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Associations between LGBTQ-Affirmative School Climate and Adolescent Drinking Behaviors

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Abstract

Background—We investigated whether adolescents drank alcohol less frequently if they lived in jurisdictions with school climates that were more affirmative of lesbian, gay, bisexual, transgender, and questioning (LGBTQ) individuals.

Methods—Data from the 2010 School Health Profile survey, which measured LGBTQ school climate (e.g., percentage of schools with safe spaces and gay-straight alliances), were linked with pooled data from the 2005 and 2007 Youth Risk Behavior Survey, which measured sexual orientation identity, demographics, and alcohol use (number of drinking days, drinking days at school, and heavy episodic drinking days) in 8 jurisdictions. Two-level Poisson models tested the associations between school climate and alcohol use for each sexual-orientation subgroup.

Results—Living in jurisdictions with more (versus less) affirmative LGBTQ school climates was significantly associated with: fewer heavy episodic drinking days for gay/lesbian (incidence-rate

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Contributors

Mr. Coulter led the study conceptualization and design, data analysis and interpretation, and writing of the article. Drs. Birkett, Corliss, Hatzenbuehler, Mustanski, and Stall contributed to study conceptualization and design, data interpretation, and writing and editing of the article. All authors approved the final manuscript as submitted and agree to be accountable for all aspects of the work.

Conflicts of Interest
None declared.

ratio [IRR]=0.70; 95% confidence interval [CI]: 0.56, 0.87; $p=0.001$) and heterosexual (IRR=0.80; 95% CI: 0.76, 0.83; $p<0.001$) adolescents; and fewer drinking days at school for adolescents unsure of their sexual orientation (IRR=0.57; 95% CI: 0.35, 0.93; $p=0.024$).

Conclusions—Fostering LGBTQ-affirmative school climates may reduce some drinking behaviors for gay/lesbian adolescents, heterosexual adolescents, and adolescents unsure of their sexual orientation.

Keywords

Adolescents; alcohol use; heavy episodic drinking; sexual orientation; school climate

1. INTRODUCTION

Gay/lesbian and bisexual adolescents drink alcohol and engage in heavy episodic drinking (HED) more frequently than their heterosexual peers (Corliss et al., 2008; Marshal et al., 2008; Talley et al., 2014). Stigma and minority stress theories (Goffman, 1963; Meyer, 2003) purport that gay/lesbian and bisexual adolescents experience an excess burden of stress related to their minority sexual orientation, which can lead them to cope by drinking alcohol. Though empirical research supporting these theories have identified interpersonal mechanisms (e.g., violence; Jun et al., 2010; Rosario et al., 2014) that partly explain sexual-orientation drinking disparities, the recent Institute of Medicine report on the health of gay/lesbian and bisexual individuals called for more research on how broader social environments contribute to health disparities (Institute of Medicine, 2011). For example, school environments have a powerful influence on adolescents' health (Bonell et al., 2013). In particular, school climates that are more (versus less) affirming of lesbian, gay, bisexual, transgender, and questioning (LGBTQ) adolescents may have fewer stressors—or foster healthy coping and resilience—for these populations, thereby mitigating sexual-orientation drinking disparities (Hatzenbuehler, 2009).

Studies have linked alcohol use with two aspects of LGBTQ school climate: the presence of gay-straight alliances (GSAs) and anti-bullying policies that enumerate sexual orientation as a protected demographic (Heck et al., 2011; Konishi et al., 2013; Poteat et al., 2013). Generally, GSAs are student clubs comprised of LGBTQ students and their heterosexual allies who work together to cultivate safe and supportive environments for students of all sexual orientations and gender identities/expressions. Studies examining the associations between GSAs and alcohol use generally show that *all* students—gay/lesbian, bisexual, *and* heterosexual students—attending schools with GSAs report lower drinking behaviors than students at schools without GSAs (Konishi et al., 2013; Poteat et al., 2013). One study (Konishi et al., 2013) showed that attending schools with anti-bullying policies that enumerate sexual orientation as a protected demographic was associated with lower odds of past-month HED for heterosexual, gay/lesbian, and bisexual students; however, some of these findings failed to reach statistical significance, despite having odds ratios of 0.50 and below. These studies suggest that GSAs and inclusive anti-bullying policies are associated with lower alcohol use for *all* students.

LGBTQ-affirmative school climates also include other vital facets. LGBTQ adolescents who learn from LGBTQ-inclusive curriculum report feeling safer and experiencing less victimization (Kosciw et al., 2012, 2014). Because lower victimization is associated with lower alcohol use (Bontempo and d'Augelli, 2002; Rosario et al., 2014; Russell et al., 2012), school climates that reduce victimization likely lower adolescents' alcohol use. Moreover, LGBTQ adolescents who see "safe space" stickers (which help LGBTQ people identify locations where they will be welcomed and affirmed) at school are more likely to feel comfortable and have positive/helpful conversations with teachers and mental health professionals about LGBTQ issues, even when controlling for presence of GSAs (Kosciw et al., 2012, 2014). Furthermore, gay/lesbian and bisexual adolescents who have supportive educators report greater feelings of safety, less victimization, and lower alcohol use than their peers without this kind of support (Goodenow et al., 2006; Kosciw et al., 2012, 2014; Seil et al., 2014). Altogether, this evidence suggests that teaching LGBTQ-inclusive curriculum, providing adolescents with safe spaces, offering counseling services, and fostering supportive student-teacher relationships may be linked with lower alcohol use.

Using an established measure of LGBTQ school climate that incorporates the abovementioned facets of the school environment (Hatzenbuehler et al., 2014), the current study examined the effects of LGBTQ school climate and sexual orientation on adolescents' drinking frequency. Using representative data from 8 jurisdictions across the United States, we examined the independent effects of LGBTQ school climate and sexual orientation on 3 alcohol use variables—number of past-month drinking days, drinking days at school, and HED days. We also tested whether sexual orientation modified the effects of LGBTQ school climate on alcohol use, and estimated the effects of LGBTQ-affirmative school climate on alcohol use for each sexual-orientation subgroup separately. Based on prior research (Corliss et al., 2008; Goodenow et al., 2006; Heck et al., 2011; Konishi et al., 2013; Kosciw et al., 2012, 2014; Marshal et al., 2008; Poteat et al., 2013; Seil et al., 2014; Talley et al., 2014), we hypothesized: gay/lesbian adolescents, bisexual adolescents, and adolescents unsure of their sexual orientation (henceforth, "unsure adolescents") would report more frequent drinking than heterosexual adolescents; and living in jurisdictions with more versus less affirmative LGBTQ school climates would be associated with less frequent drinking for all sexual orientations. This investigation extends previous research by analyzing data that is generalizable to adolescents from several jurisdictions in the United States to examine the effects of a more holistic measure of LGBTQ school climate on drinking behaviors for specific sexual-orientation subgroups.

2. METHODS

This study utilized Youth Risk Behavior Survey (YRBS) data collected from students in grades 9-12 from 14 jurisdictions that included several measures of sexual orientation—sexual identity, behavior, or attraction—in 2005 and 2007, which represent the earliest years in which a sufficient number of jurisdictions included sexual orientation items to allow for pooled analyses. Each jurisdiction administered paper-pencil surveys to adolescents and used two-stage, cluster sampling strategies to produce representative, population-based samples (Brener et al., 2004). Methodology about the pooling of the dataset is described elsewhere (Mustanski et al., 2014). Drawing on minority stress theory (Meyer, 2003), we

assumed that LGBTQ-affirmative school climates would be most pertinent for adolescents who self-identify as gay/lesbian or bisexual (versus grouping based on sexual behavior or attraction). Therefore, we focused solely on sexual identity in the current study, and analyzed data from the 8 jurisdictions that collected this information (see Table 1). Though Boston, Massachusetts collected information on sexual identity, this jurisdiction did not have data for the school climate variable and was therefore excluded from our analysis. We utilized data collected in 2005 and 2007 for each jurisdiction with 2 exceptions: we excluded 2005 data from both Maine and Rhode Island because they did not measure sexual identity. Protocol approval was not necessary because deidentified data were obtained from secondary sources.

2.1. Measurements

2.1.1. Alcohol Use—We examined 3 alcohol use measures shown to have adequate test-retest reliability (Brener et al., 2002). Number of drinking days was assessed with the question: “During the past 30 days, on how many days did you have at least one drink of alcohol?” Response options were 0, 1 or 2, 3 to 5, 6 to 9, 10 to 19, 20 to 29, and all 30 days. Number of days drinking at school was assessed with the question: “During the past 30 days, on how many days did you have at least one drink of alcohol on school property?” Response options for this question were identical to those for the number of drinking days. Number of HED days was assessed with the question: “During the past 30 days, on how many days did you have 5 or more drinks of alcohol in a row, that is, within a couple of hours?” Response options were 0, 1, 2, 3 to 5, 6 to 9, 10 to 19, and 20 or more days. For each variable, we created a continuous count variable by assigning midpoint values to categories with ranges (e.g., 1 or 2 days was coded as 1.5), consistent with previous research (Cullen et al., 1999; DeSimone, 2010).

2.1.2. Student-Level Independent Variables—Demographic measures, including sexual orientation, were assessed via self-report. Sexual identity was assessed with the question: “Which of the following best describes you?” Response options included heterosexual (straight), gay or lesbian, bisexual, and not sure. Measures for gender, race/ethnicity, and age are described elsewhere (Mustanski et al., 2014). Sexual orientation, gender, and race/ethnicity were dummy-coded and treated as categorical. In multivariable models, we treated age as a continuous variable and centered it at the grand median (16 years) to provide meaningful intercepts (Raudenbush and Bryk, 2002).

2.1.3. Jurisdiction-Level Independent Variables—We created the LGBTQ school climate variable from the 2010 School Health Profile (SHP) survey, administered by the Centers for Disease Control and Prevention (CDC). Each jurisdiction administered two unique paper-pencil surveys: one survey to school principals and one survey to lead health education teachers using random, systematic, equal-probability sampling strategies to produce representative samples of schools (Brener et al., 2011). School principals and teachers completed surveys containing different items about their school, and LGBTQ school climate was measured with the following items after the initial stem “Does your school...”: have a gay-straight alliance or similar club; identify “safe spaces” for LGBTQ adolescents; prohibit harassment based on real or perceived sexual orientation; encourage

staff to attend professional development activities about safe and supportive school environments for LGBTQ adolescents; provide LGBTQ-inclusive sexual health curricula; facilitate access to LGBTQ-competent health services outside school; and facilitate access to LGBTQ-competent social and psychological services outside school. Principals completed all items excluding the sexual health curricula item, which was completed by lead health education teachers. All items had yes/no response options. LGBTQ school climate items had excellent internal consistency (Cronbach's $\alpha=0.97$); additional details about this variable are described elsewhere (Hatzenbuehler et al., 2014). We standardized this variable, and positive scores indicated more affirmative school climates for LGBTQ adolescents.

To control for jurisdiction-level confounders, we adjusted for each jurisdiction's median household income and density of same-sex couples gathered from the 2010 United States Census. Bivariate analyses showed that both variables were positively associated with LGBTQ school climate (income: $r=0.65$, $P=0.08$; density of same-sex couples: $r=0.84$, $P<0.01$). To provide meaningful intercepts and effects in all our models, median household income was grand-mean centered and divided by 10,000, and the density of same-sex couples was grand-mean centered and multiplied by 1,000. Further detail on these variables is presented elsewhere (Hatzenbuehler et al., 2014).

2.2. Data Analyses

Analyses were conducted in Stata version 13 (College Station, Texas), and results in Tables 1 and 2 used recommended weighting procedures (Centers for Disease Control and Prevention, 2014). We conducted complete case analyses. After excluding the few participants 12 years and younger ($n=185$), the sample included 57,427 participants. Missing data were minimal, ranging from 0.5% for age to 6.2% for number of drinking days. Of the participants who responded to at least one alcohol use question ($n=56,681$), 95.0% ($n=53,814$) had complete data for all independent variables. We allowed our sample sizes to vary for each alcohol use variable.

We conducted two-level hierarchical generalized linear models with students nested within jurisdictions. Models were fit using the GLLAMM (Generalized Linear Latent and Mixed Models) command (Rabe-Hesketh et al., 2004a). Because alcohol use was measured with continuous count responses, we fit models with Poisson distributions and log link functions. Robust “sandwich” estimators were used to account for overdispersion (Rabe-Hesketh and Skrondal, 2012). Since the GLLAMM command allows for a single sampling weight variable (Rabe-Hesketh et al., 2004b), we used an adjusted sampling weight variable in multivariable analyses, which has been used previously with these data (Birkett et al., 2014; Hatzenbuehler et al., 2014; Talley et al., 2014). Derivation of the weight variable is described elsewhere (Mustanski et al., 2014).

We engaged in a three-step model building process for each alcohol use variable. Model 1 contained student-level variables. Model 2 contained student-level and jurisdiction-level variables. Model 3 contained student-level and jurisdiction-level variables as well as the cross-level interactions between sexual orientation and LGBTQ school climate, which were employed to test whether sexual orientation modified relationships between school climate and alcohol use. All models contained random intercepts, allowing alcohol use to vary by

jurisdiction. Models containing random slopes for sexual-orientation subgroups did not converge; we fit cross-level interactions in random intercept models because *a priori* hypotheses about fixed effects take priority over random effects (Snijders and Bosker, 2012). From Model 3, we estimated incidence-rate ratios and 95% confidence intervals, which correspond to a single standard deviation increase in the school climate variable for each sexual-orientation subgroup, while holding all variables constant.

3. RESULTS

Table 1 presents the frequency and percentage of each sexual-orientation subgroup by jurisdiction. Bivariate analyses shown in Table 2 indicate that gay/lesbian, bisexual, and unsure adolescents reported greater mean number of drinking days, drinking days at school, and HED days than heterosexual adolescents.

3.1. Drinking Days

Gay/lesbian, bisexual, and unsure adolescents drank on significantly more days in the past month than heterosexual adolescents, controlling for race/ethnicity, gender, and age (Model 1, Table 3). In Model 2, controlling for student-level and jurisdiction-level variables, LGBTQ school climate was not associated with drinking days. The cross-level interactions were not significant (Model 3).

Table 4 shows the associations between LGBTQ school climate and alcohol use for each sexual-orientation subgroup. For heterosexual adolescents, living in jurisdictions with more (versus less) LGBTQ-affirmative school climates reported fewer drinking days—but the effect was small. The associations between living in more versus less LGBTQ-affirmative school climates and drinking days did not achieve statistical significance for gay/lesbian, bisexual, or unsure adolescents—however, living in more versus less LGBTQ-affirmative school climates was marginally associated with fewer drinking days for gay/lesbian adolescents.

3.2. Drinking Days at School

Gay/lesbian, bisexual, and unsure adolescents drank at school on significantly more days in the past month than heterosexual adolescents (Model 1, Table 3). Living in jurisdictions with more versus less affirmative LGBTQ school climates was associated with fewer drinking days at school (Model 2). Upon adding the cross-level interactions between school climate and sexual orientation (Model 3), the effect of LGBTQ school climate on drinking days at school was more protective for unsure adolescents than heterosexual adolescents (Model 3).

LGBTQ-affirmative school climates were associated with fewer drinking days at school for unsure adolescents (Table 4). LGBTQ-affirmative school climate was not associated with drinking days at school for heterosexual, gay/lesbian, or bisexual adolescents.

3.3. Heavy Episodic Drinking Days

Gay/lesbian, bisexual, and unsure adolescents engaged in HED on more days than heterosexual adolescents (Model 1, Table 3). Living in jurisdictions with more versus less LGBTQ-affirmative school climates was associated with fewer HED days (Model 2). The cross-level interactions were not significant for gay/lesbian, bisexual, and unsure adolescents (Model 3).

Heterosexual and gay/lesbian adolescents living in jurisdictions with more (versus less) LGBTQ-affirmative school climates reported fewer HED days (Table 4). LGBTQ school climate was not associated with the number of HED days for bisexual or unsure adolescents; however, living in more versus less LGBTQ-affirmative school climates was marginally associated with fewer HED days for unsure adolescents, and the magnitude of this effect was similar to the protective effect found among gay/lesbian adolescents.

4. DISCUSSION

In general, our study showed that LGBTQ school climate was associated with fewer drinking days at school and fewer heavy episodic drinking days (Models 2 in Table 3). Specifically, heterosexual and gay/lesbian adolescents engaged in HED on fewer days if they lived in jurisdictions with more versus less affirmative LGBTQ school climates. Living in jurisdictions with more affirmative school climates was also associated with fewer days drinking at school for unsure adolescents. For bisexuals, there were no significant relationships between LGBTQ school climate and drinking behaviors.

Our finding regarding heterosexual adolescents—that they engaged in HED less frequently if they lived in more (versus less) LGBTQ-affirmative jurisdictions—aligns with previous research showing the presence (versus absence) of GSAs was associated with less alcohol use among heterosexual adolescents (Heck et al., 2011; Konishi et al., 2013; Poteat et al., 2013). One potential explanation for this finding is, like gay/lesbian and bisexual adolescents, heterosexual adolescents are victimized because their peers perceive them as gay/lesbian or bisexual (Poteat and Espelage, 2007; Poteat et al., 2011), and this kind of victimization may be lower in jurisdictions more affirming of LGBTQ adolescents. Also, school climate for *all* students might be better in jurisdictions with greater affirmation of LGBTQ individuals (e.g., schools may be more likely to conduct student-centered education), which could reduce alcohol use for all adolescents. We also cannot rule out residual confounding in which some unmeasured variable is responsible for these associations. For instance, LGBTQ-affirmative jurisdictions may have more restrictive alcohol policies and taxation that affect adolescents' drinking frequency. Future research should examine possible mechanisms and confounders that explain the associations between LGBTQ school climate and alcohol use.

For bisexual adolescents, LGBTQ-affirmative school climates were not significantly associated with drinking behaviors. These results suggest that LGBTQ-affirmative efforts in schools may not address the needs of bisexual adolescents. Biphobia could also explain this result, because bisexuals often experience bias from heterosexual and gay/lesbian individuals (Friedman et al., 2014). Like racism, biphobia and bisexual-related stigma

manifest in multiple ways—ranging from covert to blatant, and internalized to structural (Hatzenbuehler et al., 2013). Similar to previous studies (Corliss et al., 2008; Marshal et al., 2008; Talley et al., 2014), we found that bisexual adolescents had the greatest number of drinking days and HED days compared to other sexual-orientation subgroups. Moreover, bisexual adolescents comprised a larger segment of the population than gay/lesbian and unsure adolescents. These findings suggest that future research should: explore how school climates can be more affirmative of bisexual adolescents; examine reasons why bisexual adolescents are at elevated risk for alcohol use; and design, implement, and evaluate alcohol use interventions aimed at reducing alcohol use for bisexual adolescents.

For adolescents unsure of their sexual orientation, LGBTQ supportive school climates were associated with fewer school drinking days, marginally associated with fewer HED days, but not associated with fewer drinking days in general. Given the dearth of research on how social environments impact alcohol use for adolescents who are questioning their sexual orientation, we have little theoretical or empirical work to draw on to explain the observed patterns for this subgroup. Nevertheless, compared to heterosexuals, adolescents unsure of their sexual orientation are at greater risk for alcohol use and many other health risks—suicide, illicit drug use, and peer victimization (Birkett et al., 2014; Hatzenbuehler et al., 2014; Newcomb et al., 2014)—and more research about how social environments can support and affirm adolescents developing their sexual orientation is needed to inform interventions for these vulnerable youth.

4.1. Implications

Our study has direct implications for alcohol interventions. Like previous studies (Corliss et al., 2008; Marshal et al., 2008; Talley et al., 2014), we found that gay/lesbian, bisexual, and unsure adolescents engaged in drinking and HED more frequently than heterosexual peers. Thus, gay/lesbian, bisexual, and unsure adolescents must be recognized as priority populations for alcohol use interventions, especially because scant evidence exists about evidence-based interventions to reduce alcohol use among these groups (Coulter et al., 2014; Institute of Medicine, 2011).

We also showed that LGBTQ-affirmative school climates might reduce alcohol use for gay/lesbian and unsure adolescents. Based on these findings, schools can create LGBTQ-affirmative school climates by performing the following:

- 1) Establish and enforce policies that protect adolescents from being bullied or harassed based on their sexual orientation.
- 2) Create safe spaces and clubs for LGBTQ adolescents.
- 3) Train school staff how to be competent about and support the needs of LGBTQ adolescents.
- 4) Develop and implement interventions that reduce anti-LGBTQ prejudice among both students and staff.
- 5) Teach adolescents from LGBTQ-inclusive curricula, especially in health and history.

- 6) Provide adolescents with LGBTQ-competent services, or provide referrals to such resources.
- 7) Regularly provide staff, students, and parents with informational resources (e.g., websites, organizations) about how to be supportive of LGBTQ people.

These aspects of school climate are linked with feelings of safety, lower victimization, and improved mental health outcomes for gay/lesbian and bisexual adolescents (Goodenow et al., 2006; Hatzenbuehler et al., 2014; Heck et al., 2011; Konishi et al., 2013; Kosciw et al., 2012, 2014; Poteat et al., 2013; Seil et al., 2014), and our study expanded these outcomes to include HED for gay/lesbian and heterosexual adolescents. Thus, creating and sustaining LGBTQ-welcoming and -affirming school environments may reduce hazardous drinking behaviors.

4.2. Limitations

Our findings should be considered in light of the study's limitations. We cannot infer causality because data were cross-sectional—plus the SHP data were from 2010, and YRBS data were from 2005 and 2007. Prior analyses, however, showed that the SHP school climate data from 2010 were highly correlated with SHP data from 2004 and 2006 (Hatzenbuehler et al., 2014), suggesting that school climate data from 2010 were a good proxy for earlier school environment data. Yet the psychometric properties of the school climate variable are unknown, and it is possible that schools were implementing policies/programs related to gender identity and expression but not sexual orientation. Furthermore, only principals and teachers completed LGBTQ school climate items; thus, we do not know whether students were aware of the LGBTQ resources present on campus. Future research is needed to examine correlations between students' perceptions of school climates and objective indicators of these climates. Nevertheless, having principals and teachers report on LGBTQ school climate (as was done in our study) reduces bias related to having participants provide data for both the independent and dependent variables (Diez Roux, 2007). Regarding the YRBS data, all measures were self-reported by students; and our recoding of the alcohol use variables may have caused misclassification, even though we used methods from previous studies (Cullen et al., 1999; DeSimone, 2010).

This study was also partly ecological in nature: SHP and YRBS data were not necessarily drawn from the same schools. Nevertheless, schools that participated in the SHP and YRBS were selected using probability sampling methods, which would likely cause non-differential misclassification effects, biasing results towards the null. The small number of jurisdictions (n=8) reduced our statistical power for finding significant effects for jurisdiction-level variables and cross-level interactions (Snijders and Bosker, 2012), which could explain some of our marginally significant findings. There may also be residual confounding at the student level (e.g., socioeconomic status) and jurisdiction level (e.g., alcohol outlet density).

Though we used data representative of public high schools and students, they were only from 8 jurisdictions in the United States, which are among the more progressive jurisdictions in the country (Movement Advancement Project, 2015)—thereby limiting generalizability. Furthermore, we used identity-based measures of sexual orientation;

therefore, our findings may not generalize to other operationalizations of sexual orientation, including behavior- and attraction-based measures.

4.3. Strengths

Despite these limitations, our study extended the literature (Heck et al., 2011; Konishi et al., 2013; Kosciw et al., 2012, 2014; Poteat et al., 2013) on LGBTQ school climate and alcohol use. First, the LGBTQ school climate measure included multiple components, such as inclusive curriculum, services, and policies, whereas previous research often focused on individual aspects of LGBTQ school climate (e.g., only GSAs). Second, we examined the effects of LGBTQ school climate for specific sexual-orientation subgroups, rather than collapsing gay/lesbian, bisexual, and unsure adolescents into a single group; our results showed that LGBTQ supportive climates were associated with drinking for some, but not all, sexual-orientation subgroups. Third, the student-level and jurisdiction-level data in our study were derived from probability-based samples in 8 jurisdictions—thereby providing generalizable results for a substantial segment of youth living in the United States.

4.4. Conclusions

Our study addresses 1 of the 5 major recommendations put forth by the Institute of Medicine report: to examine social influences of health for gay/lesbian and bisexual individuals (Institute of Medicine, 2011). We found that LGBTQ-affirmative school climates were associated with reduced incidence of drinking days for gay/lesbian, unsure, and heterosexual adolescents. Therefore, LGBTQ-affirmative school climates may have salubrious health implications for nearly *all* adolescents, irrespective of their sexual identity.

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REFERENCES

- Birkett M, Russell ST, Corliss HL. Sexual-orientation disparities in school: the mediational role of indicators of victimization in achievement and truancy because of feeling unsafe. *Am. J. Public Health.* 2014; 104:1124–1128. [PubMed: 24825216]
- Bonell C, Farah J, Harden A, Wells H, Parry W, Fletcher A, Petticrew M, Thomas J, Whitehead M, Campbell R. Systematic review of the effects of schools and school environment interventions on health: Evidence mapping and synthesis. *Public Health Res.* 2013; 1
- Bontempo DE, d'Augelli AR. Effects of at-school victimization and sexual orientation on lesbian, gay, or bisexual youths' health risk behavior. *J. Adolesc. Health.* 2002; 30:364–374. [PubMed: 11996785]

- Brener, ND.; Demissie, Z.; Foti, K.; McManus, T.; Shanklin, SL.; Hawkins, J.; Kann, L. School Health Profiles 2010: Characteristics Of Health Programs Among Secondary Schools. Selected U.S. Sites. Centers for Disease Control and Prevention; Atlanta: 2011.
- Brener ND, Kann L, Kinchen SA, Grunbaum JA, Whalen L, Eaton D, Hawkins J, Ross JG. Methodology of the youth risk behavior surveillance system. *MMWR Recomm. Rep.* 2004; 53:1–13. [PubMed: 15385915]
- Brener ND, Kann L, McManus T, Kinchen SA, Sundberg EC, Ross JG. Reliability of the 1999 youth risk behavior survey questionnaire. *J. Adolesc. Health.* 2002; 31:336–342. [PubMed: 12359379]
- Centers for Disease Control and Prevention. Software for Analysis of Youth Risk Behavior Survey (YRBS) Data. Department of Health and Human Services; Washington, DC: 2014.
- Corliss HL, Rosario M, Wypij D, Fisher LB, Austin SB. Sexual orientation disparities in longitudinal alcohol use patterns among adolescents: findings from the Growing Up Today Study. *Arch. Pediatr. Adolesc. Med.* 2008; 162:1071. [PubMed: 18981356]
- Coulter RWS, Kenst KS, Bowen DJ, Scout. Research funded by the National Institutes of Health on the health of lesbian, gay, bisexual, and transgender populations. *Am. J. Public Health.* 2014; 104:e105–e112. [PubMed: 24328665]
- Cullen KW, Koehly LM, Anderson C, Baranowski T, Prokhorov A, Basen-Engquist K, Wetter D, Hergenroeder A. Gender differences in chronic disease risk behaviors through the transition out of high school. *Am. J. Prev. Med.* 1999; 17:1–7. [PubMed: 10429746]
- DeSimone J. Drinking and academic performance in high school. *Appl. Econ.* 2010; 42:1481–1497.
- Diez Roux AV. Neighborhoods and health: where are we and where do we go from here? *Rev. Epidemiol. Sante Publique.* 2007; 55:13–21. [PubMed: 17320330]
- Friedman MR, Dodge B, Schick V, Herbenick D, Hubach RD, Bowling J, Goncalves G, Krier S, Reece M. From bias to bisexual health disparities: attitudes toward bisexual men and women in the United States. *LGBT Health.* 2014; 1:309–318. [PubMed: 25568885]
- Goffman, E. *Stigma: Notes On The Management Of Spoiled Identity.* Touchstone; New York: 1963.
- Goodenow C, Szalacha L, Westheimer K. School support groups, other school factors, and the safety of sexual minority adolescents. *Psychol. Sch.* 2006; 43:573–589.
- Hatzenbuehler ML. How does sexual minority stigma “get under the skin”? A psychological mediation framework. *Psychol. Bull.* 2009; 135:707. [PubMed: 19702379]
- Hatzenbuehler ML, Birkett M, Van Wagenen A, Meyer IH. Protective school climates and reduced risk for suicide ideation in sexual minority youths. *Am. J. Public Health.* 2014; 104:279–286. [PubMed: 24328634]
- Hatzenbuehler ML, Phelan JC, Link BG. Stigma as a fundamental cause of population health inequalities. *Am. J. Public Health.* 2013; 103:813–821. [PubMed: 23488505]
- Heck NC, Flentje A, Cochran BN. Offsetting risks: High school gay-straight alliances and lesbian, gay, bisexual, and transgender (LGBT) youth. *Sch. Psychol. Q.* 2011; 26:161–174.
- Institute of Medicine. *The Health Of Lesbian, Gay, Bisexual, And Transgender People: Building A Foundation For Better Understanding.* National Academies Press; Washington, D.C.: 2011.
- Jun H-J, Austin SB, Wylie SA, Corliss HL, Jackson B, Spiegelman D, Pazaris MJ, Wright RJ. The mediating effect of childhood abuse in sexual orientation disparities in tobacco and alcohol use during adolescence: results from the Nurses’ Health Study II. *Cancer Causes Control.* 2010; 21:1817–1828. [PubMed: 20640883]
- Konishi C, Saewyc E, Homma Y, Poon C. Population-level evaluation of school-based interventions to prevent problem substance use among gay, lesbian and bisexual adolescents in Canada. *Prev. Med.* 2013; 57:929–933. [PubMed: 23850517]
- Kosciw, JG.; Greytak, EA.; Bartkiewicz, MJ.; Boesen, MJ.; Palmer, NA. *The 2011 National School Climate Survey: The Experiences Of Lesbian, Gay, Bisexual And Transgender Youth In Our Nation’s Schools.* GLSEN; New York, New York: 2012.
- Kosciw, JG.; Greytak, EA.; Palmer, NA.; Boesen, MJ. *The 2013 National School Climate Survey: The Experiences Of Lesbian, Gay, Bisexual And Transgender Youth In Our Nation’s Schools.* GLSEN; New York, New York: 2014.

- Marshal MP, Friedman MS, Stall R, King KM, Miles J, Gold MA, Bukstein OG, Morse JQ. Sexual orientation and adolescent substance use: a meta-analysis and methodological review*. *Addiction*. 2008; 103:546–556. [PubMed: 18339100]
- Meyer IH. Prejudice, social stress, and mental health in lesbian, gay, and bisexual populations: conceptual issues and research evidence. *Psychol. Bull.* 2003; 129:674. [PubMed: 12956539]
- Movement Advancement Project. [Aug 21 2015] LGBT policy tally snapshot. 2015. http://www.lgbtmap.org/equality-maps/legal_equality_by_state.
- Mustanski B, Van Wagenen A, Birkett M, Eyster S, Corliss HL. Identifying sexual orientation health disparities in adolescents: analysis of pooled data from the Youth Risk Behavior Survey, 2005 and 2007. *Am. J. Public Health*. 2014; 104:211–217. [PubMed: 24328640]
- Newcomb ME, Birkett M, Corliss HL, Mustanski B. Sexual orientation, gender, and racial differences in illicit drug use in a sample of US high school students. *Am. J. Public Health*. 2014; 104:304–310. [PubMed: 24328653]
- Poteat VP, Espelage DL. Predicting psychosocial consequences of homophobic victimization in middle school students. *J. Early Adolesc.* 2007; 27:175–191.
- Poteat VP, Mereish EH, DiGiovanni CD, Koenig BW. The effects of general and homophobic victimization on adolescents' psychosocial and educational concerns: the importance of intersecting identities and parent support. *J. Couns. Psychol.* 2011; 58:597. [PubMed: 21859187]
- Poteat VP, Sinclair KO, DiGiovanni CD, Koenig BW, Russell ST. Gay–straight alliances are associated with student health: a multischool comparison of LGBTQ and heterosexual youth. *J. Res. Adolesc.* 2013; 23:319–330.
- Rabe-Hesketh, S.; Skrondal, A. *Multilevel and longitudinal modeling using Stata*. STATA press; College Station, TX: 2012.
- Rabe-Hesketh S, Skrondal A, Pickles A. Generalized multilevel structural equation modeling. *Psychometrika*. 2004a; 69:167–190.
- Rabe-Hesketh, S.; Skrondal, A.; Pickles, A. *GLLAMM manual*. 2004b.
- Raudenbush, SW.; Bryk, AS. *Hierarchical Linear Models: Applications And Data Analysis Methods*. Sage; Thousand Oaks, California: 2002.
- Rosario M, Corliss HL, Everett BG, Russell ST, Buchting FO, Birkett MA. Mediation by peer violence victimization of sexual orientation disparities in cancer-related tobacco, alcohol, and sexual risk behaviors: pooled youth risk behavior surveys. *Am. J. Public Health*. 2014; 104:1113–1123. [PubMed: 24825215]
- Russell ST, Sinclair KO, Poteat VP, Koenig BW. Adolescent health and harassment based on discriminatory bias. *Am. J. Public Health*. 2012; 102:493–495. [PubMed: 22390513]
- Seil KS, Desai MM, Smith MV. Sexual orientation, adult connectedness, substance use, and mental health outcomes among adolescents: findings from the 2009 New York City youth risk behavior survey. *Am. J. Public Health*. 2014; 104:1950–1956. [PubMed: 25121812]
- Snijders, TAB.; Bosker, RJ. *Multilevel Analysis: An Introduction To Basic And Advanced Multilevel Modeling*. Sage Publishers; London: 2012.
- Talley AE, Hughes TL, Aranda F, Birkett M, Marshal MP. Exploring alcohol-use behaviors among heterosexual and sexual minority adolescents: intersections with sex, age, and race/ethnicity. *Am. J. Public Health*. 2014; 104:295–303. [PubMed: 24328614]

Highlights

- We investigated associations between LGBTQ school climates and adolescent drinking.
- LGBTQ school climate was associated with adolescent drinking behaviors.
- Gays/lesbians had fewer heavy episodic drinking days in more affirmative climates.
- Heterosexuals had fewer heavy episodic drinking days in more affirmative climates.

Table 1

Sexual Orientation by 8 Jurisdictions in the United States: Youth Risk Behavior Surveillance Surveys, United States, 2005 and 2007

	<u>Heterosexual</u>		<u>Gay/lesbian</u>		<u>Bisexual</u>		<u>Unsure</u>	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
Chicago, Illinois	1,647	91.3%	39	2.1%	64	3.5%	54	3.1%
Delaware	4,588	94.6%	46	0.9%	168	3.3%	57	1.2%
Maine	1,196	95.3%	9	0.7%	32	2.6%	25	1.4%
Massachusetts	5,909	94.1%	74	1.2%	216	3.2%	104	1.5%
New York City, New York	14,607	92.1%	212	1.2%	619	3.7%	418	3.0%
San Francisco, California	4,245	90.3%	72	1.4%	170	3.7%	211	4.7%
Vermont	15,758	93.5%	158	0.8%	557	3.1%	469	2.5%
Rhode Island	1,886	90.5%	42	1.7%	113	5.2%	49	2.6%
Total	49,836	93.0%	652	1.2%	1,939	3.4%	1,387	2.3%

Note. All data are weighted as recommended by the Centers for Disease Control and Prevention (CDC).

Table 2

Alcohol Use by Sexual Orientation and Demographic Variables: Youth Risk Behavior Surveillance Surveys, United States, 2005 and 2007

	Number of drinking days in past month (n = 51,265)		Number of drinking days at school in past month (n = 53,147)		Number of heavy episodic drinking days in past month (n = 53,159)	
	Mean	(95% CI)	Mean	(95% CI)	Mean	(95% CI)
Total Sample	1.96	(1.85, 2.06)	0.23	(0.20, 0.26)	0.78	(0.72, 0.85)
Sexual orientation						
Heterosexual	1.84	(1.74, 1.95)	0.17	(0.14, 0.19)	0.72	(0.66, 0.79)
Gay/lesbian	4.29	(3.09, 5.50)	1.35	(0.54, 2.16)	2.06	(1.40, 2.71)
Bisexual	4.04	(3.47, 4.62)	0.90	(0.59, 1.20)	1.63	(1.29, 1.97)
Unsure	2.41	(1.78, 3.04)	1.14	(0.48, 1.81)	1.19	(0.68, 1.69)
Gender						
Female	1.77	(1.66, 1.89)	0.13	(0.10, 0.15)	0.65	(0.59, 0.72)
Male	2.15	(2.01, 2.28)	0.34	(0.28, 0.39)	0.91	(0.82, 1.00)
Race/ethnicity						
White	2.41	(2.26, 2.57)	0.22	(0.18, 0.25)	1.10	(1.01, 1.20)
Black	1.29	(1.15, 1.43)	0.19	(0.11, 0.28)	0.36	(0.28, 0.50)
Hispanic	1.78	(1.63, 1.92)	0.23	(0.17, 0.28)	0.58	(0.50, 0.65)
Asian	0.95	(0.79, 1.11)	0.20	(0.10, 0.30)	0.32	(0.23, 0.41)
Other	2.32	(2.06, 2.57)	0.43	(0.32, 0.55)	0.89	(0.75, 1.03)
Age						
13 years	0.88	(0.61, 1.15)	0.06	(0.03, 0.09)	0.26	(0.15, 0.36)
14 years	1.16	(1.00, 1.33)	0.13	(0.08, 0.19)	0.34	(0.28, 0.41)
15 years	1.56	(1.44, 1.68)	0.21	(0.15, 0.26)	0.52	(0.46, 0.58)
16 years	1.96	(1.80, 2.11)	0.25	(0.19, 0.32)	0.81	(0.73, 0.90)
17 years	2.44	(2.24, 2.65)	0.24	(0.18, 0.30)	1.06	(0.93, 1.18)
18 years or older	2.84	(2.53, 3.15)	0.32	(0.22, 0.42)	1.29	(1.08, 1.50)

Note. All data are weighted as recommended by the Centers for Disease Control and Prevention (CDC).

Table 3

Student-Level and Jurisdiction-Level Correlates of Alcohol Use: Youth Risk Behavior Surveillance Surveys, United States, 2005 and 2007

	Number of drinking days in past month (n = 51,265)			Number of days drinking at school in past month (n = 53,147)			Number of heavy episodic drinking days in past month (n = 53,159)		
	Model 1 IRR (95% CI)	Model 2 IRR (95% CI)	Model 3 IRR (95% CI)	Model 1 IRR (95% CI)	Model 2 IRR (95% CI)	Model 3 IRR (95% CI)	Model 1 IRR (95% CI)	Model 2 IRR (95% CI)	Model 3 IRR (95% CI)
Intercept	1.84 (1.69, 2.00)	1.91 (1.77, 2.06)	1.88 (1.72, 2.05)	0.09 (0.07, 0.13)	0.09 (0.06, 0.13)	0.08 (0.06, 0.12)	0.77 (0.71, 0.83)	0.75 (0.67, 0.83)	0.69 (0.59, 0.80)
<u>Student-Level Variables</u>									
Sexual orientation									
Heterosexual (ref)									
Gay/lesbian	1.73 (1.20, 2.51)	1.73 (1.20, 2.51)	1.74 (1.23, 2.47)	4.13 (1.75, 9.78)	4.11 (1.76, 9.62)	4.27 (1.86, 9.77)	2.03 (1.48, 2.78)	2.03 (1.48, 2.78)	2.03 (1.49, 2.76)
Bisexual	2.29 (2.03, 2.59)	2.29 (2.03, 2.59)	2.28 (2.04, 2.55)	6.13 (4.21, 8.91)	6.12 (4.19, 8.94)	6.33 (4.38, 9.15)	2.55 (1.97, 3.29)	2.55 (1.98, 3.29)	2.53 (2.05, 3.13)
Unsure	1.33 (1.10, 1.60)	1.33 (1.09, 1.61)	1.36 (1.11, 1.68)	5.31 (3.40, 8.30)	5.27 (3.37, 8.22)	5.92 (4.14, 8.46)	1.91 (1.37, 2.67)	1.92 (1.38, 2.67)	1.97 (1.42, 2.74)
Gender									
Female (ref)									
Male	1.31 (1.24, 1.37)	1.31 (1.24, 1.37)	1.31 (1.24, 1.37)	3.08 (2.61, 3.63)	3.07 (2.61, 3.62)	3.07 (2.62, 3.61)	1.47 (1.39, 1.56)	1.47 (1.39, 1.56)	1.47 (1.38, 1.56)
Race/ethnicity									
White (ref)									
Black	0.48 (0.40, 0.56)	0.48 (0.39, 0.58)	0.47 (0.39, 0.56)	0.73 (0.52, 1.01)	0.73 (0.50, 1.07)	0.72 (0.49, 1.06)	0.3 (0.25, 0.36)	0.31 (0.24, 0.40)	0.31 (0.23, 0.40)
Hispanic	0.74 (0.68, 0.81)	0.75 (0.65, 0.86)	0.73 (0.66, 0.81)	1.14 (0.74, 1.77)	1.14 (0.71, 1.82)	1.13 (0.69, 1.84)	0.59 (0.55, 0.64)	0.62 (0.53, 0.73)	0.62 (0.53, 0.72)
Asian	0.38 (0.31, 0.46)	0.38 (0.29, 0.49)	0.37 (0.30, 0.47)	0.74 (0.49, 1.11)	0.74 (0.47, 1.17)	0.74 (0.46, 1.18)	0.28 (0.18, 0.42)	0.29 (0.18, 0.47)	0.29 (0.18, 0.47)
Other	0.93 (0.75, 1.15)	0.93 (0.72, 1.20)	0.91 (0.72, 1.16)	1.86 (1.12, 3.08)	1.86 (1.09, 3.20)	1.83 (1.06, 3.15)	0.84 (0.63, 1.10)	0.86 (0.62, 1.20)	0.86 (0.61, 1.19)
Age (continuous)	1.22 (1.15, 1.29)	1.21 (1.14, 1.29)	1.22 (1.14, 1.29)	1.14 (1.10, 1.26)	1.15 (1.04, 1.26)	1.15 (1.05, 1.26)	1.33 (1.26, 1.41)	1.33 (1.26, 1.41)	1.34 (1.26, 1.41)
<u>Jurisdiction-Level Variables</u>									
LGBTQ school climate									
Same-sex couples	0.96 (0.90, 1.02)	0.97 (0.97, 0.98)	0.98 (0.95, 1.00)		0.71 (0.64, 0.78)	1.03 (0.88, 1.20)		0.8 (0.78, 0.82)	0.8 (0.76, 0.83)
Median household income	1.14 (1.08, 1.20)	1.15 (1.11, 1.20)	1.15 (1.11, 1.20)		1.05 (1.03, 1.07)	1.02 (1.00, 1.05)		0.98 (0.97, 0.99)	0.99 (0.98, 1.00)
<u>Cross-level Interactions</u>									
Gay/lesbian × LGBTQ school climate			0.84 (0.67, 1.04)			0.68 (0.35, 1.31)			0.88 (0.71, 1.09)
Bisexual × LGBTQ school climate			1.05 (0.90, 1.23)			0.79 (0.44, 1.44)			1.19 (0.97, 1.46)

	Number of drinking days in past month (n = 51,265)			Number of days drinking at school in past month (n = 53,147)			Number of heavy episodic drinking days in past month (n = 53,159)		
	Model 1 <i>IRR (95% CI)</i>	Model 2 <i>IRR (95% CI)</i>	Model 3 <i>IRR (95% CI)</i>	Model 1 <i>IRR (95% CI)</i>	Model 2 <i>IRR (95% CI)</i>	Model 3 <i>IRR (95% CI)</i>	Model 1 <i>IRR (95% CI)</i>	Model 2 <i>IRR (95% CI)</i>	Model 3 <i>IRR (95% CI)</i>
Unsure × LGBTQ school climate		0.88 (0.69, 1.12)			0.56 (0.32, 0.97)				0.84 (0.53, 1.33)

Note. LGBTQ = lesbian, gay, bisexual, transgender, and questioning; IRR = Incidence-rate ratio; CI = Confidence interval; Ref = Reference group.

Table 4

Association between LGBTQ School Climate and Alcohol Use By Sexual-Orientation Subgroup: Youth Risk Behavior Surveillance Surveys, United States, 2005 and 2007

	Number of drinking days in past month (n = 51,265)			Number of days drinking at school in past month (n = 53,147)			Number of heavy episodic drinking days in past month (n = 53,159)		
	<i>IRR</i>	(95% <i>CI</i>)	<i>P</i>	<i>IRR</i>	(95% <i>CI</i>)	<i>P</i>	<i>IRR</i>	(95% <i>CI</i>)	<i>P</i>
LGBTQ school climate									
<u>Sexual orientation</u>									
Heterosexual	0.98	(0.95, 1.00)	0.043	1.03	(0.88, 1.20)	0.735	0.80	(0.76, 0.83)	<0.001
Gay/lesbian	0.82	(0.65, 1.02)	0.086	0.70	(0.41, 1.19)	0.184	0.70	(0.56, 0.87)	0.001
Bisexual	1.03	(0.90, 1.18)	0.690	0.82	(0.49, 1.35)	0.428	0.95	(0.80, 1.13)	0.541
Unsure	0.86	(0.68, 1.09)	0.204	0.57	(0.35, 0.93)	0.024	0.67	(0.43, 1.05)	0.081

Note. LGBTQ = lesbian, gay, bisexual, transgender, and questioning; Models display the incidence-rate ratios (IRR) and 95% confidence intervals for a one standard deviation increase in school climate, controlling for student-level and jurisdiction-level variables.