

# Protective School Climates and Reduced Risk for Suicide Ideation in Sexual Minority Youths

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Suicide is the third leading cause of death among youths aged 15 to 24 years.<sup>1</sup> Decades of research have identified multiple risk factors for adolescent suicide ideation and attempts.<sup>2</sup> One of the most consistent findings is that lesbian, gay, and bisexual (LGB, or sexual minority) adolescents are more likely than heterosexual adolescents to endorse suicidal thoughts<sup>3,4</sup> and to report having a suicide plan.<sup>5</sup> Additionally, a recent review of the epidemiological literature found that LGB youths are between 2 and 7 times more likely to attempt suicide than their heterosexual peers.<sup>6</sup>

Given the elevated risk of suicidal ideation, plans, and attempts among sexual minority youths, researchers have focused on identifying factors that explain these marked disparities. Theories of minority stress<sup>7</sup> and stigma<sup>8</sup> have highlighted the important roles that social-structural contexts as well as institutional practices and policies play in contributing to mental health disparities. Consistent with these theories, LGB adults who live in states with fewer protective social policies have higher rates of psychiatric and substance use disorders than LGB adults living in states with more protective policies.<sup>9,10</sup> For instance, LGB adults in states that passed constitutional amendments banning same-sex marriage experienced a 37% increase in mood disorders, a 40% increase in alcohol use disorders, and nearly a 250% increase in generalized anxiety disorders in the year following the enactment of the amendments.<sup>10</sup> These and other studies<sup>11</sup> have shown that the broader social contexts surrounding LGB adults shape their mental health.

Among adolescents, schools are an important social context that contributes to developmental and health outcomes.<sup>12</sup> For sexual and gender minority youths in particular, the social context of schools can promote both vulnerability and resilience.<sup>13–16</sup> A variety of methodological approaches have been used to evaluate the mental health consequences of school climates for LGB students. The predominant

**Objectives.** We examined whether sexual minority students living in states and cities with more protective school climates were at lower risk of suicidal thoughts, plans, and attempts.

**Methods.** Data on sexual orientation and past-year suicidal thoughts, plans, and attempts were from the pooled 2005 and 2007 Youth Risk Behavior Surveillance Surveys from 8 states and cities. We derived data on school climates that protected sexual minority students (e.g., percentage of schools with safe spaces and Gay–Straight Alliances) from the 2010 School Health Profile Survey, compiled by the Centers for Disease Control and Prevention.

**Results.** Lesbian, gay, and bisexual students living in states and cities with more protective school climates reported fewer past-year suicidal thoughts than those living in states and cities with less protective climates (lesbians and gays: odds ratio [OR] = 0.68; 95% confidence interval [CI] = 0.47, 0.99; bisexuals: OR = 0.81; 95% CI = 0.66, 0.99). Results were robust to adjustment for potential state-level confounders. Sexual orientation disparities in suicidal thoughts were nearly eliminated in states and cities with the most protective school climates.

**Conclusions.** School climates that protect sexual minority students may reduce their risk of suicidal thoughts. (*Am J Public Health.* 2014;104:279–286. doi:10.2105/AJPH.2013.301508)

approach is to ask LGB adolescents to report on the supportiveness of their schools.<sup>17–19</sup> Studies using this approach have indicated that LGB youths who report greater school connectedness and school safety also report lower suicidal ideation and fewer suicide attempts.<sup>18</sup> Although informative, this research may introduce bias because information is self-reported for both the exposure and the outcome.<sup>20</sup> Studies using alternative methodologies may therefore improve the validity of the inferences on the relationship between the social environment and individual health outcomes.

An alternative methodological approach has been to develop indicators of school climate that do not rely on self-report, such as geographic location of the school (i.e., urban vs rural)<sup>21</sup> and the presence of Gay–Straight Alliances in the school.<sup>22</sup> Although this approach has received comparatively less attention in the literature, recent studies have documented associations between these more objective measures of school climate and sexual minority mental health. For example,

lesbian and gay adolescents are at lower risk for attempting suicide if they live in counties where a greater proportion of school districts have antibullying policies that include sexual orientation.<sup>23</sup> Although they provide important initial insights, existing studies have been limited by examining only 1 aspect of school climate (e.g., antibullying policies or presence of Gay–Straight Alliances),<sup>16,22,23</sup> relying on nonprobability samples,<sup>16,22</sup> and using a single location,<sup>16,22,23</sup> all of which can restrict generalizability.

We built on this previous research by using data on multiple school climate variables relevant to LGB students that we obtained from the 2010 School Health Profile Survey, compiled by the Centers for Disease Control and Prevention (CDC).<sup>24</sup> We then linked this information on school climate to population-based data of adolescents living in 8 states and cities across the United States. We hypothesized that LGB adolescents living in states and cities with school climates that are more protective of sexual minority youths would be less likely to report past-year suicidal thoughts, plans, and

attempts than LGB youths living in areas with less protective school climates.

## METHODS

The study analyzed a data set that pooled 2005 and 2007 Youth Risk Behavior Surveillance Surveys (YRBSS) from several jurisdictions that included 1 or more measures of sexual orientation. The general approach to pooling the data and analyzing the pooled data set, along with the sexual orientation items and characteristics of the sample by jurisdiction, are described in detail elsewhere in this issue.<sup>25</sup> The current study analyzed data from the 9 jurisdictions that measured sexual orientation identity (i.e., as heterosexual, lesbian or gay, bisexual, or unsure), including Boston, Massachusetts; Chicago, Illinois; Delaware; Maine; Massachusetts; New York City, New York; San Francisco, California; Vermont; and Rhode Island. Because Boston did not have data on the school climate measures (see “Measures”), we dropped it from the analyses. Consequently, we analyzed data from 8 states and cities. Table 1 presents the number of respondents by sexual orientation and by the 8 jurisdictions used in the analyses. We focused on sexual orientation identity given that school climates and policies are likely to be most salient to youths who self-identify as LGB.

## Measures

Measures for demographic characteristics (gender, age, race/ethnicity) and sexual orientation were assessed via self-report. The

measurement and pooling of sexual orientation and race/ethnicity items are described elsewhere in this issue.<sup>25</sup> We excluded from the analysis those who did not respond to the sexual orientation items. The final sample size was 55 599.

**School climate.** We obtained data on school climate from the 2010 School Health Profile (SHP) survey, which is compiled biennially by the CDC. The SHP survey employs probability sampling to create a representative sample of public schools serving students in grades 6 through 12. Of the 8 items used in the current study, 7 were completed by the principal of the school; 1 item was completed by the lead health education teacher. Participation in the survey was voluntary and confidential. Across the 5 states and 3 cities in our pooled sample that were participating in the 2010 SHP, the sample sizes of the principal surveys ranged from 33 to 613, and the response rates ranged from 71% to 86%. Sample sizes and response rates were similar for the lead health education teacher surveys. Further information on the SHP survey is provided elsewhere.<sup>24</sup>

We chose the 8 items from the SHP that assess multiple dimensions of schools that are particularly relevant for LGB students, including the presence of protective environments (e.g., Gay–Straight Alliances and safe spaces) as well as curricula and services that address the unique concerns of sexual minority youths (Table 2). Importantly, significant variation exists across these 8 jurisdictions. For instance, the lowest percentage of schools that provided curricula or supplementary materials

concerning lesbian, gay, bisexual, transgender, and questioning (LGBTQ) students was 31.6%, whereas the highest was 83.7%.

We conducted a factor analysis on the 8 items, using principal axis factoring. A single factor emerged, explaining 81.7% of the variance. Factor loadings ranged from 0.69 to 0.99, and the Cronbach  $\alpha$  for the 8 items was 0.97, providing support for a single underlying factor. To create a total score, we standardized each of the 8 items and then averaged and summed them. Scores ranged from  $-1.059$  (Delaware) to  $2.015$  (San Francisco). A score of 0 indicates an average school climate across the 8 localities. Negative scores indicate a less-than-average school climate—the lower the score, the worse the school environment for LGBTQ youths; conversely, positive scores indicate a better-than-average school environment—the larger the score, the better the school environment for LGBTQ youths. Collectively, more supportive school climates are those that

1. have a Gay–Straight Alliance and safe spaces for LGBTQ youths,
2. provide curricula on health matters relevant to LGBTQ youths (e.g., HIV),
3. prohibit harassment based on sexual orientation or gender identity,
4. encourage staff to attend trainings on creating supportive environments for LGBTQ youths, and
5. facilitate access to providers off school property that provide health and other services specifically targeted to LGBTQ youths.

**Suicide outcomes.** Participants were asked the following question regarding suicidal thoughts: “During the past 12 months, did you ever seriously consider attempting suicide?” Suicide plans were assessed by asking respondents, “During the past 12 months, did you make a plan about how you would attempt suicide?” Response options for suicide thoughts and plans were dichotomous (yes or no). Suicide attempts were assessed via 1 item: “During the past 12 months, how many times did you actually attempt suicide?” Given the nonnormal distribution of this variable, we coded the responses dichotomously. The suicidal thought ( $\kappa = 83.8$ ), plan ( $\kappa = 77.0$ ),

**TABLE 1—Sexual Orientation by 8 US Jurisdictions: Youth Risk Behavior Surveillance Surveys, United States, 2005 and 2007**

Jurisdiction	Heterosexual, No. (%)	Lesbian or Gay, No. (%)	Bisexual, No. (%)	Unsure, No. (%)
Chicago, IL	1697 (90.9)	45 (2.3)	66 (3.6)	57 (3.3)
Delaware	4890 (94.2)	56 (1.1)	189 (3.4)	67 (1.3)
Maine	1241 (94.5)	11 (0.8)	36 (3.0)	32 (1.7)
Massachusetts	6095 (93.8)	89 (1.3)	225 (3.2)	117 (1.7)
New York City, NY	15 117 (92.0)	222 (1.1)	648 (3.7)	459 (3.1)
Rhode Island	1954 (90.1)	47 (1.9)	123 (5.4)	55 (2.7)
San Francisco, CA	4357 (89.9)	80 (1.5)	176 (3.7)	229 (4.9)
Vermont	16 293 (93.3)	185 (0.9)	584 (3.1)	516 (2.7)
Total	51 644 (92.8)	735 (1.3)	2047 (3.5)	1532 (2.4)

**TABLE 2—School Climates in 8 US Jurisdictions Affecting Sexual Minority Youths: 2010 School Health Profile Survey**

Variable	%, Range (Mean)
Percentage of schools that had a Gay-Straight Alliance or similar club	27.8-90.8 (45.3)
Percentage of schools that provided curricula or supplementary materials that included HIV, STD, or pregnancy prevention information relevant to LGBTQ youths	31.6-83.7 (45.3)
Percentage of schools that identified safe spaces where LGBTQ youths could receive support from staff	39.8-100 (66.24)
Percentage of schools that prohibited harassment based on a student's perceived or actual sexual orientation or gender identity	75.1-100 (89.8)
Percentage of schools that encouraged staff to attend professional development on safe and supportive school environments for all students regardless of sexual orientation or gender identity	48.1-100 (73.29)
Percentage of schools that facilitated access to providers not on school property who had experience in providing health services to LGBTQ youths	44.8-100 (62.4)
Percentage of schools that facilitated access to providers not on school property who had experience in providing social and psychological services to LGBTQ youths	40.8-100 (62.4)
Percentage of schools that provided curricula or supplementary materials that included HIV, STD, or pregnancy prevention information relevant to LGBTQ youths and engaged in all 5 practices regarding LGBTQ youths <sup>a</sup>	8.7-81.6 (25.2)

Note. LGBTQ = lesbian, gay, bisexual, transgender, and questioning; STD = sexually transmitted disease. The 8 study jurisdictions were Chicago, IL; Delaware; Maine; Massachusetts; New York City, NY; San Francisco, CA; Vermont; and Rhode Island.

<sup>a</sup>These 5 practices refer to the responses from the third through seventh items listed in this column.

and attempt ( $\kappa = 76.4$ ) variables have demonstrated excellent test-retest reliability.<sup>26</sup> Table 3 depicts the prevalence of suicide outcomes by sexual orientation group.

**Covariates.** To minimize spurious contextual influences on our results, we controlled for 2 covariates: (1) density of same-sex couples (per 1000) living in the cities or states (mean = 9.55; SD = 6.54; range = 4.03–30.25); and (2) median household income (mean = \$61 604.03; SD = \$11 737.11; range = \$45 775.00–\$90 931.41). We obtained data for both covariates from the 2010 US Census. Preliminary analyses indicated that these 2 variables were strongly associated with the school climate variable (for density of same-sex couples,  $r = 0.75$ ;  $P < .01$ ; for median household income,  $r = 0.50$ ;  $P = .06$ ), indicating the importance of their inclusion as potential confounders of the relationship between school climate and suicide outcomes.

### Statistical Analysis

We conducted descriptive analyses for creating the school climate variable using SPSS versions 20 and 21 (SPSS Inc, Chicago, IL).

Furthermore, we used the SPSS (version 21) Complex Samples software package to conduct descriptive analyses on prevalence of sexual orientation and suicide outcomes (Tables 1 and 3) to account for the complex sample design of the YRBS. We fit models examining the relationship between school climate and suicide outcomes using the multilevel software HLM version 7 (Scientific Software International, Lincolnwood, IL). Hierarchical linear modeling accounted for the complex sampling design of the pooled YRBS data set by adjusting the relative weights and altering the effective sample size using design effects calculated for each jurisdiction. The approach to calculating design effects and accounting for the clustering of the data are described in detail elsewhere in this issue.<sup>25</sup>

Hierarchical linear modeling analyses proceeded in several steps. First, we examined an unconditional model to determine whether there were significant between-group (i.e., between-jurisdiction) differences in the suicide outcomes. Second, we added level 1 covariates, including sexual orientation (dummy coded gay or lesbian, bisexual, and not

sure, with heterosexual as the reference group), gender (male or female), race/ethnicity (dummy coded African American, Hispanic, Asian, and other, with White as the reference group), and age (continuous). Third, we added level 2 variables, including school climate and the 2 covariates (density of same-sex couples and median household income). In the final model, we allowed the slopes for sexual orientation to vary (i.e., we treated them as a random effect), and we included school climate as a predictor of the variance of the sexual orientation slopes. This approach, similar to testing a cross-level interaction between school climate and sexual orientation, permitted an evaluation of the primary research question: does school climate modify the relationship between sexual orientation and suicidal thoughts, plans, and attempts? We ran analyses separately for the 3 suicide outcomes (thoughts, plans, and attempts).

Given the small amount of missing data on covariates (age: 0.5%; gender: 0.8%; race: 2.6%), we handled missing data for covariates using listwise deletion. Nonrandom missing data were also present for suicidal thoughts, as Vermont did not include that survey item. We therefore excluded Vermont from the suicidal thoughts analysis but included it for the analysis of suicidal plans and attempts. Statistical significance was set at  $P < .05$ .

## RESULTS

In the unconditional model, the variance components (VCs) indicated that there was significant variation across states and cities in suicidal thoughts (VC = 0.02;  $\chi^2 = 133.17$ ;  $P < .001$ ), plans (VC = 0.03;  $\chi^2 = 177.81$ ;  $P < .001$ ), and attempts (VC = 0.07;  $\chi^2 = 266.15$ ;  $P < .001$ ), supporting the inclusion of additional variables to explain between-group variance in these outcomes.

### Suicidal Thoughts

In the first model, we added all level 1 sociodemographic covariates to the unconditional model (Table 4). Compared with their heterosexual peers, lesbian and gay youths (odds ratio [OR] = 3.28; 95% confidence interval [CI] = 2.40, 4.47), bisexual youths (OR = 4.52; 95% CI = 3.79, 5.40), and youths who were unsure of their sexual orientation

**TABLE 3—Prevalence of Suicide Outcomes by Sexual Orientation Group and Other Demographic Variables: Youth Risk Behavior Surveillance Surveys, United States, 2005 and 2007**

Variable	Suicide Thoughts, % (95% CI)	Suicide Plan, % (95% CI)	Suicide Attempt, % (95% CI)
Total sample	13.2 (12.7, 13.6)	11.2 (10.9, 11.6)	7.8 (7.4, 8.2)
Sexual orientation			
Heterosexual	11.6 (11.2, 12.0)	9.9 (9.5, 10.2)	6.5 (6.1, 6.9)
Lesbian or gay	29.7 (25.1, 34.8)	26.6 (22.7, 30.9)	24.7 (20.4, 29.4)
Bisexual	39.6 (36.8, 42.5)	32.2 (29.5, 34.9)	28.8 (26.1, 31.6)
Not sure	25.3 (22.2, 28.6)	22.2 (19.0, 25.7)	17.3 (14.7, 20.2)
Race/ethnicity			
White	12.3 (11.5, 13.2)	10.2 (9.7, 10.8)	5.4 (5.0, 5.9)
African American	11.7 (11.0, 12.5)	10.8 (10.0, 11.6)	8.0 (7.3, 8.9)
Hispanic	13.2 (12.2, 14.2)	10.9 (10.1, 11.8)	9.9 (9.0, 10.8)
Asian	13.0 (11.8, 14.3)	11.5 (10.2, 12.9)	6.7 (5.6, 8.0)
Other	17.0 (15.9, 18.0)	14.6 (13.6, 15.6)	11.3 (10.3, 12.4)
Gender			
Male	9.2 (8.7, 9.7)	8.6 (8.2, 9.1)	5.8 (5.3, 6.3)
Female	16.8 (16.1, 17.5)	13.5 (13.0, 14.2)	9.5 (8.9, 10.1)
Age, y			
13	20.4 (12.3, 31.8)	10.0 (8.2, 12.1)	6.8 (5.4, 8.5)
14	14.4 (13.1, 15.8)	12.0 (11.0, 12.9)	8.6 (7.7, 9.7)
15	14.1 (13.3, 14.9)	11.6 (10.8, 12.3)	8.5 (7.7, 9.4)
16	12.9 (12.1, 13.8)	11.4 (10.7, 12.2)	7.3 (6.7, 8.0)
17	11.8 (11.0, 12.7)	10.2 (9.5, 11.0)	6.6 (5.9, 7.4)
18	13.2 (12.0, 14.5)	11.1 (10.0, 12.3)	8.7 (7.7, 9.7)

Note. CI = confidence interval. Numbers are unweighted.

(OR = 2.08; 95% CI = 1.62, 2.65) were significantly more likely to report suicidal thoughts in the past year. Male gender was significantly associated with reduced odds of reporting suicidal thoughts (OR = 0.54; 95% CI = 0.49, 0.60), whereas “other” race/ethnicity was significantly associated with increased odds of suicidal thoughts (OR = 1.23; 95% CI = 1.01, 1.42).

In the second model, we entered the level 2 variables (school climate, density of same-sex couples, and median household income) as predictors of suicidal thoughts. When we controlled for level 1 variables, none of the level 2 variables were associated with the intercept for suicidal thoughts (i.e., the average student in the sample).

In the third and final model, we examined cross-level interactions between the slopes of sexual orientation and school climate. This model indicated that lesbian and gay youths (OR = 0.68; 95% CI = 0.47, 0.99) and bisexual youths (OR = 0.81; 95% CI = 0.66, 0.99)

living in jurisdictions with more protective school climates were significantly less likely to report suicidal thoughts than lesbian and gay adolescents living in jurisdictions with less supportive school climates, with control for sociodemographics and the level 2 covariates. Results were not statistically significant for the unsure group (OR = 0.83; 95% CI = 0.64, 1.09).

Figure 1 depicts the results for suicidal ideation, showing an incremental reduction in the odds of reporting suicidal thoughts (y-axis) among lesbian or gay and bisexual youths relative to increasing protectiveness of school climates (x-axis). As can also be seen in Figure 1, this pattern was not observed among heterosexual youths, whose odds of suicidal thoughts did not differ across the protectiveness of school climates. Notably, in jurisdictions with the highest score on the school climate measure (depicted on the far right side of the x-axis in Figure 1), sexual orientation disparities in suicidal thoughts were sharply

reduced, particularly for the lesbian and gay adolescents.

### Suicide Plans

Lesbian and gay youths (OR = 2.98; 95% CI = 2.20, 4.03), bisexual youths (OR = 4.37; 95% CI = 3.69, 5.16), and youths who were unsure of their sexual orientation (OR = 2.10; 95% CI = 1.67, 2.65) were significantly more likely than heterosexual youths to report a suicide plan in the past 12 months (model 1, Table 4). Male gender was significantly associated with reduced odds of reporting a suicide plan (OR = 0.67; 95% CI = 0.61, 0.74), whereas “other” race/ethnicity was significantly associated with increased odds of reporting a suicide plan (OR = 1.42; 95% CI = 1.23, 1.63). None of the level 2 variables were associated with the intercept for suicide plan in the full sample (model 2).

In the final model (model 3), lesbian and gay youths (OR = 0.73; 95% CI = 0.51, 1.06;  $P = .083$ ), bisexual youths (OR = 0.82; 95% CI = 0.66, 1.02;  $P = .066$ ), and youths unsure of their sexual orientation (OR = 0.80; 95% CI = 0.62, 1.02;  $P = .067$ ) who were living in jurisdictions with more protective school climates were less likely to report a suicide plan than sexual minority adolescents living in jurisdictions with less supportive school climates. Although the magnitude and direction of these associations were nearly identical to those of suicidal thoughts, the results for suicide plan did not achieve statistical significance at the .05 level.

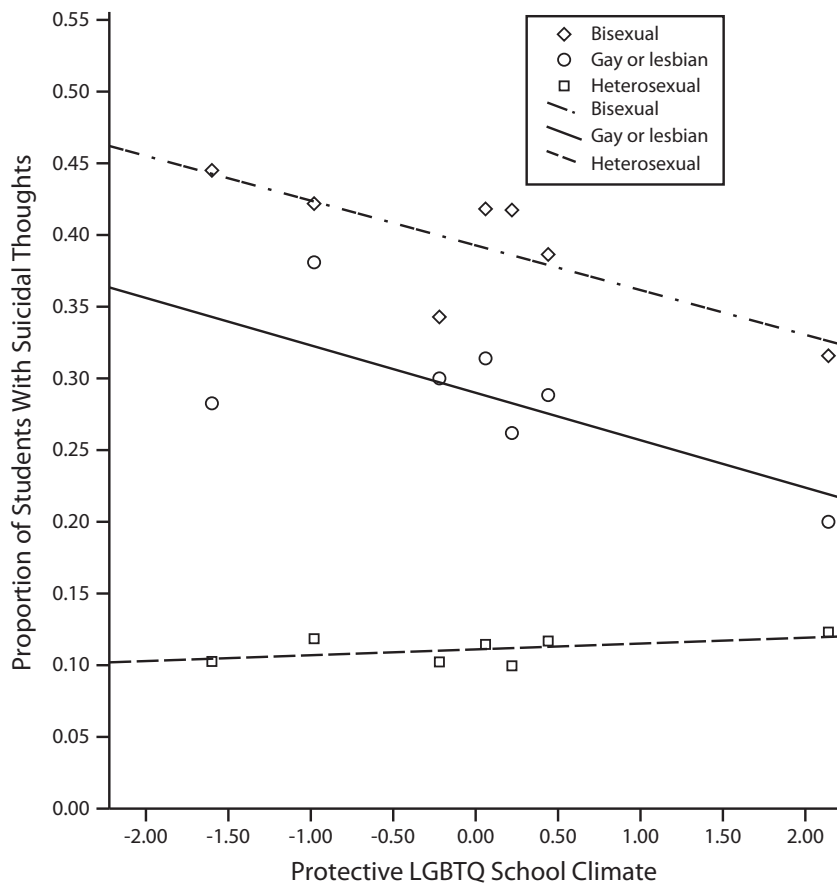
### Suicide Attempts

Lesbian and gay youths (OR = 3.87; 95% CI = 2.67, 5.63), bisexual youths (OR = 5.72; 95% CI = 4.72, 6.94), and youths unsure of their sexual orientation (OR = 2.44; 95% CI = 1.82, 3.27) were more likely to report a past-year suicide attempt (model 1, Table 4). Each racial/ethnic group was significantly more likely than Whites to report a suicide attempt in the past year; male gender and older age were both significantly associated with decreased odds of reporting a past-year suicide attempt. None of the level 2 variables were associated with the intercept for suicide attempts in the full sample (model 2). Finally, results for the cross-level interaction (model 3) indicated that sexual minority youths were less likely to

**TABLE 4—Associations Between School Climate and Suicidality: Youth Risk Behavior Surveillance Surveys, United States, 2005 and 2007**

Variable	Suicidal Thoughts, OR (95% CI)			Suicide Plan, OR (95% CI)			Suicide Attempt, OR (95% CI)		
	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3
Intercept	0.17 (0.15, 0.19)	0.17 (0.14, 0.19)	0.16 (0.14, 0.19)	0.13 (0.11, 0.15)	0.13 (0.11, 0.14)	0.13 (0.11, 0.14)	0.06 (0.05, 0.07)	0.06 (0.05, 0.07)	0.06 (0.05, 0.07)
<b>Level 1 covariates</b>									
Sexual orientation									
Heterosexual (Ref)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lesbian or gay	3.28 (2.40, 4.47)	3.27 (2.39, 4.46)	3.50 (2.31, 5.30)	2.98 (2.20, 4.03)	2.97 (2.20, 4.03)	3.13 (2.13, 4.60)	3.87 (2.67, 5.63)	3.88 (2.67, 5.65)	4.12 (2.50, 6.80)
Bisexual	4.52 (3.79, 5.40)	4.52 (3.78, 5.39)	4.77 (3.77, 6.04)	4.37 (3.69, 5.16)	4.36 (3.69, 5.15)	4.46 (3.58, 5.55)	5.72 (4.72, 6.94)	5.71 (4.71, 6.93)	6.07 (4.64, 7.95)
Not sure	2.08 (1.62, 2.65)	2.07 (1.62, 2.65)	2.35 (1.64, 3.35)	2.10 (1.67, 2.65)	2.09 (1.66, 2.64)	2.32 (1.69, 3.19)	2.44 (1.82, 3.27)	2.43 (1.82, 3.26)	2.66 (1.78, 3.99)
Race/ethnicity									
White (Ref)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
African American	0.89 (0.78, 1.02)	0.89 (0.77, 1.02)	0.89 (0.77, 1.02)	0.93 (0.89, 1.07)	0.93 (0.81, 1.08)	0.93 (0.80, 1.08)	1.45 (1.21, 1.73)	1.39 (1.16, 1.67)	1.42 (1.18, 1.70)
Hispanic	1.01 (0.87, 1.17)	1.01 (0.87, 1.17)	1.00 (0.86, 1.16)	1.01 (0.87, 1.19)	1.01 (0.87, 1.18)	1.01 (0.86, 1.18)	1.78 (1.48, 2.13)	1.70 (1.41, 2.05)	1.71 (1.42, 2.07)
Asian	1.04 (0.90, 1.22)	1.03 (0.87, 1.22)	1.03 (0.87, 1.22)	1.11 (0.95, 1.31)	1.09 (0.92, 1.29)	1.08 (0.91, 1.28)	1.24 (1.02, 1.52)	1.18 (0.94, 1.49)	1.19 (0.94, 1.50)
Other	1.23 (1.01, 1.42)	1.22 (1.06, 1.41)	1.22 (1.05, 1.41)	1.42 (1.23, 1.63)	1.41 (1.23, 1.63)	1.40 (1.22, 1.62)	1.81 (1.51, 2.16)	1.75 (1.46, 2.10)	1.76 (1.46, 2.11)
Gender									
Female (Ref)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Male	0.54 (0.49, 0.60)	0.54 (0.49, 0.60)	0.54 (0.49, 0.60)	0.67 (0.61, 0.74)	0.67 (0.61, 0.74)	0.67 (0.61, 0.74)	0.65 (0.58, 0.75)	0.66 (0.58, 0.75)	0.66 (0.58, 0.75)
Age	0.96 (0.93, 1.00)	0.96 (0.93, 1.00)	0.96 (0.93, 1.00)	0.97 (0.93, 1.00)	0.97 (0.93, 1.01)	0.97 (0.93, 1.01)	0.94 (0.90, 0.99)	0.94 (0.90, 0.99)	0.94 (0.90, 0.99)
<b>Level 2 covariates</b>									
School climate	...	1.05 (0.88, 1.26)	1.07 (0.89, 1.30)	...	1.09 (0.94, 1.27)	1.13 (0.96, 1.33)	...	1.05 (0.89, 1.25)	1.08 (0.89, 1.30)
Same-sex couples	...	0.98 (0.95, 1.02)	0.98 (0.95, 1.02)	...	1.00 (0.98, 1.03)	1.01 (0.98, 1.03)	...	0.98 (0.96, 1.01)	0.98 (0.95, 1.01)
Median household income	...	1.00 (1.00, 1.00)	1.00 (1.00, 1.00)	...	0.99 (1.00, 1.00)	0.99 (1.00, 1.00)	...	1.00 (1.00, 1.00)	1.00 (1.00, 1.00)
<b>Cross-level interactions</b>									
Lesbian or gay × school climate	...	...	0.68 (0.47, 0.99)	...	...	0.73 (0.51, 1.06)	...	...	0.80 (0.49, 1.30)
Bisexual × school climate	...	...	0.81 (0.66, 0.99)	...	...	0.82 (0.66, 1.02)	...	...	0.80 (0.61, 1.05)
Not sure × school climate	...	...	0.83 (0.64, 1.09)	...	...	0.80 (0.62, 1.02)	...	...	0.80 (0.57, 1.12)

Note. CI = confidence interval; OR = odds ratio.



Note. LGBTQ = lesbian, gay, bisexual, transgender, and questioning. The x-axis depicts protective school climates for sexual minority youths. Values represent standardized z scores for the 8 items from the School Health Profile Survey. A score of 0 indicates an average school climate across the 8 localities. Negative scores indicate school climates that are less protective for LGBTQ youths; conversely, positive scores indicate more protective school climates for LGBTQ youths. The figure depicts both raw values as well as the regression lines fit by sexual orientation groups.

**FIGURE 1—Relationship between suicidal thoughts and protective school climates, by sexual orientation status: Youth Risk Behavior Surveillance Surveys, United States, 2005 and 2007.**

report a suicide attempt if they lived in jurisdictions with more supportive climates. Although the magnitude and direction of these associations were similar to those of suicide thoughts, none reached statistical significance at the .05 level (gay and lesbian youths:  $P = .298$ ; bisexual youths:  $P = .09$ ; unsure youths:  $P = .157$ ).

## DISCUSSION

The 2011 report on LGBT health disparities from the Institute of Medicine noted the need for research on social ecological determinants of adverse health outcomes in this population, and named social influences on the lives of

LGBT people as 1 of 5 priority research areas for advancing the field.<sup>27</sup> With the current study, we address this research priority by focusing on school climate as a key social developmental context for sexual minority adolescents. We evaluate the extent to which the prevalence of suicide ideation, plans, and attempts among LGB youths are reduced in regions with school climates that protect sexual minority students.

Our results demonstrate that LGB youths living in states and cities with more protective school climates were significantly less likely to report past-year suicidal thoughts than LGB youths living in states and cities with less protective school climates. Associations

between positive school climates and reduced risk for suicidal thoughts remained significant after we controlled for potential confounders. We documented that these effects were specific to LGB adolescents; LGB supportive school climates were not associated with suicidal thoughts among heterosexual youths. Importantly, we found that higher levels of protectiveness of school climates for sexual minority students substantially reduced sexual orientation disparities in suicidal thoughts. The magnitude and direction of the results were similar for suicide plans and attempts, but these outcomes did not reach statistical significance at the .05 level.

## Limitations

This study has several limitations. Our data on school climate came from the 2010 SHP survey, the first year for which data on LGBTQ school climates were available, whereas the outcome data are from 2005 to 2007, the most recently available data to have been pooled for examination of sexual orientation disparities. Thus, we take the 2010 climate data to be a good proxy of the school climate in 2005 through 2007. The assumption is based on the idea that schools are more likely to progress gradually in improving school climate, rather than shifting drastically over years. If that is so, then our measure correctly captures variability among the localities even if it is not perfectly accurate with regard to how the specific items that comprise the measure would have been rated in 2005 through 2007. To assess the assumption of continuity, we selected 2 items (percentage of schools that had a safe-passage-to-school program and percentage of schools that had a program to prevent bullying) from the SHP survey principal report, from which the 8 items in our scale were taken. Unlike the items that comprise our LGBTQ school climate scale, these 2 items had been assessed over a longer period (2004–2010) in the same 8 jurisdictions as our sample. Although these 2 items measure school safety and antibullying contexts aimed at all students, we selected them because we believe they are particularly relevant for the LGB students in our sample and thus may be used to approximate the unmeasured LGBTQ school climate variables in 2005 through 2007. Consistent with our assumption, measures of these 2 items

were consistent and positively correlated between 2004 and 2006 and between 2006 and 2010 ( $r$ 's for safe passage were 0.9 and 0.8, respectively, and  $r$ 's for bullying prevention were 0.7 and 0.4, respectively). This indicates that each of the earlier measures provided a good approximation of the later measure. This in turn suggests that despite the discrepancy in time between exposure and outcome measures, our school climate construct properly estimated the school climate in 2005 through 2007, when outcome measures were collected. To the extent that this assumption is wrong, and the 2010 measure is not a good proxy for the 2005–2007 climate, our analyses would have suffered from the incorporation of measurement error. Introducing measurement error, which is random, would have reduced our ability to find significant findings rather than bias our results in the hypothesized direction (that is, leading us to conclude that positive school climate is protective when in fact it is not). Thus, although questions remain about the accuracy of the later measure as a proxy for earlier years, which we cannot answer, we are satisfied that inaccuracy, to the extent that it exists, has not led us to report our positive findings. (On the other hand, it is plausible that measurement error would lead to null findings regarding suicide plan and attempt.)

An additional limitation is that no psychometric properties of the LGBTQ school climate items in the 2010 SHP exist. The school climate measure relies on principals' and teachers' reports; to the extent that such results are unreliable, the validity and reliability of the measure may be compromised. However, we are confident that principals and teachers are familiar with school, district, and state policies, which they are charged with enforcing, suggesting that reporting biases are likely to be minimal. Another limitation of the school climate variable is that it is aggregated to the city and state level and may not represent the climate for the individual school that the respondent attended. However, both this and the reliance on principals' and teachers' observations would introduce random error into the school climate variable because it is unlikely that such misclassification will be systematically related to the proportion of students with suicidal thoughts, plans, and attempts. Thus,

these limitations would bias results toward the null, suggesting that the results are conservative estimates of the association between school climates and suicidal thoughts among sexual minority youths.

We take the selected items of school climate to represent greater underlying concern for the well-being of LGBTQ students on the part of school authorities. Such concern may have been manifested in other measures that generally improve protections to LGBTQ students in the localities. Thus, the items that were available to us were used as a proxy to the more general construct of affirmative school climate. We attempted to create a global measure that captures the extent to which a particular jurisdiction has a positive LGBTQ school climate. Because the specific items are to be interpreted as representing a more general construct, they do not comprise a simple index. The cost of this approach is that the measure is not intuitively interpretable.

Although we obtained data on school climates from 8 states and cities, which is an improvement over existing studies,<sup>16,22,23</sup> the locales for which data were available represent a restricted range for this variable. For example, across the 49 states and 19 cities that participated in the 2010 SHP survey, the range for the variable "provides curricula or supplementary materials that include HIV, STD, or pregnancy prevention information relevant to LGBTQ youth" was 6.1% to 100.0%, whereas for the 8 jurisdictions in the current study, it was only 31.6% to 83.7%. Related to this, the regions for which data were available to us were more liberal socially and they had more protective social climates. The restricted range most likely is related to an underestimate of the effect of school climates on suicide risk. Consequently, our results should be interpreted as providing a conservative estimate of the true size of the effect of school climate on suicidal thoughts in sexual minority adolescents.

Additionally, external validity of the study may be limited because this selective data set is not generalizable to the regions not included in the study. Future studies would benefit from greater diversity in the jurisdictions sampled to evaluate the magnitude of the effects and the generalizability of the results across different social milieu. Further limiting generalization is that although the YRBS is a representative

sample of youths in public schools, it excludes youths in private and parochial schools, as well as runaway and homeless youths. Also, the YRBS does not include measures of transgender identity or gender nonconformity, thereby preventing us from evaluating the effect of LGBTQ supportive environments on risk of suicide outcomes among transgender adolescents.

Finally, despite the large sample size, the outcomes (especially suicide attempts) were relatively rare. This restricted our statistical power to examine effect modification by certain characteristics (e.g., gender, race/ethnicity), which may have masked important subgroup differences. Additionally, as in all cross-sectional studies, we infer about but cannot test causal relationships between school climate and suicidal thoughts, plans, and attempts.

### Strengths

The current study has several methodological strengths, including the use of a representative sample of public school youths with a large enough sample size to permit disaggregation of sexual orientation groups. In addition, the study sample came from 8 states and cities across the United States, increasing the generalizability of the findings. Finally, previous studies have identified schools as 1 social context that can have significant consequences for the mental health of sexual minority students.<sup>4,13–16,19,22</sup> With some notable exceptions,<sup>21,23</sup> however, existing work has tended to use self-report measures of sexual minority youths' perceptions of their school environments.<sup>17–19</sup> These measures capture important appraisal processes, but they are measured with the same method as the outcome (i.e., self-report), which may lead to biased estimates of the relationship between school climate and mental health.<sup>20</sup> The current study overcame many of these limitations by using ecological measures of the exposure (i.e., school climates and policies) that did not rely on self-report and therefore were not confounded with the outcome of interest.

### Conclusions

The results of this study should be assessed within the context of existing knowledge. Our study expands on the contributions from previous research on social determinants of sexual

minority health that demonstrate the positive impact of supportive interventions on LGB health and well-being.<sup>7,9,10,28,29</sup> The findings point to potential targets for public health interventions aimed at reducing sexual orientation disparities in suicide risk. In particular, comprehensive suicide prevention and interventions for sexual minority adolescents should address not only individual-level<sup>3,4</sup> and family-level<sup>14,30,31</sup> factors but also broader social-contextual influences, including school climate. ■

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This article was accepted June 7, 2013.

### Contributors

M. L. Hatzenbuehler initiated the study idea, led the research and writing, and supervised the data analysis. M. Birkett conducted the statistical analyses. A. Van Wagenen obtained the data from the SHP Survey. I. H. Meyer supervised the data analyses. All authors contributed original ideas and edited drafts of the article.

### Acknowledgments

This project was supported by grants from the Eunice Kennedy Shriver National Institute of Child Health and Human Development (R21HD051178) and the National Institute of Drug Abuse (to M. L. H.; K01DA032558), and by the IMPACT LGBT Health and Development Program at Northwestern University.

Assistance from the Centers for Disease Control and Prevention (CDC) Division of Adolescent and School Health and the work of the state and local health and education departments who conduct the Youth Risk Behavior Surveillance Survey made the project possible.

**Note.** The contents of this article are solely the responsibility of the authors and do not necessarily represent the official views of the National Institutes of Health, the CDC, or any agencies involved in collecting the data.

### Human Participant Protection

Protocol approval was not necessary because deidentified data were obtained from secondary sources. Data use agreements were obtained from the Vermont and Rhode Island departments of health.

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