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Acutely Suicidal Adolescents Who Engage in Bullying Behavior: 1-Year Trajectories

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Abstract

Purpose—Prospective longitudinal research is needed to examine associations between bullying behaviors and trajectories of suicidal ideation and behavior and overall functional impairment. The specific aims of the present study are to: (1) characterize differences in baseline functioning between acutely suicidal adolescents who are classified into bullying perpetrator and non-bully groups and (2) examine the 1-year trajectories of these two groups of adolescents.

Method—Participants were 433 psychiatrically hospitalized suicidal adolescents (72% female), ages 13 to 17 years. Participants reported suicidal ideation, depression, anxiety, substance use, adaptive functioning, and bullying behavior. Six items from the Youth Self-Report were used to classify adolescents into bullying perpetrator ($n = 54$) and non-bully ($n = 379$) groups. Follow-up assessments were conducted at 6 weeks, 3 months, 6 months, and 12 months.

Results—At hospitalization, adolescents in the bully group reported significantly higher levels of suicidal ideation, substance use, and functional impairment. Suicidal ideation differences remitted at six weeks. The elevated functional impairment of the bullying perpetrator group persisted across the 12-month period.

Conclusion—Adolescents who met bullying perpetrator group criteria were characterized by more severe suicidal ideation and higher levels of proximal risk factors for suicide. Bullying behavior was not stable over time but was associated with elevated suicide risk when present. These findings highlight the importance of specifically assessing for and targeting bullying behavior at multiple time points when treating suicidal adolescents.

Keywords

Bully; Suicide; Suicidal ideation; Aggression; Psychiatric hospitalization; Longitudinal

Suicide is the second leading cause of death among adolescents ages 13 to 17 [1]. Moreover, 6.3% of high school students have attempted suicide at least once and 13.8% report suicidal ideation during the previous year [2]. Individual risk factors include depression, hopelessness, substance abuse, and family history of mental illness [3]. Social and interpersonal risk factors for suicidal behavior among adolescents include peer

victimization, physical and sexual abuse, having a socially stigmatized social identity, and perceptions of limited social support [4].

Bully perpetration (bullying others) is also a risk factor for suicidal ideation and behavior among adolescents [5]. Among sixth- to tenth-grade U.S. students, 13.0% bully others, 10.6% are victims of bullying, and 6.3% report being both a bully and a victim (“bully-victims”) [6]. Among Finnish adolescents, depression and severe suicidal ideation were strongly associated with bullying perpetration or being bullied [7]. Bully-victims may exhibit greater rates of depression and suicidal behavior than those who are solely victims or perpetrators [e.g., 7,8].

Research involving psychiatrically hospitalized adolescents provides an opportunity to assess future trajectories for a high-risk group. This population is at a high risk for suicide attempts [9], particularly during the first year following hospitalization [10]. Aggressive and bullying behaviors have received less attention in this population than internalizing psychopathology. Kerr et al. [11] found that disruptive and aggressive behaviors did not have a main effect on adolescent suicidal behavior after hospitalization. However, internalizing symptoms were more predictive of subsequent suicidal behavior among aggressive youth, suggesting an interaction between aggressive behaviors and internalizing psychopathology. Goldston and colleagues [12] found that up to 13 years after hospitalization, co-occurring major depressive disorder and conduct disorder was the only unique pattern of comorbidity that elevated risk for suicide attempts. Prinstein et al. [13] found that externalizing and disruptive behaviors were not predictive of later attempts after hospitalization. Further research is needed to clarify the relation between aggressive behaviors and suicide. A transactional developmental model of risk for suicidal behavior suggests that bullying perpetration would exacerbate this risk, possibly via reciprocal influences on self-schema and interpersonal relationships [14]. The bullying may lead to heightened social conflict, impair interpersonal relationships, and reduce opportunities for involvement in positive social activities. In a downward spiral, this could create heightened emotional distress and ultimately lead to a more negative self-concept.

To our knowledge, only one study has examined the relation between bullying others and suicidal behavior among psychiatrically hospitalized youth [15]. Female bully perpetrators had a threefold increase risk of suicide attempt compared to non-bullying girls. This association was not found among the boys; however, the study may have been underpowered to detect such a relationship because significantly more girls than boys reported both bullying behavior and suicide attempts. Further, in the absence of longitudinal data for psychiatrically hospitalized samples, it is unknown whether bullying will predict future suicidal thoughts and behavior. The few studies that examine bullying longitudinally are community- or population-based samples in which the base rates of suicidal ideation and behavior are low (for a review, see [16]). For instance, Klomek and colleagues [17] found that bullying behaviors and victimization had differential effects by gender. Bullying behavior and victimization was associated with suicide attempts and completions in adulthood but not after controlling for the effects of conduct disorder and depression, whereas frequent victimization contributed to attempted and completed suicide above and beyond conduct disorder and depression. Additional prospective longitudinal research is needed to explore further the ways in which bullying impacts trajectories of suicidal ideation and behavior and overall functioning, particularly for clinical samples at elevated risk for suicidal behavior.

The specific aims of the present study are twofold: (1) to describe whether bully perpetrators differ from non-bullying adolescents at the time of hospitalization for severe suicidal ideation and/or behavior; and (2) to examine the 1-year trajectories of acutely suicidal

adolescents who are classified into bullying perpetrator and non-bully groups. This study improves on past research by providing a prospective longitudinal examination of the trajectories of adolescent “bully-perpetrators” and “non-bullies” at the time of their acute suicide risk. Data were unavailable to focus on peer victimization in this study. It is hypothesized that psychiatrically hospitalized adolescents who engage in bullying behaviors will exhibit more suicidal behavior and ideation, higher levels of depression, and lower levels of adaptive functioning at baseline and over a 1-year period as compared to non-bullying psychiatrically hospitalized adolescents.

Methods

Participants

Participants in the present study were 433 suicidal adolescents (310 females, 123 males), ages 13 to 17 years ($M = 15.6$ years, $SD = 1.3$), who were psychiatrically hospitalized between 2002 and 2005. Participants were primarily white (85.9%). The distribution of other racial/ethnic groups was: black (7.6%), American Indian (2.3%), Asian American (1.2%), and other (3.0%). Annual income for families ranged from less than \$15,000 (5%) to more than \$100,000 per year (16%), with the median income in the range of \$40,000 to \$59,000 per year.

This study used data from the Youth-Nominated Support Team-II study, a randomized controlled intervention trial for suicidal adolescents following hospitalization [18]. Inclusion in the parent study was determined by parent or adolescent report of an adolescent suicide attempt during the past month, or suicidal ideation characterized by persistence or a specific plan, as reported on the Diagnostic Interview Schedule for Children, version IV DISC-IV [19]. Exclusion criteria included: severe cognitive impairment, direct transfer to a medical unit or residential placement, residence more than 1 hour drive from the hospital, and no legal guardian available. Thirteen adolescents were excluded from the present study because they did not complete the *Youth Self Report* (YSR) [20], which was used to classify adolescents into bully-perpetrator and non-bully groups.

Measures

The Suicidal Ideation Questionnaire—Junior—(SIQ-JR) [21] is a 15-item self-report measure that assesses a range of suicidal thoughts on a 7-point time-referential scale ranging from “I never had this thought” to “almost every day.” It has excellent test-retest reliability [21] and was predictive of suicidal thoughts and attempts 6 months after hospitalization in an adolescent inpatient sample [9]. In this sample, the SIQ-JR had an internal consistency of .92.

The Children’s Depression Rating Scale—Revised—(CDRS-R) [22] is a semistructured interview that assesses depressive symptoms for the previous 2 weeks. The CDRS-R has demonstrated strong validity and reliability in studies with adolescents [23]. Inter-interviewer reliability for total scores, which were established prior to study onset and at 1-year intervals, was very high (mean alpha across raters was .98).

The Beck Hopelessness Scale—(BHS) [24] is a 20-item self-report true/false questionnaire that assesses negative attitudes about the future (e.g., “I don’t expect to get what I really want,” “My future seems dark to me”). The BHS has demonstrated strong psychometric properties in adolescent samples [e.g., 25] and had an internal consistency of .91 in this sample.

The Multidimensional Anxiety Scale for Children—(MASC) [26] is a 39-item self-report scale designed to assess a broad spectrum of anxiety symptoms. The internal consistency coefficient for the total score, which was used in this study, was .73.

The Personal Experiences Screen Questionnaire—(PESQ) [27] is a self-report measure used to screen for adolescent abuse of alcohol or other substances. The PESQ Problem Severity scale has demonstrated adequate reliability and validity for identifying problem substance usage [27]. The Problem Severity scale in this sample had an internal consistency of .94.

The Child and Adolescent Functional Assessment Scale—(CAFAS) [28] is administered to parents and assesses their child's functional impairment across a spectrum of settings (e.g., school, home, community). The CAFAS has established strong inter-rater reliability as well as construct and concurrent validity [29]. Inter-rater reliability for CAFAS subscales in this study were high (alpha range of .83–.98).

The Youth Self Report—(YSR) [20] is a 119-item questionnaire that assesses a broad range of behavior problems and was assessed at baseline. Six items pertaining to bullying behavior (I tease others a lot; I physically attack people; I am mean to others; I destroy things belonging to others; I threaten to hurt people; I get in many fights) were selected from the larger inventory. Items were scored on a 0 to 2 scale (0 = not true; 1 = sometimes true; 2 = very true). Bully-perpetrators were categorically defined as having score of 6 or higher on these six items. This 6-item scale had an internal consistency of .77.

Procedures

Detailed study procedures are described elsewhere [17]. Briefly, Institutional Review Board approval was attained. Participants were recruited from either a university or private psychiatric hospital in a Midwestern region of the United States. Parent/guardian written informed consent and adolescent informed assent were obtained. Baseline assessments were conducted within 1 week of hospitalization (7% completed following discharge). Adolescents were randomized to either a social support intervention (Youth-Nominated Support Team Intervention-Version II [YST-II]) or treatment-as-usual [18]. There were no differences in treatment assignment between the bully-perpetration and non-bully groups. Follow-up assessments for the SIQ-JR, CDRS-R, and BHS took place after 6 weeks, 3 months, 6 months, and 12 months. Follow-up assessments for the MASC, PESQ, and CAFAS took place after 3 and 12 months. The follow-up assessment for the YSR took place after 12 months.

Data analysis

Baseline demographic and clinical characteristics of bully-perpetrator and non-bully groups were compared using chi-square and t-tests. The SIQ-JR, BHS, CDRS-R, CAFAS, MASC, and PESQ repeated scores over time were treated as correlated outcome values in mixed regression models. The aim of these analyses was to describe the trends in these scores across assessment points during the 12-month study period. Mixed regression models enabled subjects with incomplete data across time to be included, which increases statistical power. Such models are often also less biased than complete-case analysis because the smaller number of subjects in complete case analyses may be less representative of the larger population of interest [30]. Since all clinical outcome scores showed nonlinear trends over time, segmented or pairwise linear regression models were chosen over polynomial regression models because of better global fit without losing local fit. All baseline scores were centered. Coded time; hospital; treatment group; five baseline clinical scores; sex, age, and race; multiple suicide attempts; and bully group were included as fixed effects in the

initial model. The subject effects were modeled as random effects so that each subject had his/her own intercept and slope. An unstructured covariance matrix of random coefficients was specified. Bully-perpetrator versus non-bully and the coded time variable, including any time interaction terms with bully, if at least one was significant, were included in final reduced models. Other main effects were kept in the final model at the $\alpha = .05$ significance level.

Results

Baseline comparisons of bully-perpetrator and non-bully groups

Demographics—There were no differences in sex, race, maternal level of education, and proportion of families receiving public assistance between bully-perpetrator and non-bully groups (Table 1). The bully-perpetrator group was significantly younger (mean: 15.2, SD: 1.2) than the non-bully group (mean: 15.6, SD: 1.3).

Clinical characteristics—As displayed in Table 2, the bully-perpetrator group had significantly higher baseline scores than the non-bully group for suicidal ideation (SIQ-JR), substance abuse (PESQ), and overall functional impairment (CAFAS Total). In terms of specific domains of functioning, Fisher exact tests indicated the subscale scores of bully-perpetrator and non-bully groups were distributed differently in the domains of: home ($p = .02$), school/work ($p = .04$), and behavior toward others ($p = .0003$). A greater proportion of adolescents in the bully-perpetrator group were at the most severe levels of these subscales. There were no differences between groups for suicide attempt history, depression severity, hopelessness, anxiety, and functional impairment specifically related to moods/emotions.

Trends in clinical outcomes for bully perpetrator and non-bully groups across 12 months

Table 3 displays the estimated coefficients of the fixed effects from the final reduced models for the six clinical outcome variables. Table 4 presents the results for the mean scores of these variables at each time point and for the change in mean scores during each time interval. It includes p values for differences in mean scores at each time point, and for changes in mean scores during each time interval for bully-perpetrator and non-bully groups. These analyses indicate significant differences in the trajectories of bully-perpetrator and non-bully groups for all clinical variables except the CDRS-R (Depression). Figure 1 illustrates these group differences in trajectories across the 12-month study period. The specific results for each clinical outcome are described in the following sections.

Suicidal ideation—As displayed in Table 3, bully-perpetrator group had a main effect in the prediction of SIQ-JR scores, with bully perpetrators having higher scores. In addition, sex, history of multiple suicide attempts, and baseline BHS scores (hopelessness) remained as main effects, as did the three coded time variables and their interaction terms with bully groups. As indicated in Table 4, starting at significantly different baseline scores, both the bully-perpetrator and non-bully groups reported significant declines in SIQ-JR scores over 12 months. As is also indicated in Table 4, which provides the predicted slopes for the bully-perpetrator and non-bully groups for each of the four time periods, the rate of decline for the bully-perpetrator group was significantly higher than for the non-bully group from baseline to week 6; there was no difference between groups in the rate of decline from week 6 to month 12.

In comparison to the non-bully group, a significantly higher proportion of adolescents in the bully-perpetrator group scored above the SIQ-JR clinical cutpoint score of 31 at baseline (85% vs. 72%; $\chi^2_{(1)} = 4.4, p .04$). There were no significant differences in the proportion of

adolescents in bully-perpetrator and non-bully groups who scored above this cutpoint at 3 months (27% vs. 23%), 6 months (16% vs. 19%) or 12 months (15% vs. 13%).

Hopelessness—As displayed in Table 3, baseline CDRS-R (depression) and SIQ-JR scores (suicidal ideation) were significant predictors of BHS (hopelessness) scores. Bully-perpetrator group and the four time periods were also maintained in the final model to enable an examination of interactions between time and bully groups. Over 12 months, the rate of decline in BHS scores for bully-perpetrator and non-bully groups was only significantly different during the 6-week to 3-month period (Table 4).

Depression—Baseline BHS, CAFAS, MASC, and SIQ-JR scores, sex, and the three coded time variables were significant predictors of CDRS-R scores. Table 3 displays the estimated parameters. As evidenced by the statistics presented in Table 4 and illustrated in Figure 1, bully-perpetrator and non-bully groups' CDRS-R scores declined over 12 months at similar rates.

Functional impairment—As displayed in Table 3, bully-perpetrator versus non-bully group, hospital site, adolescent history of multiple suicide attempts, and the coded time variables were significant predictors of CAFAS total scores (functional impairment). Starting at different baseline scores, the change in CAFAS scores was the same for bully-perpetrator and non-bully groups over 12 months. The bully-perpetrator group had significantly higher scores than the non-bully group across the entire 12 months.

Anxiety—CDRS-R scores, SIQ-JR scores, coded time variables, and time by bully group interaction terms were significant predictors of MASC scores (anxiety) in the final model. The bully-perpetrator group was not significant as a main effect. Scores for the bully-perpetrator group were significantly lower than scores for the non-bully group at month 3 because of a greater improvement rate (Table 4).

Substance use—Bully group, history of multiple suicide attempts, baseline CAFAS score, YST-II intervention group, coded time, and the time interaction with bully group remained in the final model. The bully-perpetrator group had a significantly higher decline rate compared to the non-bully group from baseline to month 3. As indicated in Table 4, from month 3 to month 12, the rates of decline for both groups, though significantly different from each other, were not significantly different from zero. At month 12, there was no difference between bully-perpetrator and non-bully groups in PESQ scores.

Suicide attempts—There was no difference between bully-perpetrator and non-bully groups in the occurrence of one or more suicide attempts (yes/no) during the 12-month follow-up period. Ten of the adolescents in the bully-perpetrator group (22.73%) and 54 of the adolescents in the non-bully group (16.41%) reported one or more suicide attempt during this period, $\chi^2_{(1)} = 1.09, p = .297$.

Stability of bully-perpetrator and non-bully groups across 12 months

There was limited consistency in bully-perpetrator group status across the 12-month period. Although 12.47% of the sample met criteria for classification in the bully-perpetrator group at the time of hospitalization, this was reduced to 4.93% 12 months after hospitalization. Furthermore, despite the significant correlation between baseline and 12-month scores on the 6-item bullying scale, only 4 of the 16 bully-perpetrators at month 12 had maintained this status from baseline.

Comparisons of bully-perpetrator and non-bully groups as classified at 12 months

Adolescents who met criteria for classification into non-bully and bully perpetrator groups at 12 months differed significantly in month 12 assessments of suicidal ideation (mean: 16.5 ± 13.6 vs. 29.6 ± 17.7 , $p = .001$), depression (mean: 33.2 ± 11.5 vs. 41.2 ± 13.3 , $p = .008$), functional impairment (mean: 53.4 ± 41.0 vs. 87.5 ± 51.6 , $p = .009$), hopelessness (mean: 4.5 ± 4.5 vs. 8.5 ± 6.0 , $p = .007$), anxiety (mean: 36.3 ± 17.3 vs. 46.9 ± 22.7 , $p = .05$), and substance use (mean: 26.9 ± 11.3 vs. 36.4 ± 14.5 , $p = .005$)

Discussion

This prospective study of the post-hospitalization trajectories of acutely suicidal adolescents who were classified as bully-perpetrators and non-bullies identified several important differences between these groups. In keeping with study hypotheses, adolescents in the bully-perpetrator group reported significantly higher levels of suicidal ideation, alcohol/substance abuse, and psychosocial impairment. Even within this study's sample, which was composed entirely of suicidal adolescents, the subgroup of bullies was found to be significantly more impaired than the other suicidal adolescents. Moreover, their higher level of psychosocial impairment at baseline was evident for functioning in the home, school, and work settings, and interpersonal relationships. The bully-perpetrator group maintained this significantly higher level of psychosocial impairment across the 12-month study period post-hospitalization.

These group differences suggest that suicidal adolescent bully perpetrators may be at especially elevated risk for suicide. This is consistent with previous research implicating aggressive behavior, suicidal ideation, substance abuse, and elevated psychosocial impairment as risk factors for suicidal behavior [3,31]. Previous research also indicates that adolescents who bully others have multiple problem behaviors, such as emotional and behavioral difficulties, and poor academic achievement [6]. Future studies should examine whether these factors are also predictive of more medically severe suicide attempts among adolescents who bully.

We did not find an interaction between the bully-perpetrator group and sex for any clinical scale scores, which is inconsistent with a previous study that found female bullies to be at greater risk for suicidal behavior [8]. These inconsistent findings may be due to differences in sampling characteristics because adolescents in the present study were all acutely suicidal at baseline. As such, although suicidal ideation and behavior are more common among females than males [32], the males in this study had suicidal ideation or suicidal behavior in their repertoire of possible coping strategies and problems.

The post-hospitalization trajectories of adolescents in bully-perpetrator and non-bully groups were characterized by substantial reductions in the severity of their psychosocial impairment and psychiatric symptoms, particularly during the first 3 months after hospitalization. This is perhaps not surprising given that baseline assessments took place at the time of acute suicide risk. Although the bully-perpetrator group was initially characterized by more severe suicidal ideation, this difference was no longer apparent at 6 weeks. Converging with this finding, the bully-perpetrator and non-bully groups did not differ in the number of adolescents who attempted suicide during the 12-month study period. Similarly, although the bully-perpetrator group was characterized by more severe substance abuse than the non-bully group at baseline, this difference was no longer apparent at 12 months. Only the group difference in psychosocial impairment remained significant throughout the study period. One possible explanation for the absence of more sustained differences between groups is the instability of the bullying group classifications. To the extent that bullying behaviors exacerbated psychiatric symptoms, discontinuity of these behaviors may have been

associated with improvement of these symptoms. The elevated scores across clinical scales of psychiatric symptoms and psychosocial impairment for those reporting bullying perpetration behaviors at the 12-month assessment supports this potential association between severity of impairment and bullying. A second possible explanation is that, independent of engaging in bullying perpetration, all adolescents obtained mental health treatment immediately after psychiatric hospitalization that was effective in decreasing their psychiatric symptoms and bullying behaviors.

The results of this study should be considered in light of study limitations. A primary limitation pertains to the measurement of bullying. We developed an index of bullying based on adolescents' responses to six pertinent items on the YSR [20]. However, we did not have the information needed to incorporate two components often included in definitions of bullying—the ongoing or repetitive nature of the bullying behavior and the presence of an imbalance of power [33,34]. It should be noted, however, that the nature of YSR response options “sometimes true” and “very true” capture a persistent pattern of behavior (albeit not necessarily directed toward one individual), and the bullying scale items tap relational (e.g., “I am mean to others”) and physical aggression (e.g., “I physically attack people.”).

An additional limitation pertains to the generalizability of study findings. The sample was recruited from two psychiatric hospitals in a Midwestern region of the United States and was primarily Caucasian. Adolescents who belong to different racial/ethnic minority groups have differing predictors of multiple suicide attempts [35] and may be characterized by differing relationships between bullying and suicidal behavior. In addition, findings cannot be generalized to the broader community. However, as suicide risk is a common reason for psychiatric hospitalization among adolescents, these study findings have important applicability. Although the adolescents who consented to participate in the parent study did not differ demographically from those who did not [18], we are unable to ascertain whether adolescents who did and did not consent differed in their bullying behavior, or in the relationship between their bullying behavior and suicidal thoughts and behaviors. Furthermore, the sample was imbalanced by sex with 72% females. As such, statistical power was more limited for examining gender differences and relationships for boys. Finally, bullying was assessed by adolescent self-report. Because adolescents may underreport aggressive behavior, the true magnitude of the relationships examined here may be stronger than our self-report measures were able to capture. Future investigations should use multiple informants with more comprehensive measures of bullying. Despite these limitations, the present study has notable strengths including its large sample size for a clinically ascertained sample, the unique population of acutely suicidal adolescents, and a prospective longitudinal design.

In summary, the present study's findings suggest that bullying is associated with more severe suicidal thoughts, substance abuse, and psychosocial impairment, even within a sample composed entirely of acutely suicidal and psychiatrically hospitalized adolescents. Fortunately, however, bullying perpetration desisted following hospitalization. Many of the adolescents in the bully-perpetrator group did not maintain these behaviors 12 months later and showed substantial improvements in functioning over this period. Nevertheless, adolescents who were perpetrators of bullying at 12 months, regardless of their classification at baseline, were characterized by more severe impairment than other adolescents across multiple indices of psychopathology and psychosocial functioning. Thus, at both baseline and 12 months, bully-perpetrators were characterized by more severe suicidal thoughts and impairment. These findings highlight the importance of specifically assessing for and targeting bullying behavior when treating suicidal adolescents. More broadly, there is a need for characterizing varying patterns of bullying perpetration in community youth. If bullying perpetration in community youth vacillates in a manner similar to that of the present study,

the factors shaping these fluctuating trajectories may be intervention leverage points for decreasing bullying and suicidal behaviors among youth.

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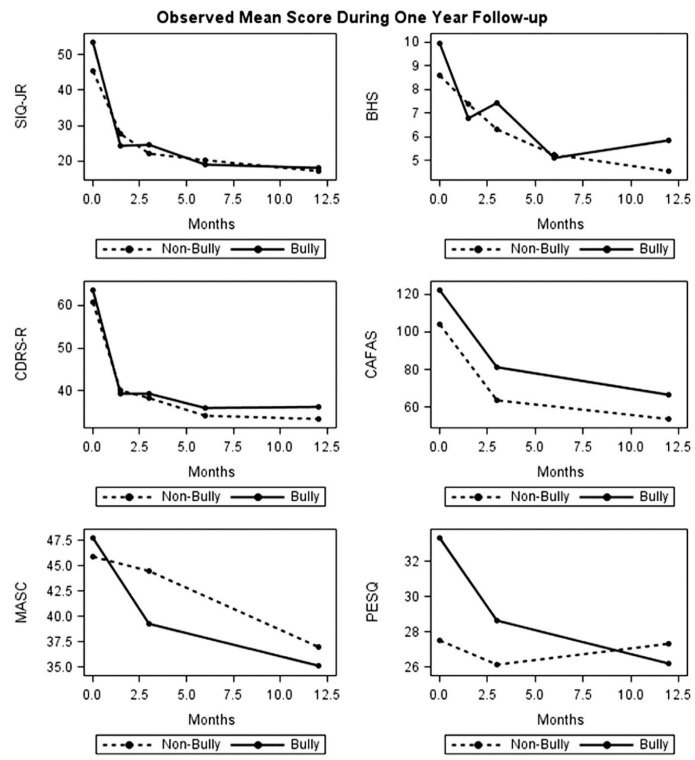


Figure 1.
Observed mean score during 1-year follow-up.

Table 1

Demographic characteristics of bully perpetrators and non-bullies

Demographic	<u>Bully perpetrators %</u> (n = 54)	<u>Non-bullies %</u> (n = 379)	Overall % (N = 433)
Sex			
M	31.5	28.0	28.4
F	68.5	72.0	71.5
Race			
Black	13.2	6.0	6.9
White	83.0	86.1	85.8
Other	3.8	7.9	7.4
Mother education			
Some high school	9.6	9.5	9.5
High school	36.5	20.3	22.4
Some college	28.9	38.4	37.2
Some graduate	25.0	31.8	30.9
Family public assistance			
No	82.7	89.7	88.8
Yes	17.3	10.3	11.2

There were no significant *p* values at 95% confidence.

Table 2

Baseline clinical characteristics of bully perpetrators and non-bullies

Measure	Construct	Bully perpetrators M (SD)	Non-bullies M (SD)	<i>p</i> (<i>t</i> test)
SIQ-JR	Suicidal ideation	53.50 (18.8)	45.31 (21.6)	<.01
CDRS-R	Depression	63.61 (11.0)	60.71 (13.1)	.12
CAFAS Total	Adaptive functioning	122.20 (35.1)	103.93 (34.3)	<.01
BHS total	Hopelessness	9.94 (5.8)	8.59 (5.8)	.11
PESQ – Problem Severity	Drug/alcohol use	33.33 (11.9)	27.54 (11.5)	<.001
MASC	Anxiety	47.72 (20.6)	45.83 (18.5)	.49
Suicide Attempt Hx				.22
None		20.4%	26.9%	
One		29.6%	35.4%	
Multiple		50.0%	37.7%	

BHS = Beck's Hopelessness Scale; CAFAS = Child and Adolescent Functional Assessment Scale; CDRS-R = Children's Depression Rating Scale – Revised; Hx = history; MASC = Multidimensional Anxiety Scale for Children; PESQ = Personal Experience Screening Questionnaire; SIQ-JR = Suicide Ideation Questionnaire - Junior.

Table 3

Estimated parameters for fixed effects from the regression mixed model

Fixed effects	Coefficient estimate	SE	df	t value	Pr > t
SIQ-JR					
Intercept	44.9	1.1	426	39.5	<.001
Male vs. female	-3.3	1.2	426	-2.7	.008
Bully vs. non-bully	6.6	2.8	426	2.4	.02
Multiple attempt	3.9	1.1	426	3.4	.0007
Centered baseline BHS score	.9	.1	426	9.4	<.0001
t1 ^a	-17.8	1.3	1,307	-14.2	<.0001
t2	12.4	1.9	1,307	6.4	<.0001
t3	4.6	1.1	1,307	4.2	<.0001
t1*Bully	-9.3	3.7	1,307	-2.5	.01
t2*Bully	12.5	5.8	1,307	2.2	.03
t3*Bully	-3.5	3.2	1,307	-1.1	.28
BHS					
Intercept	8.6	.27	426	32.2	<.0001
Bully vs. non-bully	.75	.76	426	.99	.32
Centered Baseline SIQ-JR Score	.07	.01	426	7.2	<.0001
Centered Baseline CDRS-R Score	.03	.02	426	1.97	.049
t1	-1.2	.34	1,309	-3.5	.0006
t2	.16	.52	1,309	.31	.76
t3	.45	.34	1,309	1.3	.18
t4	.42	.18	1,309	2.4	.02
t1*Bully	-1.9	.99	1,309	-1.9	.06
t2*Bully	3.5	1.5	1,309	2.3	.02
t3*Bully	-2.2	.99	1,309	-2.2	.03
t4*Bully	.81	.51	1,309	1.6	.11
CDRS-R					
Intercept	63.6	1.2	397	52.6	<.0001
Male vs. female	-2.5	.8	397	-3.0	.003
Bully vs. non-bully	-.09	1.2	397	-.76	.4
Centered Baseline SIQ-JR Score	-.09	.02	397	4.1	<.0001
Centered Baseline BHS Score	.30	.07	397	4.1	<.0001
Centered Baseline CAFAS Score	.03	.01	397	3.0	.003
Centered Baseline MASC Score	.11	.02	397	5.3	<.0001
t1	-20.8	.75	1,269	-27.6	<.0001
t2	18.8	.90	1,269	21.0	<.0001
t3	1.8	.38	1,269	4.8	<.0001
CAFAS					
Intercept	87.5	6.3	410	13.8	<.0001
Site	7.7	3.4	306	2.3	.02

Fixed effects	Coefficient estimate	SE	df	t value	Pr > t
Bully vs. non-bully	15.4	4.6	306	3.4	<.0001
Multiple attempt	8.7	3.1	306	2.8	.005
t1	-19.7	1.0	306	-19.2	<.0001
t2	18.0	1.2	306	14.5	<.0001
MASC					
Intercept	45.9	.89	426	51.8	<.001
Bully vs. non-bully	-.08	2.5	306	-.03	1.0
Centered Baseline SIQ-JR Score	.14	.04	306	3.8	.0002
Centered Baseline CDR Score	.3	.06	306	5.5	<.0001
t1	-1.0	.46	306	-2.2	.03
t2	-.07	.56	306	-.14	.9
t1*Bully	-3.9	1.3	306	-2.9	.003
t2*Bully	4.3	1.6	306	2.7	.007
PESQ					
Intercept	30.9	.99	401	31.1	<.001
Tx group	-2.1	.98	401	-2.1	.03
Multiple attempts	-3.6	1.0	401	-3.6	.0004
Bully vs. non-bully	4.8	1.7	401	2.8	.005
Centered Baseline CAFAS Score	.04	.01	401	3.0	.003
t1	-.49	.24	661	-2.0	.047
t2	.6	.30	661	2.1	.04
t1*Bully	-1.9	.72	661	-2.7	.007
t2*Bully	1.4	.86	661	1.6	.11

BHS = Beck's Hopelessness Scale; CAFAS = Child and Adolescent Functional Assessment Scale; CDRS-R = Children's Depression Rating Scale - Revised; MASC = Multidimensional Anxiety Scale for Children; PESQ = Personal Experience Screening Questionnaire; SIQ-JR = Suicide Ideation Questionnaire - Junior; Tx = treatment.

^aThe choice of using coded time t1, t2, t3 or t4 in each of 6 models was based on the non-linear pattern of the observed trends over time.

Table 4
Mixed model results for clinical scale scores of bully perpetrators and non-bullies

Clinical score	Predicted mean score M (SD)						Predicted score change M (SD) (p) ^d			
	Baseline	6 weeks	3 months	6 months	12 months	0–6 weeks	6 weeks–3 months	3–6 months	6–12 months	
SIQ-JR										
Bully	53.5 (11.7)	26.4 (12.2)	24.2 (11.4)	21.8 (9.9)	17.0 (7.5)	-27.1 (3.5) (<.0001)	-2.3 (2.8) (.42)	-1.2 (.5) (.02)	-1.2 (.5) (.02)	
Non-bully	45.3 (13.8)	27.5 (12.2)	22.1 (11.4)	20.4 (9.8)	16.9 (7.2)	-17.8 (1.3) (<.0001)	-5.4 (.99) (<.0001)	-9 (.19) (<.0001)	-9 (.19) (<.0001)	
<i>p</i> t-test ^b	<.01	.54	.21	.32	.95	.01	.29	.54	.54	
BHS										
Bully	9.9 (3.3)	6.9 (3.5)	7.5 (4.2)	5.3 (3.7)	5.8 (2.9)	-3.1 (.9) (<.0001)	.6 (.76) (<.0001)	-1.1 (.4) (<.0001)	.1 (.20) (<.0001)	
Non-bully	8.5 (3.7)	7.4 (3.7)	6.3 (3.9)	5.2 (3.5)	4.6 (2.6)	-1.2 (.34)	-1.0 (.27)	-.6 (.13)	-.2 (.07)	
<i>p</i> t-test	.02	.5	.052	.9	.005	.06	.04	.2	.2	
CDRS-R										
Bully	63.4 (5.6)	42.2 (6.9)	40.2 (6.6)	36.4 (6.2)	35.9 (5.6)	-20.8 (.8) (<.001)	-2.0 (.3) (<.001)	-2.0 (.3) (<.001)	-1.7 (.2) (.378)	
Non-bully	60.9 (6.0)	40.2 (7.3)	38.1 (7.1)	34.1 (6.7)	33.4 (6.2)	Same as bully	Same as bully	Same as bully	Same as bully	
<i>p</i> t-test	.005	.07	.052	.03	.008	No difference	No difference	No difference	No difference	
CAFAS										
Bully	120.7 (21.0)	100.9 (22.0)	81.2 (23.1)	77.6 (25.4)	70.5 (30.2)	-19.7 (1.0) (<.0001)	-19.7 (1.0) (<.0001)	-1.7 (.4) (<.0001)	-1.7 (.4) (<.0001)	
Non-bully	104.0 (18.4)	84.3 (19.2)	64.6 (20.1)	61.2 (21.9)	54.3 (25.9)	Same as bully ^c	Same as bully	Same as bully	Same as bully	
<i>p</i> t-test ^b	<.0001	<.0001	<.0001	<.0001	<.0001	No difference ^d	No difference	No difference	No difference	
MASC										
Bully	47.7 (12.9)	42.8 (12.7)	37.8 (12.6)	36.4 (12.3)	33.6 (12.1)	-5.0 (1.2) (<.0001)	-5.0 (1.2) (<.0001)	-7 (.5) (.1)	-7 (.5) (.1)	
Non-bully	45.7 (12.3)	44.7 (12.1)	43.7 (12.0)	41.5 (11.9)	37.1 (11.8)	-1.0 (.5) (.03)	-1.0 (.5) (.03)	-1.1 (.2) (<.0001)	-1.1 (.2) (<.0001)	
<i>p</i> t-test	.27	.27	.0009	.0036	.045	.003	.003	.42	.42	
PESQ										
Bully	33.8 (9.1)	31.4 (8.9)	28.9 (8.8)	28.1 (8.5)	26.5 (8.3)	-2.4 (.7) (.0003)	-2.4 (.7) (.0003)	-.4 (.3) (.13)	-.4 (.3) (.13)	
Non-bully	27.5 (8.9)	27 (8.8)	26.5 (8.7)	26.7 (8.6)	27.3 (8.5)	-.5 (.2) (.046)	-.5 (.2) (.046)	-.14 (.09) (.15)	-.14 (.09) (.15)	
<i>p</i> t-test	<.0001	.001	.06	.29	.55	.007	.007	.05	.05	

BHS = Beck's Hopelessness Scale; CAFAS = Child and Adolescent Functional Assessment Scale; CDRS-R = Children's Depression Rating Scale – Revised; MASC = Multidimensional Anxiety Scale for Children; PESQ = Personal Experience Screening Questionnaire; SIQ-JR = Suicide Ideation Questionnaire - Junior.

^a *p* value at 95% significance level for testing if the predicted score change (slope of the coded time) is zero.

b *p* value at 95% significance level for testing if differences in predicted mean scores or slopes between bully perpetration and non-bully are zero.

c, d There is no time by bully group interaction terms in final model. The monthly score change of bully perpetrators = predicted monthly score change of non-bullies.

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