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School connectedness and suicidal thoughts and behaviors: A systematic meta-analysis

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Abstract

Among the protective factors associated with reduced risk for suicide, scientific inquiries into *school connectedness* are especially important considering that schools are ideally situated to provide interventions reaching the vast majority of youth. Although there is a wealth of research that supports the association between school connectedness and reduced self-report of adolescents having a suicidal thought or making a suicide attempt, inconsistencies in the way studies have measured and operationalized school connectedness limit synthesis across findings. This meta-analytic study investigates the literature exploring associations between school connectedness and suicidal thoughts and behaviors across general and sub-populations (high risk and sexual minority youth) using a random effects model. Eligible studies examined a measure of school connectedness explicitly referred to as "school connectedness" or "connections at school" in relation to suicidal ideation or suicide attempts among youth enrolled in school (grades 6–12). Multiple meta-regression analyses were conducted to explore the influence of school connectedness measurement variation, as well as participant characteristics. Results, including 16 samples, support that higher school connectedness is associated with reduced reports of suicidal thoughts and behaviors across general (*OR* = 0.536), high-risk (*OR* = 0.603), and sexual minority (*OR* = 0.608) adolescents. Findings are consistent when analyzed separately for suicidal ideation (*OR* = 0.529) and suicide attempts (*OR* = 0.589) and remain stable when accounting for measurement variability. Although limited by its cross-sectional nature, findings support recent calls to increase school connectedness and proffer important implications for screening and intervention efforts conducted in schools.

Keywords

school connectedness; suicide; adolescent; meta-analysis; sexual minority

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Suicide remains a significant public health concern, globally accounting for 8.5% of deaths among adolescents and young adults between ages 15 to 29 (World Health Organization, 2016). Considering the critical importance of suicide prevention, a large body of literature has investigated the influence of protective factors against suicidal thoughts and behaviors (STB) during adolescence. In recent years, the idea that perceived connectedness may serve as a protective factor against STB during adolescence has garnered considerable attention. Scientific inquiries have focused on adolescent connectedness to parents, family, peers,

school, and communities in relation to a wide range of health behavior outcomes (Barber & Schluterman, 2008). Understanding the influence of *school connectedness* on STB is especially important given the critical role schools play in adolescent development and because schools are ideally situated to provide interventions reaching the vast majority of youth.

A rich literature base supports an inverse relationship between adolescent school connectedness and STB (e.g., Whitlock, Wyman, & Moore, 2014). Synthesis of these findings, however, is limited by inconsistences in the way studies have measured and operationalized school connectedness and the wide variability of participant sample characteristics included in studies. This fragmentation limits our understanding of the practical, theoretical, and scientific implications of school connectedness as a protective factor against STB. For example, are there particular categories of school connectedness that school psychologists should prioritize over others? Are there critical sub-populations that school psychologists and researchers should target their intervention efforts towards in order to prevent STB? The meta-analytic study presented here, which elucidates the influence of measurement and sample variation on the association between school connectedness and STB, will help answer these questions.

School connectedness: Definition and measurement

One of the most widely accepted definitions of school connectedness was initiated by the Wingspread declaration on school connections (Blum & Libbey, 2004). As described by Waters and Cross (2010), school connectedness may be defined as "the belief by students that adults in the school community care about students' learning and about them as individuals" (p. 165). In practice, this includes supportive academic expectations, positive teacher–student interactions, and a safe environment. Based on a review of the literature, Barber and Schluterman (2008) operationalized school connectedness to include three distinct components –interpersonal relationships, relationship to the school, and attitudes towards school importance. Taken together, school connectedness may include: (1) *social affiliations*: positive school relationships, feeling cared about and/or respected by adults at school, perceiving availability to interact with adults at school; (2) *school belonging*: feeling part of the school, feeling safe in school, feeling happy at school; (3) *attitude about school importance*: caring about school, trying to do one's best at school; and (4) *supportive learning environment*: clear and appropriate expectations, perceived fairness.

A wide variety of instruments are available to measure student and staff perceptions of school connectedness, spanning from single-item questions (e.g., "Do you feel like you belong at this school?") to more complex, multi-item instruments addressing several school connectedness categories. Most of these scales use a unit-weighted approach, averaging equally weighted items together to yield one composite score (Waters & Cross, 2010). One of the first scales to measure school connectedness was the Psychological Sense of School Membership scale (PSSM; Goodenow, 1993). Although the PSSM was initially designed to yield a single school connectedness construct, factor analyses conducted after its development identified multiple underlying constructs (Lohmeier & Lee, 2016). Thus more recent scales, such as the School Connectedness Scale (SCS; Lohmeier & Lee, 2016), have

included as many as 7 components. The most commonly used instruments, however, yield a unidimensional measure of school connectedness. These include instruments designed to measure multiple constructs with a school connectedness subscale (e.g., the Adolescent Family and Social Life Questionnaire; Yen & Shieh, 2005) and single item queries of school or teacher connectedness (e.g., Seil, Desai, & Smith, 2014). One of the most widely used measures of school connectedness is the 3- to 7-item school connectedness scale developed for the National Longitudinal Study of Adolescent Health (Add Health; Resnick et al., 1997). The Add Health scale has demonstrated satisfactory reliability when examined as a 5-item construct (α = .82 to .88; Furlong, O'Brennan, & You, 2011); however, studies that use this scale may include as few as two items. Although the variability across these instruments highlights the richness of the school connectedness literature to date, it also makes the compilation of findings across studies (e.g., meta-analytic analysis) difficult.

School connectedness and health risk behaviors

Empirical evidence overwhelmingly supports the protective role of school connectedness against risky health behaviors. For example, a systematic literature review including 18 studies (Markham et al., 2010) provided evidence that adolescent school connectedness protects against early and frequent sexual activity. Another systematic review examining emotional health (Kidger, Araya, Donovan, & Gunnell, 2012) demonstrated that teacher support, general school connectedness, and additional components of school environment (i.e., happiness with school, feeling safe at school, feeling close to people at school) have an inverse relationship to negative emotional health and suicidal behavior. Finally, a recent review of connectedness and suicidal outcomes (Whitlock et al., 2014), which identified 10 studies focused on school context, revealed that school connectedness was largely associated with reduced STB. As noted by the researchers, however, two studies that employed models accounting for multiple interactions and contexts did not indicate an inverse relationship between school connectedness and STB, suggesting more complex interactions may be at play.

The protective role of school connectedness against STB has also been revealed across more vulnerable groups, such as American Indian youth with a history of sexual abuse (Pharris, Resnick, & Blum, 1997), sexual minority or lesbian, gay, bisexual, and transgendered (LGBT) youth (Duong & Bradshaw, 2014; Whitaker, Shapiro, & Shields, 2016), and students with other risk factors, such as residing in high-risk communities (e.g., Kaminski et al., 2010), experiencing physical or sexual abuse (e.g., Eisenberg, Ackard, & Resnick, 2007), having been investigated by child welfare (He, Fulginiti, & Finno-Velasquez, 2015), engaging in sexual activity (Stone, Luo, Lippy, & McIntosh, 2015), and experiencing bullying (Cole-Lewis, Gipson, Opperman, Arango, & King, 2016). Although these findings are based on diverse participant samples, they underscore the critical importance of enhancing school connectedness to protect against STB.

Shedding light on *how* connectedness may protect against STB, Whitlock and colleagues (2014) proposed a model identifying three pathways linking connectedness to STB: (1) intrapersonal responses and processes, encompassing perceived rejection and isolation; (2) collective responsibility and action, supporting more avenues for risk identification; and (3)

positive norms and expectations, reinforcing help-seeking behavior and identifies STB risk as problematic. A number of foundational theoretical frameworks support these mechanisms, including ecological systems theory (Bronfenbrenner, 1979) and attachment theory (Ainsworth, 1979).

The Current Study

Adolescents who feel connected to their family, peers, and schools are less likely to engage in health risk behaviors. Although the former forms of connectedness (i.e., family, peers, and communities) may have critical implications for preventing STB, they are largely beyond the control of the school. *School connectedness*, however, is an important protective factor against STB that does fall within the purview of school psychology. Thus, the primary aim of this meta-analytic investigation is to examine the association between school connectedness and STB.

Although previous reviews have addressed the importance of adolescent connectedness in relation to STB (Whitlock et al., 2014) and additional reviews have explored school connectedness and school environment across a number of health outcomes (Kidger et al. 2012; Markham et al., 2010), the current study is the first to compare pooled effect sizes across studies specifically examining school connectedness in relation to STB. By reviewing findings from cross-sectional and longitudinal studies that examined adolescent (grades 6–12) school connectedness and STB, findings from this investigation will answer the following questions: (1) What is the strength of association between school connectedness and STB, and (2) How does the magnitude of association differ across varying subpopulations and measures of school connectedness? The primary hypothesis is that high levels of school connectedness will relate to reduced reports of STB across general, high-risk, and sexual minority samples. It is also hypothesized that effect sizes will remain consistent across differing categories of school connectedness.

Methods

Literature search

The systematic search and retrieval process used a standardized review protocol based on Lipsey and Wilson's (2001) meta-analysis guide and recommendations from Meta-Analysis Reporting Standards (American Psychological Association, 2008). The study aimed to identify and retrieve all empirical studies that examined the relation between school connectedness and suicidal ideation or suicide attempts conducted at any time in any geographical location. We conducted a comprehensive search of PsycINFO, Academic Search Premier, and PubMed from June 15, 2016 to July 24, 2016 using the search terms *school, connect**, and *suicid** and searched for studies in Whitlock and colleagues' (2014) review article. We conducted a thorough examination of titles, abstracts, and full articles to assess eligibility of studies. Studies were selected for meta-analysis based on the following eligibility criteria:

1. The study investigated the association between school connectedness and suicidal ideation (SI), suicide attempts (SA), or a combination of SI and SA, referred to as STB.
2. The measure of school connectedness was explicitly referred to as "school connectedness" or "connections at school" and included at least one of the four categories described previously (affiliation, belonging, attitudes, environment).
3. The study was published in English.
4. The sample included youth attending school, grades 6–12.

We excluded studies that did not directly examine the association between school connectedness and SI, SA, or STB or did not report sufficient data to calculate a measure of effect between the variables of interest (e.g., studies examining school connectedness as a mediating or moderating variable only).

Data extraction

Two review authors independently extracted and coded data based on a predetermined standardized coding manual. We selected the following moderator variables of interest *a priori* to test the potential for methodological factors to influence heterogeneity of effect sizes:

1. Region of Recruitment (US versus international).
2. Percent Caucasian/white.
3. Percent female.
4. Timeframe of STB (past 2 weeks, past 12 months, or lifetime).
5. Categories of School Connectedness (social affiliation, school belonging, attitude about importance of school, or supportive learning environment). For each study, a dichotomous (yes/no) code was applied for each category resulting in four moderator variables.

In order to conduct sensitivity analyses examining effect sizes separately among subsamples, we also coded studies based on the population sampled. After accounting for eligibility criteria, two subsamples with a minimal number of studies to pool effect sizes emerged:

1. Samples described as risky, including students involved in child welfare, reporting feeling isolated or involvement in bullying, residing in high-risk neighborhoods, and reporting being sexually active.
2. Samples described as sexual minority or LGBT youth.

We measured coder consistency for high inference variables (school connectedness categories) with Cohen's kappa (affiliations, $\kappa = 1$; belonging, $\kappa = .842$; attitude, $\kappa = 1$; environment, $\kappa = .842$; Yeaton & Wortman, 1993). Disagreements were resolved through discussion until consensus was reached between coders.

Statistical Methods

We conduced meta-analyses using Biostat's Comprehensive Meta-analysis (www.meta-analysis.com) (Borenstein, Hedges, Higgins, & Rothstein, 2015). A random effects model was selected *a priori* to account for sampling error and random effects variance (Lipsey & Wilson, 2001). The primary meta-analysis examined the average effect size of associations between school connectedness and any STB, including the mean of SI and SA in samples that included both outcomes, or SI or SA in samples that included only one outcome. Two secondary meta-analyses examined associations between school connectedness and SI and SA separately. Sensitivity analyses also examined pooled effect sizes separately across studies investigating school connectedness and STB among high-risk and sexual minority youth. Finally, we examined qualitative findings from studies that reported associations between STB and school influences that were not identified as school connectedness but included overlapping measures with the four categories of school connectedness.

We calculated effect sizes measuring school connectedness and STB from descriptive data, i.e., rates of occurrences, means and standard deviations, and inferential statistics, i.e., odds ratio (*OR*) and correlation coefficients. For missing raw data necessary to compute effect size, we made a request to researchers for more information; otherwise, we excluded studies with missing data for effect size computation ($k = 1$). We converted final results to *OR* for comparing the association between school connectedness and STB across studies.

Because meta-analysis assumes that each measure of effect is representative of an independent study, we employed a protocol to handle studies with more than one effect size and publications reporting on data from the same dataset. We calculated the average of effect sizes when studies reported findings separately across individual items of school connectedness. In the case of multiple publications reporting data from the same study, we prioritized the most recent publications and those that provided sufficient data. When publications used overlapping datasets, but reported effects from different subsamples, we selected the most inclusive sample for the primary analysis and analyzed findings for the subsamples of interest separately. When data were presented separately for subgroups (i.e., males and females) within an individual study, we conducted a meta-analysis to compute the combined effect size under a fixed effects model (Borenstein, Hedges, Higgins, & Rothstein, 2009). Finally, we selected effect sizes that reflected cross-sectional findings over longitudinal findings considering the majority of included studies were cross-sectional.

We analyzed homogeneity of effect size distribution with visual inspection of outliers and forest plots, as well as the Q statistic and I^2 (95% CI) index. Heterogeneity is signaled by a statistically significant Q (Lipsey & Wilson, 2001) and estimated by the I^2 statistic, an index between 0 and 100% (Borenstein et al., 2009), which may be interpreted as low ($I^2 = 25\%$), moderate ($I^2 = 50\%$), or high ($I^2 = 75\%$) (Higgins, Thompson, Deeks, & Altman, 2003). To measure level of publication bias, we employed a combination of Egger's regression index, the funnel plot, Duval and Tweedie's trim and fill, and Rosenthal's *fail-safe N*.

The study conducted statistical tests of 8 moderators (region of recruitment, percent Caucasian/white, percent female, STB timeframe, and the school connectedness categories of affiliation, belonging, attitude, and environment) with weighted regression analysis (meta-

regression) and analog to ANOVA using a mixed effects model. We employed ANOVA analog to investigate potential effect size differences across studies based on STB timeframe and region. We also conducted two multiple meta-regression analyses: The first model included percent Caucasian/white and percent female as moderator variables and the second model included dichotomous variables (yes/no) representing the four categories of school connectedness (affiliation, belonging, attitude, and environment). We contacted authors for more information if specific items measuring school connectedness were not reported. Case analysis for studies with missing data for moderator variables was employed.

Results

Search results

The study identified a total of 1,169 titles via the bibliographic databases PsycINFO, Academic Search Premier, and Pubmed (see Supplementary Figure 1 for PRISMA-style flow chart). We reviewed 47 articles in full for eligibility, of which 23 were excluded from the quantitative synthesis. We maintained four of these studies in the qualitative synthesis because they did not identify the measure of interest as "school connectedness," but included items similar to school connectedness. A total of 20 publications and 17 samples met eligibility criteria of which 19 publications and 16 samples with sufficient data to calculate effect sizes were included in this study. Studies examined school connectedness in relation to SI ($k = 12$) and SA ($k = 10$), with a total of 16 samples examining any form of STB (see Table 1). For more information about school connectedness and STB measures see Supplementary Table 1.

Primary Analysis

The primary analysis examined STB, including SI, SA, or a combination of SI and SA, across any sample. The analysis included a total of 16 samples, resulting in between 185,088–191,156 participants. The range of participants represents average effect sizes taken from publications that used overlapping samples with varying numbers of participants. Taken together, the studies resulted in a statistically significant mean effect size of $OR = 0.536$ (95% CI 0.460,0.624), $p < .0001$ and included effect sizes that ranged between $OR = 0.215$ to $OR = 0.811$ (see Figure 1). The heterogeneity of variance analysis was significant, $Q(15) = 515.533$, $p < .0001$, $I^2 = 97.090$, signifying between-study variance. None of the moderator analyses, including multiple meta-regression examining differences across school connectedness categories, were significant.

Trim and fill analysis did not recommend the imputation of any studies to reduce bias (see Supplementary Figure 2a). Egger's regression was not significant and Rosenthal's N indicated a minimum of 4,746 studies to lead to a p value at or above alpha of .05. These findings indicate minimal risk for publication bias.

Secondary Analyses

School Connectedness and Suicidal Ideation—When meta-analysis was conducted separately with studies examining SI as an outcome, a total of 53,618 participants from 12 samples were included. The studies generated a statistically significant mean effect size of

OR = 0.529 (95% CI 0.433,0.647), $p < .001$ (see Figure 2). The heterogeneity of variance analysis was significant, $Q(11) = 297.882$, $p < .001$, $I^2 = 96.307$, indicating between-study variance. ANOVA analog comparing studies conducted in the US, *OR* = 0.618 (95% CI 0.520, 0.734), $k = 10$, to those that were conducted internationally, *OR* = 0.226 (95% CI 0.190, 0.269), $k = 2$, was significant, $Q(1) = 64.339$, $p < .001$; however, the small number of studies conducted internationally precludes drawing definitive conclusions about these differences. None of the additional moderator analyses were significant.

Rosenthal's *N* of 2,188 to lead to a *p* value at or above alpha of .05 and non-significant results from Egger's regression supported minimal risk for publication bias. Trim and Fill analysis recommended the imputation of 1 study resulting in a mean effect size of *OR* = 0.505 (95% CI 0.409, 0.623) under the random effects model (see Supplementary Figure 2b).

School Connectedness and Suicide Attempts—A total of 10 studies examined school connectedness and SA across any sample, including a total of 57,637 participants. The mean effect size of *OR* = 0.589 (95% CI 0.493, 0.704), $p < .0001$ was statistically significant (see Figure 3). The heterogeneity of variance analysis was significant, $Q(9) = 198.636$, $p < .0001$, $I^2 = 95.469$, indicating significant between-study variance. The multiple meta-regression models were not conducted due to missing data and the presence of collinearity; none of the other moderator analyses were significant.

Trim and Fill analysis recommended the imputation of 1 study to reduce publication bias, resulting in a mean effect size of *OR* = 0.627 (95% CI 0.525, 0.749) under the random effects model (see Supplementary Figure 2c). Minimal risk for publication bias was indicated by a Rosenthal's *N* of 1,827 to lead to a *p* value at or above alpha of .05 and non-significant results from Egger's regression.

Sensitivity Analyses

High-Risk Youth—Five studies including between 9,707–10,179 participants examined school connectedness and any form of STB in high-risk samples (i.e., high risk communities, youth engaging in sexual contact, youth investigated by child welfare, and youth reporting perceived disconnectedness and/or bullying experiences). The mean effect size taken from high-risk samples remained significant, *OR* = 0.603 (95% CI 0.480,0.757), $p < .0001$ (see Figure 4). The heterogeneity of variance analysis was significant, $Q(4) = 16.249$, $p = .003$, $I^2 = 75.383$, indicating significant between study variance. Note that moderator analyses were not conducted due to the small number of studies included in the analysis. Rosenthal's *N* of 99 to lead to a *p* value at or above alpha of .05 and non-significant results from Egger's regression indicated minimal risk for publication bias. Trim and Fill analysis recommended the imputation of 1 study resulting in a similar mean effect size of *OR* = 0.634 (95% CI 0.507, 0.792) under the random effects model (see Supplementary Figure 2d).

Sexual Minority Youth—The analysis pooling effect sizes across studies examining school connectedness and any form of STB within sexual minority samples included 4 studies with between 2,436–2,485 participants. The mean effect size was statistically

significant, $OR = 0.608$ (95% CI 0.509,0.726), $p < .0001$ (see Figure 5). Heterogeneity of variance analysis indicated minimal between study variance, $Q(3) = 3.897$, $p = .273$, $I^2 = 23.015$; therefore, moderator analyses were not conducted. Analyses examining publication bias indicated minimal bias across studies. Rosenthal's N suggested 37 non-significant effect sizes would lead to a p value at or above alpha of .05 and Egger's regression was not significant. Trim and Fill analysis did not recommend the imputation of any studies (see Supplementary Figure 2e).

Additional School Influences of Suicidal Thoughts and Behavior

We excluded a total of 4 studies from the quantitative analyses because they used similar measures of school connectedness but identified them as a different construct (e.g., school attachment, school engagement, school climate). In general, studies examining STB and constructs closely aligned to school connectedness demonstrated significant bivariate associations (Borowsky, Taliaferro, & McMorris, 2013; Carter, McGee, Taylor, & Williams, 2007; De Pedro, 2012; Pharris et al., 1997).

Discussion

Findings from the present study, which pooled effect sizes across 18 samples and included nearly 200,000 participants, clearly indicate that students reporting a connection to their schools are significantly less likely to report having suicidal thoughts or report making a suicide attempt. Results support the primary hypothesis that higher school connectedness would relate to reduced reports of STB across general ($OR = 0.536$), high-risk ($OR = 0.603$), and sexual minority ($OR = 0.608$) adolescents. This association was consistent across general adolescent samples when analyzed separately for suicidal ideation ($OR = 0.529$) and suicide attempts ($OR = 0.589$). This stability across a diversity of samples, as well as the finding that among general samples these associations remained consistent after accounting for variations across ethnic and racial representation and region, underscores the importance of enhancing school connectedness for all students. These findings synthesize a large and fragmented body of literature that has identified school connectedness as an important protective factor against STB during adolescence.

The non-significant results from the moderator analyses support the second hypothesis, that effect size variability would remain stable across four categories of school connectedness (social affiliation, belonging, attitude, and environment). In other words, the association between school connectedness and STB demonstrated comparable magnitudes across studies using a variety of measures of school connectedness. Although preliminary, results suggest that a wide variety of measures of school connectedness may be used to support the identification of youth at-risk for STB, contributing to ongoing discussions about the best measurement of school connectedness.

Limitations

Although meta-analysis has a number of methodological strengths, particularly for pooling weighted estimates of effects to achieve greater power than individual studies, there are also important limitations to this analysis. Meta-analysis is frequently limited by reduced power

for moderator variable detection (Hedges & Pigott, 2004); therefore, the finding that effect size variability did not differ based on the moderators of interest may be a result of limited variability as opposed to consistent findings across studies. Indeed, given the significant heterogeneity between effect sizes indicated by the large I^2 statistics, a primary limitation of the present study is that the contributors to variation across effects remain unclear.

A related limitation of meta-analysis pertains to the influence of study methodology on variability of effect sizes. Although moderator analysis did not support heterogeneity of effect sizes due to region of recruitment, measurement of school connectedness, and timeframe of STB, these represent only a sample of the potential differences across study methodology. For example, variability could be due to participant characteristics (age and grade of students), school characteristics (e.g., private vs. public, size, school climate, etc.), or community characteristics.

Meta-analysis is also limited by the potential for publication bias, where null effects may not be adequately represented due to the “file drawer” effect. In addition to including dissertations, we employed a number of methods to measure publication bias (e.g., trim and fill analysis, etc.) supporting minimal publication bias within the present study. In an effort to further examine the potential for publication bias, we also calculated effect sizes from the publically available New York City (NYC) YRBS dataset (NYC Department of Health and Mental Hygiene, 2007; 2009) and compared them to the effect sizes we calculated from Seil and colleague’s (2014) peer-reviewed article. The mean effect sizes were comparable, reinforcing the study’s statistical findings of minimal publication bias (see Supplementary Table 2).

Results from the present study were also limited by its cross-sectional nature. Although the findings presented here do not allow for temporal inference, it is noteworthy to highlight that effect sizes calculated from the longitudinal analyses part of this study did reflect that school connectedness predicted reduced risk for STB across time, ranging between $OR = 0.380$ to $OR = 0.774$ (Kidd et al., 2006; Kidger et al., 2015; Russell & Toomey, 2013).

A final limitation concerning the present study involves its focus on bivariate analyses. Although a portion of the included studies also analyzed school connectedness as a protective factor against STB accounting for additional covariates, only direct effect sizes pertaining to school connectedness and STB were analyzed. Studies that consider multiple contexts in addition to school connectedness have revealed mixed findings depending on the additional variables examined in the model. In general, however, when multiple forms of connectedness are accounted for, parent and family connectedness appear to be the most salient of the connectedness protective factors against STB, while school connectedness is often cited as a powerful secondary protective factor for STB (e.g., Borowsky et al., 2013; Eisenberg et al., 2007). Thus, even after accounting for additional critical factors associated with STB, school connectedness has shown a positive influence on STB in school aged youth. Considering how well suited schools are for providing prevention efforts at a population-level, school connectedness remains a critically important protective factor of STB.

Implications for Research

Although preliminary research supports that school connectedness is associated with reduced reports of suicidal ideation and attempts between one and two years later (e.g., Kidger et al., 2012; McNeely & Falci, 2004), the long-term consequences of school connectedness as a protective factor against suicidal outcomes are less certain than the cross-sectional findings described here. Further research investigating school connectedness as a predictor of STB over time will help elucidate a temporal relationship with STB. Longitudinal research should also identify whether or not there is a critical period of time during development when enhancing school connectedness may be the most effective for preventing suicide.

Another important avenue of research that remains relatively unexplored is school connectedness within clinical populations, such as youth hospitalized for STB. To date, the only program designed to support school reintegration following hospitalization for STB is *Bridge for Resilient Youth in Transitions* (White, Langman, & Henderson, 2006). Its intensive model provides ongoing academic and social support following hospitalization, most likely contributing to enhanced feelings of school connectedness. Future research examining school connectedness in clinical populations will be important for the development of school transition programs designed to bolster school connectedness.

Finally, future research addressing the lack of evidence-based preventions and interventions for improving school connectedness and preventing suicide will support practical steps towards applying theoretical and empirical findings to practice. Although a recent review of the literature identified four programs that demonstrated improvements in school connectedness to reduce risk-taking behavior (Chapman, Buckley, Sheehan, & Shochet, 2013), none of the interventions examined STB as an outcome. The vast majority of interventions also required systematic school-wide changes, supporting the need for an increased understanding of the efficacy of simpler intervention designs (Chapman et al., 2013). Future interventions should capitalize on the rich literature base examining school connectedness and STB to inform the most salient inquiries and evaluations should be based on meaningful (i.e., behavioral) outcomes.

Implications for Practice

School suicide prevention programs have a long history of promoting a “culture of connectedness” in order to effectively identify youth considering suicide (Lieberman, Poland, & Cowan, 2006, p. 12; Miller, 2011). adults and students, students are more willing to break promises or secrecy and seek help when they or their peers experience suicidal thoughts or behaviors (Lieberman, Poland, & Kornfeld, 2014). Although there is a dearth of evidence-based school suicide prevention programs, interventions effective in preventing adult suicide have also targeted enhanced social connectedness and belonging (Miller, 2011). Thus, school psychologists should promote school connectedness not only as a method for intervention, but also as a way to lay the groundwork for suicide prevention efforts that rely on a culture of connectedness (Centers for Disease Control and Prevention, 2012; Lieberman et al., 2014.

According to the Wingspread Declaration, in order to foster school connectedness schools should maintain high and supportive academic expectations, fairly apply just disciplinary policies, build trusting school relationships, staff skilled teachers, support high expectations from family, and ensure that students feel connected to at least one adult in the school (Blum & Libbey, 2004). Because of their expertise in assessment and intervention and their collaborative role in the school, school psychologists are well suited to support increased school connectedness. At the whole school level, school psychologists can work closely with administrators and the school problem-solving team to promote activities supporting student and adult interpersonal interactions. Collaborative efforts can also provide opportunities for student ownership over school policies and school facilities (Waters, Cross, & Reunions, 2009; Waters, Cross, & Shaw, 2010), for example by way of student government and clubs. As consultants to faculty and staff, school psychologists can foster a collaborative teaching environment and enhanced faculty-student relationships by encouraging faculty and staff to participate in activities outside of the classroom (e.g., collaborating across disciplines, standing in the hallways in between class periods).

Particular care should also be taken to identify and support students most at risk to suicide, including those who feel disconnected from school and who may be less likely to engage in school activities. In addition to educating students, faculty, and staff about suicide warning signs, schools should consider supplementing existing school-wide surveys with a simple measure of school connectedness (i.e., items from the Add Health Survey; Resnick et al., 1997) to identify high-risk youth. Once high-risk students are identified, the school psychologist or another designated staff member may decide a more thorough suicide risk assessment is warranted. When conducting these assessments, it is important that the practitioner maintain a connection to the student by being empathic, supportive, and respectful (Lieberman et al., 2014).

Depending on the nature of the student's risk, school psychologists may implement a targeted intervention designed to increase school connectedness or they may refer the student for outside services. For example, school psychologists may consider interventions like Check and Connect, a program that is used to increase school engagement by using systematic monitoring by way of an assigned mentor (Alvarez & Anderson-Ketchmark, 2010), as well as school based mentoring programs, which have shown potential for improving student connections, reduced absenteeism, and disciplinary referrals (Gordon, Downey, & Bangert, 2013). Even in more extreme cases that may require outside services, school psychologists should continue to support student connectedness given that both quality and accessibility of adult relationships are critical factors in preventing adolescent suicide (Seeley, Rhode, & Jones, 2010).

Conclusion

Results from the present study indicate that students reporting a connection to school are less likely to report having suicidal thoughts or report making a suicide attempt. Although there are other important protective factors associated with STB, prevention and intervention efforts aimed at bolstering school related influences of STB remain critically important because schools serve the vast majority of youth. Therefore, findings from the present study

support recent calls to increase school connectedness across schools worldwide (Blum & Libbey, 2004; Murray & Pianta, 2007). Because findings were stable across multiple categories of school connectedness, schools administering school connectedness assessments to aid with suicide prevention efforts should be encouraged to select the simplest and most accessible instrument. Future research focused on developing and evaluating interventions that target school connectedness in order to prevent STB will fill a significant gap in the literature.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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References

Ainsworth MS. Infant–mother attachment. American Psychologist. 1979; 34:932–937. [PubMed: 517843]

Alvarez ME, Anderson-Ketchmark C. Review of an evidence-based school social work intervention: Check & Connect. Children & Schools. 2010; 32:125–127.

American Psychological Association. Reporting standards for research in psychology: why do we need them? What might they be? The American Psychologist. 2008; 63:839–851. [PubMed: 19086746]

Barber BK, Schluterman JM. Connectedness in the lives of children and adolescents: A call for greater conceptual clarity. Journal of Adolescent Health. 2008; 43:209–216. [PubMed: 18710674]

Beck-Cross, C. Doctoral dissertation. Drake University; 2012. Individual, family, school, And community predictors Of high school male suicidal behaviors: An analysis of 2010 Iowa Youth Survey data. Retrieved from http://www.proquest.com/products-services/dissertations/Dissertations-Abstract-International.html

Blum RW, Libbey HP. Wingspread declaration on school connections. Journal of School Health. 2004; 74:233–234. [PubMed: 15493700]

Borenstein, M., Hedges, LV., Higgins, JPT., Rothstein, HR. Introduction to meta-analysis. Chichester, UK: Wiley; 2009.

Borenstein, M., Hedges, LV., Higgins, J., Rothstein, HR. Biostat: comprehensive meta-analysis (Version 3) [Computer software]. 2015. Retrieved from http://www.meta-analysis.com

Borowsky IW, Taliaferro LA, McMorris BJ. Suicidal thinking and behavior among youth involved in verbal and social bullying: risk and protective factors. Journal of Adolescent Health. 2013; 53:S4–S12.

Bronfenbrenner, U. The ecology of human development: Experiments by nature and design. Harvard University Press; 1979. Retrieved from http://www.hup.harvard.edu/

Carter M, McGee R, Taylor B, Williams S. Health outcomes in adolescence: Associations with family, friends and school engagement. Journal of Adolescence. 2007; 30:51–62. [PubMed: 16808970]

Centers for Disease Control and Prevention. Strategic direction for the prevention of suicidal behavior: promoting individual, family, and community connectedness to prevent suicidal behavior. 2012. Retrieved from http://www.cdc.gov/ViolencePrevention/pdf/Suicide_Strategic_Direction_Full_Version-a.pdf

Chapman RL, Buckley L, Sheehan M, Shochet I. School-based programs for increasing connectedness and reducing risk behavior: A systematic review. Educational Psychology Review. 2013; 25:95–114.

Cole-Lewis YC, Gipson PY, Opperman KJ, Arango A, King CA. Protective role of religious involvement against depression and suicidal ideation among youth with interpersonal problems. Journal of Religion and Health. 2016:1172–1188. [PubMed: 26872965]

De Pedro, KMT. Doctoral dissertation. 2012. The role of school climate in the mental health and victimization of students in military-connected schools. *Available from ProQuest Dissertations and Theses database.(UMI No. 3551471)*

Duong J, Bradshaw C. Associations between bullying and engaging in aggressive and suicidal behaviors among sexual minority youth: the moderating role of connectedness. Journal of School Health. 2014; 84:636–645. [PubMed: 25154527]

Eisenberg ME, Ackard DM, Resnick MD. Protective factors and suicide risk in adolescents with a history of sexual abuse. The Journal of Pediatrics. 2007; 151:482–487. [PubMed: 17961690]

Furlong MJ, O'brennan LM, You S. Psychometric properties of the Add Health School Connectedness Scale for 18 sociocultural groups. Psychology in the Schools. 2011; 48:986–997.

Goodenow C. The psychological sense of school membership among adolescents: scale development and educational correlates. Psychology in the Schools. 1993; 30:79–90.

Gordon J, Downey J, Bangert A. Effects of a school-based mentoring program on school behavior and measures of adolescent connectedness. School Community Journal. 2013; 23:227–250. Retrieved from http://www.schoolcommunitynetwork.org/SCJ.aspx.

Govender K, Naicker SN, Meyer-Weitz A, Fanner J, Naidoo A, Penfold WL. Associations between perceptions of school connectedness and adolescent health risk behaviors in South African high school learners. Journal of School Health. 2013; 83:614–622. [PubMed: 23879780]

He AS, Fulginiti A, Finno-Velasquez M. Connectedness and suicidal ideation among adolescents involved with child welfare: a national survey. Child Abuse & Neglect. 2015; 42:54–62. [PubMed: 25791342]

Hedges LV, Pigott TD. The power of statistical tests for moderators in meta-analysis. Psychological Methods. 2004; 9:426–445. [PubMed: 15598097]

Higgins JPT, Thompson SG, Deeks JJ, Altman DG. Measuring inconsistency in meta-analyses. BMJ. 2003; 327:557–560. [PubMed: 12958120]

Kaminski JW, Puddy RW, Hall DM, Cashman SY, Crosby AE, Ortega LA. The relative influence of different domains of social connectedness on self-directed violence in adolescence. Journal of Youth Adolescence. 2010; 39:460–473. [PubMed: 19898780]

Kidd S, Henrich CC, Brookmeyer KA, Davidson L, King RA, Shahar G. The social context of adolescent suicide attempts: Interactive effects of parent, peer, and school social relations. Suicide and Life-Threatening Behavior. 2006; 36:386–395. [PubMed: 16978093]

Kidger J, Araya R, Donovan J, Gunnell D. The effect of the school environment on the emotional health of adolescents: A systematic review. Pediatrics. 2012; 129:2011–2248.

Kidger J, Heron J, Leon DA, Tilling K, Lewis G, Gunnell D. Self-reported school experience as a predictor of self-harm during adolescence: A prospective cohort study in the South West of England (ALSPAC). Journal Of Affective Disorders. 2015; 173:163–169. [PubMed: 25462412]

Langille DB, Asbridge M, Cragg A, Rasic D. Associations of School Connectedness With Adolescent Suicidality: Gender Differences and the Role of Risk of Depression. Canadian Journal of Psychiatry. 2015; 60:258–267. [PubMed: 26175323]

Lieberman R, Poland S, Cowan K. Suicide prevention and intervention. Principal Leadership. 2006; 7:11–15. Retrieved from http://www.nasponline.org/assets/documents/Resources%20and%20Publications/Handouts/Families%20and%20Educators/Suicide%20Intervention%20in%20Secondary%20Schoools%20NASSP%20Oct%202006.pdf.

Lieberman, R., Poland, S., Kornfeld, C. Best practices in suicide prevention and intervention. In: Harrison, PL., Thomas, A., editors. Best practices in school psychology: System-level services. Bethesda, MD: National Association of School Psychologists; 2014. p. 273-288.

Lipsey, DW., Wilson, DB. Practical meta-analysis. Vol. 49. Thousand Oaks, CA: Sage publications; 2001.

Logan JE. Prevention factors for suicide ideation among abused pre/early adolescent youths. Injury Prevention. 2009; 15:278–280. [PubMed: 19652004]

Logan JE, Crosby AE, Hamburger ME. Suicidal ideation, friendships with delinquents, social and parental connectedness, and differential associations by sex: Findings among high-risk pre/early adolescent population. Crisis: The Journal Of Crisis Intervention And Suicide Prevention. 2011; 32:299–309.

Lohmeier JH, Lee SW. A school connectedness scale for use with adolescents. Educational Research and Evaluation. 2011; 17:85–95.

Markham CM, Lormand D, Gloppen KM, Peskin MF, Flores B, Low B, House LD. Connectedness as a predictor of sexual and reproductive health outcomes for youth. Journal of Adolescent Health. 2010; 46:S23–S41. [PubMed: 20172458]

McNeely C, Falci C. School connectedness and the transition into and out of Health-Risk behavior among adolescents: A comparison of social belonging and teacher support. Journal of School Health. 2004; 74:284–292. [PubMed: 15493705]

Miller, DN. Child and adolescent suicidal behavior: School-based prevention, assessment, and intervention. New York, NY: Guilford Press; 2011.

Murray C, Pianta RC. The importance of teacher-student relationships for adolescents with high incidence disabilities. Theory Into Practice. 2007; 46:105–112.

New York City Department of Health and Mental Hygiene in collaboration with the NYC Department of Education. [accessed on [October 16, 2016]] Youth Risk Behavior Survey. 2007. https://www1.nyc.gov/site/doh/data/data-sets/nyc-youth-risk-behavior-survey.page; public use dataset.

New York City Department of Health and Mental Hygiene in collaboration with the NYC Department of Education. [accessed on [October 16, 2016]] Youth Risk Behavior Survey. 2009. https://www1.nyc.gov/site/doh/data/data-sets/nyc-youth-risk-behavior-survey.page; public use dataset.

Neumark-Sztainer D, Story M, French SA, Resnick MD. Psychosocial correlates of health compromising behaviors among adolescents. Health Education Research. 1997; 12:37–52. [PubMed: 10172963]

Pharris MD, Resnick MD, Blum RW. Protecting against hopelessness and suicidality in sexually abused American Indian adolescents. Journal of Adolescent Health. 1997; 21:400–406. [PubMed: 9401859]

Resnick MD, Bearman PS, Blum RW, Bauman KE, Harris KM, Jones J, Shew M. Protecting adolescents from harm: findings from the National Longitudinal Study on Adolescent Health. JAMA. 1997; 278:823–832. [PubMed: 9293990]

Russell ST, Toomey RB. Risk and protective factors for suicidal thoughts among sexual minority youth: Evidence from the Add Health study. Journal of Gay & Lesbian Mental Health. 2013; 17:132–149.

Sampasa-Kanyinga H, Hamilton HA. Does socioeconomic status moderate the relationships between school connectedness with psychological distress, suicidal ideation and attempts in adolescents? Preventive Medicine. 2016; 87:11–17. [PubMed: 26876628]

Seeley, JR., Rohde, P., Jones, L. School-based prevention and intervention for depression and suicidal behavior. In: Shinn, MR., Walker, HM., editors. Interventions for achievement and behavior problems in a three–tier model including RTI. Bethesda, MD: National Association of School Psychologists; 2010. p. 363-396.

Seil KS, Desai MM, Smith MV. Sexual orientation, adult connectedness, substance use, mental health outcomes among adolescents: findings from the 2009 New York City Youth Risk Behavior Survey. Journal Information. 2014; 104:1950–1956.

Stone DM, Luo F, Lippy C, McIntosh WL. The role of social connectedness and sexual orientation in the prevention of youth suicide ideation and attempts among sexually active adolescents. Suicide and Life-Threatening Behavior. 2015; 45:415–430. [PubMed: 25388375]

Tang TC, Ko CH, Yen JY, Lin HC, Liu SC, Huang CF, Yen CF. Suicide and its association with individual, family, peer, and school factors in an adolescent population in southern Taiwan. Suicide and Life-Threatening Behavior. 2009; 39:91–102. [PubMed: 19298154]

Waters S, Cross D. Measuring students' connectedness to school, teachers, and family: Validation of three scales. School Psychology Quarterly. 2010; 25:164.

Waters S, Cross D, Shaw T. Does the nature of schools matter? An exploration of selected school ecology factors on adolescent perceptions of school connectedness. British Journal of Educational Psychology. 2010; 80:381–402. [PubMed: 20109276]

Waters SK, Cross DS, Runions K. Social and ecological structures supporting adolescent connectedness to school: A theoretical model. Journal of School Health. 2009; 79:516–524. [PubMed: 19840228]

Whitaker K, Shapiro VB, Shields JP. School-based protective factors related to suicide for lesbian, gay, and bisexual adolescents. Journal of Adolescent Health. 2016; 58:63–68. [PubMed: 26707230]

White H, Langman N, Henderson S. A school-based transition program for high-risk adolescents. Psychiatriac Services. 2006; 57:1210–1211.

Whitlock J, Wyman PA, Moore SR. Connectedness and suicide prevention in adolescents: pathways and implications. Suicide and Life-Threatening Behavior. 2014; 44:246–272. [PubMed: 24444252]

World Health Organization. World health statistics 2016: Monitoring health for the SDGs, sustainable development goals. 2016. Retrieved from http://www.who.int/gho/publications/world_health_statistics/2016/en/

Yeaton WH, Wortman PM. On the Reliability of Meta-Analytic Reviews The Role of Intercoder Agreement. Evaluation Review. 1993; 17:292–309.

Yen C-F, Shieh B-L. Suicidal ideation and correlates in Taiwanese adolescent methamphetamine users. The Journal of Nervous and Mental Disease. 2005; 193:444–449. [PubMed: 15985838]

Young R, Sweeting H, Ellaway A. Do schools differ in suicide risk? The influence of school and neighbourhood on attempted suicide, suicidal ideation and self-harm among secondary school pupils. BMC Public Health. 2011; 11(1)

Public Health Significance Statement

Suicide remains a critically important public health concern among adolescents. The protective role of *school connectedness* against suicidal thoughts and behaviors is widely supported in the literature; however, this literature base is fragmented, varying across measures and samples. By accounting for variability across studies, this meta-analytic study reinforces the importance of enhancing school connectedness for suicide prevention and provides school psychologists with practical recommendations for screening and prevention efforts.

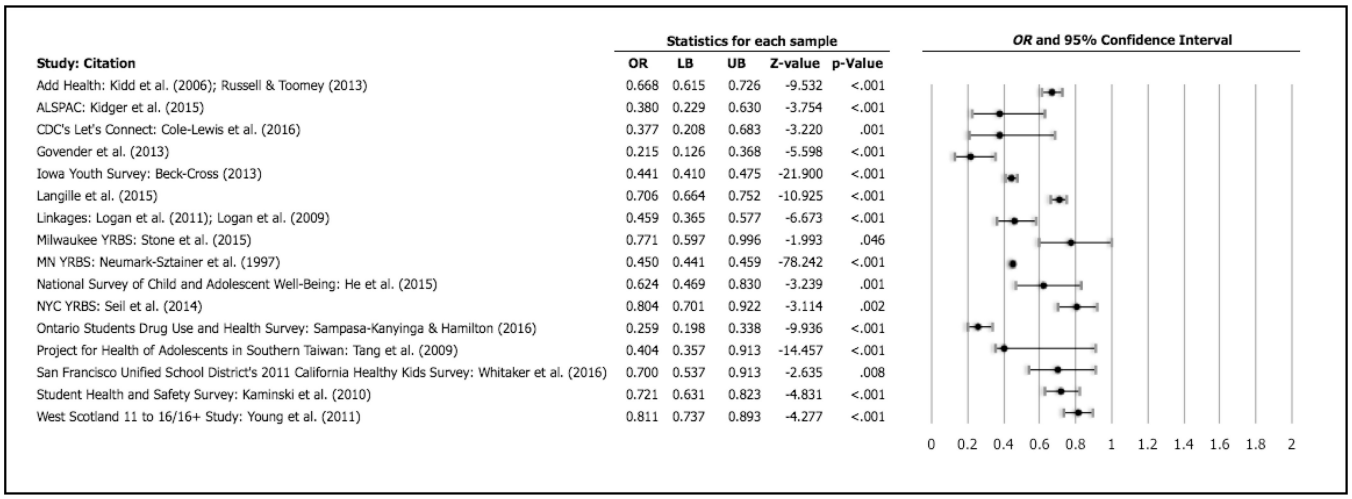

Figure 1.

Overview of meta-analysis of school connectedness and STB in general samples ($k = 16$, summary *OR* calculated with random effects model). LB = Lower Bound; UB = Upper Bound.

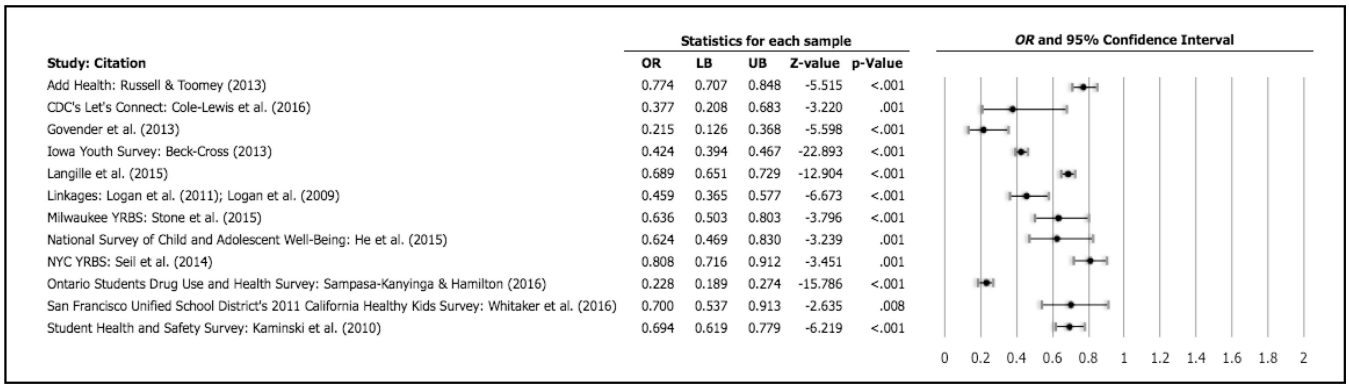

Figure 2.

Overview of meta-analysis of school connectedness and SI in general samples ($k = 12$, summary *OR* calculated with random effects model). LB = Lower Bound; UB = Upper Bound.

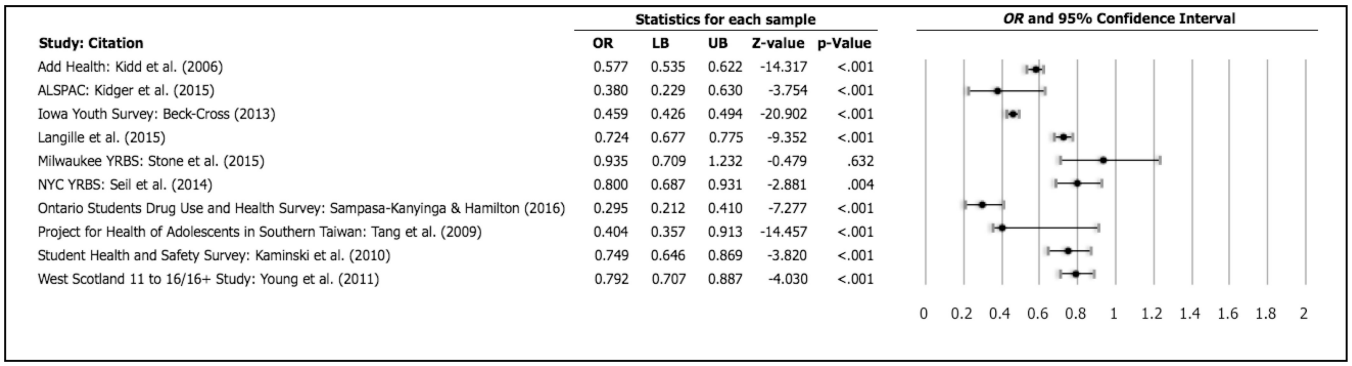

Figure 3.

Overview of meta-analysis of school connectedness and SA in general samples ($k = 10$, summary *OR* calculated with random effects model). LB = Lower Bound; UB = Upper Bound.

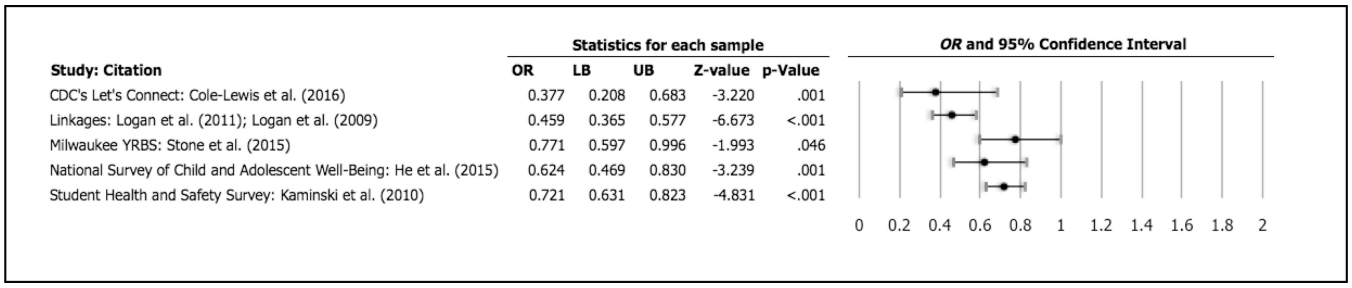

Figure 4.

Overview of meta-analysis of school connectedness and STB in high-risk samples ($k = 5$, summary *OR* calculated with random effects model). LB = Lower Bound; UB = Upper Bound.

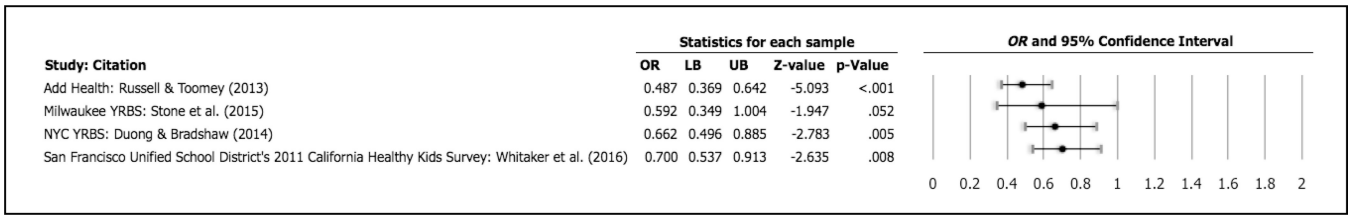

Figure 5.

Overview of meta-analysis of school connectedness and SA in LGBT samples ($k = 4$, summary *OR* calculated with random effects model). LB = Lower Bound; UB = Upper Bound.

Table 1

Summary of Included Studies

Study name, location (Years)	Citation	Sample Population	*N*	# of schools	Grade(s)	Percent Female	Percent Caucasian/ white	STB outcome
Add Health, US (1994–1995)	Kidd et al. (2006)	General	9,142	132	7–12	52.0	65.1	SA
	Russell & Toomey (2013)	General; Sexual minorities	14,738	80	NR	NR	NR	SI
ALSPAC, south-west England (NR)	Kidger et al. (2015)	General	2,475	NR	NR	NR	NR	SA
CDC's Let's Connect, Midwest region of US (NR)	Cole-Lewis et al. (2016)	Victims of bullying or students with low connections	161	NR	NR	65.8	30.7	SI
Govender*, KwaZulu-Natal, South Africa (2008)	Govender et al. (2013)	General	209	2	8–10	53.1	0	SI
Iowa Youth Survey, Iowa, US (2010)	Beck-Cross (2012)	General	9,910	307	11	0	88.4	SI; SA
Langille*, Canada's Atlantic provinces (Nova Scotia, New Brunswick, and Newfoundland and Labrador) (NR)	Langille et al. (2015)	General	4,365	NR	7, 9, 10, 12	49.2	NR	SI; SA
Linkages, US (2004)	Logan et al. (2011); Logan et al. (2009)	Residing in high risk community with prior abuse	2,598	NR	7, 9	50.6	21.1	SI
Milwaukee YRBS, Milwaukee, Wisconsin, US (2007–2009)	Stone et al. (2015)	Experienced sexual contact; Experienced sexual contact and sexual minorities	2,290 (SI); 1,818 (SA)	NR	NR	47.3 (SI); 49.5 (SA)	NR	SI; SA
Minnesota Student Survey, Minnesota, US (1993)	Neumark-Sztainer et al. (1997)	General	123,132	NR	6, 9, 12	49.9	87.4	STB

Study name, location (Years)	Citation	Sample Population	*N*	# of schools	Grade(s)	Percent Female	Percent Caucasian/ white	STB outcome
National Survey of Child and Adolescent Well-Being, US (2008–2009)	He et al. (2015)	Investigated by child welfare	995	NR	NR	59.9	39.3	SI
New York City YRBS, New York, US (2009)	Duong & Bradshaw (2014)	Sexual minorities	951	105	9–12	69.5	69.4	SA
	Seil et al. (2014)	General	8,910	105	9–12	55.5	16.6	SI; SA
Ontario Students Drug Use and Health Survey, Ontario, Canada (2009)	Sampasa-Kanyinga & Hamilton (2016)	General	4,955	198	7–12	49.0	62.5	SI; SA
Project for Health of Adolescents in Southern Taiwan, southern Taiwan (2004)	Tang et al. (2009)	General	10,233	52	NR	51.0	NR	SA
San Francisco Unified School District's 2011 California Healthy Kids Survey, California, US (2011)	Whitaker et al. (2016)	LGBT	356	NR	NR	53.7	9.6	SI
Student Health and Safety Survey, northeastern US (2004)	Kaminski et al. (2010)	Residing in high risk community	4,131	16	7, 9, 11, 12	51.5	33.6	SI; SA
West of Scotland 11 to 16/16+Study, Scotland (1999)	Young et al. (2011)	General	1,698	43	NR	NR	NR	SA; STB

Notes. Add Health = National Longitudinal Study of Adolescent Health; ALSPAC = Avon Longitudinal Study of Parents and Children; CDC = Centers for Disease Control and Prevention; Linkages = Youth Violence Survey: Linkages Among Different Forms of Violence; LGBT = lesbian, gay, bisexual, and transgender; NR = not reported; SA = suicide attempt; SI = suicidal ideation; STB = suicidal thoughts and behaviors; US = United States; YRBS = Youth Risk Behavior Survey.

* In the case that no study name was reported, the first author was used to identify the study.

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