Socioeconomic Status and Bullying: A Meta-analysis

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Abstract

Objectives: Involvement in school bullying adversely impacts on children's health and life outcomes. Can socioeconomic status be used to identify which schools or children are at greatest risk of bullying? **Methods:** We conducted a systematic review of published literature on school bullying and socioeconomic status. The literature search identified 28 cross-sectional and longitudinal studies which reported an association between roles in school bullying (victim, bully and bully-victim) and measures of socioeconomic status. **Results:** Random effects models showed socioeconomic status was only weakly related with bullying roles. Adjusting for publication bias, victims (OR = 1.40, 95% CI = 1.24-1.58) and bully-victims (OR = 1.54, 95% CI = 1.36-1.74) were more likely to come from low socioeconomic households. Bullies (OR = 0.98, 95% CI = 0.97-0.99) and victims (OR = 0.98, 95% CI = 0.97-0.99) were also slightly less likely to come from high socioeconomic backgrounds. **Conclusions:** Victim and bully-victim roles show a weak association with low socioeconomic status, however, bullies are found across all socioeconomic strata at fairly similar rates. Socioeconomic status provides little guidance for targeted intervention and all schools and children, not just those with more socioeconomic deprivation, should be targeted to reduce the adverse effects of bullying.

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Introduction

Bullying is defined as repeated, harmful behavior, characterized by an imbalance of power between the victim and perpetrator(s) (1). There is compelling evidence that school bullying impacts on children's health and wellbeing, with the effects lasting long into adulthood (2, 3). Victims of school bullying are at greater risk of physical and mental health problems (4, 5), including depression (6, 7), anxiety (8, 9), psychotic or borderline personality symptoms (10, 11), and are more likely to self-harm and attempt suicide (12, 13). A small proportion of victims are classified as bully-victims, children who are victimized by their peers, but also bully other children. Bully-victims are at even greater risk for maladjustment (5), exhibiting attentional and behavioral difficulties (4, 14), displaying poor social skills (15, 16), and reporting increased levels of depression and anxiety through adolescence and into adulthood (2). In contrast, the negative outcomes of bullying perpetration are less clear. Bullies have been found more likely to engage in delinquent or anti-social behavior (17, 18), however once other family and childhood risk factors are taken into account, they do not appear to be at any greater risk for poorer health, criminal, or social outcomes in adulthood (3).

Up to one third of children are involved in bullying, as either bully, victim or bully-victim (19, 20), and when considered alongside the damaging effects on physical and mental health, bullying can be seen as a major public health concern (21). Identifying risk factors for bullying aids potential efforts in targeting resources, which can prevent youth from becoming involved in bullying, but also limit the impact it has on their health and wellbeing. Traditional

risk factors, such as age and gender show a clear association (22, 23), however there are a range of other potential determinants whose relationship to bullying remain unclear. One such determinant is socioeconomic status (SES), which shows some links to bullying, but at present research findings are inconsistent regarding roles (i.e. bully, victim; bully-victim).

Socioeconomic status (SES) is an aggregate concept comprising resource-based (i.e. material and social resources) and prestige-based (individual's rank or status) indicators of socioeconomic position, which can be measured across societal levels (individual, household and neighborhood) and at different periods in time (24). It can be assessed through individual measures such as education, income, or occupation (25, 26), but also through composite measures, which combine or assign weights to different socioeconomic aspects to provide an overall index of socioeconomic level. There is no standard measure of SES, rather indicators are used to measure specific aspects of socioeconomic stratification (26). Accordingly, different measures of SES may show varying effects, which can result from differing causal pathways, or through interactions with other social characteristics, such as gender or race (27). The multi-faceted nature of SES has resulted in a lack of consistency over how researchers measure its relationship to bullying, and while several studies provide individual assessments of this relationship, as yet there is no clear consensus over whether roles in bullying are associated with individual socioeconomic measures, or indeed SES more generally.

Currently, the literature suggests some link between low SES and victims or bully-victims at school (28, 29). Specifically, being a victim has been reported to be associated with poor parental education (30, 31), low parental occupation (32), economic disadvantage (33, 34) and poverty (35). In addition, several studies found that bully-victims are also more likely to come from low socioeconomic backgrounds (29, 30) including low maternal education (28) and parental unemployment (36). However, others found no association between SES and

victims or bully-victims (31, 37, 38). The type of bullying may matter in relation to SES. Victims of physical and relational bullying have been found to more often come from low affluence families, while victims of cyber bullying have not (39).

Compared to victimization, few studies have explored the link between SES and bullying others. Some studies found bullying others to be associated with low SES, including economic disadvantage (34), poverty (35) and low parental education (30). Additionally, where composite measures have been used, children from low socioeconomic backgrounds have been found to bully others slightly more often (29, 40). In contrast, others found no association between bullying perpetration and measures of SES (38, 41, 42).

There is a small but growing body of literature examining the relationship between bullying and SES, and while much of it suggests that victims, bully-victims and bullies are more likely to come from low socioeconomic backgrounds, the findings are far from conclusive. Firstly, studies differ in their approach to measuring SES; some use composite measures, combining multiple indicators such as parental education, wealth and occupation, while others concentrate on a single socioeconomic indicator, most often parental education, affluence, or occupation. How bullying relates to SES may differ according to which socioeconomic indicator is used, therefore in interpreting results, one must consider not only how bullying relates to SES generally, but also which socioeconomic indicator was used, and how this may have influenced the result. Furthermore, while several studies indicate an association between bullying and low SES, the reported effect sizes vary greatly across studies, with some reporting weak and others moderate to strong associations. So far, the associations between bullying and SES have not been quantified across a range of studies in a systematic way. To address this gap in the literature, we conducted a systematic review and meta-analysis which aims to determine more precisely the exact nature and strength of the relationship between

SES and bullying. This study systematically investigates the association between role taken in school bullying (victim, bully and bully-victim) and measures of SES.

Method

Search strategy

The present study was conducted in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-analyses (PRISMA) checklist (Table S1) (43). To identify studies which reported an association between SES and bullying, a systematic search of the literature was performed using five psychological and medical databases: Web of Knowledge, Scopus, PubMed, PsycINFO and Embase. The search focused on identifying cross-sectional or prospective longitudinal studies published between January 1970 and November 2012, and used the keywords 'bully', 'bulli*', or 'peer victim' in combination with the search terms 'socioeconomic', 'economic*', 'affluence', 'inequality', 'standard of living', 'poverty', 'deprivation', 'disadvantaged', 'social class', 'educational status', 'educational level', 'educational attainment', 'level of education', 'employment', 'unemployment', 'labor', 'occupation', 'profession', 'vocation', 'income', 'salary', 'wage', 'wealth', 'financial' and 'welfare'. Search terms for SES were identified by using Medical Subject Headings (MeSH). To identify any publications missed through the database search, additional hand searches were carried out using the back-catalogues of four journals which regularly publish studies on bullying: The Journal of Child Psychology and Psychiatry, Journal of School Violence, Aggressive Behavior, and Developmental Psychology.

Inclusion/Exclusion Criteria

Abstracts for all search results were screened for relevancy using the following inclusion criteria. To be included, studies must have been written in English, and published as an article, book, or book chapter. Theses and unpublished conference papers were not considered. Furthermore, the study must have reported primary research, which employed a cross-sectional or prospective longitudinal design. Secondly, the study population should focus on children and adolescents between the ages of 4 and 18. Thirdly, the study must include measures of peer victimization and SES. All forms of bullying, ranging from physical or relational through to cyberbullying were suitable for inclusion, and could be measured using self, peer, parent or teacher reports. For SES, studies must have reported composite measures relating to overall SES, or individual socioeconomic indices, such as parental education, affluence, parental occupation, financial difficulties or income. Finally, studies must have provided, or were able to provide after request, sufficient statistical information to enable calculation of effect size. This could be reported as raw data (e.g. N's and percentages or Means and SD) or as calculated effect sizes (e.g. odds ratios, F-values or correlation coefficients). All abstracts were independently screened by two raters using the inclusion/exclusion criteria described. To assess agreement, both raters screened a subsample of studies (n = 847, 26%), giving an agreement percentage of 97.9% (Cohen's kappa = 0.82). Disagreements were resolved through discussions with a trained supervisor, and minor modifications were made to the inclusion/exclusion criteria. Both raters then screened a further sample of studies (n = 908, 27.6%), giving an agreement percentage of 99.2% (Cohen's kappa = 0.91).

Coding of Studies

Each study was independently screened by two researchers and coded on the basis of bullying role (victim, bully or bully-victim) and socioeconomic measure. A range of socioeconomic measures were reported, and were grouped into six broader categories: affluence (Family

Affluence Scale, wealth), parental education (Mother's or Father's educational attainment), financial problems (deprivation, financial difficulties, socioeconomic disadvantage), income (annual household income, combined parental income), occupation (Mother's or Father's occupation, parental unemployment) and SES (individual, multiple or composite measures of SES, social class). Moderator variables were created based on five key study characteristics: study design (cross-sectional or longitudinal), country (Europe, North America, Other or Cross-National), subject age (child: aged < 11 years, adolescent: aged 11-18 years or both), type of measure (dichotomous, categorical or continuous) and socioeconomic measure (affluence, education, financial problems, income, occupation, or SES).

Data Analysis

All analyses were conducted using Comprehensive Meta-Analysis (CMA) Version 2.2 (44). Odds Ratios (ORs) were chosen as the main unit of analysis as this is appropriate when comparing two independent groups on a dichotomous outcome (45), and the majority of studies compared victims, bullies or bully-victims to non-involved children on a categorical measure of SES (e.g. low vs medium SES, poor vs average parental education). Only eight studies reported SES as a continuous measure. The remaining twenty studies used a dichotomous or categorical measure of SES, or had used a scale which could be easily categorized. Where studies directly reported ORs and 95% confidence intervals, these were inputted into CMA. Additionally some studies reported log odds ratios and standard error which were then transformed into ORs (46). Where ORs were not reported, these were estimated by constructing 2 x 2 contingency tables from the raw data and converted in OR's using CMA (44). Several studies reported effect sizes for multiple levels of an outcome variable (e.g. reporting ORs for both low *vs* medium SES *and* low *vs* high SES), in which case the effect sizes were combined using CMA to form pooled ORs (46). Additionally some studies reported multiple effect sizes among two or more independent groups (e.g. for males

and females), in which case individual ORs were extracted and a pooled OR was constructed (46).

Overall effect sizes were computed by combining socioeconomic indices which broadly related to affluence, parental education, financial problems, income, occupation, and singular, or composite measures of SES. To assess the relationship with bullying across the socioeconomic spectrum, two separate analyses were performed; the first compared the lowest socioeconomic group to all others, while the second compared the highest socioeconomic group to all others. Exposure groups were constructed by using role in school bullying (victim, bully or bully-victim) *compared to* non-involved, therefore separate meta-analyses were performed for victims, bullies and bully-victims.

For each study included, the individual OR and 95% confidence intervals were compared to the overall weighted effect size across studies according to SES. Summary effect sizes were assessed using the random effects model, computed through the DerSimonian and Laird Method (47). This approach incorporates the heterogeneity of effects into the overall analysis, therefore providing a stricter effect size than would be found using a fixed effects model. Overall effect sizes are reported using odds ratios and 95% confidence intervals.

As a wide variety of socioeconomic measures were used in this study, we anticipated heterogeneity in the results. The distribution of effect sizes was examined using the Q and I^2 statistic. A *p*-value of less than 0.05 indicates significant heterogeneity (46). To examine variability in the effect size across studies, additional moderator analysis was performed. The five moderator categories used (Study design; country; participant age group; type of measure; socioeconomic measure) are described above. For each category of a moderator

variable, a within groups Q statistic (Qw) and between groups Q statistic (Qb) was calculated. A significant within group difference indicates that effect sizes within a category are heterogeneous, while a significant between group difference indicates that effects sizes significantly differ across categories of the moderator variable (46).

To assess publication bias Rosenthal's failsafe number was computed for each effect size to identify the number of studies that would be required to make the effect non-significant (48). A tolerance level was calculated by multiplying the number of effect sizes within the analysis (k), and adding 10 (5k+10 benchmark). A failsafe number which exceeds this tolerance level indicates the presence of a statistically significant meta-analytic effect (48). Secondly, to identify the association between the standardized effect sizes and the variance of these effects, the Begg and Mazumdar rank correlation test was performed using Kendall's τ (49). A significant effect would indicate that small studies with undesirable results were less likely to be published, while a non-significant association suggests that there is no underlying publication bias. Thirdly, Egger's linear regression test was performed to identify whether there was a tendency for studies to be published selectively, based on the nature and direction of their results. The intercept in the regression corresponds to the slope in a weighted regression of the effect size on the standard error. The farther the intercept value deviates from the zero, the less symmetrical the study findings (50). Finally, to assess and adjust for the potential influence of publication bias, the "trim and fill" method of Duval and Tweedie was used (51). This method initially trims the asymmetric studies from one side to identify the unbiased effect, and then fills the plot by re-inserting the trimmed studies as well as their imputed counterparts.

Results

Search Results

The electronic database search yielded 1,740 results from Web of Knowledge, 1,000 from Scopus, 4,110 from PubMed, 1,994 from PsycINFO, and 317 from Embase. In total, 9,111 items were retrieved from the five databases (Figure 1). There was an overlap of 5,817 articles which were subsequently removed, giving a total of 3,294 items retrieved through the database search. Of the 3,294 items retrieved, 3,136 were excluded from the analysis as they did not fit the inclusion criteria. Reasons for exclusion were: not written in English (n = 48), not book, book chapter or peer reviewed article (n = 36), sample not aged between 4 and 18 (n = 1276), no measures of bullying reported (n = 724), or no measures of SES (n = 1092).

In total, 158 abstracts were identified which met all of the inclusion criteria, and these were carried forward to full text screening, where they were assessed using the inclusion/exclusion criteria described previously. A further 129 studies were excluded from the analysis, the reasons for which were: full text not available in English (n = 4), item does not present primary research (n = 5), no independent measures of bullying reported (n = 10), no reported measures of SES (n = 33), and no direct relationship between bullying and SES reported (n = 72). Four articles did not provide sufficient data which could be used to calculate the effect size, in which case authors were contacted and the missing information was requested. One author was able to provide missing data, however two authors could not be reached, and one was unable to provide additional data, therefore a further 3 studies were excluded. Following abstract and full text screening, a total of 28 studies were identified which met the inclusion criteria.

Victims and Socioeconomic Status

In total 22 studies reported an association between SES and victimization. Sixteen of these provided data relating to low SES, while 11 provided data on high SES. Overall, results indicated that victimization was positively associated with low SES (OR = 1.52, 95% CI = 1.36-1.71) and negatively related to high SES (OR = 0.73, 95% CI = 0.63-0.86). Significant heterogeneity was found among studies. Those reporting on low SES differed by country (Qb = 15.24, p< 0.05), type of measure (Qb = 21.79, p< 0.005) and socioeconomic measure (Qb = 73.12, p< 0.005). This indicated that stronger relationships between low SES and victimization were reported in cross national studies (Mean ES = 1.57, N=3), in studies which used scale measures of SES (Mean ES = 2.04, N=2), and in studies which used measures pertaining to either affluence (Mean ES = 1.84, N=3) or overall SES (Mean ES = 1.95, N=3). For studies reporting associations between victimization and high SES, differences were observed according to design (Qb = 30.40, p< 0.005), country (Qb = 1085.33, p< 0.005), and measure of SES (Qb = 903.86, p< 0.005), indicating a stronger association between victimization and high SES in cross-sectional studies (Mean ES = 0.92, N=11), in research involving multiple countries (Mean ES = 0.32, N=2), and in studies which had used either measures of affluence (Mean ES = 0.36, N=2) or parental education (Mean ES = 0.50, N=4).

No evidence of publication bias was found for either the high or low socioeconomic models using the 5k+10 benchmark, or through the Begg and Mazumdar rank correlation test or Egger's test. Duval and Tweedie's trim and fill analysis slightly reduced the overall effect sizes but the associations with both low (OR = 1.40, 95% CI = 1.24-1.58) and high SES (OR = 0.95, 95% CI = 0.94-0.97) retained their significance.

Bullies and Socioeconomic Status

Nineteen studies reported an association between SES and bullying perpetration. Of these, 10 provided data relating to low SES, while 13 provided data on high SES. Overall, results

indicated that bullying perpetration was positively associated with low SES (OR = 1.14, 95% CI = 1.02-1.27) and negatively related to high SES (OR = 0.89, 95% CI = 0.83-0.95). Significant heterogeneity was found in the sample. Studies reporting on low SES differed by design (Qb = 11.66, p< 0.05), country (Qb = 17.61, p< 0.005), age group (Qb = 24.62, p< 0.005), type of measure (Qb = 14.45, p< 0.005) and socioeconomic measure (Qb = 23.60, p< 0.005). This indicated that stronger relationships between low SES and bullying perpetration were reported in longitudinal studies (Mean ES = 1.47, N=1), in studies conducted outside of North America and Europe (Mean ES = 3.45, N=1), and in studies which used a child sample (Mean ES = 1.37, N=4). Furthermore stronger associations were found where scale measures of SES were used (Mean ES = 1.47, N=1), and in studies which used overall measures of SES (Mean ES = 1.90, N=2). For the association between bullying perpetration and high SES, differences were observed according to design (Qb = 6.62, p< 0.05), country (Qb = 12.40, p< 0.05), age group (Qb = 24.97, p< 0.005), type of measure (Qb = 8.76, p< 0.05) and socioeconomic measure (Qb = 40.40, p< 0.005). This indicated that stronger associations between bullying perpetration and high SES were found in longitudinal studies (Mean ES = 0.97, N=6), in studies based in North America (Mean ES = 0.98, N=8), and in studies using a child population (Mean ES = 0.32, N=2). Additionally, stronger effects were found in studies which had used binary measures of SES (Mean ES = 0.72, N=1) and in studies which used parental education as an indicator of SES (Mean ES = 0.59, N=3).

Some evidence of publication bias was found for the association between low SES and bullying perpetration, whereby the fail-safe N did not exceed the benchmark figure, indicating that future studies may alter the observed effect. A significant result was also found using Egger's test, which suggests that non-significant findings were less likely to have been published. Duval and Tweedie's trim and fill analysis reduced the effect size between bullying perpetration and low SES resulting in this becoming non-significant (OR = 1.00,

95% CI = 0.97-1.03); however no evidence of publication bias was observed for the association between bullying perpetration and high SES, therefore this association remained significant (OR = 0.98, 95% CI = 0.97-0.99).

Bully-Victims and Socioeconomic Status

Nine studies reported an association between SES and bully-victims; six of these provided data relating to low SES, and 5 provided data on high SES. Results showed that being a bully-victim was positively associated with low SES (OR = 1.71, 95% CI = 1.22-2.39) but not related to high SES (OR = 0.98, 95% CI = 0.93-1.04). Significant heterogeneity was found among studies. Those reporting on low SES differed by design (Qb = 32.88, p< 0.005), age group (Qb = 11.16, p< 0.05), type of measure (Qb = 36.70, p< 0.005) and socioeconomic measure (Qb = 25.31, p< 0.005). This indicated that stronger relationships between low SES and bully-victims were reported in longitudinal studies (Mean ES = 3.95, N=1), among child populations (Mean ES = 2.02, N=3), in studies which used scale measures of SES (Mean ES = 3.95, N=1), and in studies which used measures pertaining to either financial problems (Mean ES = 2.66, N=3) or overall SES (Mean ES = 6.45, N=1). For studies reporting associations between bully-victims and high SES, differences were only observed according to country (Qb = 14.50, p< 0.05), with a stronger association found in studies conducted outside of Europe or North America (Mean ES = 0.77, N=1).

Publication bias was found for the high socioeconomic model, whereby the Fail Safe N did not exceed the 5K+10 benchmark, however the Begg and Mazumdar rank correlation test and Egger's test did not reach significance. Duval and Tweedie's trim and fill analysis slightly reduced the effect size for the association with low SES (OR = 1.54, 95% CI = 1.36-1.74) however this remained significant.

Discussion

To our knowledge this is the first systematic review and meta-analysis to explore the association between SES and school bullying. The results indicate significant, but weak associations between measures of SES and bullying roles. Victimization was positively related to low SES, and negatively associated with high SES. Bully-victim status was related to low, but not to high SES. Bullying perpetration was the most weakly related, indicating that bullies were only slightly less likely to come from higher socioeconomic backgrounds after adjusting for publication bias. Although significant, these effects, particularly for bullies, were small, suggesting that roles in bullying show some, but generally weak relationships to SES.

Firstly, considering children who were victimized at school, both victims and bully-victims were more likely to come from low socioeconomic backgrounds. At face value, these findings may be indicative of a direct relationship, whereby low SES itself is a cause for victimization. Being different to the peer group appears to be a main motivator for victimization (1, 52), and simply coming from a lower socioeconomic background or being unable to afford lifestyle goods or resources available to the rest of the peer group may single out children for victimization by their peers. In addition, higher SES is accompanied by greater access to intellectual resources, including general and specific knowledge, norms and values, and problem solving skills (26, 27), all of which can aid in the development of social skills and coping strategies (30), and reduce the likelihood of children experiencing problematic peer relationships.

Alternatively, the findings may be explained by considering how children's development and experiences differ across socioeconomic strata. Children from low socioeconomic families have been found to experience more adverse home environments, including facing harsher

punishment (53-55), restrictive and authoritarian parenting practices (56-58), experiencing greater levels of sibling violence (59), and being more often exposed to incidents of domestic violence (60, 61). From a social learning theory perspective (62), children's early relationships at home shape how they interact with others later in life. Experiencing violence or abuse at home can impact on children's ability to form and maintain peer relationships (63, 64), and both victims and bully-victims have been found to have experienced harsher parenting (65), abuse (66, 67) and sibling violence (68, 69) more often than children not involved in bullying. While some family factors show moderate or strong relationships to bullying (65, 66), the association between low SES and victims or bully-victims was weak according to statistical conventions (70), suggesting that the results may not reflect a direct association between bullying and SES, but rather an indirect relationship which is mediated by the child's home environment. Accordingly, it may be that factors associated with low SES such as how children are parented, get on with their siblings or observe domestic violence are better suited to predicting victim and bully-victim roles than socioeconomic level.

Second, the relationship between bullying perpetration and SES was notably weaker than that found for victims and bully-victims, showing no association with low SES, and indicating that bullies were only slightly less likely to come from high socioeconomic households after adjusting for publication bias. This may seem somewhat surprising considering that low SES has been strongly linked with behavioral difficulties in children, particularly aggression and anti-social behavior (71-76). Furthermore, the risk for maladjustment and behavioral difficulties increases the lower the socio-economic status (77, 78). If bullies were simply those children who exhibited high aggression and behavioral difficulties then a strong link between bullying and SES might be expected, however no such association was observed. In explaining this, it is important to consider bullying not as an individual trait, but rather as a

social strategy to achieve peer acceptance, social dominance, and ultimately, access to resources (79, 80). Bullies are not highly aggressive "oaf's" who exhibit behavioral difficulties and lack social skills or understanding; rather they have been reported to be intelligent, skilled manipulators (81, 82) with good emotional understanding of others (83) who use bullying as a means of raising their social profile and attaining dominance over their peers (84, 85). Furthermore, there appear to be few costs associated with bullying others; aside from the immediate risk of being caught and punished, bullies do not appear at any greater risk of negative health, social or criminal outcomes in adolescence or adulthood (2, 3). Bullying has been described as an evolutionary strategy (86) and accordingly bullying perpetration would be expected in any socioeconomic strata where there are potential gains to be made. This is compatible with recent research, which suggests that it is not the absolute level of socioeconomic status that predicts bullying, but rather the degree of social inequality that exists within society. Higher rates of bullying have been found in countries where social inequality is greatest (87, 88). This has been interpreted that in highly unequal societies in terms of resources, there is greater acceptance of getting ahead by any means and for bullies to make greater gains without suffering any particular costs. The relationship between SES and bullying perpetration may therefore be better understood at a societal rather than individual level. Social inequality and its relationship to bullying may warrant future research on whether and why children engage in school bullying.

Although this study provides the first systematic assessment of the relationship between bullying and SES, there are a number of limitations. Firstly, significant heterogeneity was found between studies. Moderator analysis indicated significant variations according to which socioeconomic indices were used, with composite measures of SES tending to report stronger effect sizes than individual socioeconomic indicators. The association with bullying may differ according to socioeconomic measure, however, as yet there is insufficient research

to determine how individual indicators such as affluence or parental education specifically relate to bullying. It is important to acknowledge that the strength of association with bullying roles as well as underlying causal mechanisms may differ between socioeconomic indices. Additionally, moderator analysis found some evidence of heterogeneity according to study design, country, sample age and type of measure, however, no clear trends were observed due to the small number of studies included. To address this lack of homogeneity, a random effects model was used throughout the analysis which counters the assumption that all studies in the meta-analysis were identical. Secondly, the majority of studies only reported effects using general measures of bullying. Where studies included measures of different types of bullying (e.g. physical, relational, cyber) these were combined using pooled odds ratios. There is some indication that the effect of socioeconomic factors may differ between forms of bullying (39) but there was insufficient data available to explore this further. Thirdly, only one study reported separate effects for males and females, therefore it was not possible to establish whether gender moderated the relationship between bullying and socioeconomic factors. Finally, there was some evidence of publication bias in favor of publications that found a significant association of bullying and SES. Indeed, where adjusted for publication bias, effect sizes fell further.

In summary, the study finds a significant, albeit weak association between bullying and SES. Low SES is associated with increased odds of being a victim or bully-victim, and the early experiences faced by children living in low socioeconomic households may contribute towards the risk of being victimized. In contrast, SES was a poor predictor of bullying others, suggesting that bullying perpetration does not appear to be socially patterned and occurs across all socioeconomic strata at fairly similar rates. Thus, socioeconomic factors, based on current evidence, provide little additional information for targeting efforts in preventing bullying. Rather, to reduce bullying perpetration and the adverse impact that it can have on

children's health, interventions should target all children, and not just those that experience greater socioeconomic deprivation.

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Table 1: Summary of studies

Study	Year	Age	N	Dataset	Country	Design	Type of bullying	Bullying Role	Measure of SES
Alikasifoglu et al.	2007	Adolescents	4,153	HBSC 1997/1998	Europe	Cross-sectional	General	Victims Bullies Bully-Victims	Parental education SES
Analitis et al.	2009	Adolescents	16,210	Kidscreen 2003	Other	Cross-sectional	General	Victims	Parental education
Barboza et al.	2009	Adolescents	9,816	HBSC 1997/1998	North America	Cross-sectional	General	Bullies	Income Parental education
Barker et al.	2008	Children	1,970	Quebec Longitudinal Study of Child Development 1997/1998	North America	Longitudinal	General	Victims	Income Parental education
Bonnet et al.	2009	Children	2,003	Unique	Europe	Cross-sectional	General	Victims	SES
Bowes et al.	2009	Children	2,232	E-risk study 1994/1995	Europe	Longitudinal	General	Victims Bullies Bully-Victims	SES
Christie-Mizell et al.	2011	Adolescents	687	National Longitudinal Survey of Youth 1979	North America	Cross-sectional	General	Bullies	Income Parental education
Due et al.	2009 a	Adolescents	142,911	HBSC 2001/2002	Other	Cross-sectional	General	Victims	Affluence
Due et al.	2009 b	Adolescents	614	Danish Longitudinal Health Behaviour Study	Europe	Longitudinal	General	Victims	SES
Elgar et al.	2009	Adolescents	66,910	HBSC 2006	Other	Cross-sectional	General	Bullies	Affluence

Garner et al.	2010	Children	77	Unique	North America	Cross-sectional	General	Victims Bullies	Income
Jansen et al.	2011	Adolescents	1,959	TRAILS 2001/2002	Europe	Longitudinal	General	Victims Bullies Bully-Victims	SES
Jansen et al.	2012	Adolescents	11,419	Rotterdam Youth Health Monitor	Europe	Cross-sectional	General	Victims Bullies Bully-Victims	Parental education Parental occupation SES
Kim et al.	2009	Adolescents	1,666	Unique	Other	Cross-sectional	General	Victims Bullies Bully-Victims	Parental education SES
Lemstra et al.	2012	Adolescents	4,197	Unique	North America	Cross-sectional	Physical Verbal Social Cyber	Victims	Parental education Parental occupation
Lumeng et al.	2010	Children	821	Study of Early Child Care and Youth Development	North America	Longitudinal	General	Victims	Income
Ma	2011	Adolescents	13,751	Unique	North America	Cross-sectional	General	Victims Bullies	SES
Magklara et al.	2012	Adolescents	5,614	Unique	Europe	Cross-sectional	General	Victims Bullies Bully-Victims	Financial problems Parental education Parental occupation
Nordhagen et al.	2005	Adolescents	17,114	Unique	Europe	Cross-sectional	General	Victims	Parental occupation
Pereira et al.	2004	Adolescents	4,092	Unique	Europe	Cross-sectional	General	Victims Bullies	SES
Ranta et al.	2009	Adolescents	3,156	Unique	Europe	Cross-sectional	Overt Covert	Victims	Parental occupation
Shetgiri et	2012	Adolescents	13,710	HBSC	North	Cross-sectional	General	Bullies	Affluence

al.				2001/2002	America				
Wang et al	2009	Adolescents	7,182	HBSC 2005/2006	North America	Cross-sectional	Physical Verbal Relational Cyber	Victims Bullies Bully-Victims	Affluence
Wilson et al.	2012	Adolescents	1,427	Global school-based Student Health Survey	Other	Cross-sectional	General	Victims	Financial problems
Wolke et al.	2001	Children	3,915	Unique	Europe	Cross-sectional	General	Victims Bullies	SES

Table 2: Publication Bias Analysis

Subgroup	Outcome	Fail Safe N	5k + 10 benchmark	Kendall's Tau	Egger's Test	Trim and Fill
Victims	Low	1343	115	0.15 (p = 0.35)	0.89 (-0.98,2.73) p=0.34	1.40 (1.24-1.58)
	High	972	75	0.09 (p = 0.67)	-5.54 (-12.68,1.59) p=0.12	0.95 (0.94-0.97)
Bullies	Low	39	70	0.17 (p=0.45)	1.61 (0.11,3.10) p=0.04	1.00 (0.97-1.03)
	High	81	85	-0.06 (p=0.77)	-1.32 (-3.20,0.57) p=0.16	0.98 (0.97-0.99)
Bully-Victims	Low	98	50	0.43 (p=0.14)	2.15 (-2.81,7.12) p=0.33	1.54 (1.36-1.74)
	High	0	35	0.30 (p=0.46)	1.10 (-2.50,4.71) p=0.40	0.98 (0.96-1.00)

Figure 1: Flow diagram showing study eligibility

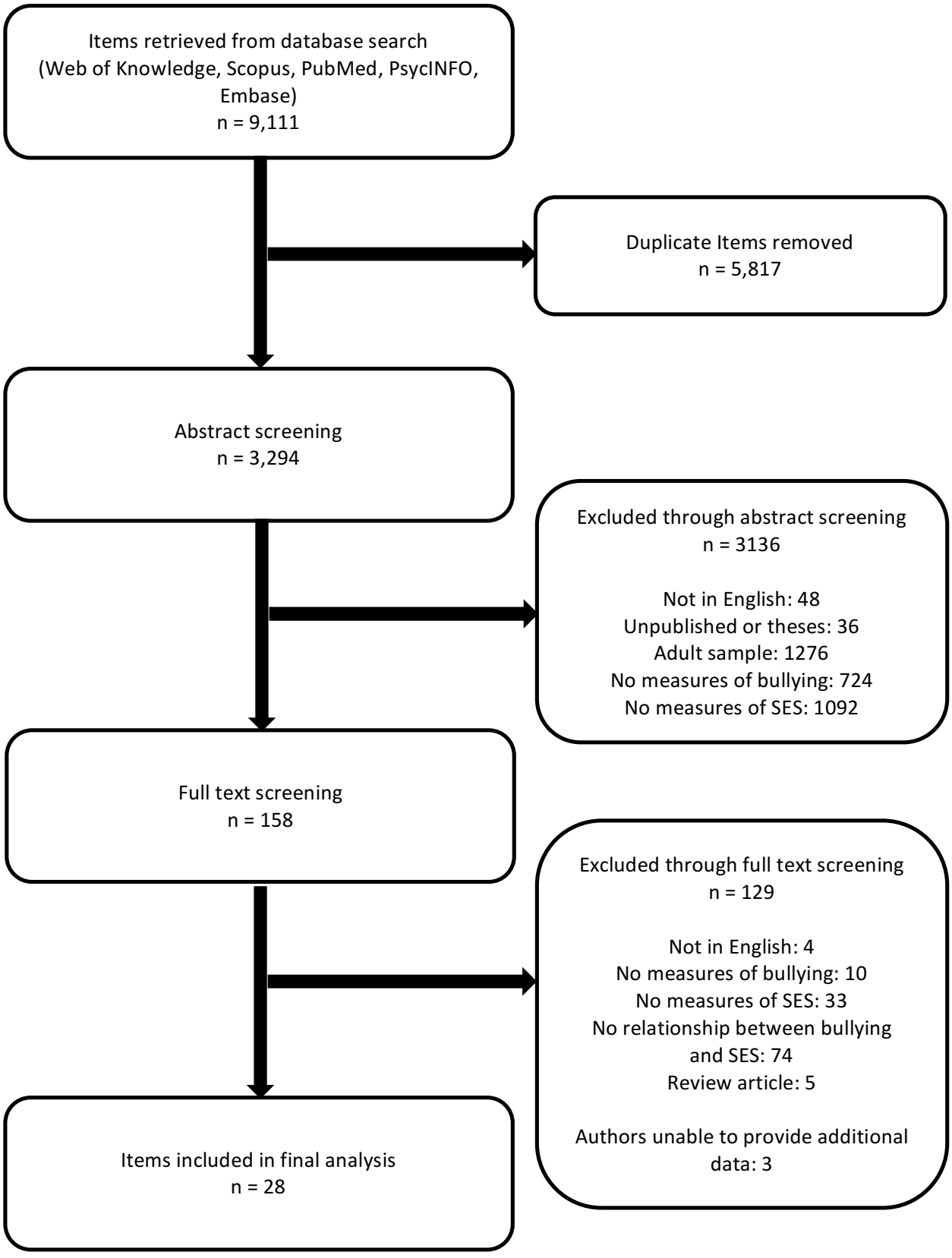

Figure 2: Victims and low SES

Author	Measure	Odds Ratios (95% CI)
Alikasifoglu	Affluence	1.58 (1.33; 1.88)
Analitis	Affluence	1.78 (1.62; 1.95)
Due (a)	Affluence	2.50 (2.08; 3.02)
Bowes	Disadvantage	1.47 (1.17; 1.87)
Lumeng	Disadvantage	1.80 (1.39; 2.34)
Wilson	Disadvantage	1.40 (1.07; 1.83)
Alikasifoglu	Education	1.11 (0.93; 1.33)
Analitis	Education	1.23 (1.12; 1.35)
Barker	Education	1.21 (0.94; 1.56)
Jansen (b)	Education	1.87 (0.97; 3.64)
Lemstra	Education	1.67 (1.18; 2.35)
Nordhagen	Education	1.23 (1.11; 1.37)
Barker	Income	1.66 (1.33; 2.08)
Magklara	Income	1.22 (0.71; 2.10)
Jansen (b)	Occupation	1.00 (0.62; 1.61)
Lemstra	Occupation	1.30 (1.02; 1.66)
Ranta	Occupation	1.77 (0.41; 7.65)
Glew	SES	1.73 (1.29; 2.33)
Kim	SES	9.62 (2.47; 37.47)
Due (b)	SES	2.35 (1.31; 4.22)
Pereira	SES	1.50 (0.97; 2.31)
Synthesis		**1.52 (1.36; 1.71)**

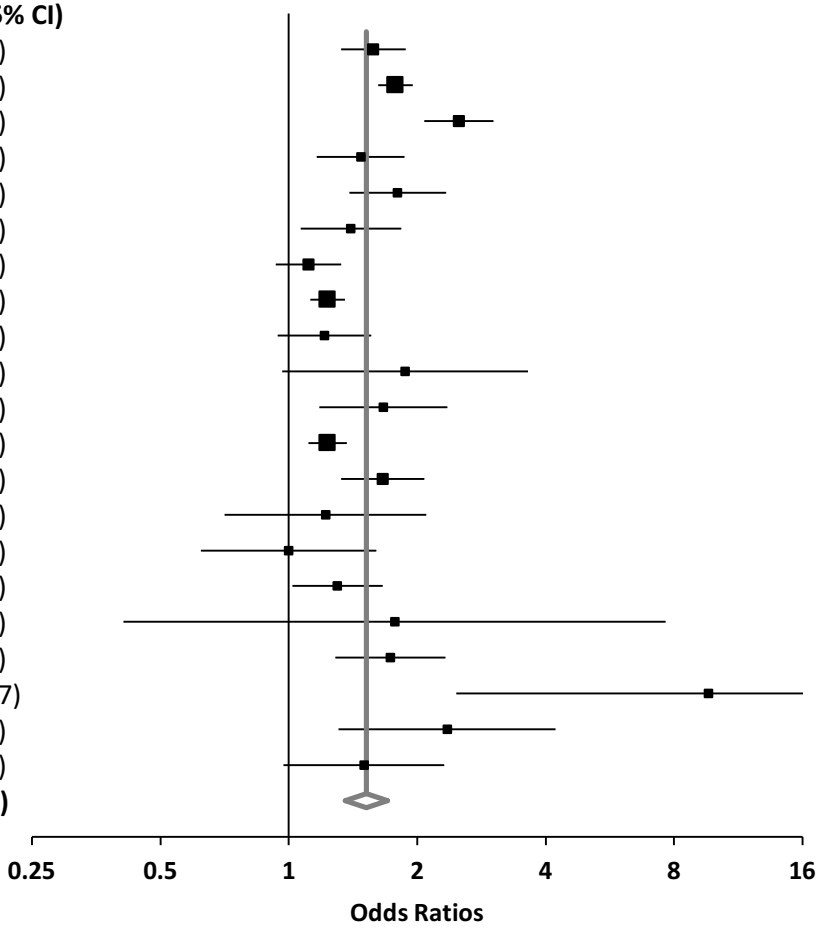

Figure 3: Victims and high SES

Author	Measure	Odds Ratios (95% CI)
Analitis	Affluence	0.35 (0.32; 0.39)
Wang	Affluence	1.14 (0.55; 2.36)
Analitis	Education	0.29 (0.27; 0.32)
Lemstra	Education	0.79 (0.69; 0.92)
Magklara	Education	0.67 (0.31; 1.46)
Nordhagen	Education	0.72 (0.66; 0.80)
Garner	Income	0.95 (0.42; 2.19)
Lemstra	Occupation	0.83 (0.70; 0.98)
Jansen (a)	SES	0.96 (0.93; 1.00)
Kim	SES	3.59 (1.29; 9.99)
Ma	SES	1.02 (1.00; 1.04)
Veenstra	SES	0.99 (0.97; 1.00)
Wolke	SES	0.79 (0.63; 0.99)
Synthesis		**0.73 (0.63; 0.86)**

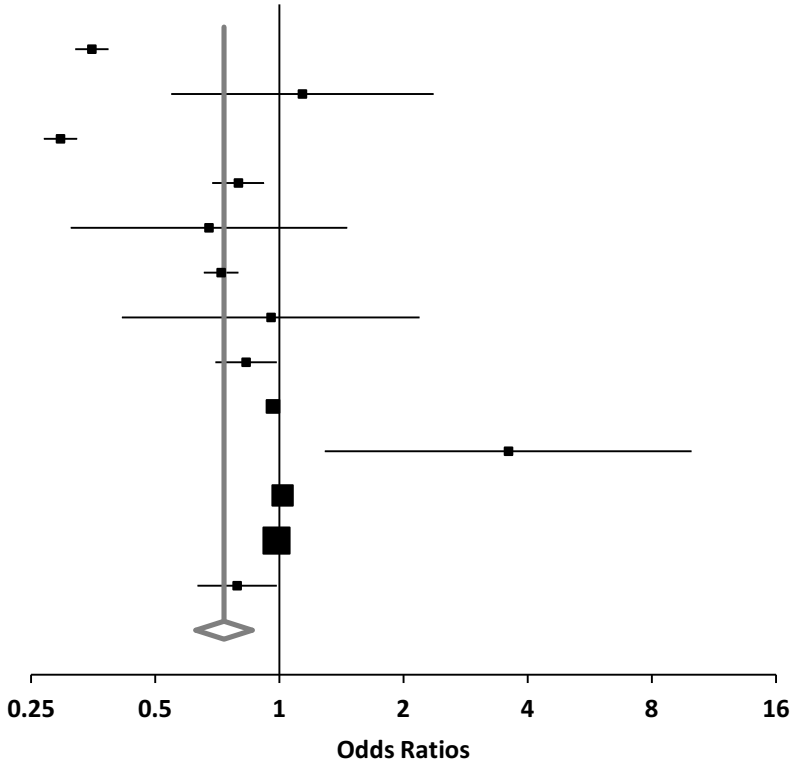

Figure 4: Bullies and low SES

Author	Measure	Odds Ratios (95% CI)
Alikasifoglu	Affluence	0.86 (0.68; 1.09)
Alikasifoglu	Education	0.91 (0.71; 1.16)
Barboza	Education	0.98 (0.94; 1.02)
Bowes	Disadvantage	1.47 (1.19; 1.81)
Flouri	Disadvantage	1.07 (0.99; 1.16)
Glew	Disadvantage	1.54 (1.25; 1.89)
Jansen (a)	Occupation	1.15 (0.89; 1.49)
Jansen (b)	Occupation	1.40 (0.95; 2.06)
Kim	SES	3.45 (0.69; 17.16)
Magklara	SES	1.33 (0.77; 2.30)
Pereira	SES	1.77 (1.02; 3.07)
Shetgiri	SES	1.00 (0.80; 1.24)
Synthesis		**1.14 (1.02; 1.27)**

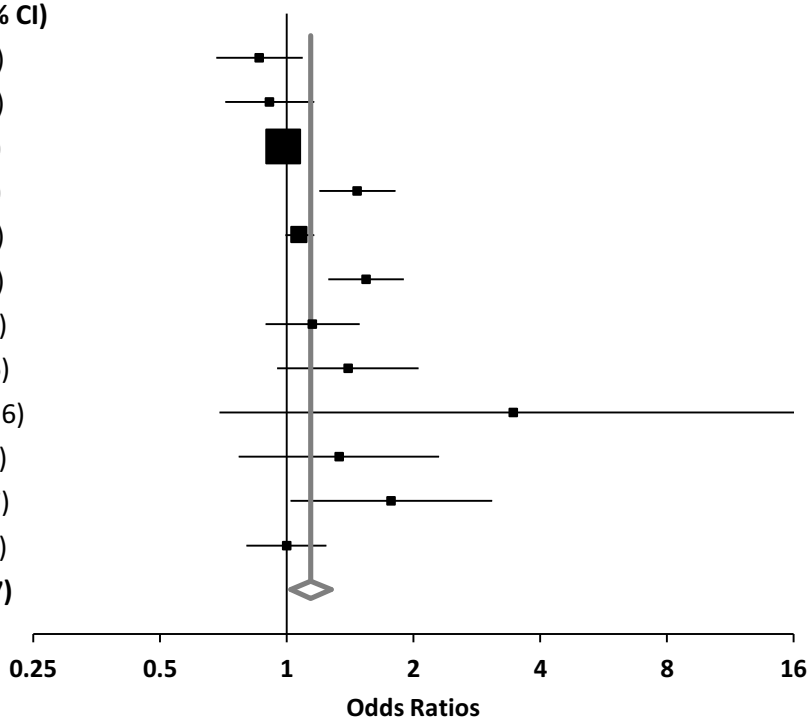

Figure 5: Bullies and high SES

Author	Measure	Odds Ratios (95% CI)
Shetgiri	Affluence	1.00 (0.90; 1.12)
Wang	Affluence	1.51 (0.58; 3.93)
Christie-Mizell	Education	0.54 (0.43; 0.67)
Magklara	Education	0.87 (0.42; 1.83)
Zimmerman	Education	0.66 (0.49; 0.88)
Barboza	Income	1.42 (1.15; 1.75)
Christie-Mizell	Income	0.46 (0.37; 0.57)
Elgar	Income	1.04 (0.79; 1.36)
Garner	Income	0.38 (0.16; 0.89)
Zimmerman	Income	0.68 (0.51; 0.91)
Jansen (a)	SES	0.97 (0.94; 1.00)
Kim	SES	2.60 (0.89; 7.55)
Ma	SES	1.01 (0.98; 1.04)
Veenstra	SES	0.98 (0.96; 1.01)
Wolke	SES	0.72 (0.54; 0.96)
Synthesis		**0.89 (0.83; 0.95)**

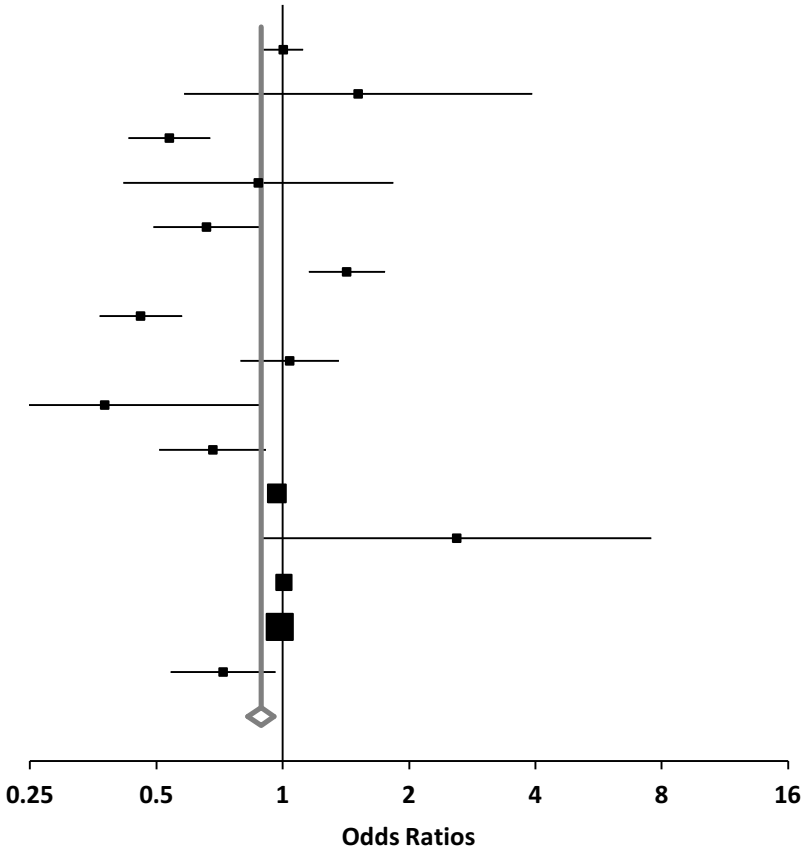

Figure 6: Bully-victims and low SES

Author	Measure	Odds Ratios (95% CI)
Alikasifoglu	Affluence	1.21 (0.96; 1.54)
Alikasifoglu	Education	1.30 (1.01; 1.67)
Bowes	Disadvantage	3.95 (2.79; 5.58)
Glew	Disadvantage	1.48 (0.85; 2.58)
Jansen (a)	Occupation	1.22 (0.90; 1.66)
Jansen (b)	Occupation	1.92 (1.22; 3.01)
Kim	SES	6.45 (1.29; 32.23)
Magklara	SES	1.41 (0.72; 2.76)
Synthesis		**1.71 (1.22; 2.39)**

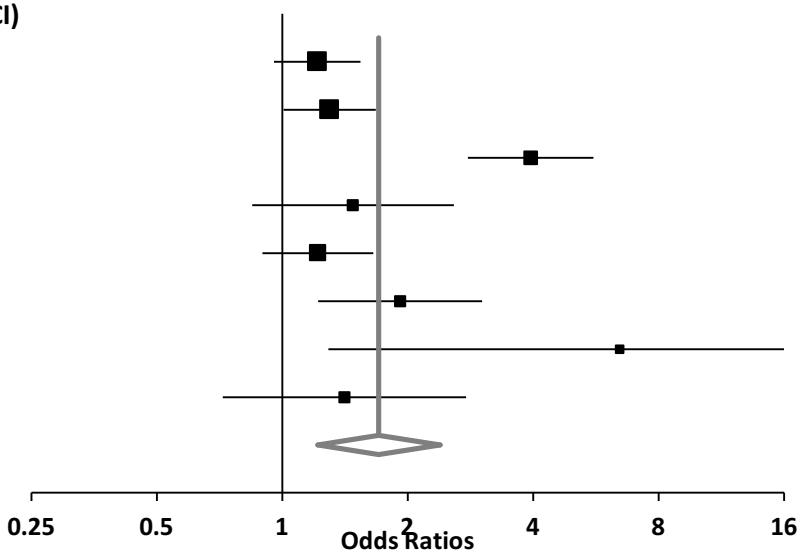

Figure 7: Bully-victims and high SES

Author	Measure	Odds Ratios (95% CI)
Wang	Affluence	0.77 (0.32; 1.84)
Magklara	Education	0.97 (0.39; 2.41)
Jansen (a)	SES	0.98 (0.96; 1.00)
Kim	SES	6.63 (2.45; 17.93)
Veenstra	SES	0.98 (0.95; 1.01)
Synthesis		**0.98 (0.93; 1.04)**