation and maladaptive cognitive and coping processes should also be considered.

In the case of substance use, one factor independent of minority stress that has received little attention in the literature on SMA substance use disparities are social norms (Green and Feinstein, 2012). Social norms theory assumes that individuals incorrectly perceive that the attitudes, beliefs, and behaviors of others are different from their own and thus adjust their own behavior (Berkowitz, 2005). Both descriptive (i.e., perceptions of others' behavior) and injunctive (i.e., perceptions of whether a behavior is approved by others) social norms exist (Cialdini, 2003 Prentice and Miller, 1996), and the effects of these norms on the use of alcohol, tobacco, and other drugs are well documented (Berkowitz, 2005; Perkins, 2003).

Although social norms are considered a key intervention point for reducing substance use during adolescence (Berkowitz, 2005) and social networks have been a hallmark of substance use prevention research for nearly 30 years (Dishion et al., 2012; Hawkins et al., 1992 Oetting and Beauvais, 1987), there is a dearth of literature applying social norms theory to understanding sexual orientation substance use disparities. We identified only one study among adolescents which found that SMA girls had more descriptive norms regarding tobacco use than heterosexual girls, but these norms did not significantly mediate the association between sexual orientation and tobacco use; sexual orientation differences in tobacco norms were not found for boys (Austin et al., 2004). Limitations of this work include it being outdated as the data were collected in 19991, and it did not examine injunctive norms or substances other than tobacco.

Research involving young and middle adults has documented that alcohol use social norms specific to sexual minority communities were associated with more alcohol use among sexual minorities (Hatzenbuehler et al., 2008; Trocki et al., 2005). Another study found that sexual minority adult women perceived sexual minority women to drink more than heterosexual women and that more descriptive social norms (i.e., norms related to women in general and those specific to sexual minority women) and alcohol use were positively associated with each other over time (Litt et al., 2015). Moreover, a recent study found that sexual minority adults misperceived their sexual minority peers to be more likely to use alcohol and drugs to cope with minority stress (i.e., 2016 Orlando nightclub shooting), considering only a small portion of the sample was likely to do so (Boyle et al., 2017). These studies underscore the importance of examining social norms in understanding substance use; however, they did not clearly delineate between descriptive and injunctive norms, test the effects of norms on multiple substances, or examine these norms specifically among adolescents or with racially diverse samples. Adolescence is a critical period for substance use initiation featuring unique developmental factors and during which peers and parental influences are important; therefore, more research is needed to understand sexual orientation differences in descriptive and injunctive norms among adolescents and test how these norms may account for disparities in substance use.

The present study explored factors that contribute to sexual orientation disparities in substance use among adolescents. In an effort to test both minority stress and social norms theories, we examined how homophobic bullying (i.e., one form of minority stress) and descriptive and injunctive social norms may account for sexual orientation disparities in substance use, namely tobacco, alcohol, marijuana, and prescription drugs. Specifically, we (a) examined sexual orientation differences in homophobic bullying and descriptive and injunctive social norms regarding friends and parents; and (b) tested the mediating effects of minority stress and social norms on the relationship between sexual orientation and use of four substances (Fig. 1). Consistent with the literature on minority stress (Meyer, 2003) and research documenting more descriptive substance use norms among SMA compared to heterosexual adolescents (Austin et al., 20014), we hypothesized that SMA will experience more homophobic bullying and have more descriptive substance use friend norms than heterosexual adolescents, and that both of these factors would contribute to sexual orientation disparities in use of tobacco, alcohol, marijuana, and prescription drugs among adolescents. We also hypothesized similar patterns for injunctive substance use norms for

friends and parents; however, given the lack of literature on SMA injunctive norms, these were exploratory hypotheses.

2. Methods

Secondary analyses were conducted using a dataset collected from the Youth Development Survey (YDS), a comprehensive cross-sectional survey of the primary school district of a large county in North Carolina. The YDS was originally developed in 1972 and has been conducted every two to four years using random cluster sampling. The institutional review board-approved survey covers topics including school bonding, relationships, bullying, substance use, and mental health.

2.1. Procedures

Following methods similar to other national U.S. adolescent surveys such as the Youth Risk Behavior Survey (Centers for Disease Control and Prevention, 2000) and Communities That Care (Substance Abuse and Mental Health Services Administration, 2004), all public middle and high schools in the county were invited to participate. Of the 67 schools invited, 66 schools participated in fall 2014. One school declined to participate because it served children with intensive special needs. To ensure a probability sampling frame, the survey was administered in classes where all students, regardless of achievement or other considerations, are required to participate. We randomly selected classrooms in the 6th, 8th, 10th, and 12th grades; in total, 219 classrooms were selected for participation. A passive parental consent was sent to parents that offered an overview of the study purpose and indicated they could contact the teacher or other school representative should they prefer their child not participate. No parents responded or declined participation of their child.

After classrooms were selected, opaque envelopes were stamped with basic classroom information (e.g., school name, teacher's name, number of students) and the appropriate number of blank surveys was placed inside the envelope. During a three-week period in late 2014, approximately 25 community volunteers were trained on best practices in survey research and went to schools to collect responses. Teachers were asked to leave the classroom during implementation to reduce response bias and adolescents were informed of their human subjects protections rights by trained proctors who administered the survey. Youth then completed the survey instrument independently and were instructed to place their survey into the opaque envelope directly. Prior to leaving the classroom, survey volunteers were instructed to seal the envelope in front of the students, and then returned the sealed envelope to the research team for data processing and analysis.

Surveyed youth returned 4259 surveys (94.5% response rate). Prior to modeling, the data was prepared and cleaned. Respondents that appeared to be actively dishonest or who responded incorrectly to validity checks were removed. These included those who endorsed use of a fictitious drug, daztrex, those who reported 30-day but not lifetime use of any substance, and those who reported an age of substance initiation that was greater than their reported current age. Of the remaining, 187 surveys were returned blank and 238 did not complete the sexual orientation measure and were removed from the sample. The final analytic sample was 3012 participants. Multiple imputation with chained equations was

performed using IVEware (version 0.2) to create 20 datasets with no missing values on all outcome variables (Raghunathan et al., 2001).

2.2. Participants

Participants were 3012 adolescents (49.3% female; 44.2% male; and 0.9% transgender or other) who identified as straight or heterosexual (78.2%), mostly heterosexual (16.6%), bisexual (3.4%), mostly gay or lesbian (0.7%), and gay, lesbian, or homosexual (1.1%). They ranged in age from 10 years old or younger (0.4%), 11 (14.3%), 12 (11.2%), 13 (11%), 14 (10.1%), 15 (14.5%), 16 (12.6%), 17 (12.1%), 18 (7.6%), to 19 years old or older (0.4%); the mode was 15 years of age and 5.9% did not provide their age. Participants were racially diverse: 37.5% identified as Black or African American; 28% as White; 17% as Hispanic or Latino; 8.9% as multiracial; 5.8% as Asian or Asian American; 1.2% as American Indian or Native American; and 0.8% as Native Hawaiian or other Pacific Islander; 0.8% did not identify their race. Participants spanned several grade levels: 6th (27%), 8th (21.5%), 10th (26.9%), and 12th (18.8%); 5.8% did not report their grade level.

2.3. Measures

2.3.1. Demographic and control variables—Participants reported their age, gender, grade, race and ethnicity, and sexual orientation. Participants' sexual orientation identity was assessed with one item—"How do you identify?"—with the following response options: Straight/Heterosexual, Mostly Straight, Bisexual, Mostly Gay/Lesbian, or Gay/Lesbian/Homosexual

2.3.2. Substance use—Participants were asked if they had smoked cigarettes in their lifetime (lifetime use) and the past 30 days (recent use). Response choices were: *never*, *once or twice*, *once in a while but not regularly*, or *regularly*. Adolescents were also asked if in their lifetime and the past 30 days they had "drank one or more drinks of alcohol," "used marijuana or hashish," and "used prescription drugs not prescribed." Response choices were *0*, *1* or *2*, *3–5*, *6–9*, or *10+ times*. Response choices were dichotomized into 0 = never/once or twice and 1 = more than twice.

2.3.3. Homophobic bullying—Participants' experiences with homophobic bullying were assessed with one item. They were asked how often they were bullied during the past 12 months "because you are gay, lesbian, or bisexual, or someone thought you were." Response options ranged from *never* to *every day*, coded from 0 to 4, respectively.

2.3.4. Descriptive norms—Participants' descriptive norms regarding close friends were assessed with a 7-item measure using the following question: "When you think of your four best friends (the friends you are closest to), in the past year (12 months) how many of your best friends have:"—respondents were then presented with items specific to the use of the following substances: tobacco (e.g., "smoked cigarettes"), alcohol (e.g., "drank alcohol to the point of getting drunk"), marijuana (e.g., "used marijuana"), and prescription drugs (e.g., "used prescription medications for fun (e.g., pain pills, Xanax)"). Response options were from *0 friends* to *4 friends*. Items were averaged to create one measure of descriptive norms

for all four substances, with higher scores indicating higher descriptive norms.[1] For this study, the Cronbach alpha reliability coefficient was 0.89.

2.3.5. Injunctive norms for friends—Participants' injunctive norms for friends were assessed with a 6-item measure using the following question: "How wrong would your friends feel it would be for you to:"—respondents were then presented with items specific to the use of the following substances: tobacco (e.g., "smoke tobacco"), alcohol (e.g., "use alcohol at all, even just one or two sips"), and prescription drugs (e.g., "use prescription drugs without a doctor's order"). Injunctive norms for marijuana were not assessed in the YDS; therefore, they were not included in this study. Response options ranged from 1 (*very wrong*) to 4 (*not wrong at all*). Items were averaged to create one measure of injunctive norms for all three substances, with higher scores indicating more permissive norms. For this study, the Cronbach alpha reliability coefficient was 0.92.

2.3.6. Injunctive norms for parents—Participants' injunctive norms for parents were assessed with a 6- item measure using the following question: "How wrong do your parents feel it would be for you to:"—respondents were then presented with items specific to the use of the following substances: tobacco (e.g., "smoke tobacco"), alcohol (e.g., "use alcohol at all, even just one or two sips"), marijuana (e.g., "smoke marijuana), and prescription drugs (e.g., 'use prescription drugs without a doctors order'). Response options ranged from 1 (*very wrong*) to 4 (*not wrong at all*). Items were averaged to create one measure of injunctive norms for all four substances, with higher scores indicating more permissive norms. For this study, the Cronbach alpha reliability coefficient was 0.83.

2.4. Analytic plan

Descriptive and regression analyses were conducted using IBM SPSS Statistics 22. The substance use variables were coded as 0 (*no use/experimental use* = never used or used once or twice) or 1 (*use* = used more than twice); this is to stringently assess substance use while accounting for experimental use during adolescence. Sexual orientation was coded into two groups: participants who identified as heterosexual as one group (n = 2356) and participants who identified as bisexual, mostly gay or lesbian, or gay, lesbian, or homosexual as one SMA group (n = 157). There were too few participants for SMA adolescents to consider subgroups of SMA separately (e.g., bisexual adolescents). The mostly heterosexual group (n = 499) was not included in these analyses, because prior analyses of this dataset did not document many substance use disparities between mostly heterosexual adolescents and heterosexual adolescents in this sample (Goldbach et al., 2017). For all analyses, the reference group was heterosexual adolescents, coded as 0, and the target group was SMA adolescents, coded as 1. We first conducted correlational analyses and then a multivariate analysis of variance to test for sexual orientation, gender (coded as 0 = *female*, 1 = *male*),

[1]In addition to testing measures of overall social norms across the four substances (i.e., one measure of descriptive norms for all four substances), we tested substance-specific descriptive norms (e.g., tobacco-specific descriptive norms) and injunctive norms (e.g., tobacco-specific injunctive norms for friends; tobacco-specific injunctive norms for parents) in all of our analyses. We found similar results for both types of social norms measures (i.e., overall substance use vs. substance-specific use). For parsimony and clarity, we retained the overall substance use social norms measures.

and racial and ethnic differences (0 = *White*; 1 = *racial/ethnic minority*) in homophobic bullying and all four social norms.

We conducted logistic regression analyses to examine differences between heterosexual adolescents and SMA in their likelihood of using substances in the past 30 days (recent use) and lifetime, and then conducted hierarchical regression analyses to test the effects of sexual orientation on homophobic bullying and social norms. All of these regressions accounted for sociodemographic characteristics, specifically age, grade, gender, and race. We then conducted eight multiple mediation models to test the relationship among sexual orientation, mediators (i.e., homophobic bullying and descriptive and injunctive norms), and substance use, while accounting for socio-demographics. The mediation models tested all of the mediators concurrently. The PROCESS macro (Hayes, 2013) was used to conduct a bias-corrected bootstrapping procedure using 1000 samples with 95% confidence intervals and to obtain indirect effects to test for mediation. In addition, we conducted the Sobel Z test for additional tests of mediation; however, we focused on the results of the bootstrapping procedure in our discussion of results as it is a more robust test of mediation.

3. Results

3.1. Correlations and basic comparisons

Table 1 presents associations between the substance use social norms variables and homophobic bullying as well as basic descriptives for these variables. We conducted a multivariate analysis of variance to test for sexual orientation, gender, and racial differences in homophobic bullying and the three social norms. Results indicated a statistically significant effect for sexual orientation, Wilks's $\Lambda = 0.89$, $F(4, 2305) = 69.78$, $p < 0.001$, $\eta_p^2 = 0.108$, and race, Wilks's $\Lambda = 0.99$, $F(4, 2305) = 4.27$, $p < 0.01$, $\eta_p^2 = 0.007$. There were no significant differences in substance use social norms for gender, Wilks's $\Lambda = 1.0$, $F(4, 2305) = 1.91$, $p = 0.11$, or the interaction of all three demographic variables, Wilks's $\Lambda = 1.0$, $F(4, 2305) = 1.80$, $p = 0.13$. The two-way interaction effects of the demographic variables were also not significant ($p = 0.05$ to 0.19). Follow-up analyses with a Bonferroni adjustment indicated that SMA reported more homophobic bullying ($\eta_p^2 = 0.097$) than heterosexual adolescents. They also had higher descriptive and more permissive injunctive social norms compared to heterosexual adolescents: close friend descriptive norms ($\eta_p^2 = 0.006$), friend injunctive norms ($\eta_p^2 = 0.009$), and parent injunctive norms ($\eta_p^2 = 0.011$). With the exception of homophobic bullying, effect sizes were mostly small (see Table 1 for means). Follow-up analyses with a Bonferroni adjustment for racial differences documented a significant difference between White and racial and ethnic minority participants in homophobic bullying ($\eta_p^2 = 0.004$), but the effect size was small; there were no other statistically significant racial differences.

3.2. Associations among sexual orientation, social norms, and substance use

Results of the logistic regressions indicated that after accounting for sociodemographic characteristics, SMA had higher odds than heterosexual adolescents of recent and lifetime use of tobacco (recent: adjusted odds ratio [AOR] = 3.95, 95% confidence interval [CI]=

[1.81, 8.60]; lifetime: AOR = 7.11[4.24, 11.90]), marijuana (recent: AOR = 4.50[2.77, 7.32]; lifetime: AOR = 3.18[2.10, 4.81]), alcohol (recent: AOR = 2.09[1.03, 4.24]; lifetime: AOR = 2.55[1.72, 3.78]), and prescription drugs (recent: AOR = 4.44[1.80, 10.93]; lifetime: AOR = 3.82[2.09, 6.97]). These results are presented in Step1 of Table 2.

While accounting for sociodemographic characteristics, hierarchal regression analyses indicated that compared to heterosexual adolescents, SMA experienced more homophobic bullying (unstandardized beta [B] = 0.83,$p < 0.001$), had higher close friend descriptive norms (B = 0.35, $p < 0.001$), and had more permissive friend injunctive norms (B = 0.35, $p < 0.001$) and parent injunctive norms (B = 0.21, $p < 0.001$); see Fig. 2. Homophobic bullying was associated with more recent tobacco use; it was not associated with lifetime tobacco use and it was not associated with recent or lifetime marijuana, alcohol, or prescription drug use. Higher descriptive and more permissive injunctive norms were all associated with greater recent and lifetime substance use (see Table 2, Fig. 2), except for the association between parent injunctive norms and recent prescription drug use.

3.3. Mediation results

While accounting for sociodemographic characteristics, multiple mediation models testing all the mediators concurrently indicated that higher descriptive and more permissive injunctive norms had significant mediation effects on the relationship between sexual orientation and recent and lifetime use of all four substances (see Table 3 for indirect effects), except for parent injunctive norms mediating the association between sexual orientation and for recent prescription drug use. Homophobic bullying was not a significant mediator of the association between sexual orientation and any of the substances.

Close friend descriptive norms and friend injunctive norms had significant mediating effects on the associations between sexual orientation and recent and lifetime use of all four substances (tobacco, alcohol, marijuana, and prescription drugs). Similarly, parent injunctive norms had significant mediating effects on the associations between sexual orientation and recent and lifetime use of all four substances, with the exception for recent prescription drug use.

4. Discussion

Sexual orientation disparities in substance use have been widely documented among adolescents (Marshal et al., 2008). However, there is a dearth of research identifying factors that explain these disparities beyond minority stress (Meyer, 2003), especially studies using racially diverse samples of adolescents. To our knowledge, the present study was the first to examine and document that descriptive and injunctive norms, in conjunction with minority stress, are important factors in explaining sexual orientation disparities in substance use among racially diverse adolescents beyond minority stress alone. Thus, the study contributes to both minority stress research as well as work relying upon social norms theory.

The results of our study have implications for the minority stress model and substance use. Consistent with the minority stress model and prior research (Meyer, 2003), our findings demonstrate that SMA are significantly more likely than heterosexual adolescents to

experience homophobic bullying. Our findings also suggest that homophobic bullying is associated with more recent and lifetime tobacco use for all adolescents, regardless of sexual orientation, which is consistent with other studies documenting the negative effects of homophobic on both SMA and heterosexual adolescents' mental health (Poteat et al., 2011; Poteat et al., 2014). Adolescents might be engaging in maladaptive coping processes, such as smoking cigarettes, as a way to deal with minority stressors (e.g., homophobic bullying; Bux, 1996; Hatzenbuehler, 2009). However, our study found that homophobic bullying did not account for sexual orientation disparities in substance use when examined simultaneously with social norms. Although minority stress did not account for these disparities, it is plausible that more comprehensive measures of homophobic bullying as well as other forms of sexual orientated-related minority stress may better explain the ways in which it might account for disparities. Given the racial and ethnic diversity of our sample, other forms of minority stress, such as racism, might also be important factors to help explain substance use disparities.

Our study provides novel results regarding the role of social norms in understanding sexual orientation disparities in substance use. The results of this study were similar to Austin et al. (2004), which documented descriptive norm differences in cigarette use among sexual minority girls. However, our study built upon this work by considering whether both injunctive and descriptive norms mediated the relation between sexual orientation and substance use. We found that SMA had significantly higher descriptive and more permissive injunctive norms than heterosexual adolescents. Overall, descriptive and injunctive norms played a key and consistent role in partially explaining sexual orientation disparities in recent and lifetime substance use across all four substances. These results have key implications for practice, because social norms are commonly a target of adolescent substance use interventions (Berkowitz, 2005). It is plausible that SMA's social networks may contribute to the development of social norms in which using substances is perceived as more prevalent and acceptable. For example, recent research showed that SMA are more likely than heterosexual adolescents to have social networks composed of peers who use and misuse alcohol and tobacco, and greater substance use in these social networks was associated with SMA's own use of substances (Hatzenbuehler et al., 2015). This might be concurrently exacerbated by targeted marketing of SMA by companies (e.g., tobacco industry; Dilley et al., 2008; Smith et al., 2008). Future research is needed to examine how targeted marketing shape SMA's social norms and how social network processes (e.g., socialization, homophile) of SMA's social networks are related to permissive social norms and consequently increased substance use. There is a lack of research on SMA's injunctive norms for parents; thus, future research is also needed to better understand how SMA perceive their parents' approval or disapproval of their own substance use and how that contributes to their own substance use.

Our findings indicated that social norms account for sexual orientation disparities whereas minority stress, specifically homophobic bullying, did not; therefore, our results have additional potential implications for the minority stress model. Future research should consider the way in which minority stressors may lead to more permissive social norms, which lead to changes in substance use patterns. Given that SMA are more likely to be victimized by their family and peers than their heterosexual peers (Friedman et al., 2011);

and poor relationships with parents and peers may result in deviant peer affiliation (which is associated with substance use; Hawkins et al., 1992), more work is needed, with larger samples, to examine this dynamic relationship more closely.

Our findings should be considered in the context of the study's limitations. First, our findings are limited by the cross-sectional design of the study and temporal ordering of our measures. Longitudinal research is needed to provide rigorous tests of the mediating effects of minority stress and social norms on trajectories in sexual orientation disparities in substance use over the developmental period of adolescence. Second, due to a small number of sexual minority participants and the lack of statistically significant gender differences, we aggregated lesbian, gay, and bisexual youth into one group. Given that SMA girls and bisexual adolescents are at greater risk of substance use, more research is needed to understand their elevated risk.

Similarly, we aggregated adolescents across grades, including middle and high school students. Although we accounted for age and grade in our analyses, future research should examine substance initiation and use across adolescence to help tailor developmentally appropriate interventions. Third, our sample was composed of students in school. Although our sampling methods were similar to representative samples of adolescents (e.g., Youth Risk Behavior Survey; Centers for Disease Control and Prevention, 2000), the sample is limited to students who attended school on the day of the data collection. Thus, students with more severe substance use problems or who experience contextual barriers that prevent their school attendance may not have been represented in our sample.

We also had limitations in measurement. Although we used both recent and lifetime measures of substance use, our measures did not account for quantity of substance use, which is important for understanding hazardous use of substances and the development of substance use disorders. Additionally, as common in secondary analyses, we were limited to the measures that were included in the study, which only included descriptive norms for best friends and only one measure of minority stress. Other types of descriptive norms and sexual orientation- specific norms (i.e., descriptive or injunctive norms related to friends of the same sexual orientation; e.g., Litt et al., 2015) may be critical to understanding sexual orientation disparities in substance use.

Similarly, future research would benefit from examining how other forms of minority stress (e.g., parental rejection, internalized heterosexism) may explain disparities concurrently with social norms.

To our knowledge, this was the first study to test minority stress in conjunction with social norms to understand sexual orientation disparities in substance use in a large and racially diverse sample of adolescents. Although we found partial support for minority stress and substance use, our results demonstrate that higher descriptive and more permissive injunctive social norms appear to be an important mechanism in explaining sexual orientation substance use disparities across tobacco, alcohol, marijuana, and prescription drug use. Future research should further test and begin to integrate both theoretical

approaches to advance the science in sexual orientation substance use disparities and inform the development of culturally sensitive and effective interventions for SMA.

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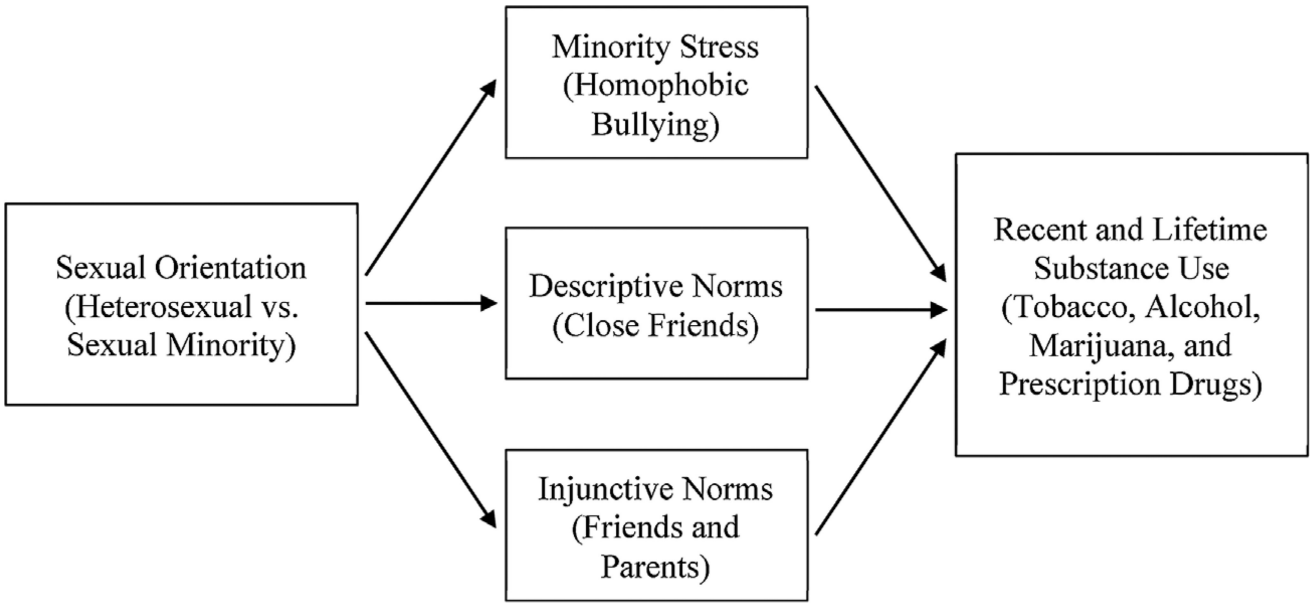

Fig. 1.

Conceptual model of the mediating effects of minority stress and social norms on the association between sexual orientation and substance use.

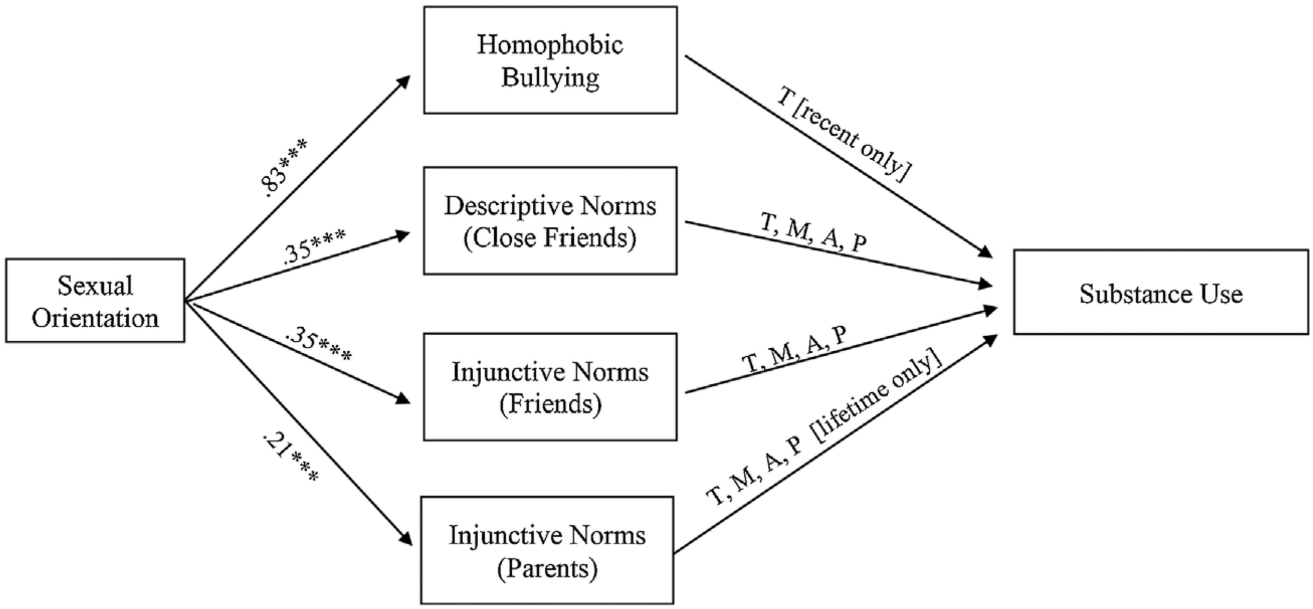

Fig. 2.

Results of minority stress and social norms on the association between sexual orientation and substance use.

Note. This figure summarizes some of the results of the effects of sexual orientation on homopbhic bullying and social norms as well as the results testing the effects of homopbhic bullying and social norms on recent and lifetime substance use. For example, the association between homophobic bullying and substance use was only significant for recent tobacco use, but not the other substances. The figure does not represent mediation or path analysis.

T = tobacco; M = marijuanna; A = alcohol; P = prescription drug use.

Table 1

Correlations and Descriptives for Social Norms Variables across Sexual Orientation Groups.

	HB	Close Friend DN	Friend IN	Parent IN
HB	–	0.07	0.01	−0.11
Close Friend DN	0.04*	–	0.52**	0.25**
Friend IN	0.05*	0.46**	–	0.48**
Parent IN	0.03	0.25**	0.39**	–
	M (SD)	M (SD)	M (SD)	M (SD)
Total Sample	0.16 (0.56)	0.52 (0.84)	1.67 (0.82)	1.25 (0.46
Heterosexual	0.11 (0.44)	0.50 (0.83)	01.64 (0.80)	1.24 (0.45)
Sexual Minority	0.92 (1.18)	0.92 (0.92)	2.07 (0.95)	1.47 (0.56)

Correlations above and below the diagonal are for sexual minority and heterosexual adolescents, respectively.

DN = descriptive norms; HB = homophobic bullying; IN = injunctive norms.

Table 2

Logistic Regression Models Documenting the Effects of Sexual Minority Status and Social Norms on Substance Use.

	Recent		Lifetime	
	B (SE)	**AOR (95% CI)**	**B (SE)**	**AOR (95% CI)**
Tobacco				
Step 1	1.37 (0.40) **	3.95 (1.81, 8.60)	1.96 (0.26) ***	7.11 (4.24, 11.9)
Sexual Minority				
Step 2	0.46 (0.54)	1.59 (0.55, 4.59)	1.60 (0.34) ***	4.93 (2.52, 9.64)
Sexual Minority				
HB	0.46 (0.22) *	1.59 (1.03, 2.44)	0.24 (0.17)	1.27 (0.91, 1.75)
Close Friend DN	1.15 (0.16) ***	3.16 (2.30, 4.35)	1.04 (0.12) ***	2.83 (2.25, 3.56)
Friend IN	0.47 (0.22) *	1.60 (1.04, 2.45)	0.51 (0.15) **	1.66 (1.23, 2.23)
Parent IN	0.91 (0.25) ***	2.49 (1.52, 4.09)	0.63 (0.20) **	1.87 (1.27, 2.78)
Marijuana				
Step 1	1.50 (0.25) ***	4.50 (2.77, 7.32)	1.16 (0.21) ***	3.18 (2.10, 4.81)
Sexual Minority				
Step 2	1.49 (0.33) ***	4.46 (2.35, 8.47)	1.06 (0.28) ***	2.88 (1.65, 5.02)
Sexual Minority				
HB	−0.32 (0.20)	0.72 (0.49, 1.07)	−0.30 (0.16)	0.74 (0.54, 1.02)
Close Friend DN	1.21 (0.11) ***	3.35 (2.73, 4.12)	1.26 (0.09) ***	3.53 (2.98, 4.19)
Friend IN	0.40 (0.13) **	1.49 (1.15, 1.93)	0.43 (0.10) ***	1.53 (1.25, 1.88)
Parent IN	0.78 (0.18) ***	2.17 (1.54, 3.07)	0.66 (0.15) ***	1.94 (1.46, 2.60)
Alcohol				
Step 1	0.74 (0.36) *	2.09 (1.03, 4.24)	0.94 (0.20) ***	2.55 (1.72, 3.78)
Sexual Minority				
Step 2	0.23 (0.46)	1.26 (0.51, 3.07)	0.57 (0.25) *	1.76 (1.08, 2.87)
Sexual Minority				
HV	0.00 (0.22)	1.00 (0.65, 1.54)	−0.04 (0.13)	0.96 (0.75, 1.23)
Close Friend DN	1.22 (0.13) ***	3.39 (2.65, 4.34)	0.81 (0.07) ***	2.25 (1.95, 2.59)
Friend IN	0.36 (0.17) *	1.44 (1.04, 1.99)	0.44 (0.09) ***	1.55 (1.31, 1.84)
Parent IN	0.77 (0.21) ***	2.15 (1.43, 3.24)	0.69 (0.13) ***	1.99 (1.55, 2.55)
Prescription Drugs				
Step 1				
Sexual Minority	1.49 (0.46) **	4.44 (1.80, 10.93)	1.34 (0.31) ***	3.82 (2.09, 6.97)
Step 2				
Sexual Minority	1.00 (0.58)	2.73 (0.89, 8.44)	0.83 (0.38) *	2.29 (1.08, 4.86)
HB	−0.05 (0.30)	0.95 (0.53, 1.70)	0.13 (0.19)	1.14 (0.79, 1.64)

	Recent		Lifetime	
	B (SE)	**AOR (95% CI)**	**B (SE)**	**AOR (95% CI)**
Close Friend DN	1.03 (0.20) ***	2.79 (1.89, 4.12)	0.86 (0.12) ***	2.37 (1.87, 3.00)
Friend IN	1.06 (0.27) ***	2.90 (1.70, 4.94)	0.76 (0.16) ***	2.14 (1.57, 2.91)
Parent IN	0.44 (0.26)	1.56 (0.91, 2.67)	0.43 (0.20) *	1.53 (1.03, 2.27)

Sexual minority variable coded as 0 (heterosexual) or 1 (sexual minority). Models accounted for age, gender, race and ethnicity, and grade level.

B = unstandardized beta; DN = descriptive norms; HB = homophobic bullying; IN = injunctive norms; SE = standard error.

* $p < 0.05$.

** $p < 0.01$.

*** $p < 0.001$.

Table 3

Indirect Effects of Sexual Orientation on Substance Use through Descriptive and.

	Recent			Lifetime		
	B (SE)	**95% CI**	**Z**	**B (SE)**	**95% CI**	**Z**
Tobacco						
HB	0.39 (0.23)	−0.06, 0.84	2.09*	0.20 (0.16)	−0.12, 0.53	1.42
Close Friend DN	0.40 (0.10)	0.20, 0.61	4.06***	0.37 (0.09)	0.19, 0.56	4.40***
Friend IN	0.16 (0.08)	0.01, 0.34	1.95+	0.18 (0.08)	0.05, 0.34	2.76**
Parent IN	0.20 (0.07)	0.08, 0.36	2.99**	0.13 (0.06)	0.05, 0.26	2.68**
Marijuana						
HB	−0.27 (0.17)	−0.66, 0.01	−1.60	−0.25 (0.14)	−0.55, 0.00	−1.85
Close Friend DN	0.43 (0.11)	0.24, 0.66	4.65***	0.45 (0.11)	0.25, 0.65	4.80***
Friend IN	0.14 (0.06)	0.05, 0.27	2.55*	0.15 (0.05)	0.07, 0.29	3.19**
Parent IN	0.16 (0.05)	0.07, 0.29	3.38***	0.14 (0.04)	0.07, 0.25	3.43***
Alcohol						
HB	0.00 (0.24)	−0.63, 0.37	0.01	−0.04 (0.11)	−0.28, 0.17	−0.35
Close Friend DN	0.43 (0.11)	0.23, 0.66	4.49***	0.29 (0.07)	0.15, 0.42	4.62***
Friend IN	0.13 (0.06)	0.01, 0.26	1.98+	0.16 (0.05)	0.07, 0.26	3.60***
Parent IN	0.16 (0.06)	0.07, 0.30	3.01**	0.15 (0.04)	0.08, 0.24	3.80***
Prescription Drugs						
HB	−0.04 (0.38)	−0.96, 0.33	−0.16	0.11 (0.16)	−0.25, 0.40	0.70
Close Friend DN	0.36 (0.11)	0.18, 0.60	3.60***	0.31 (0.08)	0.14, 0.46	4.13***
Friend IN	0.37 (0.13)	0.16, 0.65	3.08**	0.27 (0.09)	0.12, 0.46	3.49***
Parent IN	0.09 (0.07)	−0.04, 0.23	1.52	0.09 (0.05)	−0.01, 0.20	1.95+

B = unstandardized beta; CI = confidence interval; DN = descriptive norms; HB = homophobic bullying; IN = injunctive norms; SE = standard error; Z = Sobel Z test.

+ $p = 0.05$.

* $p < 0.05$.

** $p < 0.01$.

$^{***}p < 0.001$.