HHS Public Access

Author manuscript

J LGBT Youth. Author manuscript; available in PMC 2025 January 01.

Published in final edited form as:

J LGBT Youth. 2024 ; 21(4): 659–676. doi:10.1080/19361653.2023.2230462.

Protective factors associated with reduced substance use and depression among gender minority teens

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Abstract

Gender minority (GM) students are at high risk for substance use and depression. This study explores the role of protective factors in reducing rates of substance use and depression based on high school surveys. Univariate and multivariate analyses were conducted to evaluate the association between exposures and outcomes. Youth completed surveys in 2018 (n=16,288) and in 2021 (n=10,792). GM students reported exposure to protective factors less frequently than their cisgender peers: good financial status (88.6% v 96.5% v in 2018 and 95% v 97.8% in 2021), feeling a sense of school/community membership, (mean score 2.7 v 3.0 in 2018 and 2.6 v 3.0 in 2021) or having two or more caring adults in their life (61.5% v 79.7% v in 2018 and 64.2% v. 80.6% in 2021). GM youth experienced risk factors more often than their peers including bias-based bullying (mean score: 0.6 v 0.2 in 2018, 0.5 v. 0.2 in 2021); peer victimization (0.5 v. 0.2 in 2018, 0.3 v 0.1 in 2021), and homelessness/foster care exposure (32.8% v 10.8% in 2018

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Declaration of Interest Statement: The authors report there are no competing interests to declare.

Data source: 2021 Dane County Youth Assessment, Dane County Youth Commission, Madison, Wisconsin. https://www.dcdhs.com/About-Us/Commissions-Boards-and-Committees/Youth-Commission/Youth-Assessment

and 15.8% v. 6.6% in 2021). Several factors mitigated depression and substance use among GM students. GM youth experienced these protective factors less frequently than their peers.

Keywords

gender minority youth; protective factors; risk factors; depression; substance use

Introduction

During middle and high school, adolescents explore, develop, and express their sexual identity (Gray & Squeglia, 2018; Kar et al., 2015). Adolescents who identify as transgender, non-binary, gender nonconforming, and/or do not identify with male or female gender (collectively gender-minority or GM), go through the same developmental processes. This normal process of identity formation can be difficult for adolescents who identify as GM. Previous research shows that GM youth have higher rates of substance use and mental health difficulties than their cisgender peers (Mereish, 2019; Russell & Fish, 2016). Strong parent-child relationships, a safe home, community and school environment, and positive social engagement protect against adolescent substance use and poor mental health in the general population (Allen et al., 2021; Rusby et al., 2018). In contrast, peer substance use, parent-adolescent conflict, child maltreatment and parental substance use increase these behavioral risks (Allen et al., 2021; Newcomb et al., 2020).

Safe school and home environments support healthy development for youth in general. Child maltreatment, poor parent-child relationships, and fear of being a crime victim undermine feelings of safety and are highly correlated with poor mental health in adolescence (Mueller et al., 2019; Yoon et al., 2017). Beyond these general risk factors affecting adolescent development, GM students face specific threats to feeling welcomed and safe at school including experiencing higher rates of bullying compared with cisgender peers. More than three-quarters of those who were openly transgender or perceived as transgender at some point between kindergarten and grade 12, experienced some form of mistreatment ranging from verbal harassment and stricter discipline to physical and sexual assault (Smith & Reidy, 2021) and seventeen percent faced such severe mistreatment that they left a K–12 school (James et al., 2016). These kinds of maltreatment at school have been correlated with higher rates of substance use (Coulter et al., 2019; Lowry et al., 2020; Reisner et al., 2015).

GM college students are more likely than their peers to have mental health challenges, with 4.3 times higher odds of experiencing depression, anxiety, eating disorders, nonsuicidal self-injury, suicidal ideation, or suicidal attempts (Lipson et al., 2019; Wyman Battalen et al., 2021). Transgender students have a 2.99 higher odds of past-year suicidal ideation than non-transgender students (Perez-Brumer et al., 2017). Forty percent of transgender adults reported a previous suicide attempt, and 34% of those respondents noted that their first attempt was at age 13 or younger. Thirty-nine percent reported the first suicide attempt between the ages of 14 and 17 (James et al., 2016).

The Healthy Outcomes from Positive Experiences (HOPE) framework extends insights drawn from the clear effects of adverse experiences on child development and has identified

four key types of positive childhood experiences (PCEs) that function to create thriving, resilient children, even in the face of adversity (Sege, 2017). Adults who report higher numbers of PCEs are significantly less likely to report depression or poor mental health, (Bethell et al., 2019) and adolescents who had these experiences during childhood were less likely to have mental health problems as older teens (Guo et al. 2022) and adults.

These experiences cluster around the four building blocks of HOPE; relationships with adults and other children; safe, stable and equitable environments to live, learn and play; social/civic engagement, and opportunities for social/emotional development (Sege, 2017). This article explores the prevalence of protective factors, their relationship to these four building blocks, and their association with better mental health outcomes and lower rates of substance use among students. The study also explores the association between exposures to risk factors and substance use and other mental health problems. We were able to explore the durability of the relationships between exposures and outcomes prior to and during the pandemic.

Materials and Methods

Survey

The Dane County Youth Assessment (DCYA) is a web-based cross-sectional survey administered every three years to students in Dane County, Wisconsin. Dane County is the second largest county in Wisconsin with a population of 564,000. The population is majority White (85%) and 20% are age 18 or younger (United States Census Bureau, 2021). The Dane County Students Commission, United Way of Dane County, Public Health Madison & Dane County, the city of Madison, Wisconsin, K12 Associates Consulting of Middleton, WI, seventeen public school districts and one private high school collaborated to create this survey (Dane County Department of Human Services, 2021). A committee of educators, public health professionals, project funders, and parent representatives developed the survey questions. The survey consists of multiple choice questions on various protective and risk behaviors in regards to school, peer relations, family, and community. Developers extrapolated questions from the Centers for Disease Control and Prevention (CDC) Youth Risk Behavior Surveillance System and other national surveys to allow for comparisons between national and Dane County students. Students in grades 7 to12 completed online surveys between January and April of 2018, and again between January and April of 2021.

Survey administration took place in classrooms, with designated time set for students to answer questions on a specialized survey link; the specialized link was deactivated following administration. Those who were unable to attend the designated survey time were offered a make-up schedule. Reading assistance was provided to students requiring this service by each participating school district. Student participation was voluntary and anonymous. Students were provided with instructions specifying that they could skip questions or opt-out of the survey at any point. No personal identifying information was collected as part of this survey, and student responses can and will not be connected to individual respondents at any time. Surveys were approved by each participating school district prior to administration, and followed Hatch Amendment protocols for human subjects under 18 (U.S. Office of Special Counsel). Populations or demographics reporting small numbers were grouped by

district to maintain confidentiality. Legal guardians were given the opportunity to opt their child out of participating through a waiver letter sent to all parents and guardians 6–8 weeks prior to survey administration (Dane County Department of Human Services, 2021). This report only analyzed data from students in grades 9 to 12. The Tufts University School of Medicine Institutional Review Board granted this study exemption from review due to a determination that it was not classified as human studies research.

Gender identity

Gender identity was assessed with the following questions; “How do you describe your gender identity?” (Male, Female, Non-Binary, Gender Fluid, Other) and “Do you identify as transgender?” (Yes, No) Students who selected non-binary or gender fluid, or answered yes that they identify as transgender, were included in the GM group.

Exposures

All risk and protective factors were examined for both cisgender and GM students.

Protective factors items included:

1. Environment: having a current stable financial status (based on family’s current situation), engaging in physical activity for 60 minutes or more three or more times per week,
2. Relationships: connections to multiple adults outside the home, and
3. Engagement: whether or not they felt connected to their school and/or community and, possibly engaging in physical activity for 60 minutes or more three or more times per week, if the respondent referred to team sports

Risk factors included experiencing bias or bullying in the past 12 months, frequency of experiences of peer victimization (i.e. being hit, picked on, made fun of, etc.) in the last 30 days, or having been either homeless or in foster care in their lifetime. We refer to protective and risk factors as “exposures.” Table 1 delineates survey items.

We calculated composite scores for peer victimization, sense of school and community membership, and bias-based bullying (BBB) based on prior data (Espelage D. L., 2001; Vigna, 2018, 2020). Total items answered for questions included in sense of school and community membership were scored so that a higher composite score indicated higher agreement with belonging. We calculated scores for BBB by scoring 0–4 for Never-Very Often. Higher composite scores therefore indicate a higher frequency of BBB (see Table 1). We calculated peer victimization scores by averaging experiences of victimization against experiences perpetrating victimization in order to create a composite score. Higher scores indicate more frequent experiences of victimization. We derived this score from a limited set of questions in 2021 relative to 2018 (See Table 1 footnote).

Notable outcomes were reports of depression and substance use, which were among the mental health conditions and health risk behaviors included in the survey.

Data analysis

We conducted separate analyses for the 2018 and 2021 surveys using SAS (SAS/STAT Software, 2022) and tabulated descriptive statistics on the samples' demographic characteristics. We excluded respondents not reporting key demographic variables of grade, race, or GM status from subsequent analysis. Corresponding factors/outcomes in which responses were missing were also excluded from subsequent analysis. We used chi square tests for categorical variables, and t-tests for continuous variables to compare differences in the distribution of exposures between cisgender and GM students.

We initially used univariate logistic regression models to examine unadjusted associations between each of the demographic (grade [9, 10, 11, 12], race [white vs non-white], gender identity [cisgender/GM]) and exposure variables with the binary outcomes of interest (drinking, substance use, smoking, depression, suicidality, any mental health issues, use of mental health services). We used adjusted logistic regression models (for grade, race, and GM status) to test the associations between individual exposures and these outcomes. In models where GM status was significantly associated with the outcome, we added exploratory interaction terms to evaluate whether the association between the exposure of interest varied between those identifying as GM compared to cisgender students. As we aimed to identify possible exposures that may differ in their association with adverse outcomes for GM students compared to cisgender students, we retained interaction terms in the adjusted models with a liberal threshold for statistical significance ($p<0.10$). Otherwise, we used an alpha of 0.05 to define statistical significance for the association between exposures and outcomes. We calculated odds ratios and 95% confidence intervals for all associations.

Results

2018 yielded 16,288 completed surveys and 2021 yielded 10,792 completed surveys. Table 2 outlines response rates by grade, age, race, and gender identity. We excluded 538 (3.3%) and 111 (1.0%) participants due to missing demographic data (grade/race/gender) (Table 2).

There were significant differences in exposure to risk and protective factors between GM and cisgender students. GM students were significantly less likely to report exposure to any of the protective factors including good financial status, engaging in physical activity 3+ times per week, feeling a sense of school/community membership, or having two or more caring adults in their life (Tables 3, 4). Compared with cisgender students, GM students were significantly more likely to report risk factors including experience of BBB, experience of peer victimization, and experience with homelessness or being in foster care (Tables 3, 4).

Protective factor associations with depression

GM students were more likely to report depression compared to their cisgender peers. This was seen in both 2018 (297/562 (62.8%) vs. 3522/15456 (24.8%); $p<0.0001$) and 2021 (347/540 (65.2%) vs. 3155/10288 (31.4%); $p<0.0001$). All four protective factors were significantly associated with reduced reporting of depressive symptoms in the study population as a whole in both surveys (Tables 3, 4). The association between physical

activity and depression did not reach statistical significance for GM students. Additionally, compared with cisgender students, physical activity 3+ times per week had lower protective effects against depression in GM students for both the surveys. Scores of sense of school and community membership showed a similar pattern, with cisgender students showing greater reduction in depression when reporting high sense of belonging in the school and community when compared to GM students (Tables 3, 4).

Protective factor associations with substance use

Substance use was also more common among GM students in 2018 (GM 189/562 (33.6%) vs. cisgender 4122/15456 (26.7%); p<.0001), while no significant difference was reported between cisgender and GM reports of substance use in 2021 (GM 181/549 (34.2%) vs. cisgender 3159/10288 (31.7%); p=0.2337). Three of the four protective factors (good financial status, sense of school/community membership, two or more caring adults) were significantly associated with reduced reported substance use in the population as a whole in both surveys. Physical activity 3+ times per week was not significantly associated with reduced substance use in either year for either group of students.

Having good financial status was significantly less protective for GM students when compared to cisgender peers in 2021 but not in 2018, while having a sense of school/community membership was significantly less protective for GM students compared to cisgender peers in 2018 but not in 2021 (Tables 3, 4).

Risk factors for depression

All three risk factors, experience of BBB, experience of peer victimization and homelessness/foster care exposure, were significantly associated with increased reported depression in the study population for both surveys (Tables 3, 4). Some risk factors were more strongly associated with depression in GM students in one survey, and did not show association in the other, including all three risk factors in 2018 and BBB and homelessness/foster care exposure in 2021 (Tables 3, 4).

Risk factors for substance use

All three risk factors were significantly associated with substance use in the overall population during both survey years. There were no consistent differences in the associations between any of the risk factors and reported substance use across both survey administrations. Two risk factors were significantly more strongly associated with reporting substance use among GM students; experiencing homelessness (2018 only), and experiencing peer victimization (2021 only). Experience of BBB, which includes bullying concerning race, sexuality, or other elements of personal identity, did not show a significant association with substance use and gender identity in either data set (Tables 3, 4).

Discussion

Adolescence is a dynamic developmental stage. Although gender minority youth have higher rates of depression and substance use (Connolly et al., 2016; Eisenberg et al., 2017; Mereish, 2019) than their peers, we found that the experience of protective factors (good financial

status, sense of school/community membership, two or more caring adults) is associated with lower rates of both reported depression and substance use for GM adolescents. Recent research on the importance of protective factors and key PCEs have shed light on the power and importance of these factors in improving health outcomes (Bethell et al., 2019; Crandall et al., 2019; Crouch et al., 2021; Daines et al., 2021; Sege, 2017; Wang et al., 2021). A recently published systematic review demonstrated the important role that schools play in fostering positive relationships and a sense of belonging among LGBTQ+ students as an important and effective way to reduce suicidal thoughts and behavior in this population (Marraccini et al., 2022). Our study reaffirms the importance of key protective factors such as having a sense of school/community belonging and two or more caring adults, in reducing rates of depression and substance use in both cisgender and GM students.

In this study we found that in the survey population as a whole, all protective factors were associated with reduced reported depression and substance use and all risk factors were associated with increased reporting of depression and substance use. GM students were consistently less likely to report protective factor exposures and more likely to report risk factor exposures. Additionally, most of the protective factors (except physical activity) appeared to be *less protective* against depression. Several protective factors (financial status, sense of school/community membership) were less protective against substance use among GM students compared to cisgender students.

Previous research demonstrated that significant health disparities exist between GM adolescents and their cisgender peers (Eisenberg et al., 2017; Kann et al., 2018; Kann et al., 2016; Marshal et al., 2008; Perez-Brumer et al., 2017). This study demonstrates the importance of protective factors in protecting against depression and substance use. Although helpful, many protective factors may be less beneficial among GM compared to cisgender students. In this study, GM students were less likely to experience key protective factors than their cisgender peers.

Our study demonstrated that GM students are more likely to be exposed to risk factors and more likely to report exposure to BBB in both surveys compared with cisgender adolescents. The experience of BBB was associated with substance use in both cisgender and GM students, as all students who were subjected to BBB showed similarly elevated risk for substance use regardless of gender identity. GM students' excess exposure to BBB disrupts their access to the HOPE building block of having a safe, stable and equitable environment for living and learning.

Previous research has examined specific categories of PCEs that are needed for healthy child development, (Bethell et al., 2019) including the four building blocks of HOPE (Sege, 2017). These results show that GM students have reduced access to these building blocks. GM students increased exposure to risk factors may in fact block access to key protective factors, for example bias based bullying may block access to a safe school environment. These differences in access to these building blocks may contribute to higher rates of poor health outcomes for GM students. The results of this study have implications for increasing access to building blocks for GM students, as the impact of such positive experiences is strong within this group. Policies limiting transgender youth from sports participation,

making them feel less comfortable at school, would be expected to harm these vulnerable children by denying access to the engagement building block. This could have a detrimental effect on their sense of belonging within their school or community. GM youth are at risk for depression and substance abuse; inclusive policies that increase access to protective factors would lessen these risks. Further research is needed to determine why GM students benefit less from some protective factors so this disparity can be addressed.

Limitations

Study limitations include self-reported data which can introduce bias such as recall bias, selection bias, and social desirability bias, although the direction and magnitude impact of possible biases are unknown. Our study sample consists of in-school adolescents in one county in Wisconsin, therefore limiting generalizability. This is cross-sectional data not including information regarding the timing of risk and protective factors relative to the outcomes of interest. Additionally, the relatively high numbers of missing data may also lead to biased results if the missing results would have varied between the two groups.

Minor differences in the survey questions and methodology between the 2018 and 2021 surveys make direct comparisons less reliable (See footnote Table 1). In addition, the 2021 survey had fewer student respondents than the 2018 survey (16,288 vs. 10,792); this factor also suggested the inadvisability of developing detailed statistical comparisons between the two survey administrations. We attempted to disaggregate the data by both grade level and original 8-level racial / ethnic identity, and with a 5-level racial / ethnic identity grouping. However these groupings lead to zero/small number cells for the outcomes of interest, making reliable statistical testing impossible.

Future research, with larger sample sizes, could be directed to determine how grade level and racial/ethnic identity intersect with the overall results reported here.

Conclusion

This study provides a critical look into the effects of key protective factors for depression and substance use among cisgender and GM students. The limited access by GM students to these important protective factors and their greater exposure to risk factors is of concern. The apparent increased vulnerability of GM students to risk factors and the more limited effect of some protective factors is an interesting finding and more research is needed to further understand this phenomenon and how it may inform outreach to this vulnerable population. Future studies that focus on improving access to PCEs may reduce the risk of depression and substance use among GM students.

Author Acknowledgements:

The authors would like to thank Amanda Winn, MSW and Laura Grubb, MD, MPH for their assistance in preparing this manuscript.

Funding source:

This work was supported by the National Center for Advancing Translational Sciences, National Institutes of Health. Award number UL1TR002544.

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Table 1:

Analysis Question Text

Variable	HOPE Building Block	Question	Response Options
Household Financial Status	Environment	How would you describe your family's current financial situation?	*Not a problem, Tight but fine, Struggling with finances*
Sense of School/Community Membership		Agree or disagree with each of the following statements about your school. **a.** The rules and expectations are clearly explained. **b.** I feel close to people in my school. **c.** I feel safe at my school. **d.** Teachers and other adults treat students fairly. **e.** There are adults I can talk to at school if I have a problem. **f.** I feel like I belong at my school	*Strongly Agree, Agree, Neutral, Disagree, Strongly Disagree*
	Environment	Choose the option that best describes your neighborhood or community.	
		a. I can ask my neighbors for help. **b.** If I had to move, I would miss my neighborhood. **c.** I feel safe in my neighborhood. **d.** My neighbors are friendly to me. **e.** I can count on the police if I need them. **f.** I help my neighbors.	
Physical Activity	Environment and Engagement	During the past 7 days, on how many days were you physically active for a total of at least 60 minutes per day? The physical activity could have happened a few times throughout the day at smaller amounts, adding up to 60 minutes as a total for the day.	*0–7 days*
Number of Caring Adults	Relationships	Not counting your parents, how many adults can you rely on if you have a problem and need help?	*No other adults, At least 1, At least 2, At least 3, 4+ Adults*
Homelessness/Foster Care Exposure	RISK Factor	Have you ever…	*Never; Yes, in the last 12 months; Yes, but not in the last 12 months*
		a) Run away from home for 1 or more nights?	
		b) Been homeless with your family?	
		c) Been homeless on your own?	

Variable	HOPE Building Block	Question	Response Options
		d) Been in foster care?	
		e) Been kicked out of your house by your parents?	
Experience of Bias-Based Bullying (BBB)	RISK Factor	In the past 12 months, how often have you been bullied, threatened or harassed…	*Never, Rarely, Sometimes, Often, Very Often*
		a) Through the internet or text message	
		b) By others thinking you're gay, lesbian, bisexual, or transgender	
		c) About your race or ethnic background	
		d) About your immigration status	
		e) About your political views	
		f) About how you look	
Experience of Peer Victimization[a]	RISK Factor	How many times were you involved in any of these activities in the past 30 days?	*Never, 1 or 2 times, 3 or 4 times, 5 or more times*
		a) Someone made unwanted sexual comments to me.	
		b) I got hit and pushed by other students.	
		c) In a group I made fun of other students.	
		d) Other students picked on me.	
		e) I upset other students for the fun of it.	
		f) I started arguments or conflicts.	
		g) I spread rumors about other people.	
		h) I told someone to stop harassing another student.	
		i) Other students made fun of me.	

Variable	HOPE Building Block	Question	Response Options
		g) I excluded other students from my group of friends.	
		k) Other students called me names.	
		l) I helped harass other students.	

This table depicts exact question text issued in the Dane County Youth Assessment survey in years 2018 and 2021. Questions reprinted and analyzed with permission of the Dane County Youth Commission, Madison, Wisconsin.[15]

[a]Experience of Peer Victimization question text differed between 2018 and 2021 survey distribution. 2021 survey question text reads “How many times were you involved in any of these activities in the past 30 days?: (a) Someone made unwanted sexual comments to me; (b) I got hit and pushed by other students; (c) Other students picked on me; (d) I told someone to stop harassing another student; (e) Other students made fun of me; (f) Other students called me names.”

Table 2:

Demographics of Survey Respondents

Variable	Category	2018 Frequency (%) (N=16288)	2021 Frequency (%) (N=10792)
Age	14 years old or younger	2597 (16.1)	1521 (14.1)
	15 years old	4395 (27.2)	3017 (28.0)
	16 years old	4126 (25.5)	2819 (26.2)
	17 years old	3546 (21.9)	2440 (22.7)
	18 years old or older	1513 (9.4)	973 (9.0)
	Missing	111	22
Gender Minority	Cisgender	15456 (96.5)	10228 (95.0)
	Gender Minority	562 (3.5)	540 (5.0)
	Missing	270	24
Grade	9th	4649 (29.0)	3050 (28.4)
	10th	4256 (26.5)	2972 (27.6)
	11th	3959 (24.7)	2604 (24.2)
	12th	3183 (19.8)	2132 (19.8)
	Missing	241	34
Race	White	11417 (70.1)	8298 (77.0)
	Non-White	4560 (28.0)	3413 (22.4)
	Missing	311	81
Depression	Yes	3819 (26)	3502 (32.5)
	No	10832(74)	7072 (66.9)
	Missing	1367	194
Substance Use	At least 1 substance	4311 (32)	3340 (31.8)
	No substances	9219 (68)	7162 (68.2)
	Missing	2488	266
Financial Status Good/Okay	Yes	15095 (96.2)	9430 (97.6)
	No	598 (3.8)	230 (2.4)
	Missing	325	1108

Variable	Category	2018 Frequency (%) (N=16288)	2021 Frequency (%) (N=10792)
Physical Activity 3+ days/week	Yes	11555 (74.5)	7557 (70.8)
	No	3947 (25.5)	3114 (29.2)
	Missing	516	97
Two or More Caring Adults	Yes	10863 (79.1)	8334 (79.7)
	No	2868 (20.9)	2120 (20.3)
	Missing	2287	314
Homelessness/Foster Care Exposure	Yes	1807 (11.5)	761 (7.1)
	No	13856 (88.5)	9950 (92.9)
	Missing	355	57
Sense of School/Community Membership Score	Mean (SD)	3.02 (0.52)	2.95 (0.48)
	Missing	3062	720
Experience of Bias-Based Bullying Score	Mean (SD)	0.23 (0.41)	0.25 (0.41)
	Missing	2635	424
Experience of Peer Victimization Score	Mean (SD)	0.25 (0.38)	0.13 (0.32)
	Missing	2874	390

SD stands for Standard Deviation from the mean where used.

Table 3:

Demographics of Survey Respondents, only Cisgender and Gender Minority[a]

Variable	Category	2018 Frequency (%)[b] (N=16018)	2021 Frequency (%)[c] (N=10768)
Age	14 years old or younger	2563 (16.0)	1518 (14.1)
	15 years old	4345 (27.2)	3013 (28.0)
	16 years old	4072 (25.5)	2813 (26.2)
	17 years old	3510 (22.0)	2436 (22.7)
	18 years old or older	1495 (9.4)	972 (9.0)
	Missing	33	16
Grade	9th	4596 (29.0)	3045 (28.4)
	10th	4207 (26.5)	2965 (27.6)
	11th	3912 (24.7)	2601 (24.2)
	12th	3153 (19.9)	2130 (19.8)
	Missing	150	27
Race	White	11378 (71.0)	8290 (77.0)
	Non-White	4515 (28.2)	2412 (22.4)
	Missing	127	66

[a]This table above excludes records where gender minority variable is missing.

[b]For 2018 data 538 are excluded due to any Missing in demographics variable (grade/race/gender for further analysis).

[c]For 2021 data 111 are excluded due to any Missing in demographics variable (grade/race/gender for further analysis)

Table 4:

Factor Frequencies and Rate of Outcomes by Gender Identity: 2018 Data

						Depression					Substance Use				
	Variable	**Overall Freqency**	**Frequency Cisgender (n=15456)[a]**	**Frequency GM (n=562)[a]**	**p-value**	**aOR Overall**	**p-value**	**aOR Cisgender**	**aOR GM**	**aOR p**	**aOR Overall**	**p-value**	**aOR Cisgender**	**aOR GM**	**aOR p**
Protective Factors	Financial Status Good/ Okay	15095 (94.2)	14623 (96.5)	472 (88.6)	<.0001	0.21 (0.17,0.25)	<.0001	0.2 (0.17,0.24)	0.52 (0.25,1.08)	0.0142	0.44 (0.37, 0.54)	<.0001	No Interaction		
	Physical Activity 3+ days/week	11555 (72.1)	11244 (75.1)	311 (59.6)	<.0001	0.57 (0.52, 0.62)	<.0001	0.56 (0.51,0.61)	0.81 (0.55,1.19)	0.0668	1.03 (0.94,1.12)	0.5302	1.00 (0.91,1.09)	1.85 (1.24,2.78)	0.0036
	Sense of School/ Community Membership (mean)	3.02 (0.52)	3.0 (0.5)	2.7 (0.6)	<.0001	0.24 0.22,0.26)	<.0001	0.23 (0.21,0.25)	0.47 (0.32,0.7)	0.0008	0.44 (0.41,0.48)	<.0001	0.44 (0.40, 0.47)	0.67 (0.45,0.98)	0.0362
	Two or more Caring Adults	10863 (79.1)	10596 (79.7)	267 (61.5)	<.0001	0.40 (0.37, 0.44)	<.0001	No Interaction			0.69 (0.59,0.71)	<.0001	No Interaction		
Risk Factors	Experience of Bias-Based Bullying (mean)	0.23 (0.41)	0.2 (0.4)	0.6 (0.7)	<.0001	4.53 (4.07,5.04)	<.0001	4.81 (4.31,5.37)	2.03 (1.43,2.88)	<.0001	2.62 (2.37,2.89)	<.0001	No Interaction		
	Experience of Peer Victimization (mean)	0.25 (0.38)	0.2 (0.4)	0.5 (0.6)	<.0001	3.75 (3.36,4.18)	<.0001	3.87 (3.46,4.32)	2.01 (1.3,3.1)	0.0042	3.91 (3.5,4.38)	<.0001	No Interaction		
	Homelessness/ Foster Care Exposure	1807 (11.3)	1634 (10.8)	173 (32.8)	<.0001	4.19 (3.75,4.68)	<.0001	4.4 (3.93,4.93)	1.79 (1.15,2.78)	0.0001	4.01 (3.57,4.51)	<.0001	3.91 (3.46, 4.41)	5.9 (3.7,9.42)	0.0936

This table shows frequencies and odds ratios for both outcomes of interest among the study population, cisgender, and gender minority students. GM stands for gender minority where used. OR refers to the odds ratio for factor interactions, while aOR refers to adjusted odds ratio for said interaction. For each protective or risk factor row, frequencies of reporting the protective/risk factor are shown overall and for each gender group; p-value refers to significance in the difference between Cisgender and GM reporting of the factor. Columns 7–11 refer to odds ratios of reporting the row factor as well as depression among the population and gender groups; aOR p refers to the significance of difference in the odds ratios between cisgender and gender minority students for this outcome when reporting the row factor. Columns 12–16 refer to odds ratios of reporting the row factor as well as substance use among the population and gender groups; aOR p refers to the significance of difference in the odds ratios between cisgender and gender minority students for this outcome when reporting the row factor. “No Interaction” indicates that there was no significant difference between gender groups in reporting the row factor and outcome; these factors did not show different risk or protective effects among cisgender vs. gender minority respondents.

[a]Total n includes missing values as represented in Table 2; missing values for each row factor are removed from frequencies and percentages.

Table 5:

Factor Frequencies and Rate of Outcomes by Gender Identity: 2021 Data

						Depression					Substance Use				
	Variable	**Overall Frequency**	**Frequency Cisgender (n=10228)[a]**	**Frequency GM (n=540)[a]**	**p-value**	**aOR Overall**	**p-value**	**aOR Cisgender**	**aOR GM**	**aOR p**	**aOR Overall**	**p-value**	**aOR Cisgender**	**aOR GM**	**aOR p**
Protective Factors	Financial Status Good/ Okay	9430 (97.6)	8993 (97.8)	437 (95.0)	0.0002	0.24 (0.18, 0.33)	<.0001	No Interaction		0.2906	0.31 (0.23, 0.41)	<.0001	0.28 (0.21,0.38)	0.78(0.32,1.9)	0.0310
	Physical Activity 3+ days/week	7557 (70.8)	7305 (72.1)	252 (47.0)	<.0001	0.62 (0.57, 0.68)	<.0001	0.61 (0.55,0.67)	0.91 (0.63,1.3)	0.0354	0.96 (0.88, 1.06)	0.4325	0.94 (0.85,1.04)	1.36 (0.94,1.97)	0.0613
	Sense of School/ Community Membership (mean)	2.95 (0.48)	3.0 (0.5)	2.6 (0.5)	<.0001	0.23 (0.2, 0.25)	<.0001	0.22(0.2,0.24)	0.35(0.23,0.52)	0.0273	0.50 (0.45, 0.54)	<.0001	No Interaction		0.8072
	Two or more Caring Adults	8334 (79.7)	7994 (80.6)	340 (64.2)	<.0001	0.51 (0.46, 0.56)	<.0001	0.49(0.44,0.54)	0.87(0.59,1.28)	0.0043	0.85 (0.77, 0.95)	0.0029	No Interaction		0.3090
Risk Factors	Experience of Bias-Based Bullying (mean)	0.25 (0.41)	0.2 (0.4)	0.5 (0.6)	<.0001	4.82 (4.28, 5.41)	<.0001	4.96(4.39,5.6)	3.38(2.25,5.08)	0.0777	3.03 (2.72, 3.37)	<.0001	No Interaction		0.1207
	Experience of Peer Victimization (mean)[a]	0.13 (0.32)	0.1 (0.3)	0.3 (0.5)	<.0001	4.55 (3.89, 5.33)	<.0001	No Interaction		0.2235	2.97 (2.58, 3.42)	<.0001	3.14(2.7,3.65)	1.95(1.31,2.91)	0.0296
	Homelessness/ Foster Care Exposure	761 (7.1)	676 (6.6)	85 (15.8)	<.0001	4.32 (3.67, 5.08)	<.0001	4.53(3.83,5.36)	2.18(1.21,3.9)	0.0179	4.56 (3.87, 5.37)	<.0001	No Interaction		0.4811

This table shows frequencies and odds ratios for both outcomes of interest among the study population, cisgender, and gender minority students. GM stands for gender minority where used. OR refers to the odds ratio for factor interactions, while aOR refers to adjusted odds ratio for said interaction. For each protective or risk factor row, frequencies of reporting the protective/risk factor are shown overall and for each gender group; p-value refers to significance in the difference between Cisgender and GM reporting of said factor. Columns 7–11 refer to odds ratios of reporting the row factor as well as depression among the population and gender groups; aOR p refers to the significance of difference in the odds ratios between cisgender and gender minority students for this outcome when reporting the row factor. Columns 12–16 refer to odds ratios of reporting the row factor as well as substance use among the population and gender groups; aOR p refers to the significance of difference in the odds ratios between cisgender and gender minority students for this outcome when reporting the row factor. “No Interaction” indicates that there was no significant difference between gender groups in reporting the row factor and outcome; these factors did not show different risk or protective effects among cisgender vs. gender minority respondents.

[a]Total n includes missing values as represented in Table 2; missing values for each row factor are removed from frequencies and percentages.