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Suicidal Thinking and Behavior Among Youth Involved in Verbal and Social Bullying: Risk and Protective Factors

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A B S T R A C T

Purpose: To identify risk and protective factors associated with thinking about or attempting suicide among youth involved in verbal and social bullying.
Methods: We analyzed data on 130,908 students in the sixth, ninth, and twelfth grades responding to the 2010 Minnesota Student Survey. Among students involved in frequent bullying (once a week or more during the past 30 days), we compared those who did and did not report suicidal ideation or a suicide attempt during the past year. Separate analyses were conducted for perpetrators only, victims only, and bully-victims.
Results: Overall, 6.1% of students reported frequent perpetration only, 9.6% frequent victimization only, and 3.1% both. Suicidal thinking or a suicide attempt was reported by 22% of perpetrators only, 29% of victims only, and 38% of bully-victims. In logistic regression models controlling for demographic and other risk and protective factors, a history of self-injury and emotional distress were risk factors that cross-cut the three bullying involvement groups. Physical abuse, sexual abuse, a mental health problem, and running away from home were additional risk factors for perpetrators only and victims only. Parent connectedness was a cross-cutting protective factor, whereas stronger perceived caring by friends and by nonparental adults were additional protective factors for some groups.
Conclusions: A range of risk and protective factors were associated with suicidal ideation and a suicide attempt among youth involved in verbal and social bullying. Findings may assist in identifying youth at increased risk for suicidal thinking and behavior and in promoting key protective factors.
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Bullying is a prevalent experience that is associated with serious risks among children and adolescents. A cross-national study found that involvement in bullying at school at least twice in the last school term as a bully, victim, or both ranged from 9% to 54% across 25 countries [1]. This study, conducted during the 1997–1998 academic year, found that 30% of a nationally representative sample of United States students in grades 6–10 reported at least this level of involvement in bullying [1,2]. Repeated in the 2005–2006 academic year, the Health Behavior in School-Aged Children Survey identified U.S. students in grades 6 through 10 involved at least once in the past 2 months at school as a bully, victim, or both in four types of bullying: physical, verbal, relational/social, and cyber/electronic bullying. Prevalence rates were high, with 21% of the youth reporting involvement in physical bullying, 54% verbal bullying, 51% social bullying, and 14% electronic bullying [3].

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Research shows that both bullying victimization and perpetration are associated with psychosocial problems. Previous studies have found that victims, perpetrators, and bully-victims demonstrate elevated levels of depression, physical fighting, weapon-carrying, self-harm behavior, suicidal ideation, and suicide attempts [1,2,4–10]. Longitudinal studies indicate that youth involvement in bullying is a risk factor for later suicidal ideation, suicide attempts, and deaths by suicide [11,12].

Few studies have identified factors associated with psychosocial problems, including suicidal behavior, among youth involved in bullying. Studies have identified symptoms of depression and conduct problems as risk factors for suicidal behavior among some youth involved in bullying [12], and authoritative parenting and high self-control as protective factors that diminish suicidal ideation among victims of bullying [7]. The elevated risk of suicidal thinking and behavior among youth involved in bullying warrants further study to identify risk and protective factors that can help guide the targeting and development of prevention and intervention strategies in this high-risk group.

The purpose of this study was to (1) identify environmental risk factors and risk behaviors associated with thinking about or attempting suicide among youth involved in bullying; and (2) identify protective factors against suicidal ideation or suicide attempts among youth involved in bullying. We assessed risk and protective factors for three groups of youth involved in bullying: victims, perpetrators, and youth reporting involvement as both a victim and perpetrator of bullying.

Methods

Study design and sample

Data came from the 2010 Minnesota Student Survey, a population-based, cross-sectional survey administered every 3 years to students in grades 6, 9, and 12 attending public, charter, and tribal schools [13]. This anonymous survey, conducted by the Minnesota Departments of Education, Health, Human Services, and Public Safety, examines a range of health behaviors as well as potential risk and protective factors. In 2010, 88% of all Minnesota public school districts participated in the survey, including approximately 79% of all sixth grade, 75% of ninth grade, and 59% of twelfth grade students (N = 130,908) [13]. Most school districts used passive parental consent, and students provided assent. Approximately 3% of the surveys were excluded due to numerous inconsistencies or improbable answers. Additional details concerning the survey methodology are available elsewhere [13]. The University of Minnesota Institutional Review Board approved this secondary data analysis.

The sample included 65,160 boys (49.8%) and 65,748 girls (50.2%) in grades 6 (35.7%), 9 (36.2%), and 12 (28.1%). Students reported their race/ethnicity as white (73.0%), African/African American (5.5%), Asian/Pacific Islander (5.4%), Hispanic (4.4%), American Indian (1.5%), mixed race (6.8%), and don't know (3.5%). Approximately 28% of the students received free/reduced-price lunch at school, and 62% reported living with two biological parents.

Measures

We categorized students into bullying groups based on responses to two items: verbal/social bullying perpetration ("During the past 30 days, how often have you, on your own or as part of a group, made fun of or teased another student in a hurtful way or excluded another student from friends or activities?") and verbal/social bullying victimization ("During the past 30 days, how often has another student or group of students made fun of or teased you in a hurtful way, or excluded you from friends or activities?"). Response options for both items were "never," "once or twice," "about once a week," "several times a week," and "every day." We classified students into the following groups: no involvement in bullying (never victimized or perpetrated), moderate involvement (victimized or perpetrated once or twice a month), frequent perpetrator only (perpetrated once a week or more and victimized less than once a week), frequent victim only (victimized once a week or more and perpetrated less than once a week), and frequent bully-victim (victimized and perpetrated once a week or more).

The dependent variable reflected suicidal thinking and behavior during the previous year, a suicidality variable used in previous studies [14,15]. Suicidal ideation was assessed with the item "Have you ever thought about killing yourself?" and suicide attempt was assessed with the item "Have you ever tried to kill yourself?" We categorized students into the suicidality group if they responded "yes, during the past year" to one or both of the items assessing risk of suicide.

Independent variables fell into two domains, risk factors and protective factors, comprising known correlates of suicidality among adolescents (Table 1). Measures reflected items commonly used in other population-based studies of adolescents [16,17]. Multi-item scales had moderate reliabilities, likely because of the small number of items in each scale (Table 1). Correlations among risk factors ranged from .01 to .53, and among protective factors, .05 to .67.

Demographic variables included gender; grade (sixth, ninth, and twelfth grade); free-lunch status ("Do you currently get free or reduced-price lunch at school?"); race/ethnicity, which was dichotomized to reflect white versus non-white students; and whether or not students lived with two biological parents ("Which adults do you live with?").

Data analysis

Analyses were performed using SAS version 9.2 [18]. Preliminary analyses determined the prevalence of thinking about or attempting suicide among the bullying groups. Subsequent analyses focused on the three bullying involvement groups that demonstrated the greatest risk of suicide, youth frequently involved in bullying (once a week or more) as perpetrators only, victims only, and bully-victims. The primary analyses were performed in three stages to determine factors most strongly associated with suicidal thoughts and suicide attempts among youth frequently involved in bullying (i.e., the three groups described above). First, bivariate tests (chi-square [χ^2] tests and independent samples t-tests) were used to examine relationships between the independent variables and suicidality for each of the bullying groups. Variables that demonstrated significant differences between those who reported thinking about or attempting suicide and those who did not at the .01 level ($p < .01$) were then entered into logistic regression models at the second stage. The second stage involved creating chunk-wise logistic regression models separately for risk factors and for protective factors for each of the three bullying involvement groups. For the third stage, nonsignificant independent variables from the second stage models were eliminated, and remaining variables were entered simultaneously

Table 1
Independent variables

Variable	Description of variable	Number of items
Risk factors		
Family substance use	Alcohol or drug use by family member repeatedly caused family, health, job, or legal problems (yes/no)	2
Witness to family violence	Anyone in family ever hit anyone else in the family so hard or often they had marks or were afraid of that person (yes/no)	1
Physical abuse	Any adult in your household ever hit you so hard or often had marks or were afraid of that person (yes/no)	1
Sexual abuse	Any adult or person outside your family ever touched you sexually against your wishes or forced you to touch them sexually; an older or stronger member of your family ever touched you sexually or had you touch them sexually (yes/no)	2
Mental health problem	Personal mental or emotional health problem lasting at least 12 months (yes/no)	1
Physical health problem	Personal physical health condition or problem lasting at least 12 months (yes/no)	1
Emotional distress	On a 4-point scale, often unhappy, depressed, or tearful; on a 5-point scale, during the last 30 days, felt were under any stress or pressure; on a 5-point scale, during the last 30 days, felt sad; on a 5-point scale, during the last 30 days, felt so discouraged or hopeless wondered if anything was worthwhile; on a 5-point scale, during the last 30 days, felt nervous, worried, or upset (dichotomized to a score indicating significant distress on one or more of the variables/all other responses)	5
Cigarette smoking	On a 7-point scale, during the last 30 days, on how many days smoked a cigarette (dichotomized to 0 days/1 or more days)	1
Alcohol use	On a 7-point scale, during the last 30 days, on how many days drank an alcoholic beverage (dichotomized to 0 days/1 or more days)	1
Marijuana use	During the past 12 months, on how many occasions used marijuana (dichotomized to 0 times/1 or more times)	1
Run away from home	On a 5-point scale, during the last 12 months, how often run away from home (dichotomized to 0 times/1 or more times)	1
Skipped school	On a 5-point scale, during the past 30 days, how many days did not go to school because felt would be unsafe at school or on the way to or from school (dichotomized to 0 times/1 or more times)	1
Self-injury	During the last year hurt self on purpose (e.g., cutting) (yes/no)	1
Violence perpetrator	On a 5-point scale, during the past 12 months, how often hit or beat up another person (dichotomized to 0 times/1 or more times)	1
Weapon carrying	During the past 30 days, carried a gun or other weapon on school property (dichotomized to 0 days/1 or more days)	2
Victim of school violence	During the past 12 months, threatened, pushed, shoved, grabbed, kicked, bitten, hit, stabbed, or had a gun fired at you on school property (yes/no)	4
Changed schools	On a 4-point scale, how many times changed schools since the beginning of the school year (dichotomized to 0 times/1 or more times)	1
Negative perception of weight	At the present time, think you are underweight, about the right weight, or overweight (right weight/underweight/overweight)	1
Distractibility/impulsivity	On a 4-point scale, often have trouble concentrating, restless and cannot stay still for long, often have trouble getting to sleep and staying asleep, do things before thinking	4 ($\alpha = .67$)[a]
Protective factors		
Physical exam	Had a physical exam within the past 12 months (yes/no)	1
Sport participation	On a 7-point scale, during the past 12 months, how often participated on club/community or school sport teams (dichotomized to monthly or less/once a week or more)	1
Religious activities	On a 7-point scale, during the past 12 months, how often participated in religious activities (religious services, education, youth group, etc.) (dichotomized to monthly or less/once a week or more)	1
Fine arts activities	On a 7-point scale, during the past 12 months, how often participated in fine art activities (band, choir, dance, drama, etc.) (dichotomized to monthly or less/once a week or more)	1
Parent connectedness	On a 5-point scale, can talk to father/mother about problems, how much feel parents care about you	3 ($\alpha = .61$)[a]
Other adult caring	On a 5-point scale, how much feel other adult relatives, religious leaders, and other adults in your community care about you	3 ($\alpha = .67$) [a]
Teacher caring	On a 5-point scale, teachers are interested in you as a person, show respect for students, care about you	3 ($\alpha = .75$)[a]
Caring friends	On a 5-point scale, how much feel friends care about you	1
Physical activity	On how many of the past 7 days exercised or participated in activities that made you sweat or breathe hard for at least 20 minutes	1
Like school	On a 5-point scale, how feel about going to school	1
Academic achievement	Two grades get the most (GPA)	1
School safety	On a 4-point scale, feel safe at school; bathrooms in school are safe	2 ($r = .51$)[b]
Neighborhood safety	On a 4-point scale, feel safe in your neighborhood; feel safe going to and from school	2 ($r = .43$)[b]

[a] Cronbach's alpha coefficient was used to assess internal consistency.
[b] Pearson's correlation coefficient was used to assess the strength of the relationship between two variables.

into logistic regression models to determine factors associated with suicidality among the three bullying groups after controlling for the other factors. Demographic variables were included in all models in stages two and three. Continuous variables entered into the logistic regression models in stages two and three were calculated on a 0 to 1 scale to make interpretations of odds ratios for the variables more comparable. Effect sizes (Cohen's *d*) were calculated to further assess the impact of specific variables. A Bonferroni correction was calculated at stages two and three to reduce the likelihood of a Type I error because these stages required repeating analyses for each bullying involvement group.

Results

Overall, 43.3% of the sample reported no involvement in verbal or social bullying, 37.8% reported moderate involvement, 6.1%

reported frequent perpetration only, 9.6% reported frequent victimization only, and 3.1% reported frequent victimization and perpetration. Suicidal ideation (SI) and suicide attempt (SA) differed significantly across the bullying involvement groups ($\chi^2 = 6{,}509.8$, $p < .0001$): no involvement – SI only 6.3%, SA 1.2%; moderate involvement – SI only 11.4%, SA 2.3%; frequent perpetrator only – SI only 16.5%, SA 5.0%; frequent victim only – SI only 21.8%, SA 6.5%; and frequent bully-victim – SI only 26.1%, SA 11.1%.

In first stage analyses for the three groups of youth with frequent involvement in bullying, bivariate tests for each group demonstrated significant differences between those who reported thinking about or attempting suicide and those who did not for all of the variables assessed except participation in fine arts activities and having a physical examination in the past year for the perpetrator only and bully-victim groups (Table 2). Girls were significantly more likely than boys to report suicidal thinking or behavior in all three bullying involvement groups. Suicidality peaked in ninth grade in this sample of sixth, ninth, and twelfth graders. Youth living without two biological parents, non-white youth, and those receiving free or reduced-price lunch were most at risk for suicidal ideation or suicide attempts in all of the bullying involvement groups.

There were several factors that increased the risk of suicidal thinking and behavior such that more than half of youth involved in bullying with these risk factors reported suicidal ideation or a suicide attempt in the past year. In all three bullying involvement groups, a majority of youth who reported a history of self-harm behavior in the past year reported thinking about or attempting suicide. For victims only and bully-victims, a majority of youth who reported a history of sexual abuse, a mental health problem, or running away from home in the past year reported suicidal thinking or behavior. Furthermore, among the bully-victim group, the presence of several additional risk factors was linked to thinking about or attempting suicide for more than half of the youth: witnessing family violence, a history of physical abuse, cigarette smoking, marijuana use, skipping school because of safety concerns, or carrying a weapon at school.

All of the factors based on nondichotomous variables or multi-item scales were significantly associated with suicidal thoughts or behaviors across bullying involvement groups (t-tests not shown). Findings demonstrated higher mean scores for distractibility/impulsivity among youth who reported suicidality and lower mean scores for parent connectedness, connectedness to other adults, perceived caring by teachers, perceived caring by friends, liking school, academic achievement, physical activity, perceived school safety, and perceived neighborhood safety.

All significant variables in bivariate analyses were included in subsequent analyses. Tables 3 and 4 present second-stage findings for each of the bullying groups from the first set of logistic regression analyses conducted separately for risk factors and protective factors. Risk factors associated with suicidal thoughts or a suicide attempt for all of the bullying groups were self-injury and greater emotional distress. Protective factors that demonstrated consistent inverse relationships with thinking about or attempting suicide across the bullying groups were higher levels of parent connectedness and stronger perceived caring by friends.

Among perpetrators only, physical abuse, sexual abuse, a mental health problem, running away from home, carrying a weapon, and perceiving oneself as overweight, also increased risk of suicidality. Stronger connections to nonparental adults was an additional protective factor for perpetrators only. Among victims only, additional risk factors included physical abuse, sexual abuse, a mental health problem, running away from home, perceiving oneself overweight, participation in religious activities, and higher levels of distractibility/impulsivity. Additional protective factors for victims only were stronger connections to nonparental adults, liking school, and feeling safe at school. Among victim-perpetrators, no additional risk or protective factors emerged.

Third-stage analyses determined factors associated with thinking about or attempting suicide for each of the bullying groups, after controlling for risk and protective factors significant in second-stage models and all of the demographic factors (Table 5). Across the bullying involvement groups, self-injury and greater emotional distress increased the odds of reporting suicidality. Conversely, higher levels of parent connectedness demonstrated a protective effect for all of the groups. The most salient risk factor for all of the bullying involvement groups was a history of self-harm, with odds ratios (ORs) ranging from 3.76 to 5.41, whereas the strongest protective factor overall was parent connectedness, with ORs ranging from .55 to .31 across the three groups. Among perpetrators only, additional significant risk factors included physical abuse, sexual abuse, mental health problems, running away from home, carrying a weapon, and perceiving oneself as overweight. Additional risk factors associated with suicidality among the victim only group were physical abuse, sexual abuse, a mental health problem, and running away from home, whereas stronger connections to nonparental adults, stronger perceived caring by friends, and liking school were protective factors. The only additional factor associated with suicidality for the victim-perpetrator group was the protective factor of greater perceived caring by friends.

Discussion

In this large statewide sample of sixth, ninth, and twelfth grade students involved in verbal and social bullying, we found that 22% of frequent perpetrators only, 29% of frequent victims only, and 38% of frequent bully-victims reported suicidal thinking or a suicide attempt during the past year. Several environmental risk factors and risk behaviors were associated with suicidal thinking and behavior among youth involved in bullying. Other factors emerged that protected against suicidality among these high-risk youth. A history of self-injury and emotional distress were risk factors that cross-cut the three bullying involvement groups, and parent connectedness was a cross-cutting protective factor.

Many of the risk and protective factors for suicidality identified in this study among youth involved in bullying mirror factors found to predict and protect against suicidal ideation and behavior in general populations of adolescents. Mental health problems, especially depressive disorders; a history of adverse childhood experience, such as physical and sexual abuse and family violence exposure; substance use; violence victimization and perpetration; weapon-carrying; running away from home; and chronic health problems are salient risk factors for suicidal ideation and behavior among adolescents [19–22]. Perceived parent and family connectedness, caring relationships with nonparental adults, school connectedness, academic achievement, and perceived safety at school are important protective factors against adolescent suicide attempts [19,20,22]. Because bullying victimization and perpetration are potent risk factors for suicidality among youth, the presence of other known suicide

Table 2
Percentage of youth involved in bullying reporting suicidal thoughts or a suicide attempt according to demographic, risk, and protective factors

	Suicidal thoughts or suicide attempt					
	Perpetrator only N = 7,937		Victim only N = 12,503		Victim and perpetrator N = 4,011	
	N (%)	χ^2	N (%)	χ^2	N (%)	χ^2
Gender		101.6***		58.9***		38.7***
Female	789 (27.9)		1,920 (31.7)		620 (43.8)	
Male	841 (18.0)		1,481 (25.4)		792 (33.7)	
Grade		25.2***		163.8***		32.7***
Sixth	492 (22.5)		1,597 (24.2)		436 (33.2)	
Ninth	783 (23.6)		1,315 (36.2)		673 (42.8)	
Twelfth	355 (17.8)		489 (29.2)		303 (34.5)	
Family structure		53.3***		91.8***		31.1***
Two biological parents	741 (18.5)		1,702 (25.3)		656 (33.3)	
Other situation	873 (25.5)		1,665 (33.4)		739 (42.2)	
Race/ethnicity		38.4***		18.1***		8.1**
White	976 (19.6)		2,360 (27.5)		880 (35.8)	
Non-white	643 (25.9)		1,003 (31.5)		516 (40.6)	
Free/reduced price lunch		34.7***		9.1**		7.1**
Yes	624 (25.8)		1,113 (30.6)		480 (40.8)	
No	970 (19.8)		2,170 (27.9)		902 (36.2)	
Family substance use		147.1***		285.9***		128.3***
Yes	664 (31.9)		1,203 (40.7)		670 (49.5)	
No	941 (17.8)		2,121 (24.4)		726 (30.8)	
Witnessed family violence		219.6***		392.4***		171.0***
Yes	503 (36.6)		1,126 (44.4)		561 (54.2)	
No	1,103 (18.4)		2,211 (24.3)		828 (31.0)	
Physical abuse		399.1***		566.3***		176.5***
Yes	540 (42.8)		1,243 (47.0)		589 (53.7)	
No	1,058 (17.3)		2,094 (23.2)		800 (30.6)	
Sexual abuse		345.3***		423.6***		189.2***
Yes	361 (48.2)		720 (52.0)		431 (59.7)	
No	1,236 (18.7)		2,600 (25.4)		952 (32.1)	
Mental health problem		352.6***		739.2***		234.4***
Yes	430 (45.2)		1,236 (50.4)		566 (58.1)	
No	1,162 (18.3)		2,038 (22.5)		815 (30.4)	
Physical health problem		30.1***		85.4***		57.1***
Yes	298 (28.2)		860 (36.1)		413 (48.6)	
No	1,297 (20.7)		2,425 (26.5)		966 (34.3)	
Emotional distress		767.2***		1,082.8***		387.0***
Yes	1,268 (35.6)		2,981 (38.6)		1,255 (47.6)	
No	359 (9.2)		413 (10.0)		152 (13.6)	
Cigarette smoking		127.8***		287.0***		123.1***
Yes	531 (31.8)		571 (49.9)		474 (52.9)	
No	1,063 (18.8)		2,740 (26.1)		891 (32.3)	
Alcohol use		86.2***		307.8***		81.7***
Yes	743 (27.5)		789 (46.0)		583 (47.4)	
No	796 (18.2)		2,408 (25.2)		734 (32.0)	
Marijuana use		70.6***		262.5***		111.1***
Yes	620 (27.9)		582 (48.4)		502 (51.0)	
No	937 (19.0)		2,668 (26.1)		820 (31.9)	
Ran away from home		422.0***		827.8***		272.1***
Yes	532 (44.0)		1,060 (55.8)		595 (58.7)	
No	1,071 (17.3)		2,286 (23.2)		790 (29.3)	
Skipped school		85.9***		248.3***		80.9***
Yes	201 (37.6)		835 (43.4)		439 (50.5)	
No	1,417 (20.4)		2,549 (25.7)		968 (33.6)	
Self-injury		1,190.8***		1,817.6***		714.5***
Yes	726 (58.6)		1,483 (64.7)		739 (71.8)	
No	896 (14.4)		1,900 (19.9)		664 (24.4)	
Violence perpetration		103.1***		157.4***		67.9***
Yes	987 (26.6)		1,291 (36.4)		896 (43.1)	
No	608 (16.8)		2,035 (25.0)		479 (29.8)	
Carried weapon at school		125.2***		164.8***		104.9***
Yes	402 (34.0)		442 (46.7)		498 (51.1)	
No	1,281 (19.4)		2,946 (27.0)		904 (32.7)	
Victim of school violence		92.6***		57.1***		15.4***
Yes	1,211 (25.1)		2,915 (30.1)		1,288 (38.5)	
No	407 (15.5)		463 (21.9)		113 (28.5)	
Changed schools		28.5***		21.6***		15.2***
Yes	155 (31.3)		289 (35.8)		182 (46.6)	
No	1,470 (21.1)		3,095 (28.1)		1,221 (36.5)	

(*continued on next page*)

Table 2
Continued

	Suicidal thoughts or suicide attempt					
	Perpetrator only N = 7,937		Victim only N = 12,503		Victim and perpetrator N = 4,011	
	N (%)	χ^2	N (%)	χ^2	N (%)	χ^2
Perception of Weight		192.2***		184.4***		90.1***
Overweight	569 (32.5)		1,286 (36.5)		565 (46.7)	
Underweight	214 (26.1)		504 (30.8)		221 (42.4)	
Right weight	819 (17.0)		1,539 (23.8)		602 (30.5)	
Physical exam		1.5		14.7***		3.5
Yes	715 (21.0)		1,587 (27.4)		594 (36.0)	
No	847 (22.2)		1,638 (30.7)		760 (39.1)	
Sport participation		57.7***		66.1***		56.6***
Yes	750 (18.4)		1,494 (25.2)		620 (31.9)	
No	851 (25.8)		1,848 (32.0)		769 (43.9)	
Religious activities		6.8**		19.2***		10.6**
Yes	463 (20.0)		1,210 (26.4)		462 (34.2)	
No	1,129 (22.7)		2,070 (30.1)		912 (39.6)	
Fine arts activities		.08		4.9*		1.2
Yes	549 (22.0)		1,532 (27.6)		532 (36.5)	
No	1,048 (21.7)		1,788 (29.5)		853 (38.2)	

* $p < .05$.
** $p < .01$.
*** $p < .001$.

risk factors among youth involved in bullying dangerously elevates the risk for suicidal behavior. Promoting key factors known to protect against suicidal thinking and behavior in this high-risk group of youth involved in bullying may be an effective secondary prevention strategy.

In the present study, the most powerful risk factor associated with thinking about or attempting suicide for all three bullying involvement groups was a history of self-harm. Self-injurious behavior, such as cutting or burning the skin, has been linked to suicidal ideation and attempt. Youth most frequently report engaging in self-injury to alleviate overwhelming negative emotions; thus, self-injury represents a sign of distress that may lead to suicidal behavior [23–27]. Our findings demonstrate the frequent co-occurrence of self-injurious behavior and suicidality and the prominence of self-injury as an independent risk factor associated with suicidality among youth involved in bullying. Self-injurious behavior in this population of youth with high levels of psychosocial distress and elevated risk for suicidal behavior demands attention as a potential harbinger of suicidality.

It is notable that having a physical examination in the past year was not significantly protective against suicidal thinking or behavior for two of the bullying involvement groups in bivariate analysis and did not remain a significant protective factor for the victim only group in multivariate analysis. Overall, approximately half of students reported having a physical examination in the past year [28]. Studies indicate that health care providers often fail to screen for or identify emotional distress, suicidal ideation, and suicide attempts in their adolescent patients [29–32]. The implications of our findings are twofold: (1) the health care setting does not currently provide services that prevent or reduce suicidal thinking or behavior among youth involved in bullying and thus, represents a missed opportunity to intervene; and (2) suicide and bullying prevention efforts must involve other settings, such as schools, to reach more youth at risk, including those who do not receive regular medical care.

It should be noted that the data are based on self-reporting of behaviors and perceptions. Self-report questionnaires have been found to generate largely valid and reliable data among adolescents [33,34]. The study used a measure of bullying involvement that includes verbal and relational/social bullying behaviors, but not physical or electronic bullying. Our findings show that these types of bullying behaviors are associated with suicidal thinking and behavior; however, risk and protective factors for suicidality may differ for youth involved in physical and/or electronic bullying. Response options identified the frequency of bullying involvement, but not the intensity of bullying experiences, which may have varied widely among youth reporting frequent bullying involvement. Also, the measure of bullying used in this study included examples of verbal and social bullying behaviors with a context descriptor of "in a hurtful way," but did not assess for a power imbalance between the students involved. This study examined findings for three bullying involvement groups, but did not analyze findings separately based on other factors, such as gender, grade, or suicidal involvement (ideation or attempt). There is the possibility that those who chose not to take the survey or were absent from school when the survey was administered were different from those who completed the survey. Additionally, the Minnesota Student Survey was conducted in a single geographic area, and the data are cross-sectional, not longitudinal, meaning cause and effect cannot be determined.

Primary prevention of bullying is essential for preventing suicidal thinking and behavior, as well as other psychosocial problems among adolescents. Whole school interventions that view bullying as a systemic problem and involve individuals, peer groups, classrooms, teachers, and administration have been the most successful school-based interventions to reduce bullying [5,35,36]. However, research has revealed challenges in implementing such programs and demonstrated lack of consistent effectiveness in reducing bullying behaviors, particularly in the United States [4,36–38]. In addition to focusing on the school environment, interventions that incorporate family-strengthening components, such as parenting education programs, and linkages to mental health services for youth with depression and other psychosocial problems hold promise for increasing the effectiveness of bullying prevention efforts [4,39]. Given the frequent coexistence of both bullying involvement and

Table 3
Logistic regression models for risk factors associated with thinking about or attempting suicide among youth involved in bullying

	[a]Adjusted odds ratios (99% confidence intervals) and [b]effect sizes					
	Perpetrator only	*d*	Victim only	*d*	Perpetrator and victim	*d*
Risk factors						
Family substance use	1.03 (.83, 1.28)	.02	1.04 (.88, 1.22)	.03	.93 (.72, 1.21)	.06
Witnessed family violence	1.03 (.80, 1.35)	.02	1.20 (.99, 1.44)	.14	1.37 (1.01, 1.84)	.25
Physical abuse	1.73 (1.33, 2.24)**	.43	1.31 (1.09, 1.57)*	.21	1.13 (.84, 1.53)	.10
Sexual abuse	1.46 (1.09, 1.94)*	.30	1.50 (1.22, 1.84)**	.32	1.41 (1.02, 1.94)	.27
Mental health problem	1.56 (1.21, 2.01)**	.35	1.65 (1.40, 1.94)**	.40	1.32 (1.00, 1.74)	.22
Physical health problem	.87 (.67, 1.12)	.11	.99 (.84, 1.17)	.01	1.12 (.85, 1.48)	.09
Emotional distress	3.19 (2.57, 3.95)**	.95	3.08 (2.56, 3,70)**	.92	3.22 (2.35, 4.41)**	.96
Cigarette smoking	1.05 (.81, 1.37)	.04	.99 (.75, 1.30)	.01	.89 (.63, 1.26)	.09
Alcohol use	1.18 (.93, 1.48)	.13	1.18 (.95, 1.46)	.13	1.08 (.80, 1.46)	.06
Marijuana use	.94 (.73, 1.21)	.05	1.25 (.96, 1.62)	.18	1.27 (.90, 1.78)	.19
Ran away from home	1.65 (1.29, 2.11)**	.40	1.74 (1.44, 2.09)**	.44	1.40 (1.05, 1.87)	.27
Skipped school	.93 (.65, 1.33)	.06	1.13 (.94, 1.36)	.10	.92 (.68, 1.25)	.07
Self-injury	4.72 (3.79, 5.87)**	1.31	3.76 (3.19, 4.43)**	1.10	4.83 (3.69, 6.32)**	1.33
Physical fighting	1.13 (.92, 1.40)	.10	1.20 (1.03, 1.41)	.14	1.09 (.85, 1.41)	.07
Carried weapon at school	1.42 (1.09, 1.84)*	.28	.99 (.76, 1.27)	.01	1.01 (.74, 1.37)	.01
Victim of school violence	1.27 (1.02, 1.58)	.19	.97 (.80, 1.18)	.02	1.09 (.73, 1.62)	.07
Changed schools	.78 (.53, 1.15)	.20	.91 (.69, 1.19)	.07	.96 (.64, 1.44)	.03
[c]Perceived underweight	1.32 (.98, 1.77)	.22	1.09 (.89, 1.34)	.07	1.19 (.84, 1.69)	.14
[c]Perceived overweight	1.41 (1.13, 1.75)**	.27	1.33 (1.14, 1.55)**	.22	1.35 (1.04, 1.74)	.24
[d]Distractibility/impulsivity	1.49 (.91, 2.43)	.31	1.72 (1.20, 2.47)*	.43	1.24 (.70, 2.20)	.17

[a] Models were conducted separately for the three bullying involvement groups and included gender, grade, racial/ethnic group, family structure, receipt of free/reduced price lunch, and all variables in the table.
[b] Effect sizes reflect Cohen's *d* (small = .20, medium = .50, large = .80).
[c] Reference is perceived right weight.
[d] The odds ratio represents the odds of reporting suicidal thoughts or a suicide attempt for those at the highest end of the scale when compared with those at the lowest end of the scale.
* $p < .0017$ (Bonferonni adjustment was $\alpha = .01/6$ for number of models run for risk and protective factors = .0017).
** $p < .0001$.

suicidal behavior with interpersonal youth violence [22,40], intervention strategies with demonstrated effectiveness in reducing violent and delinquent behavior, such as parent training programs, should be implemented and evaluated as bullying and suicide prevention programs [39,41].

Regarding secondary prevention of suicidality among youth involved in bullying, findings from this study point to key environmental risk factors, risk behaviors, and protective factors associated with suicidal thinking and behavior in this population of youth who are already at elevated risk. Screening of all youth in school and health care settings should include questions about involvement in bullying as a victim, perpetrator, or both. Assessment of youth involved in bullying should include identifying risks and assets by asking about a history of suicidal ideation and suicide attempts; self-injurious behavior; symptoms of depression and other mental health problems; adverse childhood experience; access to lethal means; violence involvement as a victim and/or perpetrator; running away from home; substance

Table 4
Logistic regression models for protective factors associated with thinking about or attempting suicide among youth involved in bullying

	[a]Adjusted odds ratios (99% confidence intervals) and [b]effect sizes					
	Perpetrator only	*d*	Victim only	*d*	Perpetrator and victim	*d*
Protective factors						
Physical exam			1.05 (.93, 1.20)	.04		
Sport participation	.95 (.79, 1.14)	.04	.90 (.78, 1.03)	.08	.81 (.65, 1.02)	.17
Religious activities	1.13 (.93, 1.38)	.10	1.20 (1.04, 1.38)*	.14	.99 (.78, 1.25)	.01
[c]Parent connectedness	.25 (.16, .40)**	1.15	.15 (.11, .22)**	1.66	.21 (.12, .36)**	1.32
[c]Other adult caring	.33 (.21, .53)**	.90	.35 (.24, .49)**	.85	.60 (.34, 1.06)	.40
[c]Friend caring	.62 (.43, .88)*	.38	.61 (.48, .77)**	.39	.61 (.42, .88)*	.39
[c]Physical activity	.86 (.66, 1.11)	.12	1.04 (.85, 1.28)	.03	.91 (.66, 1.24)	.07
[c]Like school	.90 (.65, 1.24)	.08	.57 (.45, .73)**	.45	.95 (.65, 1.38)	.04
[c]Academic achievement	.68 (.45, 1.01)	.30	.70 (.51, .97)	.28	.63 (.40, .99)	.37
[c]Teacher caring	.90 (.56, 1.44)	.08	1.06 (.74, 1.52)	.05	.64 (.37, 1.11)	.35
[c]School safety	.66 (.42, 1.05)	.33	.61 (.43, .87)*	.39	.99 (.59, 1.65)	.01
[c]Neighborhood safety	.66 (.39, 1.11)	.33	.69 (.47, 1.02)	.29	.71 (.41, 1.22)	.27

[a] Models were conducted separately for the 3 bullying involvement groups and included gender, grade, racial/ethnic group, family structure, receipt of free/reduced price lunch, and all variables in the table with odds ratios listed for that model.
[b] Effect sizes reflect Cohen's *d* (small = .20, medium = .50, large = .80).
[c] For nondichotomous variables and multi-item scales, the odds ratio represents the odds of reporting suicidal thoughts or a suicide attempt for those at the highest end of the variable or scale when compared with those at the lowest end of the variable or scale.
* $p < .0017$ (Bonferroni adjustment was $\alpha = .01/6$ for number of models run for risk and protective factors = .0017).
** $p < .0001$.

Table 5
Logistic regression models for risk and protective factors associated with thinking about or attempting suicide among youth involved in bullying

	[a]Adjusted odds ratios (99% confidence intervals) and [b]effect sizes					
	Perpetrator only	*d*	Victim only	*d*	Perpetrator and victim	*d*
Risk and protective factors						
Physical abuse	1.59 (1.27, 1.99)**	.37	1.35 (1.15, 1.59)**	.24		
Sexual abuse	1.42 (1.08, 1.86)*	.28	1.54 (1.26, 1.89)**	.34		
Mental health problem	1.53 (1.20, 1.95)**	.34	1.61 (1.37, 1.89)**	.38		
Emotional distress	3.13 (2.55, 3.84)**	.93	2.74 (2.28, 3.29)**	.82	3.71 (2.80, 4.92)**	1.09
Ran away from home	1.60 (1.27, 2.02)**	.37	1.64 (1.37, 1.97)**	.39		
Self-injury	4.86 (3.94, 6.00)**	1.34	3.76 (3.19, 4.42)**	1.10	5.41 (4.29, 6.81)**	1.45
Carried weapon at school	1.37 (1.08, 1.75)*	.25				
[c]Perceived underweight	1.29 (.97, 1.71)	.20	1.04 (.85, 1.27)	.03		
[c]Perceived overweight	1.35 (1.10, 1.67)*	.24	1.18 (1.01, 1.37)	.13		
[d]Distractibility/impulsivity			1.47 (1.03, 2.11)	.30		
Religious activities			1.10 (.94, 1.27)	.07		
[d]Parent connectedness	.55 (.33, .91)*	.47	.40 (.27, .59)**	.74	.31 (.19, .52)**	.96
[d]Other adult caring	.62 (.39, .97)	.38	.52 (.36, .74)**	.52		
[d]Friend caring	.67 (.46, .98)	.32	.73 (.57, .93)*	.25	.56 (.40, .79)**	.46
[d]Like school			.69 (.54, .88)**	.29		
[d]School safety			.84 (.62, 1.15)	.14		

[a] Models were conducted separately for the three bullying involvement groups and included gender, grade, racial/ethnic group, family structure, receipt of free/reduced price lunch, and all variables in the table with odds ratios listed for that model.
[b] Effect sizes reflect Cohen's *d* (small = .20, medium = .50, large = .80).
[c] Reference is perceived right weight.
[d] For nondichotomous variables and multi-item scales, the odds ratio represents the odds of reporting suicidal thoughts or a suicide attempt for those at the highest end of the variable or scale when compared with those at the lowest end of the variable or scale.
* $p < .0033$ (Bonferonni adjustment was $\alpha = .01/3$ for number of models run for the final analysis = .0033).
** $p < .0001$.

use; self-perception of weight status; sexual orientation and gender identity; connections to family, nonparental adults, and friends; school achievement; and school safety. Provider education; incorporation of validated, user-friendly screening tools, such as the Pediatric Symptom Checklist [42], Guidelines for Adolescent Preventive Services questionnaires [43], and TeenScreen [44]; and ready access to effective interventions are likely to improve the feasibility and effectiveness of screening in these settings [29,45]. Given the magnitude and consequences of youth involvement in bullying together with the potential for effective prevention and intervention, better recognition and intervention on behalf of youth at highest risk for suicidal thinking and behavior is imperative.

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