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Natalie A. Williams

University of Nebraska–Lincoln, nwilliams17@unl.edu

Jennifer Fournier

University of Tennessee, jhamil16@uthsc.edu

Mace Coday

University of Tennessee, mcoday@uthsc.edu

Phyllis A. Richey

University of Tennessee, prichey@uthsc.edu

Frances A. Tylavsky

University of Tennessee, ftylavsk@uthsc.edu

See next page for additional authors

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Authors

Natalie A. Williams, Jennifer Fournier, Mace Coday, Phyllis A. Richey, Frances A. Tylavsky, and Marion E. Hare



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Body Esteem, Peer Difficulties, and Perceptions of Physical Health in Overweight and Obese Urban Children Ages 5 to 7 Years

Natalie A. Williams, Ph.D. [Assistant Professor]

School of Public Health, University of Memphis, Memphis, TN, USA. nwillams7@memphis.edu

Jennifer Fournier, M.S. [Project Coordinator]

Department of Preventive Medicine, University of Tennessee, Memphis, TN, USA.
jhamil16@uthsc.edu

Mace Coday, Ph.D. [Associate Professor]

Department of Preventive Medicine, University of Tennessee, Memphis, TN, USA.
mcoday@uthsc.edu

Phyllis A. Richey, Ph.D. [Associate Professor]

Department of Preventive Medicine, University of Tennessee, Memphis, TN, USA.
prichey@uthsc.edu

Frances A. Tylavsky, Dr.PH [Professor]

Department of Preventive Medicine, University of Tennessee, Memphis, TN, USA.
ftylavsk@uthsc.edu

Marion E. Hare, MD, M.S. [Associate Professor]

Departments of Pediatrics and Preventive Medicine, University of Tennessee, Memphis, TN, USA. mhare@uthsc.edu

Abstract

Objective—To determine whether there is an association between body mass index (BMI) and body esteem in young overweight and obese urban children, and to test peer relationship difficulties and perceived physical health as mediators of this relationship.

Methods—Child self-reported body esteem, and parent-reported child peer relationship difficulties (being bullied by peers and peer rejection) and physical health perceptions were obtained from 218 overweight and obese children ages 5–7 years (81% racial/ethnic minority, *M* BMI = 25.3) and their primary caregivers.

Results—Higher BMI was associated with lower body esteem for both girls and boys. This relation was mediated by poor physical health for boys but not for girls. Peer relationship difficulties did not mediate the observed association between BMI and body esteem in either group; however, girls with higher BMI experienced more bullying and being bullied by peers was associated with lower body esteem in girls.

Conclusions—Intervening with perceptions of physical health may buffer overweight and obese boys from developing low body esteem in early childhood.

Keywords

Obesity; body image; peers; health perceptions

Childhood obesity is a significant public health concern that emerges early in life and disproportionately affects low income and racial/ethnic minority populations (Ogden, et al., 2010). Obesity in children is associated with psychosocial concerns that may adversely affect child development, including lowered self-esteem and self-concept (Griffiths, Parsons, & Hill, 2010). Body esteem is the facet of self-concept that has been most consistently associated with weight, and includes the attitudes, evaluations, and feelings an individual holds about his or her own body. Low body esteem has implications for children's health and well-being, including its role in the etiology of disordered eating and depressive symptomatology and its associations with lower global self-esteem (Allen, et al., 2006; Burrows & Cooper, 2002; Mond, et al., 2011), but has not been thoroughly examined in minority children.

Compelling evidence suggests that obesity increases the risk for low body esteem during late childhood and adolescence, and this has been found to be especially true for obese females (Clark & Tiggemann, 2008; Mendelson, White, & Mendelson, 1996; Shin & Shin, 2008). Whether excessive weight also has a negative impact on body esteem in obese preschoolers and early elementary school-aged children is less clear. In the few previous investigations focusing on this age group, higher weight (and BMI) has been found to negatively impact body esteem and related constructs (i.e., body dissatisfaction) in some studies (Davison, Markey, & Birch, 2000; Pallan, et al., 2011; Young-Hyman, Schlundt, Herman-Wenderoth, & Bozylinski, 2003) but not others (Davison, Markey, & Birch, 2003; Mendelson & White, 1985). These discrepant findings may reflect differences across studies in weight-related sample characteristics, for example, inclusion of children who were only slightly or moderately overweight versus extremely obese (i.e., BMI >99th percentile). This not only limits the ability to find a significant relationship, but to the extent that there is a linear association between BMI and body esteem, studies failing to include significant numbers of children who fall at the upper quartile of the BMI distribution may underestimate the deleterious effect of excess weight on body esteem.

Identification of modifiable processes that link overweight/obesity with body esteem in young school-aged children would provide much needed targets for school and community based intervention programs seeking to improve the psychological health of obese children, yet only one previous investigation (to our knowledge) has explicitly tested mediators of the relation between weight and body esteem in children. Davison and Birch examined parent and peer teasing as mediators of the association between weight and various components of self-concept in girls at ages 5 and 7 years (Davison & Birch, 2002). Although not a significant mediator at age 5, peer weight-related teasing was found to account for the relationship between weight and body esteem by age 7. However, weight-related teasing is only one of many challenges encountered in the peer environment by overweight and obese children. Overt aggression and relational aggression are both common, occurring at higher rates in overweight and obese children relative to normal weight children across gender and racial/ethnic groups (van den Berg, et al., 2008). Overweight and obese children are also more socially isolated and have fewer friends than nonoverweight children (Strauss & Pollack, 2003). In this group, girls are particularly vulnerable to peer relationship concerns (Griffiths & Page, 2008; Tang-Peronard & Heitmann, 2008). Being bullied and rejected by peers are associated with lower physical appearance self-concept (Eisenberg et al., 2006) and merit consideration as potential mediators of the association between weight and body esteem.

In addition to peer relationship difficulties, obesity is associated with diminished functional health and well-being (i.e., health-related quality of life) (Williams, et al., 2005). Relative to their healthy weight counterparts, obese children and adolescents report worse overall physical health on measures of health-related quality of life, along with greater physical

illness symptoms and more functional limitations (Tsiros et al., 2009). Obese girls generally report more physical health impairments than boys (Ingerski, Janicke, & Silverstein, 2007; Janicke et al., 2007; Swallen, et al., 2005). To our knowledge, the associations between perceptions of obese children's physical health and their self-concept have been examined in only one published study, which failed to find an association of body dissatisfaction and global self-concept to physical health quality of life (Wallander et al., 2009). However, lower physical health-related quality of life in children has been found to negatively impact outcomes that overlap conceptually with body esteem, such as body image (Haraldstad, et al., 2011).

The Present Study

The studies reviewed above shed light on the relation between weight and body esteem in older children and adolescents, but there is a paucity of knowledge regarding the impact of obesity on body esteem during early childhood- a critical period for physical, social, emotional, and behavioral development. There is a particular need to focus on minority and underserved children because our current understanding of body esteem in overweight and obese children is primarily based upon samples of white, middle-class children, despite evidence that minorities exhibit the highest rates of overweight and obesity. This study examined the association between BMI and body esteem in an urban, predominantly minority sample of overweight and obese 5- to 7-year-olds, including children with BMI above the 99th percentile for their age and gender. The first aim was to examine the association between BMI and body esteem. We expected to find an inverse relationship between BMI and body esteem, such that higher BMI would be associated with lower body esteem for both boys and girls. The second aim was to elucidate the processes through which obesity could lead to reduced body esteem. Consistent with this, we examined peer relationship difficulties and perceptions of physical health as mediators of the relationship between BMI and body esteem. We conducted these mediation analyses separately for boys and girls, due to evidence of gender differences in obese children's experience of peer relationship difficulties and perceptions of physical health problems. We expected that the strongest evidence for mediation would be found for girls. Specifically, we anticipated that in girls, the relationship between BMI and body esteem would be accounted for by peer relationship difficulties (both bullying by peers and peer rejection) and perceptions of poorer physical health.

Methods

Participants

Data were drawn from an ongoing randomized controlled trial investigating the effectiveness of a family-based childhood obesity intervention. Information regarding the participants, procedures, and baseline data for this study is described in detail elsewhere (see Hare et al., 2012). Briefly, eligibility criteria specified that children were between 4 and 7 years of age at screening, were English-speaking, had a BMI 85th percentile for age and sex norms, and did not have a disease or disability that would prevent weight loss or participation in physical activity. Out of the 602 families referred to the study, 317 met initial eligibility criteria and completed a screening visit (SV). Of those who were screened, 270 participants consented to participate and were randomized in the study. Since 4-year-old participants were not able to provide reliable self-report data on body esteem, evidenced by a low internal consistency estimate ($\alpha = .60$) on the measure assessing this outcome, only children aged 5 to 7 who completed the body esteem scale ($n = 218$) were included in the present study.

Procedure

Recruitment of minority and underserved families was a priority in this study. Consistent with this, initially our recruitment efforts were targeted only to community health clinics that serve low-income, predominantly minority patients (typically these individuals did not have insurance or had the state's public insurance for children). This approach proved challenging in terms of meeting our recruitment goals, thus, we expanded our recruitment efforts to private pediatric practices and also did direct mailings to families with children in our target age range. Although families recruited through the private pediatrics clinics and direct mailings were of higher SES than the families recruited through the community clinics, 63% of this group reported a total annual family income less than \$50,000. Referred families participated in a brief preliminary telephone screen, after which potentially eligible children were scheduled for a SV. The purpose of the SV was to obtain informed consent, reassess and confirm eligibility, obtain child anthropometric measures and demographic, medical, nutritional, and psychosocial information. Approximately two weeks following the completion of the SV, participants completed a baseline visit (BV) which included a physical exam, collection of parent anthropometrics, provision of an accelerometer and instructions upon its use, and orientation to group assignment. The present investigation includes both intervention and control group participants and uses data collected at the SV and BV. This study protocol was approved by The University of XXX's Institutional Review Board.

Measures

Height and Weight—Study staff trained in methods of obtaining accurate anthropometric measures obtained child height and weight data in accordance with the guidelines defined in the NHANES Anthropometric Procedures Manual (Centers for Disease Control and Prevention, 2007). Using these data, BMI was calculated as weight in kilograms divided by height in meters squared. Sex-specific BMI percentile for age was calculated using the US Centers for Disease Control and Prevention 2000 reference standards (Kuczmarski & Flegal, 2000). Children between the 85th and 95th percentile were considered overweight, and those at or above the 95th percentile were considered obese. A standardized BMI score (BMI_z) was calculated for each participant following guidelines established by the CDC, and this continuous variable was used for data analysis.

Body Esteem—The Revised Body-Esteem Scale was used to assess children's attitudes and feelings about their body and physical appearance (B. K. Mendelson & White, 1985). A 3-point response scale (1= no, 2= sometimes, and 3 = yes) was used to rate agreement with items rather than a yes/no response format in order to increase variability, as has been done in previous studies with young children (Davison & Birch, 2002). The total score on this 20-item questionnaire is calculated as the sum of individual items, and ranges from 20 to 60 with a higher score indicating better body esteem. Internal consistency for this measure was found to be good in the current sample ($\alpha = .83$).

Perceived Physical Health and Peer Relationship Difficulties—The MacArthur Health and Behavior Questionnaire (HBQ) was used to assess aspects of children's peer relationships and perceptions of their physical health (Essex et al., 2002). The HBQ is a comprehensive parent-report questionnaire measuring parent perceptions of children's functioning across multiple domains. Subscales assessing perceptions of global physical health and peer relationships (peer acceptance/rejection and bullying) were the focus of the current study. Evaluation of the HBQ's overall psychometric qualities revealed that this instrument has high test-retest reliability and cross-informant agreement, as well as strong predictive and discriminate validity (Essex et al., 2002; Luby et al., 2002). Internal consistency estimates in the current sample for the three scales examined in the present

study were acceptable (Global Physical Health $\alpha = .70$, Bullying $\alpha = .70$, Peer Acceptance/Rejection $\alpha = .74$).

The HBQ Global Physical Health scale consists of five items, four of which assess parents' impressions of the impact their child's health has on his or her functioning (e.g., "In general, how much difficulty, pain, or distress does your child's health cause him or her?", "To what extent does health limit your child in any way, keeping him or her from activities he or she wants to do?"). These items are scored on a 4-point Likert scale with response options 0 = "none at all", 1 = "a little", 2 = "somewhat", and 3 = "a great deal". The final item on the Global Physical Health scale asks parents to rate how often their child misses school due to poor health (response options 0 = "rarely or never (less than 1 day/month)", 1 = "a little of the time (1–2 days/month)", 2 = "sometimes (3–5 days/month)", and 3 = "often (6 or more days/month)"). Responses are averaged across these five items to provide a score for Global Physical Health, with a higher score indicating more perceived impairment in physical health.

Peer Acceptance/Rejection is determined by the mean of eight items on the HBQ, scored on a 4-point scale (1 = "not at all like", 2 = "very little like", 3 = "somewhat like", and 4 = "very much like"). For these items, parents are presented with statements describing a child in the context of his or her peers (e.g., "Is often left out by other children", "Is not much liked by other children", "Actively disliked by other children, who reject him/her from their play"), and are asked to select the response choice for each statement that best describes their child. For the current study, items were reverse scored as necessary so that a higher score indicated more peer rejection/lower peer acceptance.

The HBQ Bullied by Peers subscale consists of three items, scored on the same 4-point scale as the peer rejection/acceptance items. Bullying items specifically assess the extent to which the child is picked on, teased or ridiculed, and pushed or shoved by other children. Parent responses are averaged across the three items, with a higher score indicating that the child experiences more bullying by peers.

Results

Demographic characteristics for this sample of 218 children are presented in Table 1. Children were on average 6.7 years ($SD = 0.81$) and the overall BMI in this sample was 25.3 ($SD = 4.58$), with 7.3% of the sample classified as overweight and 92.7% classified as obese. Mean scores on BMIz, body esteem, perceptions of physical health, and peer relationship difficulties are presented in Table 2 for the sample as a whole and separately for girls and boys. One-way analysis of variance (ANOVA) was used to test for gender differences in these variables. Results did not support gender differences in mean scores on body esteem or on either aspect of peer relationship difficulties examined (Table 2); however, boys had higher BMI than girls and girls were perceived by their parents as having poorer physical health.

The relationship between BMI and body esteem was examined as the first step in the process of testing mediation in a multiple regression framework using procedures recommended by Baron and Kenny (1986). There was a significant main effect from BMIz to body esteem, such that heavier boys and girls both reported lower body esteem ($\beta = -.29, -.20, p < .05$, respectively). Because this satisfied the first condition required for establishing mediation as hypothesized in Figure 1, the mediating roles of physical health and peer relationship difficulties (being bullied and rejected by peers) in the relationship between BMI and body esteem were then examined. With respect to the second condition (i.e., BMI perceptions of physical health and peer relationship difficulties), significant associations were found

only for bullied by peers and poorer perceived physical health. Specifically, girls with higher BMI were reported to experience more bullying ($\beta = .18, p = .05$), and higher BMI was associated with more perceived physical health problems in both girls ($\beta = .39, p < .001$) and boys ($\beta = .38, p < .001$).

A series of regression analyses examining bullying (for girls only) and perceived physical health (for boys and girls) were conducted to determine whether the third condition (i.e., bullying and perceptions of physical health \rightarrow body esteem) and fourth condition (i.e., the relationship between BMI and body esteem is significantly reduced when bullying or perceptions of physical health are entered into the regression equations before BMI) required to establish mediation were met. Results of these regression analyses revealed that for girls being bullied was associated with lower body esteem ($\beta = -.36, p < .001$). Additionally, the relationship between girls' BMI and body esteem was reduced with bullying in the model; however, significance testing of this difference using the conservative Sobel test approach (Sobel, 1982) showed that the decrement in prediction did not reach statistical significance (Sobel test = $-1.90, ns$). Thus, although girls with higher BMI were reported to experience more bullying, and being bullied was associated with lower body esteem, bullying did not account for the relationship between BMI and body esteem in the present sample.

Poorer perceived physical health was associated with lower body esteem in both girls ($\beta = -.18, p < .05$) and boys ($\beta = -.40, p < .001$), and the relationship between BMI and body esteem was reduced with bullying in the model in both groups. However, significance testing of this difference showed that the decrement in prediction was statistically significant for boys (Sobel test = $-2.25, p < .05$) but not for girls boys (Sobel test = $-1.30, ns$). These results provide initial evidence to support the role of physical health perceptions in the relationship between higher BMI and lower body esteem for boys.

Discussion

As expected, higher BMI was associated with lower body esteem in this sample of overweight and obese urban minority boys and girls aged 5 to 7 years. This result replicates most research examining the impact of weight on body esteem in older children and adolescents as well as some studies that have been conducted with younger children (Davison & Birch, 2001; Davison & Birch, 2002; Pallan et al., 2011; Young-Hyman, et al., 2003). It is noteworthy that our sample had a larger proportion of extremely obese children than has been included in most previous investigations focusing on this age group. These findings are particularly intriguing as they challenge the belief that obese children are not vulnerable to the adverse effects of obesity in terms of reduced self-concept until late childhood or adolescence. Additionally, although an early study in this area found that low self-esteem is not characteristics of obese inner-city black children (Kaplan & Wadden, 1986), our findings suggest that this population may be vulnerable to developing low body esteem (the facet of self-esteem most closely related to weight). This conclusion is consistent with a study finding that black children reported more body size dissatisfaction than their white counterparts, despite having similar weights (Young-Hyman et al., 2006), as well as findings from a review suggesting that racial and ethnic differences in body esteem and/or body image concerns have diminished over time (Shaw et al., 2004). Thus, our findings indicate that excessive weight negatively influences even very young minority children's self-perceptions of their physical appearance, evidenced in the current study by reduced body esteem.

Although overweight children and adolescents are at risk for low self concept, especially reduced body esteem, the mechanisms that account for this association remain poorly

understood. In the present study, we assessed two aspects of peer relationship difficulties—being the recipient of peer bullying and being rejected by peers—as influences on the relation between BMI and body esteem. We found that girls (but not boys) with higher BMI were reported to experience more bullying by peers, and girls who were bullied more reported lower body esteem. However, being bullied did not mediate the association between higher BMI and lower body esteem. These results were contrary to our predictions and at odds with results of the only other published study that has examined bullying by peers as a mediator of the relationship between weight and body esteem in young girls during the early elementary school years (Davidson & Birch, 2001). Further, our results did not support the hypothesized mediational role of peer rejection, because this aspect of peer relationship difficulties was not related to either BMI or body esteem in this sample of overweight/obese children. Sociometric studies indicate that peer rejection is associated with children's social, behavioral, and cognitive competencies (Newcomb, Bukowski, & Pattee, 1993), thus, we speculate that these influences play a greater role in determining whether a child will be rejected by his or her peers during the early elementary school years than physical appearance. Alternatively, it is possible that our findings diverge from previous findings due to differences in sample composition. There is a paucity of literature available for comparison because most existing studies have focused on older and less diverse samples. Although the composition of our sample allowed for examination of our research questions in a socio-economically diverse group of overweight and obese young children, the sample size did not permit for reliable comparisons to be made among specific racial groups.

Numerous studies have found that obese girls report more physical illness symptoms and greater functional limitations than obese boys, and perceptions of problems related to physical health may affect children's attitudes and feelings about their appearance. For these reasons, we considered perceived physical health as a potential mediator of the association between BMI and body esteem. Again contrary to our predictions, we found that physical health perceptions mediated the association between BMI and body esteem for boys but not for girls. This finding is somewhat perplexing, given that girls had poorer physical health than boys as reported by their primary caregiver. In addition, although increasing BMI was associated with decrements in physical health for both sexes, there was not a gender difference in the magnitude of this association and poorer physical health was related to lower body esteem for both boys and girls (though more strongly for boys). One explanation for this finding is that obese boys may internalize gender-specific attitudes related to physical abilities or physical competencies (from parents, peers, and media), such as believing that boys should be stronger, tougher, or more athletic than girls (Jacobs, et al., 2002). Consequently, obese boys who experience more physical limitations and weight-related health problems may be particularly vulnerable to developing negative self-perceptions of their appearance, explaining our finding of a much stronger relationship between poorer perceived physical health and reduced body esteem in boys compared with girls.

Our results also contribute to the literature on gender differences in the psychosocial functioning of obese children. Evidence of poorer perceived physical health in obese girls replicates studies with older children and adolescents, and suggests that these differences may begin to emerge in early childhood. However, we did not find differences between overweight/obese boys and girls in terms of the degree to which they were bullied or rejected by their peers. Previous research with older children and adolescents has consistently shown that obese girls are more often the targets of peer victimization and are more socially marginalized compared with obese boys (Eisenberg, Neumark-Sztainer, & Story, 2003; Strauss & Pollack, 2003). Further, research suggests that stigma associated with obesity starts as early as preschool (Musher-Eizenman et al., 2004; Puhl & Latner, 2007). Thus, the lack of gender differences in peer relationship difficulties in this sample was

unexpected. We interpret this finding in light of data supporting an absence of gender differences in weight-based stigmatization in children less than 10 years of age and evidence that young children rate obese boys and girls equally in terms of negative characteristics (Tang-Peronard & Heitmann, 2008). Consequently, although overweight elementary school-aged children are more often the targets of peer victimization compared with their healthy weight peers, gender differences in rates of bullying and peer rejection may not emerge until early adolescence when overweight girls begin to experience a higher degree of weight-related stigmatization.

Strengths and Limitations

Strengths of the present study include the racial/ethnic diversity of our sample as well as the inclusion of many children who were extremely obese; both improve the generalizability of our findings to a broader population of children. Additionally, our focus on the negative impact of body esteem on overweight and obese early elementary school-aged children advances research exploring the social and psychological consequences of childhood obesity, as little research has focused on this developmentally vulnerable age group. Finally, our examination of the mechanisms leading to reduced body esteem in overweight and obese boys and girls is a unique feature of this study. Improved understanding of the processes that link weight status with body esteem can be used to develop evidence-based interventions targeting at-risk overweight/obese children. Specifically, our findings add to the growing literature documenting the harmful effects of peer victimization on the psychological well-being of young girls, and extend previous research by showing a detrimental effect of diminished physical health on the body esteem of boys.

A few limitations should be noted. First, there may be measurement error in the questionnaires used to assess the hypothesized mediating variables. Due to the young age of children in our study we relied exclusively on parents to provide information regarding children's peer difficulties and physical health limitations, whereas body esteem was obtained by child self-report due to the nature of this construct. Although data suggest that there is a moderate association between child and parent reports of both peer difficulties and physical health-related quality of life (Eiser & Morse, 2001), it is possible that parents have a biased view of their child's functioning in these areas. Parents may not be fully aware of the extent to which their child is bullied or rejected by his or her peers, and consequently may underreport difficulties in this area. Conversely, there is evidence that parents who are experiencing psychosocial distress functioning may rate their child's functioning as worse (Eiser, Eiser, & Stride, 2005). Parent ratings may also be influenced by their own gender biases. For example, caregivers may place greater importance on functioning in the peer versus physical health domain for girls, but the opposite for boys (Eccles, Jacobs, & Harold, 1990). As a result, parents of girls may be most attuned to and concerned about their child's peer difficulties, whereas deficits in physical functioning may elicit greater concern for parents of boys. Although in the present study we did not find evidence for gender differences in mean levels of children's peer relationship difficulties (and in fact, found that parents of girls reported more physical health problems than parents of boys) to the extent possible, future work should attempt to overcome limitations related to dependence on parent-report by collecting both parent and child reports (or parent and teacher-reports). In addition, future work is needed to clarify the role of parental attitudes in the associations between child gender, overweight/obesity, and body esteem.

Two other potential measurement-related limitations should be noted. First, because the Body Esteem Scale was administered in interview format, it is possible that children's responses may be affected by social desirability bias. Administration in this form was necessary because the majority of children were not proficient readers. We attempted to minimize this source of bias by conducting the interview without the parent present and also

by conveying to the child that there was no right or wrong answer. Second, child physical health functioning was not assessed using a validated health-related quality of life measure (either general or specific to obesity). However, many of the items on the HBQ physical health scale mirror those included on standard health-related quality of life questionnaires, indicating that the HBQ provided an adequate measure of physical functioning and limitations. A related concern is that we did not specifically assess weight-related teasing or peer rejection, as has been done in recent studies examining the effect of obesity on this aspect of children's peer relationships (McCormack et al., 2011; Eisenberg, Neumark-Sztainer, Haines, & Wall, 2006). Weight-specific measures have considerable merit and provide a clearer theoretical basis as a mechanism linking overweight/obesity and lower body esteem. Replication of our findings using weight-specific measures of peer victimization is an important direction for future work. In particular, use of a tool that assesses the extent to which children feel that they are socially marginalized as a result of their physical appearance may shed light on the lack of a mediating role for peer rejection in the present study.

Girls were more represented in our overall sample than boys, and the comparatively smaller sample size for boys may have hindered our ability to detect significant effects in this group. To elaborate gender differences in the processes linking weight with body esteem in young children, future studies should attempt to obtain larger numbers of obese boys. Similarly, including a wider range of BMI would allow for categorical analyses that test for group differences in body esteem as a function of weight classification (i.e., normal weight, overweight, obese), and this may be more useful from a clinical perspective. Another limitation is that our concurrent data collection prohibited speculation about cause and effect. Several studies have suggested that obesity precedes reduced self-concept, and similar findings have been reported regarding the temporal associations of obesity to peer teasing and reduced physical health. However, the relations among these variables may be more complex and prospective longitudinal studies are needed to provide greater clarity on this issue. Finally, some evidence is suggestive that parental psychological difficulties may exert a greater influence on children's psychological adjustment than obesity or gender (Reilly et al., 2003). Parental psychological functioning was not assessed in the current study, limiting our ability to examine this intriguing possibility.

Conclusions and Implications

Results of the current study reveal gender-specific processes linking excess weight with reduced body esteem in young children, and suggest that intervening with perceptions of physical health may help to buffer obese boys from developing low body esteem. Overweight and obese children who maintain positive attitudes and feelings about their appearance may be protected from serious adverse psychological outcomes, including depression and eating disorders.

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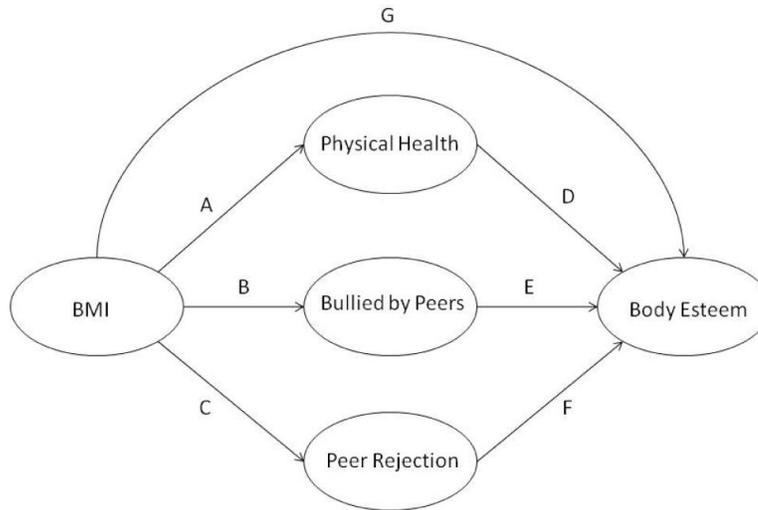


Figure 1.

The process of testing mediation determined whether the following conditions were met: (1) BMI predicted body esteem, (2) BMI predicted bullying, peer rejection, and perceptions of physical health (Paths A, B, and C), (3) bullying, peer rejection, and perceptions of physical health predicted body esteem, independent of BMI (Paths D, E, and F) (4) the relationship between BMI and body esteem was significantly reduced when bullying, peer rejection, and perceptions of physical health were entered into the regression equations before BMI (Path G).

Table 1

Sample characteristics (n = 218)

	%
Child age (years)	
5	21.1
6	37.6
7	41.3
Child gender	
Girl	63.8
Boy	36.2
Race/Ethnicity ^a	
Caucasian, non-Hispanic	18.8
African-American, non-Hispanic	72.5
Hispanic	5.0
More than 1 race identified	2.8
Native Hawaiian/Pacific Islander	0.5
Parent relationship status	
Married or Living with partner	50.9
Single, never married	37.3
Separated, Divorced, or Widowed	11.8
Parent educational attainment	
High school diploma or less	19.6
Associate's degree or Some college	43.2
College graduate or more	31.8

Note.

^aOne participant declined to answer.

Table 2

Means and standard deviations for study variables for the overall sample and by gender.

	Overall (n = 118)	Girls (n = 139)	Boys (n = 79)	F
BMIz	2.50 (0.50)	2.40 (0.44)	2.67 (0.53)	16.56**
Body esteem	44.99 (8.37)	45.53 (8.62)	44.02 (7.87)	1.64
Physical health	0.89 (0.52)	0.95 (0.54)	0.79 (0.45)	4.98*
Peer rejection	2.16 (0.55)	2.15 (0.53)	2.19 (0.58)	0.18
Bullied by peer	1.79 (0.73)	1.78 (0.71)	1.82 (0.76)	0.27

Note. Higher mean scores indicate better body esteem, but poorer perceptions of physical health and more peer relationship difficulties. Results regarding group differences on study variable means between boys and girls were obtained from ANOVA analyses.

* $p < .05$.

** $p < .001$.

Table 3

Summary of regression analyses testing the effect of physical health perceptions and peer relationship difficulties as mediators of the relationship between body mass index and body esteem in boys and girls.

Step	Outcome	Predictors	Boys		Girls	
			Sobel	Mediation	Sobel	Mediation
Physical health						
2 (Path A)	Physical health	BMI	.38***		.39***	
3 (Path D)	Body esteem	Physical health	-.40***		-.18*	
1/4 (Path G)	Body esteem	BMI	-.29** / -.17	-2.25*	-.20* / -.15	-1.30
Bullied by peers						
2 (Path B)	Bullied	BMI	.03		.19*	
3 (Path E)	Body esteem	Bullied	-.19		-.35***	
1/4 (Path G)	Body esteem	BMI	-.29** / -.30**	-	-.20* / -.11	-1.90
Peer rejection						
2 (Path C)	Peer rejection	BMI	-.14		.06	
3 (Path F)	Body esteem	Peer rejection	-.04		-.16	
1/4 (Path G)	Body esteem	BMI	-.29** / -.30**	-	-.20* / -.18*	-

Note. Paths A through G reference the paths in Figure 1. Step 2 corresponds to Paths A, B, and C; Step 3 corresponds to Paths D, E, and F; and Step 4 corresponds to Path G. Numbers in rows for step 3 are the standardized regression coefficients for the direct relation of BMI to body esteem before/after including the mediator in the model. Dash indicates that mediation was not tested because at least one of the direct relations was not significant.

* $p < .05$.

** $p < .01$.

*** $p < .001$.