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Associations Between Nonsuicidal Self-Injury and School-Based Health-Promotive Factors for Sexual and Gender Minority Youth and Their Peers

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Abstract

Purpose: The purpose of this study was to identify associations between school-based, health-promotive factors and nonsuicidal self-injury (NSSI) for sexual and gender minority youth and their heterosexual and cisgender peers.

Methods: Using data from the 2019 New Mexico Youth Risk and Resiliency Survey ($N=17,811$) and multilevel logistic regression to account for school-based clustering, we compared the effect of four school-based health-promotive factors on NSSI for stratified samples of lesbian/gay, bisexual, and gender-diverse (hereafter, gender minority [GM]) youth. Interactions were examined to evaluate the impact of school-based factors on NSSI for lesbian/gay, bisexual, (compared with heterosexual) and GM (compared with cisgender) youth.

Results: Stratified analyses showed that three school-based factors (adult at school who listens, adult at school who believes they will be successful, clear school rules) were associated with lower odds of reporting NSSI for lesbian/gay and bisexual youth, but not GM youth. Interaction effects showed that lesbian/gay youth demonstrated greater reductions in odds of NSSI when reporting school-based supports compared with heterosexual youth. Associations between school-based factors and NSSI were not significantly different for bisexual compared with heterosexual youth. GM youth appear to experience no health-promotive effect on NSSI of school-based factors.

Conclusions: Our findings underscore the potential of schools to provide supportive resources that reduce the odds of NSSI for most youth (i.e., heterosexual and bisexual youth), but are particularly effective in reducing NSSI among lesbian/gay youth. However, more study is needed to understand the potential impact of school-based health-promotive factors on NSSI for GM youth.

Keywords: health-promotive factors, nonsuicidal self-injury (NSSI), school, sexual and gender minority (SGM) youth

Introduction

NONSUICIDAL SELF-INJURY (NSSI), the direct, deliberate destruction of one's body tissue without suicidal intent,^{1,2} is a serious and prevalent adolescent health problem in the United States. Common forms of NSSI include skin cutting, scratching, biting, and burns^{3,4}; culturally sanctioned body modifications (e.g., piercings and tattoos) are excluded. The lifetime prevalence of at least one episode of NSSI

among the general population of adolescents is estimated to be 17% to 18%.^{5,6}

Sexual minority (SM) youth (i.e., lesbian, gay, and bisexual youth) are more likely to engage in NSSI, have a younger age of onset, and experience more episodes of NSSI than their heterosexual peers.⁷ The odds of NSSI are also three times higher for SM youth.^{7,8} Although less well studied, gender minority (GM) youth (i.e., transgender or gender-diverse youth) have reported odds of NSSI two to four times higher

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than their cisgender peers.^{9,10} NSSI is also one of the most impactful risk factors for completed suicide among youth.¹¹ Among SM youth, reported NSSI is associated with a nearly 400% increase in the risk of suicide.¹² As a result, it is of vital public health importance to identify points of intervention that can be leveraged to address NSSI disparities experienced by sexual and gender minority (SGM) youth.

Minority stress theory posits that distal stressors due to homophobic and transphobic culture, including discrimination, violence and victimization, and proximal stressors such as internalized homophobia and transnegativity are the likely driving mechanisms of the mental health disparities among SGM youth and adults.^{13–15} Within this framework, behaviors such as NSSI may be viewed as coping mechanisms in response to discriminatory and hostile environments.

The mental health disparities experienced by GM youth may also be associated with gender dysphoria (dysphoria associated with incongruence between one's physical traits and gender identity) in addition to being a sequela of the harmful ways others may treat GM youth.^{16,17}

SGM youth report many of the same reasons for self-injuring as their cisgender and heterosexual peers. However, they also face unique social stressors that could influence their motivation for self-injury. In one study, trans-identified youth engaged in NSSI to cope with gender dysphoria and were more likely than other GM youth to self-injure.¹⁸ In a study of SM women, participants identified having been bullied and feeling shame, confusion, and self-loathing as antecedents to their NSSI.¹⁹

Resilience and social safety frameworks can help elucidate why some youth can avoid negative outcomes, such as NSSI, despite experiencing minority stressors. Social safety theory prioritizes the significance of relational resources, arguing that health disparities experienced by SGM populations can be explained by “insufficient social safety.”²⁰ In this formulation, the “protective social fabric” that provides most people with a sense of connectedness and the ability to move through their environments without fear is not available to SGM individuals.²⁰ In response to this experience of chronic unsafety, SGM individuals often demonstrate a cluster of biobehavioral adaptations associated with chronic threat vigilance that is also linked to long-term negative health consequences.²⁰

In resilience theory, health-promotive factors include internal assets (e.g., self-efficacy, future orientation) and social and environmental resources (e.g., connectedness to school, parents, or supportive adults) that can help disrupt trajectories between chronic threat vigilance and negative health outcomes.²¹ For adolescents, relationships with adults are conceptualized as key resources that help to compensate for negative experiences, including stigma or disadvantage.²² For social safety theorists, these resources help reconstruct the health-promotive social fabric for SGM youth and can improve their sense of social safety. These two theories point to the need to prioritize school-based supports to increase social safety and resilience and ameliorate disparities experienced by SGM students.

Prior literature has found that SGM youth who feel connected to their parents and safe at home reported significantly lower rates of NSSI.^{23,24} Previous studies examining possible associations between supportive adults at school and NSSI for adolescents and SM youth, specifically, have been inconclusive. One study reported an association be-

tween past-year adolescent NSSI and supportive adults at schools that was significant in univariate but not multivariate analysis.²⁵ Another study with a large state-based sample reported no associations between repetitive NSSI and the presence of a caring teacher at school among SM youth.²³

Learning more about specific modifiable school-based factors that protect against NSSI for SGM youth is important for several reasons. First, the prevalence of NSSI among SGM youth is a major public health problem and its associations with serious comorbidities such as suicidal behaviors make it a potential point of intervention for reducing SGM mental health inequities. Second, the school setting is a prime location for SGM youth health interventions, given the number of hours adolescents typically spend in school and evidence of the school's role in influencing health outcomes for SGM youth.^{26,27} Research has shown SGM youth might derive particular benefit from supportive relationships and social integration in the school setting, as many SGM youth do not have access to supportive relationships at home. Hence, schools often provide important social and emotional resources.^{23,24}

This study sought to address gaps in the literature by identifying specific modifiable school-based factors to target through school-based intervention efforts to reduce inequities in NSSI between SGM youth and their heterosexual and cisgender peers. Its specific aims included (1) determining associations between school health-promotive factors (i.e., adult who listens, adult who believes I will be a success, clear rules at school, and involvement in extracurricular school-based activities) and reports of NSSI for SGM youth; and (2) comparing differences in the health-promotive effects of these school factors for heterosexual, cisgender, and SGM youth. We performed secondary data analysis using a population-based statewide data set from racially and ethnically diverse groups of adolescents.

Methods

Sample

We analyzed data from the 2019 New Mexico Youth Risk and Resiliency Survey (NM-YRRS), collected as part of the nationwide Youth Risk Behavior Survey (YRBS) and administered in conjunction with the Centers for Disease Control and Prevention.²⁸ The NM-YRRS includes core modules from the YRBS high school questionnaire plus a module adapted from the California Healthy Kids Survey to measure resiliency factors.²⁹ The NM-YRRS yields population-based data and is administered biannually in high schools across the state by the New Mexico Department of Health, Public Education Department, and the University of New Mexico. Data were collected from schools through a two-stage cluster sample design.²⁸

Human subjects approval statement

Ethics approval was obtained from the Pacific Institute for Research and Evaluation Institutional Review Board. No human subjects were involved in this secondary analysis.

Measures

Outcome. The dependent variable was drawn from a question about NSSI: “During the past 12 months, how many times did you do something to purposely hurt yourself without wanting to die, such as cutting or burning yourself on

purpose?" Possible responses ranged from "0 times" to "6 or more times." We dichotomized responses to reflect not having engaged in NSSI (0 times) and having done so (1+ times) in the last 12 months.

Independent variables. Sexual orientation was measured in response to the question, "Which of the following best describes you?" with response options, including "Heterosexual (straight)," "Bisexual," "Gay or lesbian," and "Not sure." Those participants who responded "Not sure" were categorized as missing.³⁰ SM identity was captured with binary variables reflecting students who identified as (1) heterosexual (reference), (2) gay or lesbian, or (3) bisexual. Gender identity was measured separately using responses to the question: "Do you consider yourself transgender, genderqueer, or genderfluid?" Yes or No [reference]. Those who answered "yes" were considered GM youth.

Four school-based factors were measured. Two items assessed support from an adult at school: "At my school, there is a teacher or some other adult who listens to me when I have something to say" and "At my school there is a teacher or some other adult who believes that I will be a success." Two other school-based factors included "At school I am involved in sports, clubs, or other extracurricular activities (such as band, cheerleading, or student council)" and "In my school, there are clear rules about what students can and cannot do." For each of the four items, responses were dichotomized into "Not true at all"/"A little true" and "Pretty much true"/"Very much true."

Demographic variables included self-reported sex ("What is your sex?" Male [reference] or Female), grade (9th–12th grade), country of birth (U.S.-born [reference] vs. foreign-born), and parent education (average level of education between parents [less than high school to graduate/professional degree]). Race/ethnicity was also incorporated in adjusted analyses using a preconstructed five-category (American Indian/Alaska Native [AI/AN], Asian/Pacific Islander, African American, Hispanic/Latino/a, and White [reference]) nominal variable wherein participants' preferred race/ethnicity was prioritized. Finally, we controlled for persistent feelings of sadness/hopelessness in the past year ("During the past 12 months, did you ever feel so sad or hopeless almost every day for two weeks or more in a row that you stopped doing some usual activities?").

Data analyses

Preliminary analyses examined the extent of multicollinearity in our nondemographic variables of analysis. A correlation matrix (Pearson's *R*) of analytic variables is presented in Supplementary Table S1. Despite the conceptual similarity between our measures, no correlations exceeded a Pearson's *R* of 0.6. We further examined variance inflation factors (VIFs) in our analytical models. VIFs did not exceed 2.5 for any covariates in the models, indicating that multicollinearity does not pose a significant problem for our analysis.³¹ We also conducted preliminary analyses to examine the potential conceptual dependence between the binary variable capturing self-reported sex (male/female) and the binary variable capturing gender identity (cisgender/GM). The correlation between these two variables did not demonstrate problematic levels of dependence (Pearson's *R* = -0.026). Cross tabs and

a χ^2 test of independence show that a slightly higher proportion of female-identified youth than male-identified youth identified as GM (4.1% and 3.1%, respectively).

The χ^2 test did show that this difference was statistically significant ($\chi^2 = 4.6589$, $p = 0.031$). However, with large sample sizes, it is expected that even small differences will yield significant effects.

We used two-level logistic regression to assess the associations between school-based factors and NSSI for SM and heterosexual youth and GM and cisgender youth. The first phase of our analysis involved subsetting the data by SGM identity groups and investigating the effects on NSSI of school-based health-promotive factors for lesbian/gay, bisexual, and GM youth separately, adjusting for key demographic variables. Then, in the full sample, we assessed the moderating effect of sexual orientation on the relation between each health-promotive factor and the likelihood of NSSI. Each sexual orientation/school-based health-promotive factor interaction was assessed in a separate model to explore whether SM youth and heterosexual youth were significantly different in their probabilities of NSSI when exposed to the four different school health-promotive factors. Similarly, we tested the moderating effect of gender identity on the relation between each school health-promotive factor and likelihood of NSSI to examine the extent to which cisgender and GM youth did or did not differ.

Testing these interaction effects enabled us to document potential inequities between SGM youth and their peers and consider the extent to which a one-size-fits-all approach might not meet the specific needs of SGM youth.^{32,33} In a set of sensitivity analyses, we investigated the effects of sexual and gender identity interactions separately. Results from analyses that included sexual orientation interactions and gender identity interactions in separate models did not differ from the analyses presented in this study.

To accommodate missing data, we used the R package, *mice*,³⁴ to perform multiple imputation ($m = 20$) and the *mitml* and *lme4* packages to perform multilevel analyses on imputed data.^{35,36} All estimates were pooled based on 20 imputations in accordance with Rubin's rules.³⁷ All analyses included a random intercept to account for school-based clustering and sampling weights to account for the survey's complex sampling structure.

Results

The final sample included 17,811 students. Overall, 85.2% identified as heterosexual, 3.6% as lesbian or gay, and 11.2% as bisexual. Cisgender youth comprised 96.8% of the sample, and youth who identified as GM were 3.2% of the sample. Table 1 presents further demographic information for the sample.

Stratified results for lesbian/gay, bisexual, and gender minority youth

Table 2 presents findings from the stratified analyses. In the analysis with lesbian/gay youth, identifying as Hispanic/Latino(a) was associated with lower odds of reporting NSSI compared with non-Hispanic White youth (odds ratio [OR] = 0.576, 95% confidence interval [CI] = [0.44–0.75], $p < 0.001$). AI/AN lesbian and gay youth were also much less likely than non-Hispanic White youth to report NSSI

TABLE 1. DEMOGRAPHICS AND SELECTED CHARACTERISTICS OF 2019 NEW MEXICO YOUTH RISK AND RESILIENCY SURVEY RESPONDENTS

	N/range	Weighted percent/mean (SD)	95% CI
Demographic and selected characteristics			
<i>Sexual identity</i>			
Heterosexual	13,310	85.2%	0.846–0.858
Lesbian/gay	557	3.6%	0.033–0.039
Bisexual	1754	11.2%	0.107–0.117
<i>Self-reported sex</i>			
Female	8577	52.6%	0.518–0.533
Male	7738	47.4%	0.467–0.482
<i>Gender identity</i>			
Cisgender	15,836	96.8%	0.965–0.971
Transgender/gender diverse	520	3.2%	0.029–0.035
<i>Grade level</i>			
9th grade	4460	27.5%	0.268–0.281
10th grade	4279	26.3%	0.257–0.270
11th grade	3977	24.5%	0.238–0.251
12th grade	3531	21.7%	0.211–0.224
<i>Race/ethnicity</i>			
American Indian or Alaska Native	2467	15.2%	0.146–0.157
Asian or Pacific Islander or Native Hawaiian	380	2.3%	0.021–0.026
Black/African American	508	3.1%	0.029–0.034
Hispanic/Latino(a)	8292	51.0%	0.502–0.517
Non-Hispanic White	4621	28.4%	0.277–0.291
Foreign-born	1087	6.7%	0.063–0.071
Parental education level	1–6	3.76 (1.27)	3.710–3.748
Sad/hopeless for 2 weeks in the last 12 months	6624	40.6%	0.398–0.414
School health-promotive factors (“very much true/pretty much true”)			
At my school, there is a teacher or some other adult who listens to me when I have something to say.	10,972	67.9%	0.672–0.686
At my school, there is a teacher or some other adult who believes that I will be a success.	12,049	74.7%	0.740–0.754
There are clear rules for students	13,088	81.7%	0.811–0.823
I am involved in sports, clubs, or other extracurricular activities	9338	58.3%	0.575–0.591
Dependent variable			
Any nonsuicidal self-injury in the past 12 months	3551	21.8%	0.212–0.224

Totals for demographic items may not be the same due to some participants choosing to not respond to particular demographic questions. CI, confidence interval; SD, standard deviation.

in the last year (OR=0.557, 95% CI=[0.34–0.90], $p<0.05$). Female youth were more likely than male youth in this group to report NSSI (OR=1.327, 95% CI=[1.13–1.55], $p<0.001$). In addition, lesbian and gay youth who reported feeling sad or hopeless in the last year were more likely also to report NSSI (OR=7.81, 95% CI=[6.16–9.89], $p<0.001$). A more advanced grade level was associated with a reduction in odds of NSSI (OR=0.732, 95% CI=[0.57–0.93], $p<0.05$).

Of the school-based health-promotive factors, having an adult who listens, an adult who believes they will be a success, and perceiving clear rules were all significantly associated with reduced likelihood of NSSI among lesbian/gay youth. Reporting an adult who listens was associated with a significant reduction in the odds of NSSI (OR=0.674, 95% CI=[0.56–0.81], $p<0.001$), as was having an adult

at school who believes they would be successful (OR=0.680, 95% CI=[0.58–0.80], $p<0.001$), and perceiving there to be clear rules at school (OR=0.739, 95% CI=[0.61–0.90], $p<0.01$). Being involved in extracurricular activities was not associated with NSSI for lesbian/gay youth.

Similar patterns were observed in the bisexual sample. Hispanic/Latino(a) ethnicity, Asian/Pacific Islander racial background, and advanced-grade level were all associated with lower odds of reporting NSSI among bisexual youth. Reporting sadness/hopelessness in the past year was associated with a greater likelihood of reporting NSSI (OR=4.521, 95% CI=[4.01–5.10], $p<0.001$). The same three factors (i.e., having an adult at school who listens, an adult who believes they will be a success, and clear rules at school) were

TABLE 2. STRATIFIED ASSOCIATIONS BETWEEN SCHOOL-BASED HEALTH-PROMOTIVE FACTORS AND NONSUICIDAL SELF-INJURY FOR SEXUAL AND GENDER MINORITY YOUTH

	<i>Lesbian/gay</i>			<i>Bisexual</i>			<i>Gender minority</i>		
	<i>OR</i>	<i>SE</i>	<i>95% CI</i>	<i>OR</i>	<i>SE</i>	<i>95% CI</i>	<i>OR</i>	<i>SE</i>	<i>95% CI</i>
Intercept	0.328**	0.383	0.15–0.70	0.587**	0.178	0.41–0.84	0.321*	0.451	0.13–0.80
Female	1.327***	0.283	1.13–1.55	1.075	0.049	0.98–1.18	1.365*	0.144	1.02–1.83
Foreign-born	1.149	0.126	0.89–1.48	1.262	0.127	0.98–1.63	0.766	0.140	0.58–1.01
Race/ethnicity (ref: non-Hispanic White)									
Hispanic/Latino(a)	0.576***	0.137	0.44–0.75	0.758***	0.068	0.66–0.87	0.763	0.189	0.52–1.11
American Indian/ Alaska Native	0.557*	0.243	0.34–0.90	0.808	0.115	0.64–1.01	0.431**	0.276	0.25–0.75
African American	0.725	0.304	0.40–1.32	1.175	0.177	0.82–1.68	2.490	0.580	0.76–8.12
Asian/Pacific Islander	0.653	0.313	0.35–1.21	0.648**	0.152	0.48–0.87	0.872	0.431	0.37–2.08
Grade level	0.732*	0.122	0.57–0.93	0.679***	0.060	0.60–0.76	0.804	0.190	0.55–1.18
Parental education	1.004	0.077	0.86–1.17	0.986	0.031	0.93–1.05	0.965	0.091	0.80–1.16
Sad/hopeless	7.805***	0.120	6.16–9.89	4.521***	0.061	4.01–5.10	12.161***	0.215	7.87–18.78
School health-promotive factors									
Adult at school who listens	0.674***	0.093	0.56–0.81	0.778***	0.063	0.69–0.88	1.057	0.161	0.76–1.47
Adult at school who believes I will be a success	0.680***	0.085	0.58–0.80	0.854**	0.058	0.76–0.96	0.909	0.166	0.65–1.27
Clear rules at school	0.739**	0.097	0.61–0.90	0.824**	0.065	0.72–0.94	1.050	0.159	0.76–1.45
Involved in clubs, sports, activities	1.026	0.083	0.87–1.21	1.049	0.043	0.96–1.14	0.910	0.150	0.67–1.23
Covariance (Level 1 intercept– Level 2 intercept)	2.187			0.566			2.762		

p*<0.05; *p*<0.01; ****p*<0.001.
OR, odds ratio; SE, standard error.

significantly associated with reductions in odds of reporting NSSI.

In the GM sample, school-based health-promotive factors were not significantly associated with NSSI. In this sample, it was also evident that experiencing sadness/hopelessness in the past year was strongly associated with NSSI, such that reporting sadness was associated with an increase in the likelihood of NSSI (OR = 12.161, 95% CI = [7.87–18.78], *p* < 0.001). Other significant predictors of NSSI in this sample include self-reported female sex (OR = 1.365, 95% CI = [1.02–1.83], *p* < 0.05) and AI/AN identity (OR = 0.431, 95% CI = [0.25–0.75], *p* < 0.01). Identifying as AI/AN among GM youth reduced the likelihood of reporting NSSI.

School health-promotive factors and NSSI in the full sample of youth

Table 3 presents findings from the main effects and interactive models predicting NSSI for the full sample. The main effects model shows that lesbian/gay youth (OR = 2.24, 95% [CI] = [1.99–2.51], *p* < 0.001) and bisexual youth (OR = 3.02, 95% CI = [2.83–3.23], *p* < 0.001) had higher odds of engaging in NSSI in the past year than heterosexual peers. GM students (OR = 2.45, 95% CI = [2.08–2.88], *p* < 0.001) had higher odds of engaging in NSSI than their cisgender

peers. Female students had higher odds of engaging in NSSI than male students (OR = 1.33, 95% CI = [1.30–1.37], *p* < 0.001). Hispanic/Latino(a) students had lower odds of having engaged in NSSI than non-Hispanic students (OR = 0.87, 95% CI = [0.82–0.91], *p* < 0.001) and Asian/Pacific Islander students had higher odds of having engaged in NSSI than non-Hispanic White students (OR = 1.15, 95% CI = [1.01–1.31], *p* < 0.05). Having persistent feelings of sadness/hopelessness in the past year was strongly associated with the odds of NSSI (OR = 6.55, 95% CI = [6.27–6.84], *p* < 0.001).

Three school-based factors were associated with lower odds of NSSI for the full sample. Reporting having an adult at school who listens when they have something to say (OR = 0.80, 95% CI = [0.76–0.83], *p* < 0.001), having an adult at school who believes they will be a success (OR = 0.85, 95% CI = [0.81–0.89], *p* < 0.001), and having clear rules at school (OR = 0.90, 95% CI = [0.85–0.94], *p* < 0.001) were all associated with lower odds of reporting NSSI in the past year.

Models a–d (Table 3) show the effects of interaction models for each school-based health-promotive factor with SM and GM identity. Interaction effects show that the relationship between these school-based factors and NSSI was significantly different for lesbian/gay youth compared with

TABLE 3. ADJUSTED ASSOCIATIONS BETWEEN SCHOOL-BASED HEALTH-PROMOTIVE FACTORS AND NONSUICIDAL SELF-INJURY

	Main effects				Model a				Model b				Model c				Model d			
	OR	SE	95% CI	OR	SE	95% CI	OR	SE	95% CI	OR	SE	95% CI	OR	SE	95% CI	OR	SE	95% CI		
Intercept	0.077***	0.069	0.07-0.09	0.077***	0.069	0.07-0.09	0.077***	0.070	0.07-0.09	0.077***	0.071	0.07-0.09	0.077***	0.069	0.07-0.09	0.077***	0.069	0.07-0.09		
Lesbian/gay	2.237***	0.058	1.99-2.51	2.282***	0.059	2.03-2.57	2.370***	0.062	2.10-2.68	2.396***	0.066	2.10-2.73	2.221***	0.058	1.98-2.49	2.221***	0.058	1.98-2.49		
Bisexual	3.022***	0.034	2.83-3.23	3.004***	0.036	2.80-3.22	2.989***	0.039	2.76-3.23	3.152***	0.053	2.83-3.51	3.019***	0.034	2.82-3.23	3.019***	0.034	2.82-3.23		
Gender minority	2.447***	0.081	2.08-2.88	2.408***	0.078	2.06-2.82	2.394***	0.082	2.03-2.82	2.349***	0.081	2.00-2.76	2.457***	0.080	2.09-2.89	2.457***	0.080	2.09-2.89		
Female	1.334***	0.015	1.30-1.37	1.335***	0.015	1.30-1.38	1.336***	0.015	1.30-1.38	1.334***	0.015	1.30-1.37	1.335***	0.015	1.30-1.37	1.335***	0.015	1.30-1.37		
Foreign-born	0.973	0.047	0.89-1.07	0.975	0.047	0.89-1.07	0.975	0.048	0.89-1.07	0.975	0.048	0.89-1.07	0.978	0.048	0.89-1.08	0.972	0.048	0.88-1.07		
Race/ethnicity (ref: non-Hispanic White)																				
Hispanic/Latino(a)	0.867***	0.026	0.82-0.91	0.868***	0.027	0.82-0.92	0.864***	0.026	0.82-0.91	0.864***	0.026	0.82-0.91	0.867***	0.026	0.85-0.91	0.867***	0.026	0.82-0.91		
American Indian/ Alaska Native	0.996	0.044	0.91-1.09	1.000	0.044	0.92-1.09	0.994	0.045	0.91-1.09	0.994	0.045	0.91-1.09	0.996	0.044	0.91-1.09	0.996	0.044	0.91-1.09		
African American	0.870	0.078	0.74-1.02	0.871	0.078	0.75-1.02	0.871	0.079	0.74-1.02	0.868	0.078	0.74-1.02	0.870	0.078	0.74-1.02	0.870	0.078	0.74-1.02		
Asian/Pacific Islander	1.149*	0.067	1.01-1.31	1.148*	0.067	1.01-1.31	1.147*	0.067	1.01-1.31	1.147*	0.067	1.01-1.31	1.150*	0.067	1.01-1.31	1.150*	0.067	1.01-1.31		
Grade level	0.705***	0.023	0.67-0.74	0.705***	0.023	0.67-0.74	0.705***	0.023	0.67-0.74	0.704***	0.023	0.67-0.74	0.706***	0.023	0.68-0.74	0.706***	0.023	0.68-0.74		
Parental education	1.013	0.012	0.99-1.04	1.012	0.012	0.99-1.04	1.012	0.012	0.99-1.04	1.012	0.012	0.99-1.04	1.012	0.012	0.99-1.04	1.012	0.012	0.99-1.04		
Sad/hopeless	6.554***	0.022	6.27-6.84	6.547***	0.022	6.27-6.84	6.547***	0.022	6.27-6.84	6.547***	0.022	6.27-6.84	6.560***	0.022	6.28-6.85	6.554***	0.022	6.27-6.85		
School health-promotive factors																				
Adult at school who listens	0.795***	0.022	0.76-0.83	0.794***	0.024	0.76-0.83	0.794***	0.022	0.76-0.83	0.794***	0.022	0.76-0.83	0.795***	0.022	0.76-0.83	0.795***	0.022	0.76-0.83		
Adult at school who believes I will be a success	0.845***	0.023	0.81-0.89	0.845***	0.023	0.81-0.88	0.847***	0.025	0.81-0.89	0.847***	0.025	0.81-0.89	0.844***	0.023	0.81-0.88	0.845***	0.023	0.81-0.88		
Clear rules at school	0.898***	0.026	0.85-0.94	0.897***	0.026	0.85-0.94	0.897***	0.026	0.85-0.94	0.897***	0.026	0.85-0.94	0.917**	0.028	0.87-0.97	0.898***	0.026	0.85-0.95		
Involved in clubs, sports, activities	1.024	0.019	0.99-1.06	1.025	0.019	0.99-1.06	1.025	0.019	0.99-1.06	1.025	0.019	0.99-1.07	1.024	0.019	0.99-1.06	1.031	0.023	0.98-1.08		
Interactions																				
Lesbian/gay × listens				0.808*	0.084	0.68-0.96														
Bisexual × listens				1.012	0.070	0.88-1.17														
GM × listens				1.237	0.122	0.97-1.58														
Lesbian/gay × success				0.759*	0.086	0.64-0.90														
Bisexual × success				1.027	0.058	0.91-1.15														
GM × success				1.181	0.110	0.95-1.47														
Lesbian/gay × rules													0.813*	0.088	0.68-0.97					
Bisexual × rules													0.900	0.074	0.78-1.04					
GM × rules													1.177	0.119	0.93-1.49					
Lesbian/gay × involved																0.839*	0.081	0.71-0.99		
Bisexual × involved																0.992	0.053	0.89-1.10		
GM × involved																1.083	0.107	0.87-1.34		
Random effects																				
Covariance (Level 1 intercept–Level 2 intercept)	0.123			0.123			0.123			0.123			0.123			0.123				
N																		17,811		

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.
GM, gender minority.

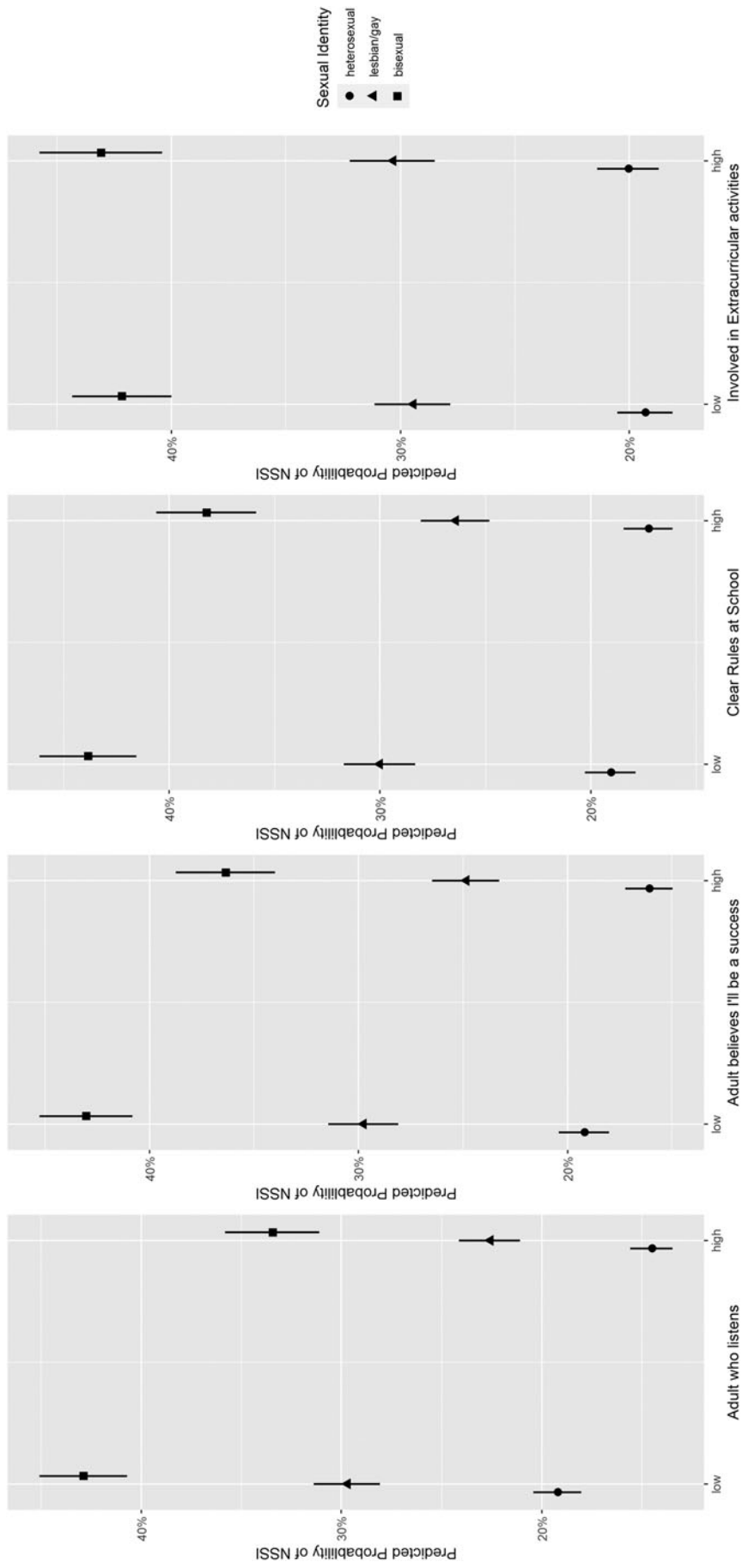


FIG. 1. Predicted probabilities of nonsuicidal self-injury among heterosexual and sexual minority youth moderated by school-based factors. NSSI, nonsuicidal self-injury.

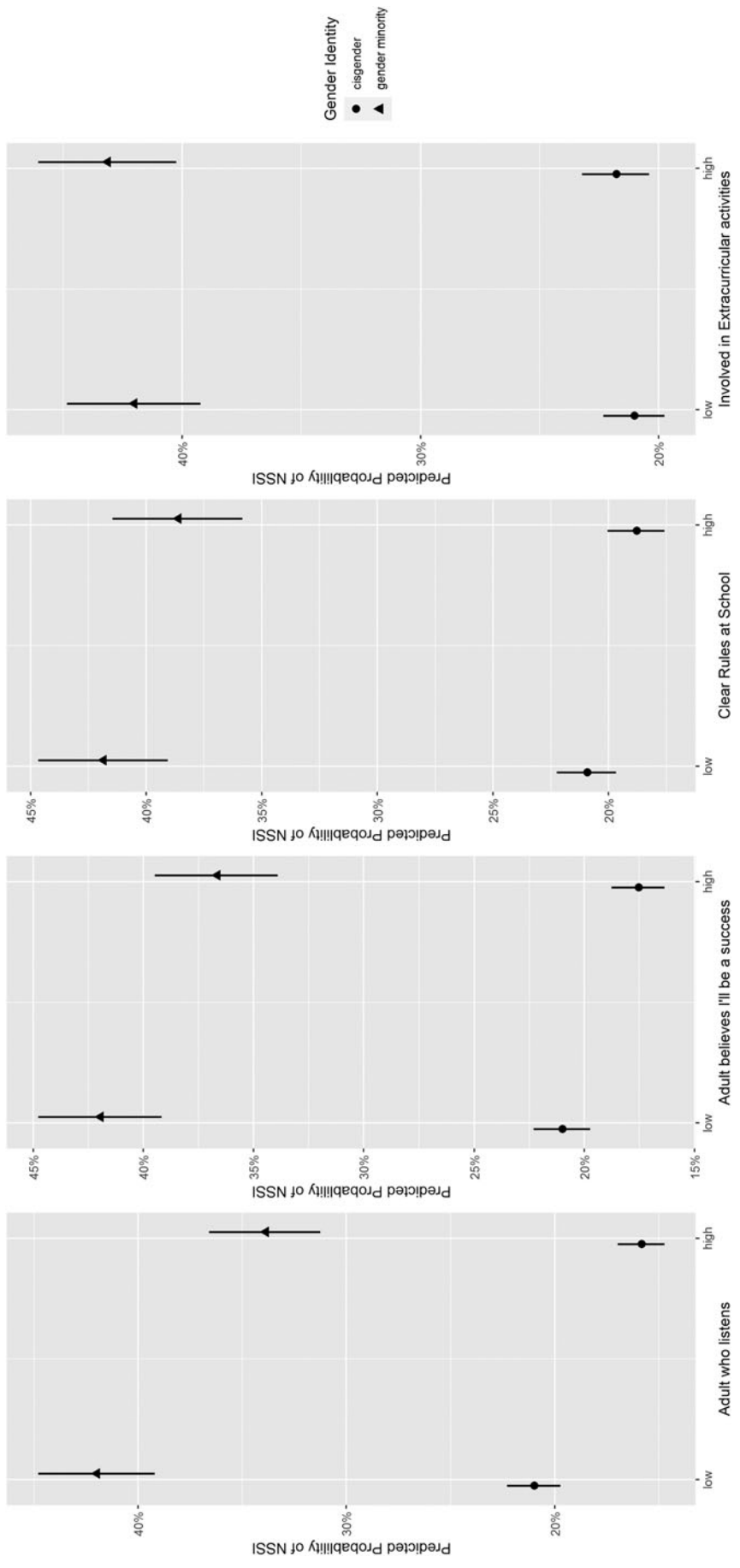


FIG. 2. Predicted probabilities of nonsuicidal self-injury among cisgender and gender minority youth moderated by school-based factors.

heterosexual youth. Specifically, for lesbian/gay youth, having an adult at school who listens (OR=0.81, 95% CI=[0.68–0.96], $p < 0.06$), having an adult at school who believes they will be successful (OR=0.76, 95% CI=[0.64–0.90], $p < 0.05$), and reporting clear rules at school (OR=0.81, 95% CI=[0.68–0.97], $p < 0.05$) were all associated with additional reductions in odds of NSSI compared with heterosexual youth. A significantly different response to participating in extracurricular activities was also evident among lesbian/gay youth, such that they experienced slightly more benefit from these activities than heterosexual youth. Bisexual youth who reported experiencing these school-based health-promotive factors had reductions in odds of NSSI that were statistically equivalent to heterosexual youth.

Figure 1 shows the predicted probabilities of NSSI among heterosexual and SM youth by school-based health-promotive factors. Reporting having an adult at school who listens, an adult at school who believes they will be a success, having clear rules at school, and engaging in extracurricular activities were all associated with greater reductions in odds of NSSI for lesbian/gay youth compared with bisexual or heterosexual youth. However, overlapping CIs in the graph depicting the interactive effect of SM identities and participation in extracurricular activities demonstrate its nonsignificant association with NSSI for all groups.

Figure 2 shows the impact of school-based health-promotive factors on NSSI for GM and cisgender youth. This figure demonstrates that supportive adults and clear rules at schools were associated with reduced odds of engaging in NSSI for cisgender youth, but not for GM youth.

Discussion

In this study, we analyzed data from a population-based, statewide sample of high school students to identify the health-promotive effects of school-based factors on NSSI for SGM youth. Three school-based factors were associated with lower odds of reporting NSSI. The degree of health-promotive effect for each factor was significantly greater for lesbian/gay youth than for heterosexual youth. These school-based factors were also associated with lower odds of NSSI for bisexual youth, but the degree of beneficial effect was not different from heterosexual youth. GM youth appear to experience no health-promotive effect of these school-based factors.

School connectedness supports a variety of positive health outcomes for SGM youth²⁶ and represents a potential locus for targeting efforts to ameliorate NSSI disparities experienced by SGM youth.³⁸ This is especially important given that SGM youth might have less access to supportive adults than their peers. Various empirically substantiated strategies can improve school climates for SGM youth; in particular, professional development designed to cultivate supportive educators is one key to ensuring supportive adults are present in school environments.^{39–41} To optimize health-promotive school environments for SGM youth, professional development around SGM-related topics should be mandated, offered at regular intervals (e.g., during onboarding and annually), and should prioritize practical ways schools can address SGM student needs.⁴² These efforts would represent institutionalizing the need for schools to provide relational resources that resilience theorists believe to be necessary to

protect against the negative effects of stigma and discrimination. And in so doing, schools would provide the protective social fabric that social safety theorists argue is missing for many SGM youth and adults.²⁰

Promising avenues for NSSI prevention and early intervention include school-based programs.^{43–46} Professional development aimed at helping school professionals reduce the stigma associated with NSSI and learn to effectively and empathetically communicate with students about NSSI can help prevent youth of all sexual orientations and gender identities from engaging in NSSI.^{47,48} Increasing access to caring, non-familial adults may be one important aspect of school-based NSSI prevention. In this way, schools would help restore a protective social fabric for SGM youth while bolstering this fabric and capacity for resilience among all students.^{20–22}

Our findings suggest that GM youth do not experience the same benefits from these school-based factors as lesbian/gay youth or bisexual youth. Moreover, they raise the possibility that some school-based experiences (i.e., clear rules at school) might harm GM youth. More study is urgently needed to confirm this. Victimization of GM youth in schools occurs not only in the context of peer relationships, but can also be perpetrated by adults and institutional policies.^{32,33,49} Transnegativity and victimization of GM youth in schools may be implicated in the lack of health-promotive effect of school-based factors for GM youth. Programming or professional development undertaken by schools to promote SGM-inclusive and safe environments should be mindful of and proactive in efforts to combat transnegativity and victimization of GM youth.¹¹ Our findings point to the need to understand other health-promotive factors that could represent key resilience resources for GM youth. These resources may include access to gender-affirming care, supportive family members and peers, and trans-inclusive policies and practices at the institutional level.^{50–52}

We found that participation in extracurricular activities was not significantly associated with reduced odds of NSSI. However, extracurricular activities are not all created equal. For example, some research indicates that activities that reinforce a gender binary and heterosexual norms (e.g., football or religious activities) are associated with decreased well-being among SGM youth.⁵³ Our dataset did not include information on participation in clubs such as Genders and Sexualities Alliances or Gay Straight Alliances (GSAs) known to support SGM students' wellbeing.³⁹ It is possible that the slight yet significant difference in the effects of extracurricular activities between lesbian/gay youth compared with other youth was due to their being more likely to participate in GSAs compared with bisexual or GM youth. Further research disentangling the effects of different types of extracurricular activities on diverse youth populations is needed.

Limitations

Our study has several limitations. Our study was cross-sectional and could not identify causality. In addition, data from a single state may not reflect adolescents elsewhere. Further research is needed to establish the generalizability of these findings. Finally, the NM-YRRS asks respondents to provide self-reported sex by choosing between only two options: male and female. It does not specifically query sex

assigned at birth. Although the inclusion in NM-YRRS of an item that asks respondents about their gender identity is a benefit of this survey, it is not possible to accurately measure respondents' GM identities.

Conclusion

Despite its potential limitations, our study underscores the value of the school setting as a site where adults can contribute to SGM youth resiliency and mitigate risk for NSSI by bolstering the health-promotive social fabric and sense of safety available to SGM youth at school. School-based and policy efforts to provide inclusive and supportive environments for SGM youth are of the utmost importance in the current era. Political efforts to restrict freedoms and increase the hostility of school climates toward SGM youth are likely to increase stigmatization and victimization of SGM youth and detrimentally impact the mental health and wellbeing of SGM youth.⁵⁴ Those who work in school settings are particularly well positioned to provide support for SGM youth and work to counteract the structural and institutional violence imposed by these political maneuverings. Further research is needed to understand the mechanisms that shape the health-promotive influence of school-based supports on NSSI risk for SGM youth and their peers. Research on the potential impacts of school-based practices on NSSI risk for GM youth is particularly needed.

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Authors' Contributions

M.M.R. conceptualized the study design with input from A.K., D.S., and C.W. A.K. completed the data analysis. M.M.R., D.S., and C.W. assisted A.K. in data interpretation. M.M.R. and A.K. drafted the article. All authors contributed to article writing and revisions. All authors reviewed and approved the final version of this article.

Disclaimer

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Author Disclosure Statement

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Supplementary Material

Supplementary Table S1

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