

Original Investigation

Relationship Between Peer Victimization, Cyberbullying, and Suicide in Children and Adolescents

A Meta-analysis

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IMPORTANCE Peer victimization is related to an increased chance of suicidal ideation and suicide attempts among children and adolescents.

OBJECTIVE To examine the relationship between peer victimization and suicidal ideation or suicide attempts using meta-analysis.

DATA SOURCES Ovid MEDLINE, PsycINFO, and Web of Science were searched for articles from 1910 to 2013. The search terms were *bully**, *teas**, *victim**, *mobbing*, *ragging*, and *harassment* in combination with the term *suic**. Of the 491 studies identified, 34 reported on the relationship between peer victimization and suicidal ideation, with a total of 284 375 participants. Nine studies reported on the relationship between peer victimization and suicide attempts, with a total of 70 102 participants.

STUDY SELECTION Studies were eligible for inclusion if they reported an effect size on the relationship between peer victimization and suicidal ideation or suicide attempt in children or adolescents.

DATA EXTRACTION AND SYNTHESIS Two observers independently coded the effect sizes from the articles. Data were pooled using a random effects model.

MAIN OUTCOMES AND MEASURES This study focused on suicidal ideation and suicide attempts. Peer victimization was hypothesized to be related to suicidal ideation and suicide attempts.

RESULTS Peer victimization was found to be related to both suicidal ideation (odds ratio, 2.23 [95% CI, 2.10-2.37]) and suicide attempts (2.55 [1.95-3.34]) among children and adolescents. Analyses indicated that these results were not attributable to publication bias. Results were not moderated by sex, age, or study quality. Cyberbullying was more strongly related to suicidal ideation compared with traditional bullying.

CONCLUSIONS AND RELEVANCE Peer victimization is a risk factor for child and adolescent suicidal ideation and attempts. Schools should use evidence-based practices to reduce bullying.

JAMA Pediatr. doi:10.1001/jamapediatrics.2013.4143
Published online March 10, 2014.

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Meta-analyses^{1,2} have clearly demonstrated the negative relationship between peer victimization and mental health as well as physical health. Common elements in definitions of peer victimization include the repeated nature of harassment, an imbalance in power between bully and victim, and the intention to cause harm on the part of the perpetrator. Bullying can be physical or verbal, but also can be exercised through exclusion.^{3,4} Estimates⁵ suggest that, depending on the country of residence, between 5% and 20% of children are victims of bullying. During the past decade, an interest in the relationship between peer victimization and adolescent suicide⁶ has surged. A large body of research^{6,7} now suggests that peer victimization is an important risk factor for adolescent suicide. Approximately 20% of adolescents seriously consider suicide, and between 5% and 8% of adolescents in the United States attempt suicide within a year; overall, suicide is one of the most frequent causes of adolescent mortality worldwide.^{8,9} In this article, meta-analysis is used to further clarify the relationship between peer victimization and suicide.

Studies on bullying and suicide typically use either suicidal ideation or suicide attempts as an outcome measure. *Suicidal ideation* may be defined as thoughts or wishes to end one's life and is seen as a precursor to suicide,¹⁰ whereas *suicide attempt* refers to nonfatal events in most studies.⁶ Studies^{11,12} including both suicidal ideation and suicide attempts suggest that the relationship between each of these outcome measures and peer victimization may differ; thus, in the present meta-analysis, the relationships between peer victimization and suicidal ideation, and peer victimization and suicide attempts are separately analyzed. Some current studies¹²⁻¹⁴ focus on cyberbullying; although there are few studies focusing on the relationship between cyberbullying and suicidal ideation, results suggest that cyberbullying is as strongly related to suicidal ideation as traditional bullying is. Most studies on peer victimization and suicide have used self-reports.⁶ The use of a single informer, as opposed to the use of multiple informers, may lead to inflated effect sizes.^{15,16} In the present study, we tested whether the strength of the effect sizes between bullying and suicide is stronger for studies using only self-reports than for studies using multiple informants.

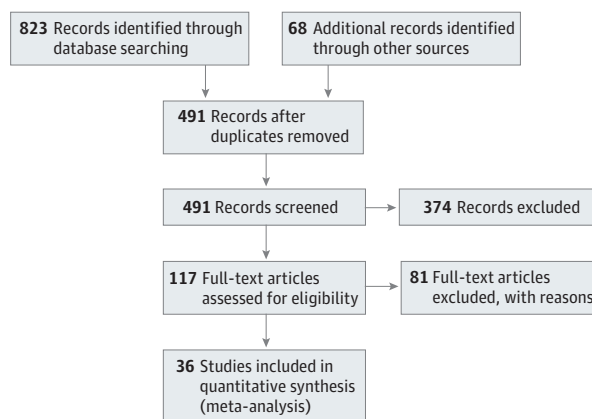
In brief, this meta-analysis aimed to examine the relationship between peer victimization and suicidal ideation or suicide attempts in children and adolescents. Because some articles¹⁷ suggest that the effects of bullying on suicidal ideation are more severe for girls than for boys and that young children may suffer more from bullying,¹⁸ we assessed these factors as moderators. We also compared the effects of cyberbullying and traditional bullying on suicidal ideation. Furthermore, the effects of same-method variance, confounding variables, study design, response rate, and the use of single-item measures were analyzed.

Methods

Study Retrieval and Selection

A review protocol does not exist for the purposes of the present study. The search engines PsycINFO, Web of Science, and Ovid

Figure 1. Flow Diagram of All Stages of the Literature Search



All stages of the literature search are detailed, from the number of records identified through the number of studies included in the meta-analysis.

MEDLINE were searched using the terms *bully**, *teas**, *victim**, *mobbing*, *ragging*, and *harassment* in combination with the term *suic**. The search included articles published from January 1, 1910, to January 26, 2013. In addition to this literature search, review articles^{6,7} were searched for relevant publications. The reference lists of retrieved articles were scanned to identify articles for potential inclusion in the meta-analysis. Articles published in English, Spanish, German, French, Dutch, Portuguese, and Lithuanian were eligible for inclusion in the analysis. Studies from any country were eligible for inclusion. Our search was not limited to published articles; book chapters, dissertations, unpublished articles, and posters were also eligible. A flow diagram of our search results is provided in **Figure 1**. Studies on self-harm that did not include a measure on suicide were excluded, because it has been argued that self-harm is conceptually different from suicide, and reasons behind self-harm are different from reasons behind suicide.¹⁹ Only studies that focused on bullying by peers were included; thus, studies on other types of victimization (eg, assault, sexual abuse, and robbery) or by other perpetrators (eg, parents, teachers, and strangers) were excluded. Studies that included participants older than 21 years were excluded from the meta-analysis. Studies that focused on clinical samples^{10,20-23} or samples of incarcerated youth²⁴ were excluded from the meta-analysis to ensure that the obtained results could be generalized to a population in a usual setting.²⁵ One longitudinal study²⁶ was included because it provided an effect size in which both peer victimization and suicidal ideation were calculated at the first measurement. Five other studies²⁷⁻³¹ using retrospective and prospective designs were excluded. Retrospective and prospective designs are often evaluated separately in meta-analyses because they concern how peer victimization affects victims later in life,³² which is a different question from how peer victimization is immediately related to suicide. Several studies made use of the same data set (Dane County Youth, Global School Health Survey, Add Health, Linkages, and Youth Risk Behavior Survey). When studies used the same data set, we chose to code the study that used the full data set over those that used only a subsample. If multiple studies

used the full data set, we chose the study from which an effect size was more easily retrieved. The studies included in the meta-analyses^{12-15,17,18,26,33-61} are summarized in the Supplement (eTable 1 and eTable 2). Some studies report only on suicidal ideation, others report only on suicide attempts, and some studies report on both measures. If studies reported on both suicidal ideation and suicide attempts, they were included in both meta-analyses. For the relationship between peer victimization and suicidal ideation, 34 studies met our inclusion criteria, with a total of 284 375 participants. For the relationship between peer victimization and suicide attempts, 9 studies met our inclusion criteria, with a total of 70 102 participants. Of the studies included in the meta-analysis on suicidal ideation, 1 article was written in Portuguese³⁴ and 1 article was written in Lithuanian⁵⁹; all other articles included were written in English.

Coding Decisions

Because odds ratios (ORs) were the most reported measure of effect size, we coded ORs when available. We included ORs that compared victimized children with a comparison group of children who did not experience victimization. Some articles^{18,36,39,42,44,46,57} provided separate effect sizes for different levels of victimization (eg, never, less than weekly, and frequently and low, moderate, and high victimization) or used different forms of victimization (eg, physical, relational, or verbal and covert or overt). In these studies we combined the different forms of bullying or used the groups that experienced the least victimization as a control group and combined the groups that reported more victimization into a victimized group; these combinations allowed us to compute a single OR.

Most studies that used multiple items to measure suicidal ideation or attempts used continuous scores to reflect the degree of suicidal ideation or attempt. From some of these studies, ORs could not be obtained; instead, we coded correlations^{18,26,35,37,53,54,56} or computed the Cohen d ^{38,43,55} from the mean (SD). When using correlations, we determined the correlation between the victimization and suicidal ideation scales as an effect size. When computing the Cohen d we compared the mean scores on suicidal ideation scales for children who were victimized with the scores for children who were not victimized. We used the program Comprehensive Meta-analysis (Biostat; <http://www.meta-analysis.com/index.php>) to convert correlations and Cohen d values into ORs.^{62,63} In 2 articles^{14,33} the effect size had to be coded into a correlation coefficient from a regression coefficient⁶⁴; the correlation coefficient was then converted to an OR. In 1 article⁵² the necessary information to compute the effect size over all the respondents was missing; thus, we used the P value to obtain a conservative estimate.⁶⁵

Eight studies* used ORs as well as multiple items to assess suicidal ideation or suicide attempts. Three of these investigations^{18,46,49} used validated cutoff scores to decide on the absence of suicidal ideation or suicide attempts. Four studies^{15,37,44,55} considered a positive answer to any item as indicative of suicidal ideation; for these articles we used the operationalization of suicidal ideation provided by the authors. One study³⁹ used an arbitrary categorization of “low, some, and

high” suicidal ideation. For this study we used the low suicidal ideation group as the comparison group and combined the some and high suicidal ideation categories into the suicidal ideation group. When multiple independent samples were reported in a study, these were separately coded. Seven studies^{15,26,43,44,48,55,59} distinguished between traditional victims and individuals who are bullies as well as victims (hereinafter referred to as *bully-victims*). In all studies, bully-victims and victims were compared with the same control group to compute an effect size. This means that the effect sizes for bully-victims and victims were not independent. In the main analysis, we used the available data to compute effect sizes comparing victims (any child who was victimized, including victims and bully-victims) with the children who were not victimized (uninvolved children and bullies). We argued that because other studies included populations of both victims and bully-victims but classified both groups as victims, combining victims and bully-victims would create the best comparability with studies that did not distinguish between the groups. From the 7 articles^{15,26,43,44,48,55,59} that reported distinctions between victims and bully-victims, we separately coded the effect sizes and ran separate analyses. We also analyzed the effect of the following variables as confounders: sex, age, ethnicity, substance use, family violence, previous attempted suicides, attempted suicides of family members, and psychopathology. These variables were chosen on the basis of several literature reviews on suicide.⁶⁻⁹ Sample sizes, response rates, the percentage of girls in a study, method of reporting (self vs other), confounders, the country where a study was conducted, measurement of bullying, suicidal ideation and suicide attempts, study design, and effect sizes were coded independently by 2 of the authors (M.v.G. and J.T.). Differences were resolved through discussion. Before discussing disagreement in coding, the authors coded studies identically 96% of the time.

Statistical Analysis

Data were analyzed using the program Comprehensive Meta-analysis. Odds ratios were used as effect sizes. Other effect sizes were transformed into ORs before the analyses. The effect of self-reports or peer reports and cyberbullying vs traditional bullying was tested using a subgroup analysis. To analyze potential moderating effects of age on bullying, the effect sizes of studies with participants younger than 13 years were compared with the effect sizes of studies with participants 13 years or older. To analyze the potential moderating effects of sex, the effect sizes of studies that consisted of girls were compared with the effect sizes of studies that consisted of boys. Three articles¹²⁻¹⁴ that provided separate measures of cyberbullying were compared with samples of traditional bullying to analyze the moderating effects of cyberbullying. To assess the risk of publication bias, we computed the Orwin fail-safe N , which estimates how many studies with nonsignificant results would be needed to nullify a meta-analytically obtained effect size. If many studies would be needed, we could conclude that, although the meta-analytically obtained effect size may be slightly inflated, the significant effect is not the result of publication bias. We calculated the association between the

*References 15, 18, 37, 39, 42, 44, 46, 49, 55

Table. Relationship Between Victimization, Suicidal Ideation, and Suicide Attempts

Characteristic	No.		OR (95% CI)			Q	I ²	Orwin Fail-safe N
	Studies	Effect Size	Participants	Fixed	Random			
Suicidal ideation	34	66	284 375	2.20 (2.16-2.24)	2.23 (2.10-2.37)	438.10	85.16	480
Suicide attempts	9	13	70 102	2.78 (2.57-3.06)	2.55 (1.95-3.34)	107.62	88.85	127

Abbreviation: OR, odds ratio.

standardized effect sizes and the variances of these effect sizes as well using the Kendall τ method: a high Kendall τ coefficient suggests that small studies with nonsignificant results tend not to be published, whereas a nonsignificant Kendall τ coefficient suggests the absence of such publication bias. Furthermore, we used the Duval and Tweedle trim-and-fill procedure,⁶⁶ which imputes effect sizes until the error distribution closely approximates normality; in this manner the trim-and-fill procedure provides a more unbiased estimate of the effect size than does the observed estimate. Data were analyzed using a random-effects model.

Results

Suicidal Ideation

A total of 34 studies^{12-15,17,18,26,33-59} were identified that focused on the relationship between peer victimization and suicidal ideation. These studies yielded a total of 66 independent effect sizes. The age of the participants in these studies ranged from 9 to 21 years. Only 4 of the samples used other reports of bullying; in all other samples, self-reports were used. Additional characteristics of each study are given in the Supplement (eTable 1). Meta-analytic results showed that there was a large degree of variance in study effect sizes ($Q = 438.10$; $I^2 = 85.16$). There was a significant relationship between peer victimization and suicidal ideation (OR, 2.23 [95% CI, 2.10-2.37]). Results are summarized in the Table. A forest plot is provided in Figure 2. The Kendall τ was 0.10 ($z = 1.23$; $P = .21$). The Duval and Tweedle trim-and-fill procedure suggested that, by imputing 4 studies to achieve a more normal error distribution, the unbiased estimate of the effect size would closely match the observed effect size (the unbiased estimate: OR, 2.18 [95% CI, 2.05-2.32]). The funnel plot is provided in the Supplement (eFigure 1). The funnel plot, Kendall τ , and Duval and Tweedle trim-and-fill procedure all suggest the absence of publication bias. To ensure that the results obtained were not due to studies with nonsignificant results that could not be identified, the Orwin fail-safe N was computed. We found that 480 studies with an OR of 1.00 would need to be included to reduce the obtained results to a trivial OR of 1.10. Results for victims and bully-victims were analyzed separately (OR, 1.75 [95% CI, 1.42-2.14] for victims and 2.35 [1.75-3.15] for bully-victims). Moderator analyses suggested that there were no significant differences in effect size between samples consisting entirely of boys or entirely of girls ($Q_1 = 0.41$; $P = .52$) and between samples younger than 13 years and older than 13 years ($Q_1 = 0.01$; $P = .92$). Cyberbullying, however, was more strongly related to suicidal ideation (OR, 3.12 [95% CI, 2.40-4.05]) than

was traditional bullying (2.16 [2.05-2.28]); this difference in effect sizes was significant ($Q_1 = 7.71$; $P = .02$).

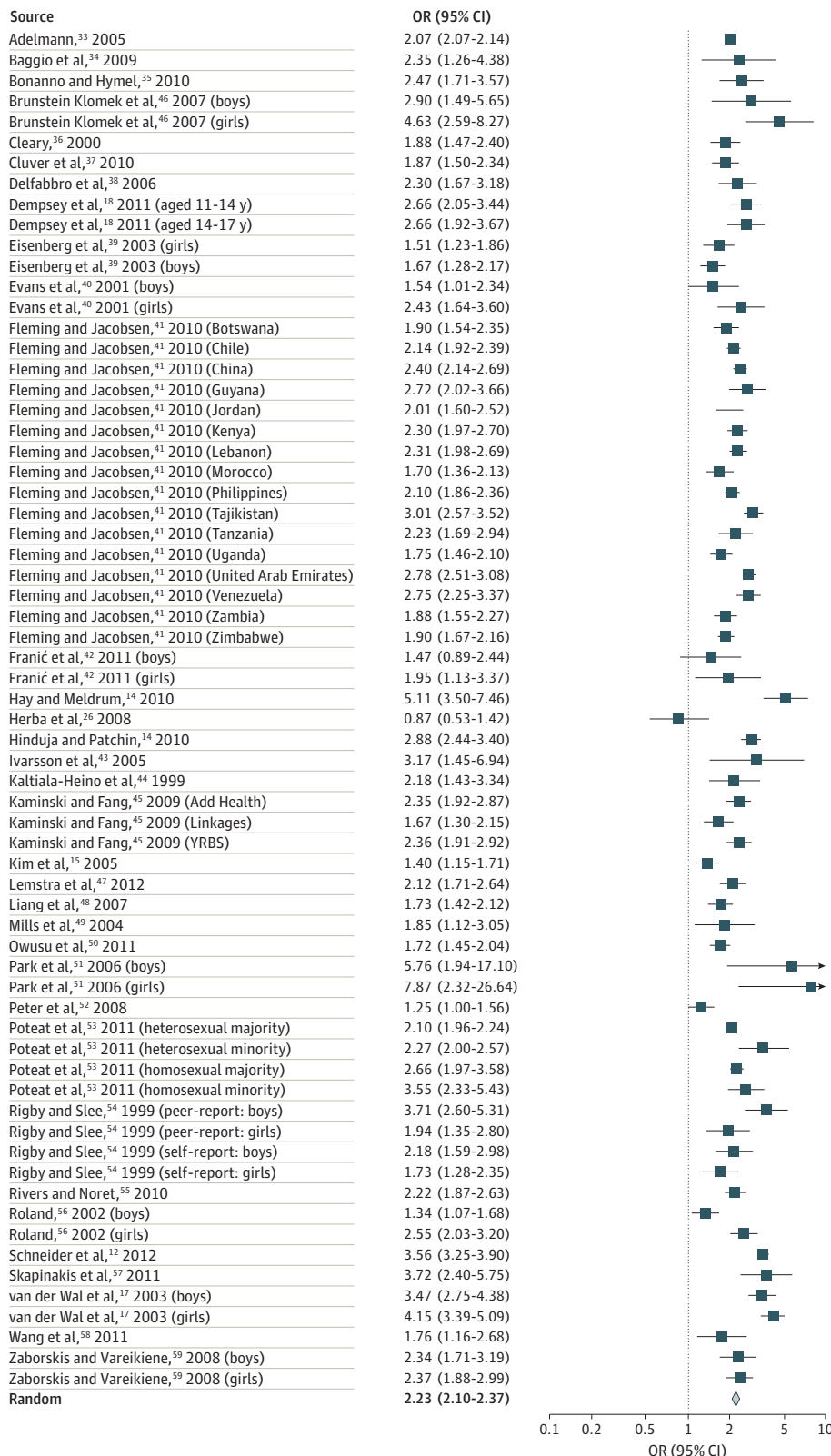
We performed several moderator analyses on the methodologic aspects of the studies. Studies using cluster samples, stratified samples, simple random samples, or census data did not differ significantly in effect size from those that used purposive or convenience sampling techniques ($Q_1 = 3.94$; $P = .14$). Studies using single items to assess suicidal ideation did not differ significantly from those using multiple items ($Q_1 = 0.54$; $P = .46$). Studies with a response rate higher than 75% did not differ significantly from those with a response rate lower than 75% ($Q_1 = 0.06$; $P = .81$). The difference in effect size between studies using only self-reports and those using other reports and self-reports was not significant ($Q_1 = 0.92$; $P = .34$). A meta-regression analysis indicated that there was no relationship between the number of confounders controlled for and the effect sizes of the studies ($z = -0.14$; $P = .89$).

Suicide Attempts

A total of 9 studies† were identified that focused on the relationship between bully victimization and suicide attempts. These studies yielded a total of 13 independent effect sizes. The age of the participants in these studies ranged from 9 to 21 years. All studies used only self-reports. Additional characteristics of each study are given in the Supplement (eTable 2). Meta-analytic results showed that there was a large degree of variance in study effect sizes ($Q = 107.62$; $I^2 = 88.85$). There was a significant relationship between peer victimization and suicide attempts (OR, 2.55 [95% CI, 1.95-3.34]). The results are summarized in the Table. The forest plot is provided in Figure 3. The Kendall τ was 0.11 ($z = 0.55$; $P = .58$). The Duval and Tweedle trim-and-fill procedure suggested that no studies needed to be imputed and that the obtained estimate was unbiased. The funnel plot is provided in the Supplement (eFigure 2). The funnel plot, Kendall τ , and Duval and Tweedle trim-and-fill procedure all suggest the absence of publication bias. To ensure that the results obtained were not due to studies with nonsignificant results that could not be identified, the Orwin fail-safe N was computed. We found that 127 studies with an OR of 1.00 would be needed to reduce the obtained results to a trivial OR of 1.10. Because of the small number of studies, we could not perform analyses on sex, age groups, victims and bully-victims, or cyberbullying for suicide attempts. We performed several moderator analyses on the methodologic aspects of the studies. Studies using cluster samples, stratified samples, simple random samples, or census data did not differ in effect size from those that used purposive or convenience

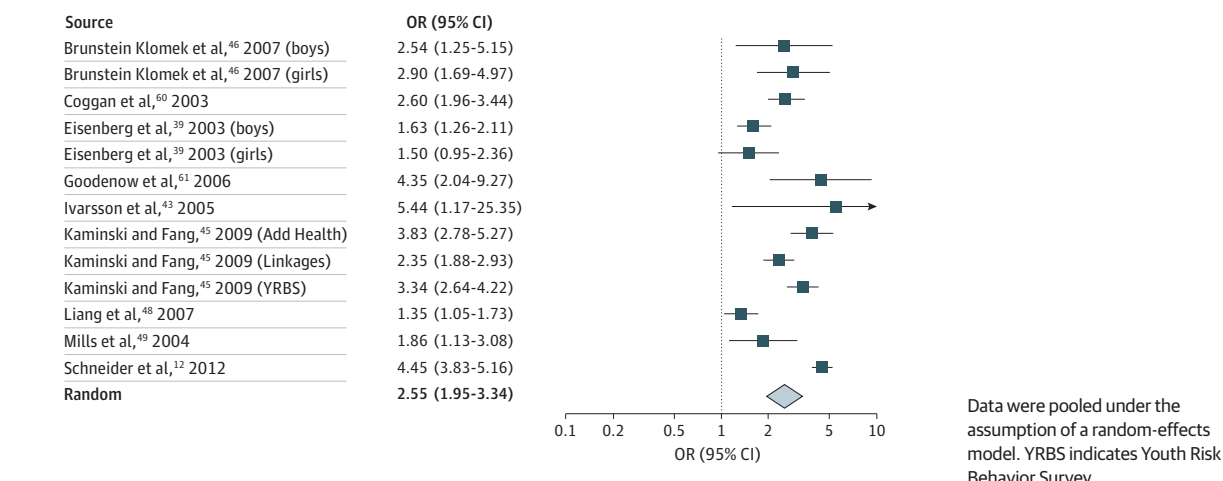
†References 12, 39, 43, 45, 46, 48, 49, 60, 61

Figure 2. Forest Plot of the Effect Sizes Between Peer Victimization and Suicidal Ideation



Data were pooled under the assumption of a random-effects model. YRBS indicates Youth Risk Behavior Survey.

Figure 3. Forest Plot of the Effect Sizes Between Peer Victimization and Suicide Attempts



sampling techniques ($Q_1 = 0.57; P = .45$). Studies using single items to assess suicide attempts did not differ significantly from those using multiple items ($Q_1 = 0.03; P = .86$). A meta-regression analysis indicated that there was no relationship between the number of confounders controlled for and the effect sizes of the studies ($z = 0.81; P = .42$).

Discussion

In this article, the results of a meta-analysis on the relationship between peer victimization and suicidal ideation or suicide attempts are reported. Results showed a positive relationship between peer victimization and suicidal ideation among 284 375 youths and a positive relationship between peer victimization and suicide attempts among 70 102 youths. Furthermore, this meta-analysis demonstrated that peer victimization is related to suicidal ideation for older as well as younger children, boys as well as girls, and victims as well as bully-victims. There were substantial differences between the studies evaluated in response rate, design, confounders that were controlled for, and use of self-report or peer reports of bullying. According to our analyses, these differences between the studies were not related to their effect sizes. Furthermore, analyses indicated that the results were not associated with publication bias. The absence of methodologic moderators and publication bias suggests that the relationship between peer victimization and suicidal ideation as well as suicide attempts is robust, and this meta-analysis further confirms that peer victimization is an important risk factor for adolescent suicide.^{6,7}

Our study did not confirm the notion that the relationship between peer victimization and suicidal ideation was moderated by age or sex. There are few studies^{16,17} to support this notion. Brunstein Klomek et al⁴⁶ suggested that, for girls, victimization immediately increases the risk for suicidal ideation, whereas for boys, only prolonged victimization is related to suicidal ideation; this hypothesis could

not be tested in the present meta-analysis, because the included articles did not provide the effect sizes necessary to address this relationship.

Whereas previous studies¹²⁻¹⁴ demonstrated that cyber-victimization is as strongly related to suicidal ideation as is traditional victimization, the present meta-analysis suggests that cyberbullying is even more strongly related to suicidal ideation. This result, however, needs to be interpreted carefully, because we could include only 3 studies to estimate an effect size for cyberbullying. Potentially, the effects of cyberbullying are more severe because wider audiences can be reached through the Internet and material can be stored online, resulting in victims reliving denigrating experiences more often.⁶⁷

Limitations

Limitations of the study include the broad construct of peer victimization that we used. Although bullying may be both verbal and physical, the effects of verbal and physical victimization may differ.¹⁸ Because most studies focused on combinations of different types of bullying, we could not analyze the effects of the different types. Suicidal ideation is also a broad construct, ranging from the wish to commit suicide to actually thinking and planning suicide. We could not analyze distinctions in the severity of suicidal ideation, because many studies mixed items of different severity to create an overall index of suicidal ideation or used only a single item to measure general ideation. In this meta-analysis, we provided moderator analyses for age and sex. Ideally, the effects of other confounders, such as psychopathology and suicide history, would also have been analyzed. However, of the studies that we analyzed, too few included data on earlier suicide attempts, and the studies that controlled for psychopathology focused on a broad range of disorders, so meaningful comparisons could not be made. Longitudinal studies on the relationship between peer victimization and suicide are scarce; thus, the present meta-analysis focused on cross-sectional studies. Most studies

focused on suicidal ideation as an outcome measure; others focused on self-reported attempts. What these studies have in common is that they did not evaluate actual suicide. Children who commit suicide may differ from those who perform a nonfatal attempt³¹; thus, it remains a question how far peer victimization is related to successful suicide. To our knowledge, only 2 studies^{12,31} focused on the relationship between peer victimization and suicide attempts resulting in hospitalization, and only 1 study³¹ included actual suicide; these investigations suggest that bullying is also a substantial risk factor for suicide attempts leading to hospitalization and completed suicides. Furthermore, suicidal

ideation is thought to invariably precede suicide attempts, and suicide attempts are the strongest known risk factor for future actual suicide.^{68,69}

Conclusions

Congruent with narrative reviews,^{6,7} this meta-analysis establishes that peer victimization is a risk factor of suicidal ideation and suicide attempts. Efforts should continue to identify and help victims of bullying, as well as to create bullying prevention and intervention programs that work.

ARTICLE INFORMATION

Accepted for Publication: August 29, 2013.

Published Online: March 10, 2014.

doi:10.1001/jamapediatrics.2013.4143.

Author Contributions: Drs van Geel and Tanilon had full access to all the data in the study and take responsibility for the integrity of the data and the accuracy of the data analysis.

Study concept and design: All authors.

Acquisition of data: van Geel, Tanilon.

Analysis and interpretation of data: All authors.

Drafting of the manuscript: van Geel.

Critical revision of the manuscript for important intellectual content: All authors.

Statistical analysis: van Geel, Tanilon.

Administrative, technical, and material support: Vedder.

Study supervision: van Geel, Vedder.

Conflict of Interest Disclosures: None reported.

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