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PEDIATRIC REVIEW

Are overweight and obese youths more often bullied by their peers? A meta-analysis on the relation between weight status and bullying

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Research suggests that overweight and obese youths are stigmatized in contemporary society, and are more likely than normal-weight youths to become the victims of bullying. In the current study, meta-analyses were performed to analyze to what extent overweight and obese youths are more likely than normal-weight youths to be the victims of bullying. The databases Psychinfo, ERIC and Medline were searched for relevant articles. Retrieved articles were scanned to find further articles. Language was not used as an exclusion criterion. A total of 14 articles ($N = 55\,231$) were included in a meta-analysis on bullying and overweight youths, and a total of 16 articles ($N = 58\,520$) were included in a meta-analysis on bullying and obese youths. The results suggested that both overweight and obese youths were more likely to be victims of bullying. The results were not moderated by gender, overweight and obese boys and girls were equally likely to be victimized. Results remained significant after adjustment for publication bias. Both overweight and obesity are risk factors for being a victim of bullying.

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INTRODUCTION

Bullying between peers during childhood and adolescence has been recognized as a problem worldwide.[1] Bullying has been defined as repeated physical or verbal harassment, in which the bully is more powerful than the victim.[2,3] The potential consequences for the victims of bullying include loss of sleep, depression, lower school motivation, psychosomatic problems, and even suicide.[4–6] Though some meta-analyses suggest that bullying interventions are effective,[7,8] other meta-analytic studies have provided only mixed support for existing bullying interventions.[9,10] By better understanding which children and adolescents are likely to be bullied, more targeted and potentially more effective interventions can be designed.[11] This article aims at providing an answer to the question whether or not children and adolescents' weight is an indicator for the risk of being bullied. In the current society, overweight and obese youths are stigmatized as being lazy, sloppy, incompetent and lacking in willpower,[12,13] and adolescents themselves view weight status as one of the main explanations of why peers would be bullied.[14]

Based on large data sets from six countries, international standards for overweight and obesity,adjusted for age and gender, have been established[15] by averaging centile curves that pass through a body mass index (BMI) of 25 (overweight) and 30 (obese) at age 18. Many studies on bullying and weight status adhere to these international standard definitions.[16–23] Several other studies on bullying and weight status use age- and gender-specific cutoff points established for their country.[24–31] Especially obese children seem to be victims of bullying more often.[20,21] For overweight children the results have been mixed, with some studies reporting overweight children also are more often bullied,[19,20,29] and some studies not reporting differences between overweight and normal-weight children.[16,28]

The role of gender in the relation between bullying and weight status is unclear. It has been suggested that among boys, a large body size may be associated with physical strength, a trait that is valued among boys. Strength is less valued among girls, and thus girls may be more likely to be bullied because of obesity than boys,[16] and some studies indeed find that overweight or obese girls are more likely to be bullied than overweight or obese boys.[26] These results are not consistent across studies, however, and it has also been suggested that the relation between gender, weight status and bullying depends on the specific form, physical or relational, of bullying that is being studied.[20]

In the current study, meta-analyses are used to analyze whether overweight and obese children are more likely to be the victims of bullying than normal-weight youths. Using meta-analyses, the outcomes of studies can be statistically combined, the moderating influence of study designs can be assessed and the effects of publication bias can be addressed.[32] We expect that obese children are more likely to be bullied than normal-weight children.[19,20] For overweight children the results are less consistent, but based on several studies[19,20,29] we expect that overweight children are significantly more often bullied than normal-weight children. Moderator analyses will be used to analyze whether study designs and the measurement of height and weight have affected study results. Moderator analyses will also be used to assess the impact of gender on the relation between either overweight or obesity status and bullying. Most studies adhered to the international standard definitions of Cole *et al.*,[15] and some studies used country-specific definitions of overweight and obesity. We shall use moderator analyses to analyze whether studies that used the international standard definition provided different results

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than studies that used country-specific definitions of overweight and obesity.

MATERIALS AND METHODS

Study retrieval and selection

The search engines Psychinfo, ERIC and MEDLINE were searched using the search terms bully* or victim* in combination with obes* or overweight or BMI. We searched for studies published between 1950 and August 2013. In addition, the reference lists of retrieved articles were scanned to find potential articles for inclusion in the meta-analysis. Initially, 224 articles were found, which were reduced after screening of abstracts to 117 articles. Articles, reports, dissertations, book chapters and research posters were all eligible for inclusion in the meta-analysis. Language (either or not English) was not used as an exclusion criterion. Studies were only included if they provided an effect size that compared the bullying of obese or overweight children with a group of non-overweight peers. Studies were excluded if they did not use definitions of overweight and obesity that were adjusted for gender and age. Several studies[16–23] used the international standards of overweight and obesity provided by Cole *et al.*,[15] whereas other studies[24–31] used definitions that were specific for their country. Studies were excluded if they did not compare a group of overweight or obese children with a group of children with normal weight. Some studies combined overweight and obese youth into a single overweight/obese category. These studies were excluded from the analyses because overweight and obese youth might not be at the same risk to become victims of bullying.[19,20] Some studies did not focus on general bullying but only on weight-related teasing or name calling; these studies were excluded from the analyses. By focusing only on weight-related teasing, other forms of bullying, of which non-overweight children might more often be the victim, are not considered. This could potentially result in a biased meta-analysis. Studies had to focus on bullying between peers; studies that focused on bullying by others were excluded from the study. Studies that included participants over 19 years of age were excluded. The 16 studies summarized in Table 1 met the inclusion criteria and were used in the meta-analyses. All studies included used self-reports as measure of bully victimization. One study was written in Italian,[22] all other studies were written in English. Two studies[27,30] were only included in the meta-analysis on obese youth because they did not provide data on overweight youth.

Coding decisions

If articles included multiple independent samples, these were entered in the meta-analyses separately. Most studies included in the meta-analyses used odds ratios (ORs) as effect size measure. We chose to code the OR that compared a group of overweight or obese children with a non-overweight control group. For one study,[18] we used a risk ratio as a conservative estimate of an OR. One study used mean scores instead of ORs.[29] From this study, we coded a Cohen's *d* that compared overweight or obese children with a group of normal-weight children. The Cohen's *d* was then converted into ORs using the program Comprehensive Meta-analysis.[33] In studies that did not provide a general measure of bullying, but used several forms of bullying (relational, physical, verbal) the several forms were averaged to create a general measure of bullying. Two of the authors (MvG and JOT) independently coded the effect sizes and the moderators. Differences were resolved through discussion. Prior to discussion, the authors coded identically 91% of the time.

Analyses

Data were analyzed using the program Comprehensive Meta-analysis.[33] ORs were used as effect sizes. Other effect sizes were transformed into ORs prior to the analyses. We conducted two meta-analyses, one to compare overweight children with normal-weight children, and one to compare obese children with normal-weight children. Because nonsignificant results may be missing, the effect sizes computed in the meta-analysis may be inflated. To assess the risk of this type of publication bias, we computed Rosenthal's fail safe *N* and Orwin's Fail safe *N*, which estimate how many studies with nonsignificant results would be needed to nullify a meta-analytically obtained effect size. We calculated the association between the standardized effect sizes and the variances of these effect sizes as well using the Kendall τ method: a high Kendall τ coefficient suggests that small studies with nonsignificant results tend not to be published, whereas a nonsignificant Kendall τ coefficient suggests the absence of such publication bias. We used Duvall and Tweedie's trim-and-fill procedure, which imputes effect sizes until the error distribution closely approximates normality; this procedure provides a more unbiased estimate of the effect size than the observed estimate. Because study characteristics of included studies may affect the outcomes of meta-analyses, we ran a moderator analysis to analyze whether the effect sizes from studies using convenience or purposive samples differed from studies using random, cluster

Table 1. Study characteristics of the studies included in the meta-analyses

Authors (year)	N *(%response)*	*Age range (%girls)*	*Country*	*Design*	*BMI measure & definition*[a]
Brixval *et al.*[16]	4781 (89.3)	11–15 (51.4)	Denmark	Cluster	Self-report[15]
Elgar *et al.*[17]	355 (90)	11–14 (54.6)	Wales	Cluster	Weight & height[15]
Garcia-Continente *et al.*[18]	2558 (NA)	13–18 (55.3)	Spain	Stratified	Weight & height[15]
Gibson *et al.*[24]	262 (NA)	6–13 (NA)	Australia	Convenience	Weight & height[37]
Griffiths *et al.* [25]	6932 (NA)	7.5–8.5 (50.3)	Great Britain	Cluster	Weight & height[38]
Guo *et al.*[26]	12439 (NA)	11–18 (49.8)	China	Stratified	Self-report[39]
Jankauskiene *et al.*[27]	1162 (95.5)	11–17 (54.0)	Lithuania	Random	Self-report[40]
Janssen *et al.*[19]	5749 (72.4)	11–16 (52.7)	Canada	Cluster	Self-report[15]
Kukaswadia *et al.*[20]	1738 (74)	11–15 (NA)	Canada	Cluster	Self-report[15]
Lumeng *et al.*[28]	821 (60)	8–12 (50)	United States	Stratified	Weight & height[41]
Pearce *et al.*[29]	416 (72.8)	14–18 (51.7)	United States	Convenience	Self-report[42]
Reulbach *et al.*[21]	8568 (57)	9 (51.4)	Ireland	Stratified random	Weight and height[15]
Sweeting *et al.*[30]	2127 (93)	11 (49.8)	Scotland	Purposive	Weight & height[38]
Verzeletti *et al.*[22]	2667 (NA)	13–15 (59)	Italy	Cluster	Self-report[15]
Wang *et al.*[31]	6939 (85)	11–17 (51.2)	United States	Cluster	Self-report[41]
Wilson *et al.*[23]	1006 (82)	11–17 (53.9)	Seychelles	Cluster	Weight & height[15]

Abbreviation: BMI, body mass index. [a]References are provided to indicate with which definitions of overweight and obesity the authors have worked.

or stratified samples. We also compared studies that used objective measurements of height and weight with studies that used self-reports of height and weight. Data were analyzed using a random-effects model, which is more appropriate for meta-analyses based on a literature search than a fixed-effects model because it does not assume a common underlying effect size for all included studie.[32]

RESULTS

Bullying and overweight youth

The meta-analysis on bullying and overweight youth was based on 14 studies that provided 25 effect sizes. These 14 studies concerned a total of 55 231 youths. The meta-analysis indicated that under the assumption of a random effects model there was a significant OR between being overweight and being a victim of bullying (OR = 1.19 (1.10–1.29)). The analysis is summarized in Table 2. A forest plot is provided in Figure 1. Orwin's fail safe *N* procedure suggested that 59 studies with nonsignificant results would be needed to reduce this result to an OR of 1.05, Rosenthal's fail safe *N* suggested that 152 studies with non-significant studies would be needed before the cumulative effect would become nonsignificant. Kendall's τ was (0.14($Z = 1.00$, $P = 0.32$)), which suggested an absence of publication bias. The Duvall and Tweedie trim-and-fill procedure suggests that three studies would need to be imputed under the assumption of a random effects model to achieve an approximately normal error distribution. Including these three studies would lead to a similar significant effect size (OR = 1.17 (1.08–1.27)). There was no statistical difference between studies using self-reports of height and weight to compute BMI or studies that measured children's length and weight to compute BMI (Q(1) = 2.408, $P = 0.121$), and there was no significant difference between studies using cluster or random sampling and studies using convenience or purposive sampling (Q(1) = 3.631, $P = 0.057$]) We tested for the moderating effects of gender. A nonsignificant effect indicated that he effect sizes between bullying and overweight status did not differ for boys and girls ((1) = 1.934, $P = 0.164$). Studies that used the international standard definition provided by Cole *et al.*[13] did not provide different effect sizes than studies that used a country-specific definition of obesity (Q(1) = 0.662, $P = 0.416$).

Bullying and obese youth

The meta-analysis on bullying and overweight youth was based on 16 studies that provided 28 effect sizes. These 16 studies concerned a total of 58 520 youths. The meta-analysis indicated that under the assumption of a random effects model, there was a significant relation between being obese and being a victim of bullying (OR = 1.51 (1.32–1.71)). The analysis is summarized in Table 2. A Forest plot is provided in Figure 2.

Orwin's fail safe *N* procedure suggested that 70 studies with nonsignificant results would be needed to reduce this result to an OR of 1.05, and Rosenthal's fail safe *N* indicated that 633 nonsignificant studies would be needed before the cumulative effect would become nonsignificant. Kendall's τ was (0.03 ($Z = 0.257$, $P = 0.797$)), which suggested an absence of publication bias. The Duvall and Tweedie trim-and-fill procedure suggests that 13 studies would need to be imputed under the assumption of a

Table 2. Relations between weight status and bullying victimization

	No. of studies	*No. of effect sizes*	N	*Odds ratio (95% CI)*	*Q*(df)	I^2	*Orwin's fail safe* N
Overweight	14	25	55 231	1.19 (1.10–1.29)	32.743(24)	26.701	59
Obese	16	28	58 520	1.51 (1.34–1.72)	81.572 (27)	66.900	70

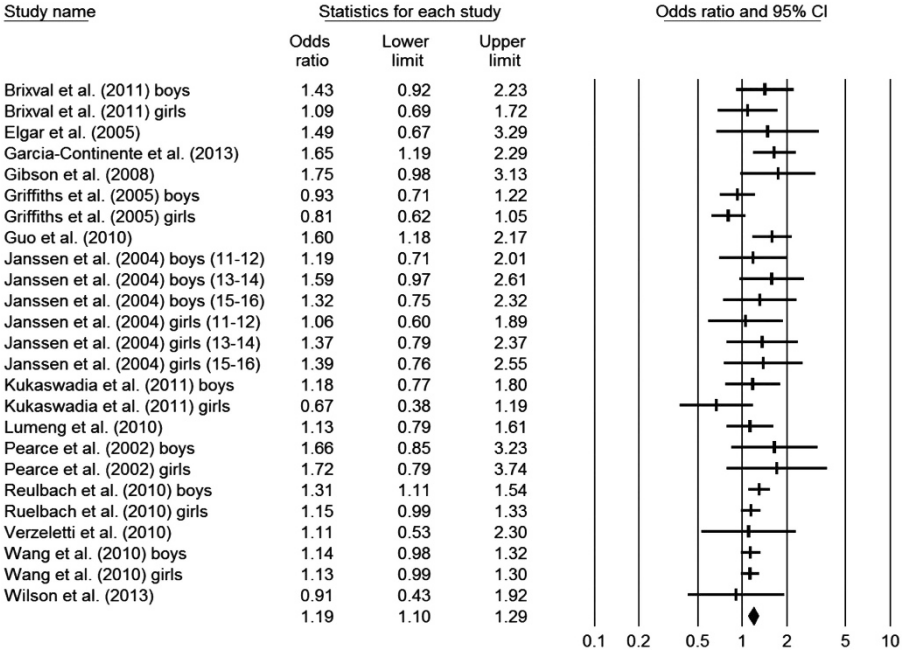

Figure 1. A forest plot for the meta-analysis on bullying and overweight. The bullying victimization of overweight children was compared with the bullying victimization of normal-weight children.

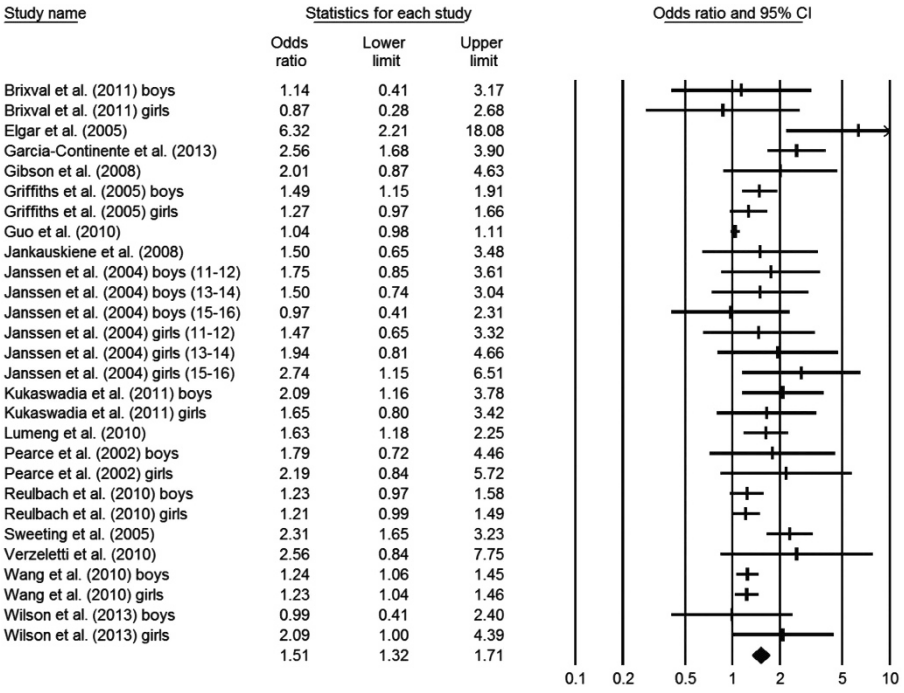

Figure 2. A forest plot for the meta-analysis on bullying and obesity. The bullying victimization of obese children was compared with the bullying victimization of normal-weight children.

random effects model to achieve an approximately normal error distribution. Including these 13 studies would lead to a lower, though still significant effect size (OR = 1.19 (1.04–1.36)). There was no statistical difference between studies using self-reports of height and weight and studies that measured children's length and weight to compute BMI (Q(1) = 2.794, $P = 0.095$). Though the relation between obesity and bullying was significant for both, studies that used purposive or convenience samples (OR = 2.209 (1.67–2.93)) reported higher effect sizes than studies that used cluster or stratified random samples ($R = 1.42$(1.26–1.61)), (Q (1) = 7.786, $P = 0.005$). A nonsignificant effect indicated that the effect sizes between bullying and obesity status did not differ for boys and girls(Q(1) = 0.148, $P = 0.700$) Studies that used the international standard definition provided by Cole *et al.*[15] did not provide different effect sizes than studies that used a country-specific definition of obesity (Q(1) = 1.228, $P = 0.268$).

DISCUSSION

The current meta-analysis was performed to analyze whether overweight and obese youth experienced more bullying than normal-weight youth. Consistent with our hypotheses, analyses indicate that both overweight and obese youths experience significantly more bullying than normal-weight youths. The analyses for the obese children were affected by publication bias and methodological characteristics, though moderator analyses and the adjustment of the effect size for bullying and obesity for publication bias suggested that the effect size would remain substantial and significant even when methodologically less strong studies were taken out of the analysis and when publication bias was adjusted for. This meta-analysis confirms that overweight and obesity are not only associated with health risk, but are also related to negative social implications.[12–14]

A limitation of the current meta-analysis is that we used a general index of bullying, because too few studies provided separate indices of the different forms of bullying (verbal, relational or physical). This is particularly lamentable because a study by Wang *et al.*[31] suggests that overweight and obese children are particularly more likely to be bullied verbally, whereas other's suggest that obese boys may experience more physical bullying, and girls more relational bullying.[20] Another limitation is that we did not include underweight children in the current meta-analysis, because there were too few studies that included underweight children. It has been found that underweight children might also more frequently be the target of bullying than normal-weight children.[31] Finally, too few studies differentiated between age groups to allow for a meaningful comparison in a meta-analysis, whereas it has been suggested that weight-related bullying may decline with age.[19]

Teachers often have difficulty identifying which children are bullied.[34] Knowing that overweight and obese children are more likely to be the victims of bullying may help teachers to identify these victims more timely. Also, because overweight and obese children are more likely the victims of bullying, we would suggest that bullying interventions pay some attention to the prejudice directed towards overweight and obese individuals[10,11] because addressing these prejudices may help to reduce bullying in the classroom. Such interventions are especially important, as overweight and obese youths already face both psychological[35] and physical health risks,[36] and a multitude of studies suggests that being the victim of bullying might lead to depression,[4] psychosomatic problems,[5] and even suicide,[6] thus further adding to the health problems of overweight and obese children and adolescents.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

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