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Weight Status as a Predictor of Being Bullied in Third Through Sixth Grades

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Abstract

OBJECTIVES—Childhood obesity and bullying both are pervasive public health problems. The objective of this study was to determine the relationship between childhood obesity and being bullied in third, fifth, and sixth grades while testing for potential confounding and moderation.

METHODS—A total of 821 children who were participating in the Eunice Kennedy Shriver National Institute of Child Health and Human Development Study of Early Child Care and Youth Development (50% male, 81% white, 17% obese, 15% overweight in third grade) were studied. Generalized estimating equations were used to evaluate the relationship between child weight status and the odds of being bullied as reported by child, mother, and teacher, accounting for repeated measures and adjusting for grade level in school, child gender, child race, family income-to-needs ratio, school racial and socioeconomic composition, and mother- and teacher-reported child social skills and child academic achievement.

RESULTS—In sixth grade, 33.9%, 44.5%, and 24.9% of the children were reported to be bullied per teacher-, mother-, and self-report, respectively. There was a significant independent association between being obese and being bullied (odds ratio: 1.63 [95% confidence interval: 1.18–2.25]). The relationship between being obese and being bullied was attenuated but not eliminated by all covariates except gender. The relationship was not moderated by any of the covariates.

CONCLUSIONS—Children who are obese are more likely to be bullied, regardless of a number of potential sociodemographic, social, and academic confounders. No protective factors were identified. Effective interventions to reduce bullying of obese children need to be identified.

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Keywords

bullying; peer victimization; childhood obesity

Obesity among US children has risen to epidemic proportions, with 17% of 6- to 11-year-olds estimated to be obese in 2003–2006.¹ Parents of obese children rate bullying as their top health concern,² and obese children who are bullied experience more depression, anxiety, and loneliness.^{3–5}

To develop effective interventions to address bullying in this population, it is first important to confirm that the child's weight status is actually the primary factor underlying the bullying. Children are bullied for many reasons, with at least one-third of all children reporting being the victim of at least some bullying.^{6,7} Whether obese children are more often bullied because of their weight status or because of some other confounding factors remains unanswered by the current literature. Specifically, previous studies either examined only weight-specific bullying in obese children^{8–10} or did not control for potentially important confounders such as race and socioeconomic status (SES).^{11–14} Such omissions are potentially problematic given that lower SES and membership in key minority groups each have been associated with an increased prevalence of obesity^{1,15} and being bullied.^{16–21} In addition, no previous study examined whether the racial or socioeconomic composition of the child's school confounds the relationship between being obese and being bullied, although school composition has been described as an important predictor of bullying prevalence.^{19–21} Other covariates that have been associated with both obesity and being bullied and have not been considered as potential confounders in previous literature include low social skills^{22–26} and low academic achievement.^{27–31}

Research that has examined associations between children's weight status and being bullied has several additional limitations. Studies have rarely¹² included cohorts focused on the age range when bullying peaks (ages 6–9 years⁶), it has sometimes relied on self-reported^{11,13} as opposed to measured weight status, and none of the US studies have included children drawn from more than a single geographic location.

The objective of this study was to fill a specific gap in the existing literature by examining the independent direct relationship between measured weight status and risk for being bullied independent of demographic, social, and academic confounders within a multisite US cohort of school-aged children. We specifically hypothesized that any association between being obese and being bullied would be attenuated, possibly eliminated, or moderated by the child's being nonwhite or of low income, attending a school that was more low-income or more racially diverse, or having weaker social or academic skills.

METHODS

Sample

The Eunice Kennedy Shriver National Institute of Child Health and Human Development Study of Early Child Care and Youth Development is a longitudinal study focused on child behavior and development.³² Participants were recruited at birth beginning in 1991 by using

a stratified random sampling plan to achieve a sample representative of the demographics of each of the 10 study sites: Little Rock, Arkansas; Irvine, California; Lawrence, Kansas; Boston, Massachusetts; Morganton, North Carolina; Philadelphia, Pennsylvania; Pittsburgh, Pennsylvania; Charlottesville, Virginia; Seattle, Washington; and Madison, Wisconsin. Details regarding the study design and all measures outlined herein are available at <https://secc.rti.org>. The study was approved by the institutional review boards of all relevant institutions. The original cohort included 1364 participants. We limited the sample to children with at least 1 measure of bullying, 1 measure of weight status, and data regarding the socioeconomic and racial composition of at least 1 school attended during third, fifth, and sixth grades. This resulted in a sample of 821 children (60% of the original cohort). The sample included differed from the sample excluded in that the study sample had a mean income-to-needs ratio in third grade of 3.99 (vs 5.13 for those excluded; $P < .0001$). The study sample did not differ from those excluded by gender ($P = .07$) or race ($P = .46$).

Predictor: Child Weight Status

Height and weight were measured during study visits in third, fifth, and sixth grades by standard protocol. BMI was calculated and BMI percentile and z score were derived for age and gender on the basis of the US Centers for Disease Control and Prevention National Center for Health Statistics growth charts.³³ Preliminary unadjusted logistic regression models indicated that the relationship between BMI z score and the odds of being bullied was nonlinear, as reflected in a significant quadratic term for BMI z score ($P < .0001$). Investigation of the nature of the nonlinear relationship indicated that BMI was appropriately categorized by using the standard definitions: obesity was defined as a BMI 95th percentile and overweight as a BMI <95th percentile and 85th percentile.

Outcome: Being Bullied

The child being bullied was reported by the child, the teacher, and the mother at third, fifth, and sixth grades. An 18-item interviewer-administered questionnaire for children and a 43-item questionnaire for teachers and mothers each were developed for the Eunice Kennedy Shriver National Institute of Child Health and Human Development Study of Early Child Care and Youth Development on the basis of previous work and were validated and reliable.^{34,35} Being bullied was captured by the means of children's responses to 4 items and teachers' and mothers' responses to 7 items (see Appendix). Pearson correlation coefficients for maternal reports of bullying across the 3 grades ranged from .52 to .67, for teachers ranged from .32 to .34, and for children's self-report ranged from .35 to .47. Cronbach's coefficient α for all 9 reports of bullying was .81. Preliminary analyses indicated that the relationship between weight status and being bullied varied by the identity of the reporter. We therefore sought to create a mean bullying score at each grade weighted for the identity of the reporter. To do so, we rescaled the mother and teacher reports to the 5-point scale used for the child reports and performed principal components analysis predicting a single bullying factor from mother, child, and teacher reports at each grade. To generate a weight for each reporter, we averaged the standardized scoring coefficients across third, fifth, and sixth grades for each reporter (mean maternal weight = .48, mean teacher weight = .43, mean child weight = .44). The weighted average bullying score was then calculated for each grade. Each child therefore had 1 score at each of 3 grades reflecting how often the child

was bullied. We sought to create a dichotomous outcome measure for ease of interpretation. Because between 50% and 75% of children had scores reflecting “never” or “hardly ever” being bullied at each time point, we defined being bullied as a mean weighted score in the top quartile.

Covariates

Demographic Covariates—Both obesity^{1,15} and being bullied^{16–21} are more common for boys, minorities, and low-income groups. Gender (male versus female) was therefore included as a covariate. Mothers reported the child’s race, which was included as a 2-category (white versus not white) variable, and the family’s income, from which income-to-needs ratio (ITNR) at third, fifth, and sixth grades was calculated as a continuous measure. ITNR is the ratio of total family income relative to the poverty level for a family of a particular size. Preliminary unadjusted logistic regression models indicated that the relationship between ITNR and the odds of being bullied was nonlinear, as reflected in a significant quadratic term for ITNR ($P < .0001$). Investigation of the nature of the nonlinear relationship indicated that ITNR was appropriately categorized as ITNR in the lowest quartile versus not.

Data regarding the race and SES of the child’s classmates were drawn from the US Department of Education’s National Center for Education Statistics (NCES) for each public school the study participant attended. The NCES annually collects data about all public schools in the United States supplied by state education agency officials, including demographic descriptors of students (<http://nces.ed.gov/ccd>).

The proportion of children within the study participant’s school who were of nonwhite race as well as the proportion who were receiving free and reduced-price lunch were generated from these data. Preliminary unadjusted logistic regression models indicated that the relationship between each of these variables and the odds of being bullied was linear, as reflected in nonsignificant quadratic terms, and they were therefore tested as continuous variables. We also examined interactions between the child’s race and the racial composition of the school, as well as the child’s ITNR and the proportion of children in the child’s school who were receiving free and reduced-price lunch, on the premise that a child’s status as a racial or socioeconomic minority within the school setting would be the most valid and relevant conceptualization of minority status, but found no significant interactions. These 4 demographic variables were therefore tested in the models as main, not interactive, effects on bullying.

Social and Academic Covariates—Teachers and mothers completed a slightly modified version of the validated and reliable Social Skills Rating System (SSRS)³⁶ in third, fifth, and sixth grades. Total standard scores, which have a mean of 100 and an SD of 15, for each reporter at each grade level are generated, with higher scores indicating greater social skills. Children were administered the Woodcock-Johnson Psycho-educational Battery-Revised (WJPB-R), a validated and reliable measure of academic achievement,³⁷ at 3rd and 5th grades. The mean of the broad reading and broad math standard scores, which have a mean of 100 and an SD of 15, was calculated, with higher scores reflecting higher academic

achievement. Because preliminary unadjusted logistic regression models indicated that SSRS standard scores and WJPB-R scores each were linearly associated with the odds of being bullied, as evidenced by nonsignificant quadratic terms, SSRS score and WJPB-R scores each were tested as continuous variables.

Statistical Analysis

All analyses were conducted by using SAS 9.1 (SAS Institute, Cary, NC). Generalized estimating equations, accounting for repeated measures within subjects, were used to determine the unadjusted and adjusted relationships between each covariate and being bullied across third, fifth, and sixth grades. All variables, with the exception of child gender and race, were therefore included as time-varying covariates. Preliminary models indicated that the child's grade in school had a significant main effect but no interactive effect with weight status. We therefore controlled for the child's grade in school in all subsequent models but did not stratify analyses. We next tested confounding of the main effect of weight status by each of the covariates, both individually and in combination. Significant attenuation was defined as reducing the main effect, as reflected in either the parameter estimate or odds ratio (OR) of obese or overweight on being bullied, by >10%.³⁸ Covariates that significantly attenuated the main effect were retained in the model. Child gender did not significantly attenuate the main effect, but given that it was significantly associated with being bullied, we elected to retain it in the final model. Adjusted ORs and their corresponding 95% confidence intervals (CIs) were calculated from these models. We examined effect modification by testing the interaction term of weight status with each covariate as well as study site, and $P < .05$ was considered a significant interaction.

RESULTS

In third grade, 14.6% of the sample was overweight and 17.3% was obese. Half (50.3%) of the children in the sample were male, and 18.9% were nonwhite. The mean ITNR in third grade was 4.0 (SD: 3.2). The schools that the children attended were on average 72.7% (SD: 25.8%) white (range: 0.1%–100.0%), and 29.2% (SD: 23.3%) of the children at the participant child's school received free or reduced-price lunch (range: 0.0%–100.0%). Mean SSRS standard scores were 105.2 (SD: 15.9) and 101.9 (SD: 14.5) by mother and teacher report, respectively. Mean WJPB-R standard scores were 110.7 (SD: 14.0) in reading and 115.9 (SD: 17.6) in math.

The unadjusted odds of the child's being bullied in association with each covariate are shown in Table 1. The odds of being bullied in relation to weight status in the unadjusted model were 1.85 (95% CI: 1.37–2.51) for obesity and 1.26 (95% CI: 0.90–1.77) for overweight. The adjusted models are also shown in Table 1. The main effect of the child's weight status on being bullied was significantly attenuated but not eliminated by all of the covariates except child gender. The odds of being bullied in relation to weight status in the adjusted model were 1.63 (95% CI: 1.18–2.25) for obesity and 1.13 (95% CI: 0.79–1.61) for overweight. There were no significant interactions between child weight status and any of the covariates, including study site. We reran the final adjusted model with bullying

operationalized as a continuous score, and the results did not differ (OR for obese: 1.04 [95% CI: 1.01–1.08]).

To examine the possibility that being bullied predicts excessive weight gain, we created a linear regression model in which being bullied in third grade was examined as the main effect, and the outcome was change in BMI *z* score between third and sixth grades. We controlled for all covariates, as well as the child's weight status in third grade. Being bullied in third grade was not associated with an increase in BMI *z* score in the subsequent 2 years ($\beta = .050$ [95% CI: -0.049 to 0.149]; $P = .32$).

DISCUSSION

This study found that obese 8- to 11-year-old US children were more likely to be bullied as compared with their nonoverweight peers independent of the child's gender, race, family SES, school demographic profile, social skills, or academic achievement. The association was partially attenuated but not eliminated by the child's race, family SES, school demographic profile, social skills, and academic achievement. The higher odds of being the victim of bullying among obese children were equally strong across children who were male and female, white and nonwhite, and poor and nonpoor and across schools of all types of demographic profiles and 10 US study sites. The association was also equally strong across the spectrum of child social skills and academic achievement. The data supported a similar trend among children who were overweight, as compared with nonoverweight, although the results did not reach statistical significance. The magnitude of the effect of being obese on the odds of being bullied was greater than the odds of being bullied in association with being poor or being male. Our study confirms previous reports in the literature and extends them in several ways. Our study population was younger and larger than most previous samples and, unlike previous studies, used reports by children, teachers, and mothers. Using data from these 3 different reporters may have increased validity of the bullying reports, especially because within our own cohort, as well as in previous literature, the prevalence of being bullied varied by reporter.^{39,40} We also were able to test confounding and moderation by a number of covariates that were not included in previous studies.

We had hypothesized that if being a racial minority or of low SES, attending a school that is of lower SES or more racially diverse, having weaker social skills, or having lower academic achievement occurs more commonly among both obese children and children who are the victims of bullying, then these factors might account for the association between obesity and being bullied, but this was not the case. In addition, we had hypothesized that if an obese child were in the racial majority, was nonpoor, attended a school that was less socioeconomically or racially diverse, had strong social skills, or had higher academic achievement, then the child's increased risk for being bullied occurring in association with their obesity would be reduced. None of these factors, however, protected the obese child from being bullied more often. In effect, being obese, by itself, seems to increase the likelihood of being a victim of bullying.

Finally, our analytic approach found cross-sectional associations between being obese and being bullied across third, fifth, and sixth grades. It is possible that children are not bullied

because they are obese but, rather, that being bullied creates stress and unhappiness that leads to behaviors such as excessive comfort food consumption that contribute to excessive weight gain. We attempted to approximate this possibility by examining the association between being bullied in third grade and change in BMI z score in the subsequent 3 years, independent of baseline weight status and confounders, and identified no significant association. These data therefore suggest that, as is commonly hypothesized, obesity causes bullying and not that bullying causes excessive weight gain and obesity.

There are limitations to our study, primarily related to generalizability. Although our sample was relatively diverse, the proportion of the sample that was nonwhite was small, making it difficult to determine whether the general patterns observed may equally apply to key subgroups in the United States. The sample was drawn from 10 sites across the United States and is representative of the demographics of these sites but not the entire population of US children. There was some attrition, and the school-level demographic data were available only for children who attended public, not private, schools; therefore, the results of this study may be generalizable only to children with the characteristics of those included in this sample.

The implications of this study are several. First, obese and overweight children are more likely to develop depressive symptoms,⁴¹ and being bullied has been reported to mediate the relationship between weight status and depressive symptoms.^{42,43} Interventions that address bullying within schools are badly needed, as are interventions that address obesity at both the individual and community levels. Second, the strong association between being obese and being bullied is consistent with other work demonstrating that despite the increase in childhood obesity prevalence, the stigmatization of obese children remains pervasive.^{44,45} In caring for the obese child, providers should consider the role that being bullied may be playing in the child's well-being. Because the bullying of obese children seems to be rooted in negative perceptions of obesity by other children,⁴⁴ future research might consider evaluating approaches to modifying those perceptions. Moreover, because the perceptions of children are connected to broader societal perceptions regarding body type, it is important to fashion messages aimed at reducing the premium placed on thinness and the negative stereotypes that are associated with being obese or overweight.

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APPENDIX: Questions to Assess the Child Being Bullied

Child self-report, answered on 5-point Likert scale (1 = never, 5 = always): Does anyone in your class

Pick on you at school?

Say mean things to you at school?

Say bad things about you to other kids at school?

Hit you at school?

Teacher and mother report, answered on a 3-point Likert scale (0 = not true, 1 = sometimes true,

2 = often true): Describe the study child's/your child's behavior with peers

- Is ridiculed by peers
 - Is picked on by other children
 - Is called names by peers
 - Is pushed around by other children
 - Peers say negative things about him or her to other children
 - Is teased or made fun of by peers
 - Is hit or kicked by other children
-

ABBREVIATIONS

SES	socioeconomic status
ITNR	income-to-needs ratio
NCES	National Center for Education Statistics
SSRS	Social Skills Rating System
WJPB-R	Woodcock-Johnson Psycho-educational Battery-Revised
OR	odds ratio
CI	confidence interval

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WHAT'S KNOWN ON THIS SUBJECT

Obese children are at greater risk for being bullied. The characteristics associated with an increased prevalence of obesity are also associated with an increased prevalence of bullying, and the independent relationship between childhood obesity and being bullied is less clear.

WHAT THIS STUDY ADDS

Obese children are more likely to be bullied, regardless of gender, race, SES, school racial and socioeconomic composition, and mother- and teacher-reported child social skills and child academic achievement. Interventions are needed to reduce bullying of obese children.

TABLE 1

ORs and 95% CIs for Being Bullied in Unadjusted and Adjusted Models

Parameter	Unadjusted Model	Adjusted Model ^a
Obese ^b	1.850 (1.370–2.510)	1.630 (1.180–2.250)
Overweight ^b	1.260 (0.900–1.770)	1.130 (0.790–1.610)
Male gender	1.450 (1.110–1.910)	1.380 (1.040–1.840)
Child race nonwhite ^c	1.680 (1.210–2.230)	0.680 (0.430–1.070)
Percentage of children in child's school who are not white	0.340 (0.210–0.540)	0.975 (0.452–2.100)
Child INTR in lowest quartile ^d	1.800 (1.380–2.330)	1.160 (0.880–1.580)
Percentage of children in child's school receiving free and reduced-price lunch	1.020 (1.010–1.020)	1.014 (1.005–1.022)
SSRS standard score ^e	0.940 (0.930–0.950)	0.945 (0.934–0.956)
Achievement testing mean standard score ^f	0.980 (0.970–0.990)	0.997 (0.987–1.008)

N = 1697 observations; *N* = 821 participants.

^a Adjusted for child's grade in school.

^b Reference is "not overweight (<85th percentile)."

^c Reference is white race.

^d Reference is ITNR in highest 3 quartiles.

^e Mean of mother and teacher report; higher scores reflect greater social skills.

^f Mean of WJPB-R math and reading scores at third and fifth grades; higher scores reflect greater academic achievement.