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Review article

Bullying Prevalence Across Contexts: A Meta-analysis Measuring Cyber and Traditional Bullying

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A B S T R A C T

Bullying involvement in any form can have lasting physical and emotional consequences for adolescents. For programs and policies to best safeguard youth, it is important to understand prevalence of bullying across cyber and traditional contexts. We conducted a thorough review of the literature and identified 80 studies that reported corresponding prevalence rates for cyber and traditional bullying and/or aggression in adolescents. Weighted mean effect sizes were calculated, and measurement features were entered as moderators to explain variation in prevalence rates and in traditional–cyber correlations within the sample of studies. Prevalence rates for cyber bullying were lower than for traditional bullying, and cyber and traditional bullying were highly correlated. A number of measurement features moderated variability in bullying prevalence; whereas a focus on traditional relational aggression increased correlations between cyber and traditional aggressions. In our meta-analytic review, traditional bullying was twice as common as cyber bullying. Cyber and traditional bullying were also highly correlated, suggesting that polyaggression involvement should be a primary target for interventions and policy. Results of moderation analyses highlight the need for greater consensus in measurement approaches for both cyber and traditional bullying.

IMPLICATIONS AND CONTRIBUTION

To safeguard youth against harmful effects from bullying, policies and programs require a clear picture of prevalence across online and offline contexts. Meta-analytic findings indicate cyber bullying is considerably less prevalent than traditional bullying and they are highly correlated. Interventions should focus on reducing malicious behaviors wherever they occur.

Scholars have long recognized that prevention of youth aggression and bullying is a major public health issue [1]. Over the last decade, research emphasis has shifted to the prevention of aggression online, where adolescents can both bully and be victimized [2,3]. Data from published studies have helped illustrate that bullying involvement, either online or offline, adversely affects youth adjustment [4,5]. The realization that bullying in any context can have lasting physical and emotional consequences has lead parents, educators, and policymakers to embrace intervention efforts, and there is now substantial educational and clinical interest in programs that help to mitigate bullying's harmful outcomes [1,6]. In an effort to better understand the relative prevalence of online and offline bullying, a growing body of research has examined both in the same study. These studies have yielded evidence useful for designing prevention programs, but they also present mixed findings and vary in their approaches to measurement and methodological rigor. As a result, scholars lack a clear picture of the extent of the

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bullying problem online compared to offline, and how measurement approaches influence reported figures.

For policies and programs to safeguard youth against detrimental consequences from bullying, it is first crucial to delineate the settings in which bullying occurs. Unfortunately, although numerous studies have examined prevalence of cyber bullying and related constructs (e.g., cyber aggression, electronic aggression) and a subset of work has contrasted prevalence of cyber bullying with traditional bullying and related constructs (e.g., relational aggression), the extent to which adolescents differentially engage in aggression across online and offline contexts remains ambiguous. In the current meta-analysis, we take stock of findings to date to understand prevalence rates of both modes of bullying within the context of one another [7,8]. We use the general term "bullying" to describe harmful behaviors that occur in both cyber and noncyber contexts, because in practice, the distinction between bullying and aggression labels is not always clear [9]. Consequently, an expansive set of behaviors must be captured to empirically distill the literature on harmful behaviors that occur online and offline [10]. Moreover, whether variability in prevalence rates is partially due to differences in measurement and/or operationalization of the bullying and/or aggression construct remains an empirical question [11,12]. For example, explicit references to bullying and bullying definitions likely influence study results [11], and these and other measurement factors are considered as moderators that may help explain variability in rates across studies.

Online harm toward others has been captured under a broad array of terms including Internet harassment [13], Internet bullying [14], Internet aggression [15], and cyber bullying [16]. Whatever label scholars choose, adolescents likely deploy a core set of behaviors to intentionally harm others online [17]. The prevalence of these behaviors, although, is inconsistent. Illustratively, rates in the literature for cyber perpetration have ranged from 5.3% to 31.5% [18,19], and those for cyber victimization have ranged from 2.2% to 56.2% [19,20]. Investigations in this arena are particularly important, because even relatively small prevalence rates may belie harmful effects. An accumulating body of research suggests concerns about harmful effects of bullying may be magnified for aggression that transpires online [5].

Variability in prevalence rates is not confined to studies of online behavior. There are also wide differences in rates of traditional bullying among studies comparing prevalence of online and offline behavior. For instance, rates of traditional bullying perpetration have ranged from 9.68% to 89.6% [19,20], and there are similar discrepancies for bullying victimization: 9%–97.9% [19,21]. As a result of these variations, the pervasiveness of both online and offline bullying is difficult to ascertain. What could account for such divergent estimates?

Inconsistencies in measurement have featured strongly in explanations of disparate prevalence rates for both cyber and traditional aggression, and scholars have called for greater consensus in definition and measurement [11,12,22]. Definitions of bullying vary widely, and not all researchers endorse the most widely cited characterization of bullying: harmful and repetitive behaviors enacted by a perpetrator who is more powerful than his or her victim [7,8,23]. Definitions of cyber bullying are particularly controversial, and some scholars question the relevance of imposing the three bullying criteria (intentionality, repetition, and power-imbalance) on the technological realm [24,25]. Still, the effect of including a definition on prevalence is inconclusive [26]. In one experimental study, providing a definition had no effect on either online or offline victimization rates [12]. However, several other studies show that definitions do affect traditional prevalence rates, increasing perpetration rates but decreasing victimization rates [11,23].

Measurement features may also help to account for variation in figures. First, researchers operationalize bullying in many different ways. Some scholars include behavioral examples thought to characterize bullying (e.g., "have you posted mean messages online") and others evoke implicit definitions (e.g., "have you bullied someone over the internet?" or "have you made fun of or teased someone on-line") [11,12]. Behavioral examples may create false positives by priming a broad array of experiences that fall beyond the definition of bullying [12]. Alternatively, youth may discount experiences that fail to align with provided examples, and behavioral descriptors could produce lower bullying figures [10]. The complexity of measuring bullying is further muddied by use of the very term "bully," which may decrease reported prevalence [11,12], and use of behavioral descriptors such as "made fun of", and "tease", without highlighting an explicit intention to harm, which may increase prevalence [23,27]. Finally, sampling bias poses a general challenge to community-based research and may lead to distorted estimates of prevalence [28]. Thus, an analysis of convenience versus random samples may help to explain variability in rates across studies.

The degree of correlation between online and offline aggression involvements is also of considerable translational significance and accordingly has generated substantial scholarly discussion [7,29]. Evidence of strong correlations bolsters arguments that policy and interventions should focus on poly-aggression involvement, targeting how youth treat each other online and offline to reduce malicious behaviors, generally [30]. Weak correlations, conversely, intimate that technology has expanded the population of aggression-involved youth and suggest that cyber-focused interventions are a more useful public-health approach. Unfortunately, unlike studies of prevalence, the literature characterizing overlap in cyber and traditional bullying is marked by heavy variation. Illustratively, some studies identify relatively weak correlations between cyber and traditional involvements and suggest technology may be galvanizing a new breed of aggressive perpetrators and/or victims [31,32]. Other studies report very strong correlations [7,33], supporting interventions that target harmful behaviors generally, including but not limited to the cyber environment.

Just as for prevalence, disparate measurement approaches may account for some of the variation in correlations reported across studies. For instance, type of traditional aggression likely impacts correlations, and relational and cyber aggressions may be especially concomitant [34]. Furthermore, many traditional bullying scales investigate behaviors specific to the school environment by measuring bullying "at school" or by "students" [35]. Distressing online interactions can occur with school-based peers, but can also occur with peers known only through online contact, and with complete strangers [25]. Thus studies examining traditional bullying "at school" may describe less correspondence between traditional and cyber bullying than studies examining traditional bullying within a wider landscape. Conversely, measures that narrowly probe cyber incidents with "students" or originating "at school" may yield higher correlations [36]. Finally, just as for prevalence, sampling bias may affect apparent overlap between cyber and traditional aggression and needs to be accounted for in considering variation in correlations across studies.

In all, these discrepancies are important because policymakers, schools, and parents are hungry for information about

where to intervene with youth to diminish their harmful behavior involvement [37]. Before translating findings for advocacy and intervention, it is crucial to first present accurate estimates regarding the extent of the problem and to demonstrate how varying concepts and measures influence results. In an effort to provide a starting point and create a context for the literature to date, we conducted a meta-analysis of research measuring both cyber and traditional bullying in adolescents. Eighty studies reported prevalence rates for cyber and traditional perpetrations, for cyber and traditional victimizations, or for all four types of bullying [e.g., 38-97]. Following best practice recommendations from Lipsey and Wilson [98], we coded and analyzed studies that together provide a sample of 335,519 youth, to estimate mean prevalence rates and identify the degree of overlap between cyber and traditional bullying across studies. Furthermore, we examined whether study features accounted for systematic variability in prevalence rates and correlations across studies.

Methods

Study selection

We employed several methods to locate possible eligible studies. First, we conducted a database search using PSYCInfo, PubMed, Educational Resources Information Centre, Proquest Dissertations and Theses, Scopus, and Google Scholar entering a combination of the following keywords: adolescent, juvenile, teenage, bully, victim, perpetrator, aggression, cyber, on-line, internet, text, and electronic. To decrease publication bias, we included dissertations and theses. Finally, we reviewed the reference list of each located article for studies that could potentially be included in our sample. We limited the studies in our analyses to those that met the following inclusion criteria: written in English; included an adolescent sample (age range including at least some youth ages 12–18 years); was self-report with a recall period immediately preceding data collection; reported concurrent prevalence rates for both cyber and traditional bullying; focused on peer (not sibling) bullying; and was not based on a unique subset of youth (e.g., deaf youth). Our original search drew 1,951 studies, and from the articles originally identified, our final sample consisted of 80 studies that were coded for study- and measurement-level effects. Supplementary Table 1 specifies our decision steps for study exclusion, and Supplementary Table 2 outlines the 87 studies that were excluded based on a full-document search.

Study coding

First, K.L.M. and J.M. created a provisional coding form and a manual. Next, they independently pilot coded five studies and then revised the coding criteria based on any identified issues. These same articles were recoded at the end of study, with perfect test–retest reliability. After pilot testing, the same researchers independently coded the studies, with a 98% agreement rate between coders. When coding information was missing or unclear, we contacted the study's primary author to request the required information. Because we were primarily interested in the moderating effect of measurement, where possible, we located the specified instrument from each study to verify definitions, wording, and items. Furthermore, because sample representativeness arguably affects prevalence estimates, we coded for whether researchers introduced a degree of randomness into their protocol, such as random-digit dialing or randomly selecting classes within schools.

Statistical analyses

We used fixed-effects models for several reasons. First, we aimed to understand variability in prevalence rates across existing studies, rather than extrapolate to a wider population of studies that may not have been included in the analysis. Particularly because cyber bullying is an emerging area of study, we deemed this a reasonable assumption. Furthermore, too much between-study variation results in underpowered random-effects models and given the wide range in prevalence rates across studies, we presumed that random error would make it particularly difficult to detect small-to-moderate moderator effects. Nonetheless, we tested this last assumption by running exploratory random-effects analyses.

Prevalence rates

We divided all prevalence rates by 100, resulting in proportion estimates for each dependent variable. Only one prevalence rate was recorded for each dependent variable within each study, to avoid violating independence assumptions. Because calculating an effect size directly from a proportion underestimates the confidence interval around the mean, we converted each proportion to a logit using a log transformation [98]. For each dependent variable, we computed a weighted mean effect size so that studies based on larger samples were given more weight than those based on smaller samples [98]. Results were transformed back to proportions from logits for ease of interpretation.

Degree of association

Effect sizes for degree of association between cyber and traditional aggressions were represented using Pearson correlations. We converted Spearman's rho and Kendal's tau to Pearson's *r* values based on Gilpin [99] and used beta coefficients to estimate correlation coefficients based on Peterson and Brown [100].

Differences in prevalence rates

To compare whether each moderator variable was more strongly associated with either cyber or traditional aggressions, we calculated *Z* values using the standard formula:

$$Z = \frac{B_1 - B_2}{\sqrt{se(B_1)^2 + se(B_2)^2}}$$

The *Z* values, which can be thought of as beta weights for each independent variable, controlled for other independent variables in the model.

Results

Mean prevalence rates

As described in the top half of Table 1, cyber bullying was less prevalent than noncyber (traditional) bullying across both perpetration and victimization. The sample-size weighted mean prevalence rates across contexts were remarkably similar for cyber perpetration (16; 95% confidence interval [CI], .15–.16)

Table 1
Prevalence estimates for cyber and traditional bullying (top) and measurement effects on cyber versus traditional prevalence (bottom)

Prevalence	Perpetration			Victimization		
	Cyber	Traditional		Cyber	Traditional	
Estimate	.155	.345		.152	.36	
Low	.153	.343		.151	.358	
High	.157	.348		.154	.362	
n	52	52		72	72	
Q(df)	Q(51) = 13300.8	Q(51) = 19470.5		Q(71) = 22312.4	Q(71) = 37782.2	
Prevalence predictors	Cyber estimate (SE)	Traditional estimate (SE)	Difference (Z)	Cyber estimate (SE)	Traditional estimate (SE)	Difference (Z)
Intercept	−.78 (.04)**	−.83 (.03)**		−.07 (.03)*	−.65 (.02)**	
Definition	.71 (.02)**	.9 (.02)**	6.89**	.42 (.01)**	.85 (.01)**	22.85**
Example	−.26 (.03)**	.52 (.03)**	19.21**	−.81 (.02)**	−.05 (.02)*	23.46**
Bully	−1 (.03)**	−.8 (.02)**	5.50**	−.97 (.02)**	−.34 (.02)**	23.93**
Fun/tease	.1 (.03)**	.39 (.02)**	8.48**	.24 (.02)**	1.11 (.01)**	40.49**
Random	−.84 (.02)**	−.38 (.01)**	18.45**	−.9 (.01)**	−.72 (.01)**	11.02**
n	48	48		67	67	
Q(df)	Q(42) = 6050.6	Q(42) = 10869.5		Q(61) = 14790.4	Q(61) = 24069.8	

Estimates for mean confidence intervals are transformed from logits. All Q statistics significant at $p < .001$. All variables coded as 0 = no and 1 = yes.
Definition = measure includes definition with three key bullying criteria; Example = measure includes example of targeted behaviors; Bully = measure references bully and/or bullying; Fun/tease = measure includes making fun or teasing without indicating harm or hurt; SE = standard error.
*$p < .05$.
**$p < .001$.

and victimization (.15; 95% CI, .15–.15) and for traditional perpetration (.35; 95% CI, .34–.35) and victimization (.36; 95% CI, .36–.36). Cochran Q statistics, calculated to assess homogeneity of the effect sizes for each dependent variable and following a chi-square distribution, indicate substantial variability in prevalence rates across all four outcomes. Figure 1 displays the prevalence rates graphically in the form of proportion of youth reporting being a perpetrator and Figure 2 graphically displays proportion of youth reporting being a victim. Notably, examination of the *pattern* of study findings across both figures reveals that most studies report higher offline rates than online rates.

Prevalence-moderator effects

The bottom half of Table 1 describes the results of moderator analyses focusing on measurement effects. It is noteworthy that almost all the measurement effects influenced both cyber and traditional aggressions in the same direction. However, there are clear differences in the *strength* of measurement effects on cyber and traditional aggressions, and the pattern of strength differences is nearly identical across perpetration and victimization.

Beginning with the first-listed predictor (middle of Table 1), results indicate that using a definition with a clear reference to intent to harm, repetition, and power imbalance is related to higher prevalence rates for both cyber and traditional bullying, although the effect is stronger for traditional than for cyber. Furthermore, providing respondents with behavioral examples is generally linked with lower prevalence estimates, with one exception. Behavioral examples are associated with higher traditional perpetration rates.

Working downward on the table, results demonstrate that including the term "bully" is related to lower prevalence rates for all four aggression indices, although the effect is stronger for cyber than for traditional bullying. Inclusion of the term "fun" or "tease" shows an opposite pattern and is associated with more prevalent aggression, with a stronger effect for traditional than cyber bullying. Finally, randomization is associated with lower prevalence rates across the four dependent variables, although the negative effect of researcher-imposed randomization is stronger for cyber than for traditional aggression.

Mean degree of association between cyber and traditional bullying

Described at the top of Table 2, the sample-size weighted mean correlation between cyber and traditional perpetration across studies was $\bar{r} = .47$ (95% CI, .47–.47), and the association between cyber and traditional victimization was $\bar{r} = .40$ (95% CI, .40–.41). These results indicate a moderately strong association. Again the Q statistics indicate a great deal of variability in degree of association between cyber and traditional bullying across studies. The correlations are displayed graphically in Figure 3. The pattern of study findings reveals that the correlations between cyber and traditional perpetration are generally higher than those between cyber and traditional victimization.

Correlation-moderator effects

The bottom of Table 2 describes moderator effects on the degree of association between cyber and traditional aggressions. Accounting for the range of estimated correlations within these models, the positive coefficients indicate a stronger degree of association and the negative coefficients indicate a weaker degree of association between cyber and traditional bullying. Thus, focusing on perpetration (bottom left of Table 2), associations based on relational perpetration have stronger correlations between cyber and traditional bullying ($Z = .84$; $\bar{r} = .69$), whereas associations based on general traditional bullying or other bullying subtypes have relatively weaker, although still positive associations (intercept; $Z = .48$; $\bar{r} = .45$). Furthermore, studies based on school-centered traditional perpetration report weaker correlations ($Z = .41$; $\bar{r} = .39$) compared to studies that do not focus on school-based traditional perpetration (intercept;

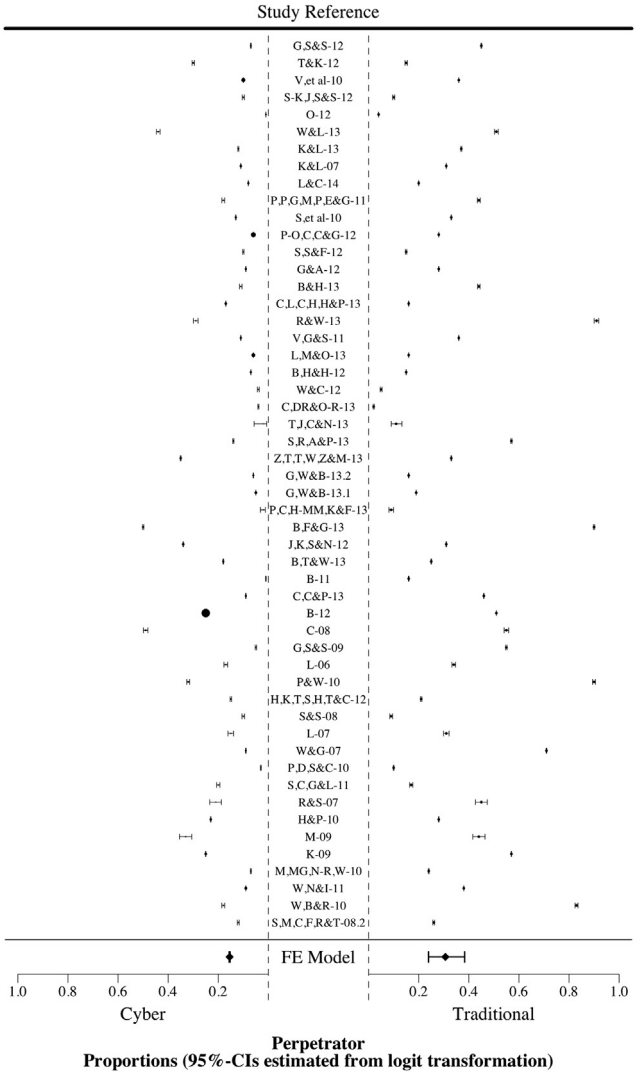

Figure 1. Error bar charts with effect sizes and 95% CIs from studies reporting prevalence rates of cyber and traditional perpetration in adolescents. Size of point scaled based on sample size. FE = fixed effect.

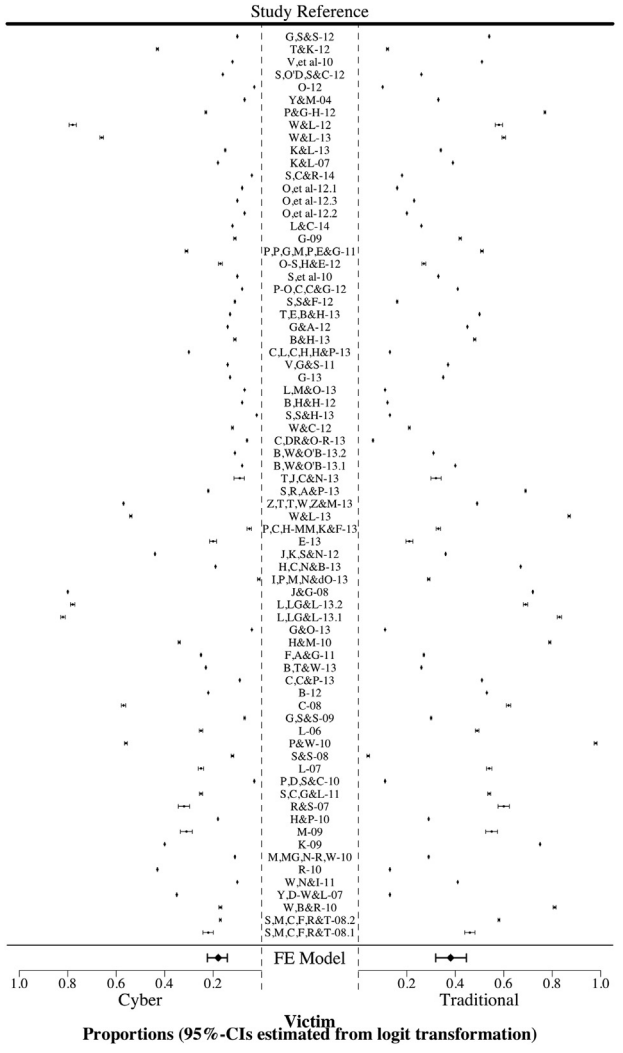

Figure 2. Error bar charts with effect sizes and 95% CIs from studies reporting prevalence rates of cyber and traditional victimization in adolescents. Size of point scaled based on sample size. FE = fixed effect.

$Z = .48$; $\bar{r} = .45$). Studies with some degree of researcher-imposed randomization also report weaker, although still positive associations between cyber and traditional perpetration ($Z = .37$; $\bar{r} = .35$).

The bottom right of Table 2 describes moderator effects on the correlation between cyber and traditional victimization. Only relational victimization significantly impacted the correlation. Specifically, traditional relational measures have stronger positive correlations between cyber and traditional victimization ($Z = .65$; $\bar{r} = .57$) than do traditional measures that are not strictly based on relational victimization (intercept; $Z = .32$; $\bar{r} = .31$).

Exploratory analyses

Our final set of analyses was exploratory and examined whether effects would hold under the more conservative random-effects models. There were only small differences in prevalence rates when comparing fixed- and random-effects models. Finally, random-effects analyses (available upon request) resulted in few statistically or substantively meaningful moderator effects. There appeared to be too much random variability in prevalence rates between studies for moderators to systematically explain their variance.

Discussion

Summary

This meta-analysis is the first to take stock of the literature on prevalence of cyber compared to traditional bullying. In doing so, we found that in the context of studies that have measured both forms of aggression to date, cyber bullying was far less prevalent, with rates that are less than half of those of traditional bullying. Moreover, the pattern of study findings was consistent both within and across studies; most studies reported higher offline rates than online rates. These trends have recently been implied but not yet tested empirically across existing studies [7,29].

Table 2
Degree of association (top) and predictors of degree of association between cyber and traditional bullying (bottom)

	Cyber and traditional perpetration	Cyber and traditional victimization
Correlation estimate	.469	.402
Low	.465	.398
High	.474	.406
n	36	37
Q(df)	Q(35) = 7821.3	Q(36) = 6290.8
Correlation predictors	**Perpetration estimate (SE)**	**Victimization estimate (SE)**
Intercept	.48 (.02)*	.32 (.02)*
Trad relational	.36 (.01)*	.33 (.01)*
School/student trad	−.07 (.02)*	−.01 (.02)
School/student cyber	.00 (.01)	−.02 (.01)
Random	−.11 (.01)*	.01 (.01)
n	34	32
Q(df)	Q(29) = 2936.2	Q(27) = 796.1

All Q statics significant at $p < .001$. All variables coded as 0 = no and 1 = yes. Trad relational = correlation based on relational bullying versus combined or other bullying types; School/student trad = traditional bullying measure references students and/or school; School/student cyber = cyber bullying measure references students and/or school; SE = standard error.
*$p < .001$.

Correlations between traditional and cyber bullying were also relatively strong, and when relational aggression was considered, the associations between online and offline bullying were particularly robust. Findings suggest that cyber and traditional measures may reflect different methods of enacting a similar behavior (being mean to others) and the form (online vs. offline) of bullying may be less important than the conduct [101].

Prevalence and moderator effects

Across 80 studies that report rates for cyber and traditional perpetration, cyber and traditional victimization, or both, we found mean prevalence rates of 35% for traditional bullying involvement and 15% for cyber bullying involvement. Consistent with our pattern of findings, Olweus [7] found that cyber bullying was considerably less prevalent than traditional bullying within large samples from the United States and Norway. Our findings are also consistent with research generated by Salmivalli et al. [29], who found that cyber bullying was far less prevalent than traditional bullying within their KiVa data. Based on disparate prevalence rates, these scholars have asserted that interventions should not shift attention from traditional to cyber settings. Our findings are consistent with this hypothesis and suggest interventions that exclusively target cyber contexts are neglecting a highly salient setting for preventing youthful bullying, at least in terms of prevalence. However, we maintain rather than focusing on the setting (e.g., online vs. offline) of bullying, efforts to prevent detrimental effects of bullying may be best served by focusing on the *behavior* of bullying—working to reduce harmful conduct wherever it occurs [6,101].

David-Ferdon and Hertz [102] noted previously, and our results substantiate, that measurement factors systematically drive variability in cyber bullying prevalence rates. Notably, similar measurement dimensions also moderated traditional perpetration results, in the same direction and often with stronger effects. For example, including a definition with three

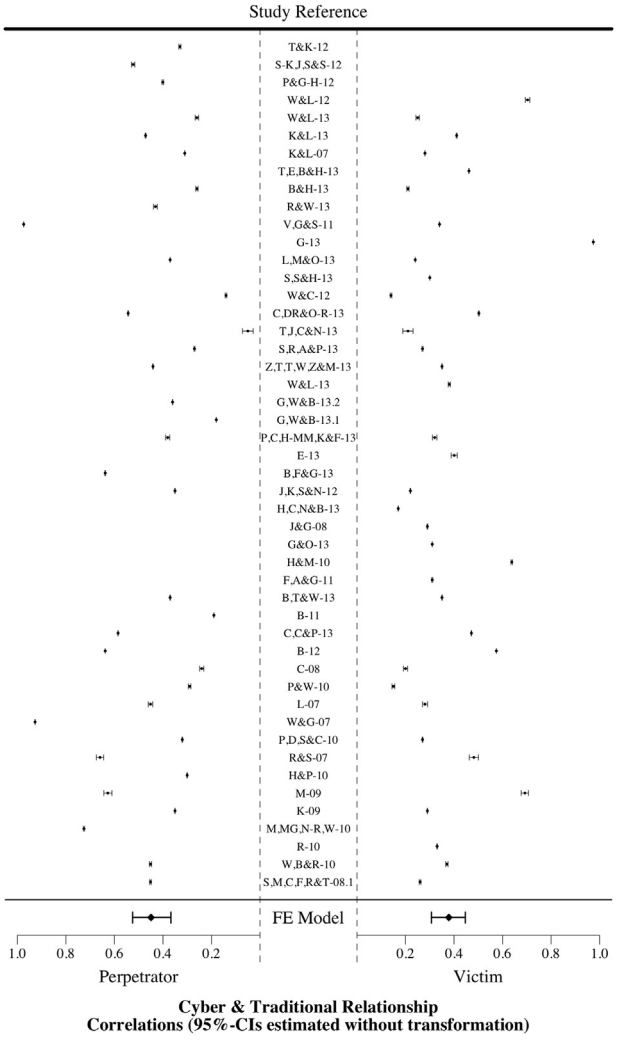

Figure 3. Error bar charts with effect sizes and 95% CIs from studies reporting overlap in cyber and traditional bullying in adolescents. Size of point scaled based on sample size. FE = fixed effect.

main bullying criteria increased prevalence across all four outcomes. It may be that without a definition, youth conjure aggressive incidents such as physical fighting [23], which are less common than bullying [103]. In contrast, behavioral examples decreased prevalence for three of four outcomes. One interpretation of this negative effect is that examples help to further clarify and encapsulate bullying definitions [104]. An alternative interpretation is that youth are underreporting harmful incidents because behavioral examples are not representative of adolescents' experiences [105]. Further research is needed to reconcile these different interpretations.

A number of other measurement features also moderated prevalence rates and in expected directions. For example, use of the term "bully" produced lower prevalence rates across outcomes, and this effect was particularly strong for cyber aggression. Conceivably, the term "bully" and its associated negative implications may deter youth from conceptualizing their involvement as such [106], and this hesitancy may be especially salient for cyber aggression. Not surprisingly, the use of terms such as fun and/or tease increased rates across outcomes;

perpetrators *and* victims may be unsure how to characterize ambiguous behaviors such as teasing or poking fun [106]. Notably, whether researchers imposed any randomization was one of the stronger predictors of prevalence. Randomization leads to lower prevalence, and this effect was particularly strong for cyber aggression. These findings highlight a need for random rather than convenience samples within the field.

Cyber and traditional correlations and moderator effects

Many previous studies have measured cyber and traditional aggressions but ignored the overlap between the two [29]. We identified mean correlations between cyber and traditional bullying across studies and characterized measurement features that help to account for this relation. Our meta-analytic results indicate fairly high correspondence between cyber and traditional perpetration ($\bar{r} = .47$) and between cyber and traditional victimization ($\bar{r} = .40$). The associations between online and offline aggressions were also heavily influenced by type of traditional aggression in the model, and correlations based on traditional relational aggression were particularly strong, perpetration ($\bar{r} = .69$) and victimization ($\bar{r} = .57$).

These findings suggest more behavioral similarities across online and offline settings than differences. What we can infer from this heavy overlap is that focusing exclusively on cyber contexts may not be the optimal approach to reducing harmful behaviors among youth. Instead, interventions should target how youth treat each other to reduce cruelty and meanness and increase respectful and positive behaviors, generally, across settings [29]. Of course, online and offline bullying were not perfectly correlated, and certain new victims may stem from the online environment. There could be many explanations for this, including access to Internet, cell phones, or the ease of cyber communication and its lack of personal cues [107]. More typically, however, youth who are involved in cyber bullying are also involved in traditional bullying, especially relational bullying.

Only a few other measurement features influenced the degree of association between cyber and traditional bullying, and these features affected only perpetration not victimization. First, because cyber bullying can involve non–school-based peers [35], we hypothesized that school-based traditional instruments might diminish correspondence between cyber and traditional bullying. As expected, school-based measures decreased overlap for perpetration, although the effect was weak. Second, sampling bias is a practical concern for community-based research, and we hypothesized that researcher-imposed randomization would affect correspondence between cyber and traditional bullying. Consistent with this notion, researcher-imposed randomization functioned to decrease overlap in perpetration, although again this effect was small. These results again underscore the need for random rather than convenience samples within the literature.

Limitations

Our findings must be considered in light of the study's limitations. First, only a subset of studies within the larger literature reported both cyber and traditional bullying prevalence ($n = 80$). Because of large between-study variance, we used fixed-effects analyses, so that results must be interpreted only within the context of studies in our sample. As the literature grows, we encourage further meta-analytic work based on larger samples under a random-effects model.

It is also worth considering whether traditional estimates describe harmful behaviors that occur solely offline. It is possible that, lacking qualifiers to designate offline events, some traditional assessments may capture malicious actions that occur online. However, this potential bias may be less likely within our data, because we examined studies that considered both types of bullying and youth may have been primed to consider these behaviors separately.

Finally, concerns about cyber bullying's prevalence are magnified by worries about its particularly deleterious consequences. Illustratively, one recent meta-analysis indicates that cyber bullying represents a particularly problematic mental health risk for victims [5]. This meta-analysis cannot speak to the different effects of cyber compared to traditional bullying. Nor can results address whether putative mediators of change are similar for both types of behaviors [6,108]. Rather, our findings anchor prevalence estimates across studies to describe the contexts in which bullying occurs, and further meta-analytic research must address antecedents and outcomes of both types of bullying.

Implications for policy and prevention

This is the first study to undertake a systematic review of the literature to uncover mean prevalence rates for cyber compared to traditional bullying. In doing so, we find that cyber bullying is far less prevalent than traditional bullying. Notwithstanding bullying within the online environment may have particularly pernicious effects on adolescent's health [5]; their involvement in this phenomenon remains less common at present. Moreover, cyber and traditional aggressions were highly correlated, indicating that youth are similarly involved in aggression across online and offline contexts. The implication of this relatively heavy overlap is that the form of communication may be less important than the behavior itself. Given that traditional bullying is more widespread than cyber bullying and given the heavy overlap between both forms of aggression, policies and programs may be best served by improving overall functioning in youth engaged in aggression or bullying more broadly, rather than focusing on hurtful behaviors that occur within a specific setting [8,29].

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Supplementary Data

Supplementary data related to this article can be found at http://dx.doi.org/10.1016/j.jadohealth.2014.06.007.

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