The Effects of Weight Management Programs on Self-Esteem in Pediatric Overweight Populations

Kelly Walker Lowry, MS, Bethany J. Sallinen, PhD, and David M. Janicke, PhD
Department of Clinical and Health Psychology, University of Florida, FL, USA

Objective Review published findings on self-esteem and pediatric overweight, and changes in self-esteem subsequent to weight management programs. **Methods** We used PsycInfo and MedLine searches to identify peer-reviewed journal articles examining self-esteem changes following participation in weight management programs **Results** Data regarding the relationship between self-esteem and obesity is mixed. Factors that place overweight children ''at-risk'' for low self-esteem include early adolescence, female gender, identification with majority cultural standards of body shape, exposure to teasing and peer victimization, a history of greater parental control over feeding, and internal attributions about weight status. Data from intervention studies suggest positive effects on self-esteem across settings. Components related to self-esteem improvements include weight change, parent involvement, and group intervention format. **Conclusions** Well-designed, longitudinal studies using multidimensional measures of self-esteem, and following CONSORT guidelines are needed to confirm and expand these findings. Emphasis should be placed on examining mediators and moderators of self-esteem change.

Key words children; self-esteem; weight management; obesity; overweight; treatment.

Pediatric overweight is a national epidemic with significant long term consequences for the individual and society. Recent results from the National Health and Nutrition Examination Survey indicate that over 33% of children between the ages of 2 and 19 years are either at-risk for overweight or overweight[1] (Ogden et al., 2006). Overweight children are at increased risk for a variety of medical complications including type 2 diabetes, abnormal glucose tolerance and insulin resistance, metabolic syndrome, hypertension, and overweight status as adults (Freedman et al., 2005; Goran, Ball, & Cruz, 2003; Weiss et al., 2004). Psychosocial complications for overweight in children and adolescents include social stigmatization, peer teasing, depression, body dissatisfaction, and less than optimal self-esteem (Sjoberg, Nilsson, & Leppert, 2005; Zametkin, Zoon, Klein, & Munson, 2004; Zeller, Saelens, Roehrig, Kirk, & Daniels, 2004).

Broadly defined, self-esteem refers to the extent to which one values oneself as a person (Harter & Whitesell, 2003). Self-esteem is a notable complication of pediatric overweight as previous research has linked low self-esteem in children with negative consequences such as behavioral disorders, negative or depressed mood, and other emotional concerns (Harter, 1993). Conversely, self-esteem improvements are associated with a decrease in externalizing behaviors (Haney & Durlak, 1998). Self-esteem in childhood and adolescence has potential long-term implications given that adolescent self-esteem may remain stable into adulthood (Harter & Whitesell, 2003). As the focus on pediatric obesity grows, concern has been expressed regarding the impact of interventions for pediatric obesity on self-esteem and whether or not weight management programs do more harm than good (O'Dea, 2005).

[1]At risk for overweight is defined as child body mass index (BMI) within the 85th–95th percentile and overweight is defined as at or above the 95th percentile for age and gender according to Center for Disease Control growth charts (Himes & Dietz, 1994).

All correspondence concerning this article should be addressed to David M. Janicke, Department of Clinical and Health Psychology, University of Florida, 101 South Newell Dr., Room #3151, Gainesville, FL 32610, USA. E-mail: djanicke@phhp.ufl.edu.

Journal of Pediatric Psychology 32(10) pp. 1179–1195, 2007
doi:10.1093/jpepsy/jsm048
Advance Access publication June 20, 2007

Over 10 years ago French, Story, & Perry (1995) published a review paper discussing the association between self-esteem and overweight status in children and adolescents. They reported mixed findings regarding this relationship in the literature, and also provided several recommendations for future research, including; (a) further examination of the moderating effects of gender, ethnicity, and other familial or cultural factors on self-esteem, and (b) evaluation of whether self-esteem or body-esteem can be changed in treatment and whether these changes are due to weight loss. With these recommendations in mind, this review attempts to assess the current state of the literature in these areas by updating and extending the information provided by French and colleagues. Specifically, the goals of this review are, (a) to examine the moderating effects of development, gender, ethnicity, peer influences, parenting, and locus of control on pediatric self-esteem, and (b) to conduct a comprehensive review of pediatric weight management programs to evaluate the impact of these programs on child and adolescent self-esteem.

Measurement of Self-Esteem

Reviews of self-esteem are limited by differences regarding construct specificity. Given the inconsistency of the definition of self-esteem in the literature, it is not surprising that self-esteem measurement can be widely discrepant across measures. Some researchers have hypothesized that self-esteem is a global, one-dimensional construct that refers to a person's overall sense of self-worth or self-concept (Rosenberg, 1965). The most common measure based on a global conceptualization is the Rosenberg Self Esteem Scale (Rosenberg, 1965). One dimensional questionnaires are often used as brief and easy to administer measures of self-esteem. However, others hypothesize that self-esteem is a multidimensional construct including multiple unique dimensions (e.g., academic, physical, social, athletic, and behavioral) that comprise global self-esteem, and with the impact of each dimension on global self-esteem depending on the perceived importance an individual places on each of these components (Harter, 1993). Current research examining self-esteem in pediatric overweight often utilizes multidimensional measures including the Self Perception Profile for Children (SPPC; Harter, 1985) or Adolescents (SPPA; Harter, 1988), or the Piers–Harris Children's Self Concept Scale (Piers & Harris, 1969; Piers, 1984). Although somewhat more time- consuming, these multidimensional measures allow for a more illuminating analysis of the association between unique dimensions of self-esteem and weight status.

Self Esteem in Overweight Children

French and colleagues (1995) reported that, in many of the studies reviewed, overweight status in children was inversely associated with self-esteem and body-esteem, but noted that the relationship was modest and that lower scores often still fell within normal ranges. A review of the literature since that time suggests that the relationships between overweight status in children and self-esteem are still not clear. A number of studies suggest that overweight children and adolescents report moderately lower levels of self-esteem compared to nonoverweight adolescents and children (Manus & Killeen, 1995; Pesa, Syre, & Jones, 2000; Stradmeijer, Bosch, & Koops, 2000; Strauss, 2000). However, these findings are not universal, as a number of other studies have not found an association between self-esteem and weight status (Gortmaker, Must, Perrin, Sobol, & Dietz, 1993; Rumpel & Harris, 1994; Renman, Engstrom, Silfverdal, & Aman, 1999; Swallen, Reither, Haas, & Meier, 2005). While there may not be a clear answer to this question, these findings point to the importance of examining factors that may lead some children who are overweight to be at greater risk for low self-esteem.

Developmental Influences

There appears to be a developmental association between obesity and rates of self-esteem in children and adolescents. Although normative child development involves a decline in self-esteem during early adolescence and a rebound in self-esteem over high school (Harter, 1999), overweight children appear to be at risk for greater declines in self-esteem as they enter early adolescence relative to their nonoverweight peers. In the 4-year National Longitudinal Survey of Youth study, Strauss (2000) found that self-esteem at 13–14 years was negatively related to obesity, whereas there was no association between self-esteem and obesity for children 9–10 years. In a separate 3-year longitudinal study of children in Australia, Hesketh and colleagues (2004) reported that higher BMI scores at 7 years of age marginally predicted poor self-esteem scores at the same age, but more strikingly predicted poor self-esteem scores at 11 years of age. One possibility for this shift may be the accumulating effects of peer victimization and societal pressure for thinness that becomes more pronounced as children reach puberty and become more concerned with peer interactions.

Gender Influences

Gender appears to play an important role in the association between self-esteem and childhood overweight. Overweight girls tend to report lower levels of self-esteem compared to overweight boys (Israel & Ivanova, 2002; Mendelson & White, 1985). Pesa and colleagues (2000) proposed that for adolescent girls, body image represents a significant component of self-esteem. Girls who are significantly overweight may experience lower levels of self-esteem due to a discrepancy between their perceived physical appearance and cultural standards of attractiveness, while overweight boys may not view physical self-esteem as being central to global self-esteem. In fact, after controlling for body image, Pesa and colleagues (2000) found no significant differences in self-esteem in overweight versus nonoverweight adolescent females. When Israel and Ivanova (2002) explored physical self-esteem, conceptually similar to body image, highly overweight girls reported lower levels of physical self-esteem compared to moderately overweight girls. In contrast, highly overweight boys reported higher levels of physical self-esteem compared to moderately overweight boys. While this suggests that self-esteem in overweight children may differ by gender, it also suggests that the perceived importance that youth place on components of self-esteem may differentially impact global self-esteem, supporting Harter's (1993) multidimensional definition of the construct.

Race/Ethnicity Influences

Ethnicity may interact with age and gender to impact the relationship between obesity and self-esteem (Kaplan & Wadden, 1986; Strauss, 2000; Young-Hyman, Schlundt, Herman-Wenderoth, & Bozylinski, 2003). Similar to age-related developmental changes in self-esteem, Strauss (2000) reported ethnic differences for overweight versus nonoverweight 13–14-year olds, but not for 9–10-year olds. Specifically, at 13–14 years, overweight White and Hispanic females reported lower levels of self-esteem than their nonoverweight counterparts. In contrast, African American overweight and nonoverweight females did not differ on levels of self-esteem at 13–14 years of age. A separate sample of overweight African American girls found similar results in that mean global self-worth scores showed little change over ages 9–14 years, however; physical appearance scores and social acceptance scores did decrease, although not as much as the decrease found in White girls (Brown et al., 1998). With respect to younger children, no association between obesity and global self-esteem for 5–10-year-old African American children was reported (Young-Hyman et al., 2003). Young-Hyman and colleagues (2003) suggested that larger body sizes are more culturally acceptable among some African Americans (Wilson, Sargent, & Dias, 1994) and parents may be unconcerned or misperceive their child's weight based on cultural norms. They also noted that negative attitudes about weight may not be communicated to the child (Young-Hyman, Herman, Scott, & Schlundt, 2000), which may lead to a more positive body image, (Kelly, Wall, Eisenberg, Story & Neumark-Sztainer, 2005) and ultimately contribute to higher self-esteem. Overall it appears that, regardless of the mechanism, overweight African-American adolescents do not exhibit the developmental declines in self-esteem that are seen in overweight Caucasian and Hispanic adolescents.

Data on self-esteem of overweight Hispanic youth is also mixed, with some data suggesting the differences experienced by Hispanic youth may be related to acculturation. A study examining the beliefs of Mexican families living in the US indicated that in some families, child overweight may be seen as a sign of health. Feeding patterns and child overweight may represent accepted and healthful parental care (Brewis, 2003). Overweight children from families with this belief did not endorse experiencing greater peer rejection, stigma, or lower self-esteem than their nonoverweight peers. Conversely, others have found higher BMI to be associated with lower self-esteem in Hispanic samples similar to rates found in overweight Caucasian youth (Mirza, Davis, & Yanovski, 2005). It is notable that in the sample from the latter study, body size dissatisfaction was related to poorer self-esteem, perhaps suggesting a link between identification with majority cultural standards of body shape.

Peer Influences

Peer victimization and social support have been linked to self-esteem in overweight youth. Research has found that overweight boys and girls reported higher levels of victimization and poorer self-esteem than non-overweight boys and girls (Sweeting, Wright, & Minnis, 2005; Young-Hyman et al., 2003), with this pattern found in both Caucasian and African American samples (Stern et al., 2006). Furthermore, the types of teasing and victimization appear to be more focused on appearance and body weight than other characteristics of the youth. Overweight youth also tend to be more influenced by peers' negative comments and attributions about their appearance than nonoverweight youth

(Hayden-Wade et al., 2005; Thompson et al., 2007). Peer victimization can also be more covert, as Strauss and Pollack (2003) have found that overweight youth are more likely to be socially isolated and on the sidelines of social networks relative to nonoverweight peers. These characteristics are certainly not universal to all overweight youth, as increased participation in school clubs and sports appears to be associated with more friendship nominations, a more central role in peer groups, and higher global self-esteem in overweight children and adolescents (Dishman et al., 2006; Strauss & Pollack, 2003).

Parenting Influences

Parenting behaviors and attitudes also impact self-esteem in overweight children. Davison and Birch (2001) explored parental concern for weight status, parental restriction of child access to food, and three dimensions of child self-esteem (i.e., body esteem, perceived physical ability, and perceived cognitive ability) in 5-year-old girls. Lower body esteem in girls was associated with higher paternal concern about the child's weight status, independent of actual weight. Recent research sheds light on these findings by indicating that girls are more likely to express negative attitudes towards obesity and obese individuals when parents promote a lean body type (Davison & Birch, 2004). Higher maternal concern about child weight status and maternal restriction of access to food was also related to girls' lower perceived physical ability and cognitive ability, again independent of weight status. Davison and Birch (2001) suggest that when mothers restrict their overweight young daughters' access to food they may unintentionally send their daughters a message of incompetence that generalizes to multiple domains of their developing self-esteem. With respect to perceived physical ability, the researchers speculate that mothers of overweight 5-year-old girls may attempt to promote weight loss by using coercive encouragement to engage in physical activity, and the girls may view this as lack of acceptance. Taken together, these data suggest that parents' use of control strategies in an effort to manage their children's weight that may have an unintentional, negative impacts on developing self-esteem.

Locus of Control Influences

Weight-related locus of control has also been linked to self-esteem in overweight youth. Overweight children 9–11 years reported lower levels of self-esteem if they believed they were responsible for their overweight status compared to those who believed they were not responsible for their weight problem (Pierce & Wardle, 1997). While more research is needed in this area, such a relationship could have significant implications for how professionals address weight management, as children who do not lose weight but also come to believe they are responsible for their weight status may be susceptible to greater decrements in self-esteem.

Summary

Clearly self-esteem is a multidimensional construct that is influenced by a variety of factors. Overall, the data regarding the relationship between self-esteem and obesity is still mixed. It is important to note that much of the published data is taken from clinical settings, and may not accurately reflect self-esteem of overweight children from the larger community (Bosch, Stradmeijer, & Seidell, 2004; Flodmark, 2005). Variability in these findings may be explained by moderating variables. There appears to be a group of factors that place overweight children ''at-risk'' for the development of poor self-esteem including early adolescence, female gender status, identification with majority cultural standards of body shape, a high incidence of teasing and peer victimization, a history of greater parental control over feeding practices, and internal attributions about weight status. Positive social support may buffer overweight children from decreases in self-esteem. While the data is mixed as to the association between global self-esteem and weight status, there is more evidence to support that specific domains of self-esteem, such as physical, social, and athletic self-esteem are more likely to be associated with overweight status.

Self-Esteem Change in Pediatric Weight Management Programs

The following section provides a synopsis of 21 pediatric weight management studies that reported data on self-esteem, including the eight treatment studies reviewed by French and colleagues (1995) and 13 studies published since that time. Studies published in peer-reviewed journals were selected through multiple searches using PsycInfo and MedLine databases and combinations of the terms ''child, adolescent, obesity, overweight, treatment, intervention, self-esteem, self-worth, and self-concept.'' Studies were included in this review only if the researchers measured and reported self-esteem pre- and post-intervention and if articles were published in English. A final search was conducted

on February 12, 2007. A brief description of each study is displayed in Table I.

Of the 21 studies reviewed, 18 studies reported evidence of increases in self-esteem or components of self-esteem from pre- to post-treatment. Two studies reported no change in self-esteem or components of self-esteem (Rohrbacher, 1973; Thomas-Dobersen et al., 1993) and one study reported decreases in self-esteem (Cameron, 1999). Of the studies demonstrating positive improvements, 10 studies included control groups that did not experience equivalent improvements. Fifty percent of all studies reviewed used the Harter SPPC or SPPA, and 25% used the Piers–Harris. Ten of the 16 studies utilizing multidimensional assessment reported improvements in global self-esteem. However, four of the studies using multidimensional measures reported improvements in at least one of the self-esteem components without significant improvements in global self-esteem. Of the two studies utilizing global scales; both reported improvements in global self esteem. Three studies did not indicate which scale was used to measure self-esteem. With regard to the study participants, four studies examined children aged 7–12 years, eight studies examined adolescents in the 11–18 year age range, and nine studies included a mixed age sample of participants. Younger children (7–11 years) had uniformly positive changes in self-esteem, whereas older children (12–18 years and mixed samples) had more variability in self-esteem improvements, with some samples experiencing global self-esteem improvements, improvements in self-esteem components, no change in self-esteem, or a decrease in self-esteem. Minimal ethnic variability was reported, with almost all of the studies consisting of overwhelmingly Caucasian samples. Fourteen studies did not report any ethnicity data for their samples. However, in studies that reported ethnicity data, no clear differences due to ethnicity emerged. Only one study reported utilizing a monoethnic sample resulting in self-esteem improvements (Wadden et al., 1990), and the number of minority participants in other samples was low and ethnic differences in results were not statistically examined. Sample sizes were widely variable and ranged from 11 participants to 634 participants. Intervention settings included 14 outpatient samples, two inpatient samples, four camp settings, and one school setting. Follow-up data was extremely limited, with only six studies reporting follow-up data on self-esteem changes. All but one of these studies with follow-up data reported maintenance of self-esteem improvements. Only two studies that reported follow-up data also reported control group follow-up data. One study reported that self-esteem rates were no different than controls but still higher than baseline for the treatment group, while one study reported improvements in the control group as well.

Impact of Weight Status Change on Self-Esteem

Given the nature pediatric weight management programs, it is possible that changes in self-esteem are associated with weight status change, although the direction of this relationship is not clear. Three studies provided data to support such a relationship. In the only study to report decreases in self-esteem subsequent to the intervention (Cameron, 1999), there was no statistically significant change in weight status for children who received the intervention. Children reported feelings of failure due to their lack of success in meeting weight loss goals, and that weekly weigh-ins were punitive and made them feel embarrassed and inadequate. Two studies demonstrated an association between decreases in weight status and increases in self-esteem. Walker and colleagues (2003) found that self-esteem improvements were associated with weight status change and length of stay at the camp-based program. Jelalian, Mehlenbeck, Lloyd-Richardson, Birmaher, & Wing (2006) found that decreases in weight status were associated with self-reported physical appearance improvements for participants in an intervention that included an outward bound activity based component, but not for an intervention including an aerobic exercise component.

Alternatively, three studies found no statistically significant relationship between self-esteem change and weight status change (Rohrbacher, 1973; Stoner & Fiorillio, 1976; Wadden et al., 1990). Notably, in each of these studies, the participants were restricted to one gender rather than mixed gender groups. Moreover, three additional studies reported significant improvements in self-esteem, despite lack of significant weight loss, although the relationship was not examined statistically (Brehm et al., 2003; Sahota et al. 2001; Sherman et al., 1992). In each of these studies, self-esteem was targeted directly during the intervention. This mixed pattern of results makes it difficult to draw definitive conclusions about the role of weight loss in self-esteem change subsequent to treatment, or the direction of potential effect. Many speculate that weight loss influences self-esteem, but it is like that in some situations self-esteem improvements influence weight loss, or that the relationship is bi-directional. For example, youth with higher self-esteem may be more likely to try new activities and experiences, or may be less influenced by the opinions

Table I. Studies Included in Review of Weight Management Interventions

Study	Sample	Type of Intervention	Parent Involvement	Self-Esteem Measurement	Self-Esteem Results	Weight Change Results	Self-Esteem Follow up
Age 7–12 years							
Foster et al., 1985	T× N = 48, Control *N* = 41; 45 f; 44 m Grades: 2–5 Ethnicity: N/R*	12-week outpatient program.	Half of parents attended meetings at weeks. 1, 3, 5, 7, and 10. Other parents attended only two meetings.	Piers–Harris (1969)	Intervention group had significant pre- to post-tx improvements compared to a nonoverweight control group.	3.6% reduction in their percentage overweight from pre-tx to follow-up.	At 18-week follow-up self-esteem was higher than baseline, but not significantly different than nonoverweight controls.
Sherman, Alexander, Gomez, Kim, & Marole, 1992	T× N = 26; 16 f; 10 m Grades: 4 –6 Ethnicity: N/R	9-week gender separated child-only outpatient program.	Letters sent home to parents.	Rosenberg & Simmons (1972)	Significant improvement pre- to post-tx.	No change in weight status.	None.
Sacher et al., 2005	T× N = 11; f and m Age: 7–11 years. Ethnicity: N/R	3-month biweekly outpatient program.	Not reported.	Not reported.	Self-esteem improved statistically pre- to post-tx.	Improvement in BMI, waist circumference, and cardiovascular fitness at post-tx and at follow-up.	All self-esteem improvements were maintained at 3-month follow-up.
Sahota et al., 2001	T× N = 634; f and m Age: 7–11 years. Ethnicity: N/R	1-year school based lifestyle modification program.	None reported.	Harter SPPC (1985)	Significant increase in global self-worth for obese children in tx schools.	No significant decrease in BMI.	None.
Age 11–18 years							
Mellin, Slinkard, & Irwin, 1987	T× N = 37, Control *N* = 29; 52 f; 14 m Age: 12–18 years. Ethnicity: N/R	14-week outpatient child treatment program.	Two parent sessions	Rosenberg (1965)	Significant improvement in tx. and control groups pre- to post-tx; greater increase in tx group.	Improvement in relative weight at 3 months and 15 months for tx group.	At 1-year. self-esteem continued improvement at follow-up for tx and control groups.
Stoner & Fiorillo, 1976	T× N = 5, Control *N* = 6; All female Age: 15–18 years. Ethnicity: N/R	16-week outpatient weight-loss program.	None reported.	Fitts Tennessee Self-Concept Scale (1965)	Significant improvements in tx group for physical and self-concept pre- to post-tx.	No weight loss in control group, Tx group lost 4–29 lbs.	None.

(continued)

Table I. Continued

Study	Sample	Type of Intervention	Parent Involvement	Self-Esteem Measurement	Self-Esteem Results	Weight Change Results	Self-Esteem Follow up
Thomas-Dobersen et al. 1993	T× N = 11, Control *N* = 9; f and m Age: 12–17 years. Ethnicity: N/R	14-week outpatient child treatment program.	Separate but simultaneous parent and child groups.	Harter SPPC (1985)	Improvements for 4 tx subjects and 1 control subjects pre- to post-tx. Did not statistically change pre- to post-tx.	No statistically significant weight change.	None.
Wadden et al., 1990	T× N = 36; All female Age: 12–16 years. Ethnicity: Black	16-week outpatient treatment.	3 conditions; child-only, mother & child, and mother & child in separate but simultaneous groups	Piers–Harris (1984)	Statistically significant improvements pre- to post-tx.	Daughters of mothers attending sessions lost twice as much weight as daughters of mothers not attending sessions.	None.
Jelalian & Mehlenbeck, 2002	T× N = 16; f and m Age: 13–16 years. Ethnicity: 94% White, 6% mixed	16-week outpatient group, plus a 90-minute peer-based skills training session.	Separate but simultaneous parent and child groups.	Harter SPPA (1988), Whitehead Children's Self-Perception Profile (1995)	Trend toward significant improvement in global self-worth; significant improvement in physical self-worth, & physical appearance. All changes pre- to post-tx.	Average 14% decrease in percent overweight.	None.
Barton, Walker, & Lambert, 2004	T× N = 61; 39 f, 22 m Control *N* = 20; 10 f, 10 m Age: 11–17 years. Ethnicity: N/R	Weight loss camp, child participants had a mean stay of 26 days.	Not described.	Harter SPPC (1985)	Significant improvement in global self-worth pre-to post-tx for tx group.	Lost average 5.7 kg and reduced BMI SD score by 0.25.	None.
Savoye et al., 2005	T× N = 25; Gender N/R Age: 11–16 years. Ethnicity: 15 White, seven Black, three Hispanic	1-year outpatient program. Optional monthly maintenance classes between year 1 and 2.	Parents attended bx modification classes separate from their children for 6 of the 12 sessions.	Piers–Harris (1984)	At 1 year. demonstrated significant improvement in self-esteem pre- to post-tx.	Decrease BMI *z*-score average 7.7% at 1 year, decrease; decrease% age body fat at 1-year.	At 2-year follow-up (1-year post-tx), self-esteem was not significantly higher than baseline.

(continued)

Table I. Continued

Study	Sample	Type of Intervention	Parent Involvement	Self-Esteem Measurement	Self-Esteem Results	Weight Change Results	Self-Esteem Follow up
Jelalian & Mehlenbeck, 2006	T× N = 76; Female and male Age: 13–16 years. Ethnicity: N/R	16-week outpatient intervention.	Parents attended separate but simultaneous meetings.	Harter SPPA (1988), Whitehead Children's Physical Self-Perception Profile (1995)	Both tx groups experienced significant improvements in appearance & physical self worth pre- to post-tx.	Significant weight loss for both treatments.	All self-esteem improvements maintained and improvements in global self-esteem at 10-month follow-up.
Mixed age range 7–18 years							
Rohrbacher, 1973	T× N = 204; All male Age: 8–18 years Ethnicity: N/R	8-week camp program.	Not described.	Secord & Jourard (1953)	Self-esteem increased pre- to post-tx only in younger subjects.	Weight loss average of 33 lbs.	None.
Cameron, 1999	T× N = 54, Control $N = 60$; Female & male Age: 10–15 years. Ethnicity: 65% White, 23% Black	Two child-only 12-week outpatient programs.	Not reported.	Piers–Harris (1984)	Weight loss group had significantly lower self-concept scores at post-tx compared to pre-tx.	No statistically significant weight loss.	None.
Braet, Tanghe, Bode, Franckx, & Winckel, 2003	T× N = 38, Control $N = 38$; 46 f, 30 m Age: 10–17 years Ethnicity: 71 White, 5 Black or Asian	10-month inpatient treatment program.	Parents visited camps once every 2 weeks. Parents received handouts on healthy foods & organize aerobic activities.	Harter SPPC (1986)	Significant increase on physical appearance, athletic competence, and social competence for tx group pre- to post-tx.	Decrease in median adjusted BMI of -48%. Control group gained median adjusted BMI of + 6%.	None.
Brehm, Rourke, Cassell, & Sethuraman, 2003	T× N = 57; All female Age: 8–15 years. Ethnicity: 51 White, 6 Black	12 session outpatient program over 6-months.	Separate but simultaneous child and parent groups.	Harter SPPC (1985)	Significant positive changes for social acceptance and athletic competence pre-to post-tx.	No significant change in BMI or % body fat.	None.

(continued)

Table I. Continued

Study	Sample	Type of Intervention	Parent Involvement	Self-Esteem Measurement	Self-Esteem Results	Weight Change Results	Self-Esteem Follow up
Walker, Gately, Bewick, & Hill, 2003	T× N = 57, Control *N* = 38; f and m Age: 9–18 years. Ethnicity: N/R	Weight loss camp with variable length of stay for child participants.	Parents invited to spend weekend at camp and given option to receive monthly bulletins.	Harter SPPC (1985)	Relative to control, campers experienced increased global self-worth, athletic competence, and physical appearance.	Significant weight loss (M = 5.6 kg) and reduction in BMI relative to the comparison group.	None.
Braet, Tanghe, Decaluwe, Moens, & Rosseel, 2004; Braet, 2006 (2-year. follow-up data)	T× N = 122; f and m Age: 7–17 years. Ethnicity: 93% White, 7% Black	10-month inpatient weight management program.	Parents were seen on a 2-week basis when they visited the center.	Harter SPPC (1985)	Significant increase in global self-worth, athletic competence, and physical appearance from pre- to post-tx.	Significant weight loss pre- to post-tx.	At 14-month follow-up all self-esteem improvements were maintained with significant increase in global self-worth, physical appearance, and school, social and athletic competence. Global self-worth increased at 2-year follow-up.
Edwards et al., 2005	T× N = 33; 23 f, Age: 8–13 years. Ethnicity: 67% Caucasian, 24.2% African Carribean, 6.1% Indian, Pakistani and mixed race.	Family-based outpatient behavioral treatment over 12 weeks.	Separate but simultaneous parent and child groups.	Piers–Harris (1984)	Total scores examined and found significant increase from pre- to post-tx.	Significant decrease in overweight -8.4%BMI.	None.

(continued)

Table I. Continued

Study	Sample	Type of Intervention	Parent Involvement	Self-Esteem Measurement	Self-Esteem Results	Weight Change Results	Self-Esteem Follow up
Gately et al., 2005	T× N = 185, 103 f, 82 m Control N = 94; 38 overweight and 56 nonoverweight; Age: 9–18 years. Ethnicity: N/R	Weight loss camp with an average of 2–6 week stay.	Not reported.	Harter SPPC (1986)	Tx group improved self-esteem significantly pre- to post-tx. No change in either control group.	Significant reductions in body mass, BMI SD, lost body fat, reduced hip and waist circumferences.	None yet, to be reported in an upcoming article.
Sacher et al., 2005	T× N = 11; f and m Age: 7–11 years. Ethnicity: N/R	3-month biweekly outpatient program.	Not reported.	Not reported.	Self-esteem improved statistically pre- to post-tx.	Improvement in BMI, waist circumference, & cardiovascular fitness at post-tx & at follow-up.	All self-esteem improvements were maintained at 3-month follow-up.

*N/R = Not Reported. tx, treatment.

of others, which can be a barrier to physical activity. Regardless of the direction of effect and the possibly that weight status change plays significant role for some children, it is likely only one of a number of factors that interact to influence self-esteem.

Impact of Parental Participation in Weight Management Programs

An important component of many programs is parental participation. Previous expert committees have recommended parental involvement as an essential component for interventions and the foundation of pediatric weight management programs (Barlow & Dietz, 1998). Research has found that parental participation is associated with change in child weight status (Epstein, Valoski, Kalarchian, & McCurley, 1995), which may moderate the relationship between weight status change and self-esteem change. Parents were consistently and actively involved in eight of the interventions reviewed, of which four studies reported improvements in global self-esteem (Edward et al., 2005; Foster, Wadden, & Brownell, 1985; Wadden et al., 1990; Savoye et al., 2005), three studies reported improvements in components of self-esteem (Brehm et al., 2003; Jelalian & Mehlenbeck, 2002; Jelalian et al., 2006), and one study reported no statistically significant change in self-esteem, but non-significant improvements in global self-esteem for 33% of the treatment group and only 11% of the control group (Thomas-Dobersen et al., 1993). Five interventions reported less consistent, minimal parental involvement through a parent session, letters home to families, or parental visits at camps. Four of these interventions reported improvements in global self-esteem (Braet et al., 2004; Mellin et al., 1987; Sherman et al., 1992; Walker et al., 2003) and one reported improvements in components of self-esteem (Braet et al., 2003). The remaining studies did not report the degree of parent involvement in treatment. Of the remaining studies, seven reported improvements in global self-esteem, one reported no change in self-esteem, and one reported decreases in self-esteem.

More positive and supportive home environments are associated with increased self-esteem in nonoverweight children (Marx & Neumark-Sztainer, 2005) and it is likely that these changes can contribute to increased self-esteem in overweight children. Two of the studies that reported positive improvements in self-esteem without weight loss included active parental participation. Many of the parent-inclusive programs (Thomas-Dobersen et al., 1993; Jelalian & Mehlenbeck, 2002; Jelalian et al., 2006) discussed

parenting skills and supportive strategies for changing healthy habits related to weight change. A major emphasis is on the use of praise and encouragement and limiting negative, coercive, and punitive interactions for less than optimal dietary and physical activity choices. Many of these studies also emphasized family-wide changes in dietary and physical activity habits. For example, Edwards and colleagues (2005) promoted ''whole family lifestyle change'' for the families participating in their program, which may have led to a more supportive and accepting environment and also may help the child feel less stigmatized. Anecdotal support for such a hypothesis can be found in the Cameron study (1999), where parents were not included in the intervention. Children receiving this intervention reportedly felt that their parents viewed them negatively compared to participants in the control group. The lack of parental participation may have hindered their use of positive supportive strategies and family wide change. Although many of these studies did not statistically examine these relationships, the potential impact of parent involvement cannot be underestimated.

Impact of Group Intervention Format and Targeting Self-Esteem During the Intervention

Another factor that may positively impact self-esteem is the use of a group intervention format to target self-esteem or components of self-esteem. Participation in a group intervention of similar peers can provide an opportunity for social bonding, perceived support, group activities, and group problem solving. Seven studies reported targeting self-esteem and related issues (e.g., self-confidence, self-image) during a group intervention (Barton et al., 2004; Brehm et al., 2003; Jelalian & Mehlenbeck, 2002; Jelalian et al., 2006; Savoye et al., 2005; Sherman et al., 1992; Walker et al., 2003). The three studies that reported self-esteem improvements without weight loss reported targeting self-esteem during the intervention. Accordingly, two of the studies reported using strategies such as a ''compliment activity'' (Sherman et al., 1992) or a ''social or group belongingness phase'' (Rohrbacher, 1973) to build self-esteem and self-confidence. Two programs utilized peer support to create a ''peer-based skills training'' experience with adolescents that resulted in improvements in components of self-esteem and a trend for improvements in global self-worth (Jelalian & Mehlenbeck, 2002; Jelalian et al., 2006). In these programs, ''Outward Bound'' style group activities were used to promote self-confidence and group cohesiveness in adolescent participants through adventurous, developmentally appropriate, and fun activities. Brehm and colleagues (2003) incorporated ''buddies'' to provide social support and encouragement to the participants. Peer interactions may lead to increased positive peer exchanges and praise for the overweight participants, which can provide a supportive contrast to the teasing and peer ridicule they may experience in other environments. Unfortunately, at the time of this review, no weight management program had reported objective data on changes in the level of teasing experienced by participants, or how these changes may impact changes in self-esteem from pre- to post-treatment. Additionally, many other interventions reviewed utilized group formats, but did not specify how or if self-esteem was addressed during the intervention, making it difficult to differentiate if the group format alone or the combination of the group format as a means to target self-esteem was responsible for increases in self-esteem for the participants.

Impact of Internal Attributions of Weight Change

A final potential mechanism for change in self-esteem in weight management programs could involve changes in attributions regarding weight status, or weight-related locus of control. Cameron (1999) suggested that increases toward more internal attributions regarding weight status may have contributed to decreases in self-esteem experienced by the children. Data from the adult literature seems to suggest that adults with more internal attributions regarding the causes for their overweight status also experience lower self-esteem during participation in weight management programs (Bryan & Tiggemann, 2001). This relationship has not been examined in children.

Summary

The results of this review suggest overall positive effects on self-esteem by pediatric weight management programs across a variety of settings and common treatment components, although methodological limitations of the research temper our confidence regarding this conclusion. While alternative research designs and better controlled studies are clearly needed, it is likely that components related to self-esteem improvements include weight status change, consistent parent involvement, the use of a peer group format to target self-esteem and develop positive peer-interactions and support during the intervention, and positive attributions regarding weight status. Research also seems to suggest that certain components of self-esteem may be affected first (such as body image) and then lead to global self-esteem improvements. Unfortunately, due to methodological limitations,

there is limited data to draw conclusions about the differential impact of important demographic and psychosocial risk factors on changes in self-esteem subsequent to intervention programs or on components of these programs.

Implications for Research and Practice

Recommendations for Future Research

Given the importance of self-esteem and potential long term effects on behavioral and emotional health, we recommend that pediatric weight management intervention studies examine and report data on self-esteem change, as well as factors related to self-esteem change. Unfortunately, we are unable to draw any conclusions regarding interventions not examined herein. For example, as rates of surgical interventions to target child and adolescent overweight continue to rise, psychosocial examination of these interventions will be critical to determine not only post-treatment effects, of which some data exists (Rand & MacGregor, 1994; Widhalm, Dietrich, & Prager, 2004), but also the impact on overall psychosocial well-being. The following recommendations are made to improve the study of self-esteem subsequent to weight management interventions.

One factor that may positively impact self-esteem is behavior goal attainment (e.g., change in dietary habits, increase in physical activity, and decreases in sedentary activity). Application of theory-based behavior change techniques have been recommended for pediatric weight management programs (Beckman, Hawley, & Bishop, 2006). Behavioral modification techniques, including goal setting, were included in many programs to facilitate changes in physical activity and dietary intake. If appropriately and sensitively utilized, these behavioral targets can provide children with more opportunities for goal achievement and positive feedback from parents or interventionists. Children are also likely to have more direct control of these behavioral goals, as opposed to weight loss, and thus appropriately set behavioral goals can be more attainable. This is especially true as improvement in weight status for children does not necessarily require weight loss. Unfortunately, to our knowledge no study has statistically examined the impact of change in lifestyle behaviors or goal attainment on child self-esteem.

Second, the interventions reviewed were widely variable with respect to assessment methodology, treatment design, and statistical examination of data. Studies utilizing multidimensional scales in cross-sectional and intervention samples have found changes in components of self-esteem without changes in global self-esteem. Additionally, researchers who have also examined participants' rated importance of these components have found that children and adolescents' global self-esteem is only affected by poor esteem in the components which they deem important (Phillips & Hill, 1998). Thus, we recommend the use of multidimensional scales, such as the SPPC, SPPA, or Piers–Harris Revised, which will be helpful in examining subcomponents of self-esteem, and that can ultimately help inform future intervention efforts.

Third, French and colleagues (1995) indicated the need for studies to examine the effects of weight regain on self-esteem, and over 10 years later, this need remains. Long term follow-up data will be necessary to examine this relationship, particularly in studies where self-esteem change and weight change were associated. Perhaps weight re-gain will negatively impact aspects of self-esteem, but without the data, this question will be left unanswered. The inclusion of overweight and nonoverweight control groups will be another essential element of future treatment designs.

Fourth, the association between self-esteem and other factors that could impact treatment outcomes and treatment components (e.g., parental involvement, parent-only vs. family-based interventions, use of the group format to target self-esteem) were rarely examined. These are factors should be more systematically monitored and investigated in future studies. Potential mediating and moderating variables noted by French and colleagues (1995) (demographic variables, peer influences) should continue to be considered with regard to weight management programs.

Fifth, conclusions in this review were limited by inconsistent reporting of demographical data and intervention descriptions. Study sample demographics, how or if self-esteem was addressed, and other treatment components were reported inconsistently. In future studies, it will be advantageous to refer to the CONSORT guidelines when preparing manuscripts for submission (Begg et al., 1996). Sample characteristics, recruitment information, attrition rates, treatment components and targets, parental involvement, length of treatment should be reported. We would like to highlight the articles of Braet (2006), Braet et al. (2004), and Jelalian et al. (2002) as strong examples of such reporting. Thorough reporting of data will also allow future reviewers to conduct meta-analyses, which we were unable to conduct due to limited published effect size information.

Sixth, examination of self-esteem is only one of a number of potential psychosocial complications in pediatric obesity that should be examined in conjunction with weight management programs. For example, considerable debate exists regarding the incidence of eating disorders in clinical overweight samples who have sought treatment, as well as intervention impacts on teasing, stigma, and depression. The impact of interventions on body image is also noteworthy given its potential impact as mediating the effect of the interventions on self-esteem change. In five of the six studies that reported self-esteem subscale data (Braet et al., 2003, 2004; Jelalian & Mehlenbeck, 2002; Rohrbacher, 1973; Stoner & Fiorillo, 1976; Thomas-Dobersen et al., 1993), improvements were noted in body image or physical appearance. Physical appearance improvements were also noted by Walker and colleagues (2003). French and colleagues (1995) hypothesized that body image may comprise a significant portion of global self-esteem for overweight youth and that programs may impact body image first, which then leads to self-esteem change. However, these relationships were rarely examined statistically, despite mounting evidence indicating that body image changes account for self-esteem changes in nonintervention samples (Pesa et al., 2000), or that changes in physical self-esteem may preclude changes in global self-esteem. Long term follow-up data would have been helpful in determining if these initial body image improvements led to future self-esteem improvements.

Recommendations for Enhancing Self-Esteem Through Pediatric Weight Management Programs

Based on the data presented, we would also like to offer the following recommendations to positively impact self-esteem in overweight children in the context of these interventions. First, it is essential to emphasize building a positive and supportive family environment for change. Parental involvement is crucial and parent sessions can be used as a venue to discuss increasing praise and support, limiting criticism and nagging about the child's diet, promoting exercise, and decreasing weight-related comments. Parental criticism and control strategies have wide-ranging effects on child self-esteem (Davison & Birch, 2001) and positive parenting strategies combined with developmentally appropriate guidelines are vital in weight management programs (Barlow & Dietz, 1998).

Second, our experiences suggest that a number of parents often directly or indirectly model negative weight-related behavior and self-talk. These comments can be internalized by children in the home and are often generalized to the child's view of their self and negative weight-related self-esteem. Parent involvement during the intervention provides the opportunity to explore parental feelings towards overweight concerns and the chance to examine personal negative self-talk and other low esteem behaviors (e.g., not wanting to exercise in front of others, embarrassed of body) that may be indirectly passed along to their children, particularly in families where one or both of the parents are overweight. We recommend helping parents address their own negative cognitions and self-talk utilizing cognitive behavioral strategies to ultimately help parents model more appropriate self-talk.

Third, self-esteem and body image issues should be directly addressed in pediatric weight management programs with both children and parents. Bosch and colleagues (2004) have recommended that interventions target psychosocial aspects concurrent with physical issues to reduce participant barriers to treatment and improve self-esteem. O'Dea (2004) highlights multiple activities and a self-esteem approach for eating problems, which could easily be adapted for inclusion in intervention programs. Group goal setting sessions can be utilized to allow group members to provide positive feedback for positive changes or goal achievement by children. Engaging parents in group discussions to build strategies to help enhance their child's self-esteem can also be beneficial for families.

Fourth, while discussion of weight status is inevitable in weight management programs, we encourage practitioners to limit the emphasis on weight status change. We do not mean to imply that weight should not be addressed, but rather not to overemphasize the importance of weight change. A larger emphasis should be placed on goal achievement for healthy eating and physical activity habits (Strauss, Rodzilsky, Burack, & Colin, 2001). It is developmentally appropriate for children to gain weight and intervention goals may focus more on weight stabilization for some children. Additionally, the explanation of BMI *z*-scores or percentage overweight may be challenging and confusing to pediatric participants. Focusing on less complex concepts, such as number of steps, hours watching television, or red foods (as a way to help identify high-fat or high-calorie foods) may be more appropriate. Children have greater control over their behavior than their weight and are likely to see more positive effects by targeting *directly* changeable goals. These changes are also more observable and lend themselves to more opportunities for positive feedback and praise.

Finally and unfortunately, many overweight children experience teasing and other negative interactions due to their weight status (Janssen, Craig, Boyce, & Pickett, 2004). The group setting can be a powerful mechanism through which to provide positive social experiences and teach adaptive social skills and coping (Jelalian et al. 2006). Subsequently, researchers have suggested that teaching overweight coping skills is as important as teaching supportive parenting (Flodmark, 2005). Interventions should discuss positive coping skills and ways to handle teasing and stress without food. Providing child and adolescent participants with nonfood related methods to handle stress and criticism can be extremely beneficial in helping to protect and insulate their self-esteem and maintain self-esteem improvements after the intervention has ended.

Conflict of interest: None declared.

Received October 2, 2006; revisions received April 29, 2007; accepted May 17, 2007

References

Barlow, S. E., & Dietz, W. H. (1998). Obesity evaluation and treatment: Expert committee recommendations. *Pediatrics, 102*, e29.

Barton, S., Walker, L., & Lambert, G. (2004). Cognitive change in obese adolescents losing weight. *Obesity Research, 12*, 313–319.

Beckman, H., Hawley, S., & Bishop, T. (2006). Application of theory-based health behavior change techniques to the prevention of obesity in children. *Journal of Pediatric Nursing, 21*, 266–275.

Begg, C., Cho, M., Eastwood, S., Horton, R., Moher, D., Olkin, I., et al. (1996). Improving the quality of reporting of randomized controlled trials. The CONSORT statement. *JAMA, 276*, 637–39.

Bosch, J., Stradmeijer, M., & Seidell, J. (2004). Psychosocial characteristics of obese children/youngsters and their families: Implications for preventive and curative interventions. *Patient Education and Counseling, 55*, 353–362.

Braet, C. (2006). Patient characteristics as predictors of weight loss after an obesity treatment for children. *Obesity, 14*, 148–155.

Braet, C., Tanghe, A., Bode, P. D., Franckx, H., & Winckel, M. V. (2003). Inpatient treatment of obese children: A multicomponent programme without stringent calorie restriction. *European Journal of Pediatrics, 162*, 391–396.

Braet, C., Tanghe, A., Decaluwe, V., Moens, E., & Rosseel, Y. (2004). Inpatient treatment for children with obesity: Weight loss, psychological well-being, and eating behavior. *Journal of Pediatric Psychology, 29*, 519–529.

Brehm, B., Rourke, K., Cassell, C., & Sethuraman, G. (2003). Psychosocial outcomes of a pilot program for weight management. *American Journal of Health Behavior, 27*, 348–354.

Brewis, A. (2003). Biocultural aspects of obesity in young Mexican schoolchildren. *American Journal of Human Biology, 15*, 446–460.

Brown, K., McMahon, R., Biro, F., Crawford, P., Schreiber, G., Similo, S. L., et al. (1998). Changes in self-esteem in Black and White girls between ages 9 and 14 years. *Journal of Adolescent Health, 23*, 7–19.

Bryan, J., & Tiggemann, M. (2001). The effect of weight-loss dieting on cognitive performance and psychological well-being in overweight women. *Appetite, 36*, 147–156.

Cameron, J. W. (1999). Self-esteem changes in children enrolled in weight management programs. *Issues in Comprehensive Pediatric Nursing, 22*, 75–85.

Davison, K. K., & Birch, L. L. (2001). Weight status, parent reaction, and self-concept in 5-year-old girls. *Pediatrics, 107*, 46–53.

Davison, K. K., & Birch, L. L. (2004). Predictors of fat stereotypes among 9-year-old girls and their parents. *Obesity Research, 12*, 86–94.

Dishman, R., Hales, D., Pfeiffer, K., Felton, G., Sauders, R., Ward, D., et al. (2006). Physical self-concept and self-esteem mediate cross-sectional relations of physical activity and sport participation with depression symptoms among adolescent girls. *Health Psychology, 25*, 396–407.

Edwards, C., Nicholls, D., Croker, H., Van Zyl, S., Viner, R., & Wardle, J. (2005). Family-based behavioural treatment of obesity. *European Journal of Clinical Nutrition, 60*, 587–592.

Epstein, L. H., Valoski, A. M., Kalarchian, M. A., & McCurley, J. (1995). Do children lose and maintain weight easier than adults: A comparison of child and parent weight changes from six months to ten years. *Obesity Research, 3*, 411–417.

Fitts, W. H. (1965). *Manual for the Tennessee Self-Concept Scale*. Nashville, TN: Counselor Records and Tests.

Flodmark, C. E. (2005). The happy obese child. *International Journal of Obesity, 29*, S31–S33.

Foster, G., Wadden, T. A., & Brownell, K. D. (1985). Peer-led program for the treatment and prevention of

obesity in the schools. *Journal of Consulting and Clinical Psychology, 53*, 538–540.

Freedman, D., Khan, L., Serdula, M., Dietz, W., Srinivasan, S., & Berenson, G. (2005). The relation of childhood BMI to adult adiposity: The Bogalusa Heart Study. *Pediatrics, 115*, 22–27.

French, S. A., Story, M., & Perry, C. L. (1995). Self-esteem and obesity in children and adolescents: A literature review. *Obesity Research, 3*, 479–490.

Gately, P. J., Cooke, C. B., Barth, J. H., Bewich, B. M., Radley, D., & Hill, A. J. (2005). Children's residential weight-loss programs can work: A prospective cohort study of short-term outcomes for overweight and obese children. *Pediatrics, 116*, 73–77.

Goran, M., Ball, G., & Cruz, M. (2003). Obesity and risk of type 2 diabetes, and cardiovascular disease in children and adolescents. *Journal of Clinical Endocrinology and Metabolism, 88*, 1417–1127.

Gortmaker, S., Must, A., Perrin, J., Sobol, A., & Dietz, W. (1993). Social and economic consequences of overweight in adolescence and young adulthood. *New England Journal of Medicine, 30*, 1008–1012.

Haney, P., & Durlak, J. A. (1998). Changing self-esteem in children and adolescents: A meta analytic review. *Journal of Clinical Child Psychology, 27*, 423–433.

Harter, S. (1985). *Manual for the Self-Perception Profile for Children*. Denver, CO: University of Denver Department of Psychology.

Harter, S. (1988). *Manual for the Self-Perception Profile for Adolescents*. Denver, CO: University of Denver Department of Psychology.

Harter, S. (1993). Causes and consequences of low self-esteem in children and adolescents. In R. F. Baumeister (ed.), *Self-esteem: The puzzle of low self-regard* (pp. 87–116). NY: Plenum Press.

Harter, S. (1999). *The construction of the self: A developmental perspective*. NY: Guilford Press.

Harter, S., & Whitesell, N. R. (2003). Beyond the debate: Why some adolescents report stable self-worth over time and situation, whereas others report changes in self-worth. *Journal of Personality, 71*, 1027–1058.

Hayden-Wade, H., Stein, R., Ghaderi, A., Saelens, B., Zabinski, M., & Wilfley, D. (2005). Prevalence, characteristics, and correlates of teasing experiences among overweight children vs. non-overweight peers. *Obesity Research, 13*, 1381–1392.

Hesketh, K., Wake, M., & Waters, E. (2004). Body mass index and parent-reported self-esteem in elementary school children: Evidence for a causal relationship. *International Journal of Obesity and Related Metabolic Disorders, 28*, 1233–1237.

Himes, J. H., & Dietz, W. H. (1994). Guidelines for overweight in adolescent preventive services: Recommendations from an expert committee. The expert committee on clinical guidelines for overweight in adolescent preventive services. *The American Journal of Clinical Nutrition, 59*, 307–316.

Israel, A. C., & Ivanova, M. Y. (2002). Global and dimensional self-esteem in preadolescent and early adolescent children who are overweight. *International Journal of Eating Disorders, 31*, 424–429.

Janssen, I., Craig, W. M., Boyce, W. F., & Pickett, W. (2004). Associations between overweight and obesity with bullying behaviors in school-aged children. *Pediatrics, 113*, 1187–1194.

Jelalian, E., & Mehlenbeck, R. (2002). Peer-enhanced weight management treatment for overweight adolescents: Preliminary findings. *Journal of Clinical Psychology in Medical Settings, 9*, 15–23.

Jelalian, E., Mehlenbeck, R., Lloyd-Richardson, E., Birmaher, V., & Wing, R. (2006). 'Adventure therapy' combined with cognitive-behavioral treatment for overweight adolescents. *International Journal of Obesity, 30*, 31–39.

Kaplan, K., & Wadden, T. (1986). Childhood obesity and self-esteem. *Journal of Pediatrics, 109*, 367–370.

Kelly, A., Wall, M., Eisenberg, M., Story, M., & Neumark-Sztainer, D. (2005). Adolescent girls with high body satisfaction. *Journal of Adolescent Health, 37*, 391–396.

Manus, H. E., & Killeen, M. R. (1995). Maintenance of self-esteem by obese children. *Journal of Child and Adolescent Psychiatry and Nursing, 8*, 17–27.

Marx, R. D., & Neumark-Sztainer, D. (2005). Questions & answers. *Eating Disorders: The Journal of Treatment & Prevention, 13*, 491–495.

Mellin, L., Slinkard, L., & Irwin, C. (1987). Adolescent obesity intervention: Validation of the SHAPEDOWN program. *Journal of the American Dietetic Association, 87*, 333–338.

Mendelson, B. K., & White, D. R. (1985). Development of self-body-esteem in overweight youngsters. *Developmental Psychology, 21*, 90–96.

Mirza, N., Davis, D., & Yanovski, J. (2005). Body dissatisfaction, self-esteem, and overweight among inner-city Hispanic children and adolescents. *Journal of Adolescent Health, 36*, 267.e16–267.e20.

O'Dea, J. A. (2004). Evidence for a self-esteem approach in the prevention of body image and eating problems among children and adolescents. *Eating Disorders, 12*, 225–239.

O'Dea, J. A. (2005). Prevention of child obesity: 'First, do no harm'. *Health Education Research, 20*, 259–265.

Ogden, C., Carroll, M., Curtin, L., McDowell, M., Tabak, C., & Flegal, K. (2006). Prevalence of overweight and obesity in the United States, 1999–2004. *JAMA, 295*, 1549–1555.

Pesa, J., Syre, T., & Jones, E. (2000). Psychosocial differences associated with body weight among female adolescents: The importance of body image. *Journal of Adolescent Health, 26*, 330–337.

Phillips, R. G., & Hill, A. J. (1998). Fat, plain, but not friendless: Self-esteem and peer acceptance of obese pre-adolescent girls. *International Journal of Obesity, 22*, 287–293.

Pierce, J. W., & Wardle, J. (1997). Cause and effect beliefs and self-esteem of overweight children. *Journal of Child Psychology and Psychotherapy, 38*, 645–650.

Piers, E. V. (1984). *Piers-Harris Children's Self-Concept Scale Revised Manual*. Los Angeles, CA: Western Psychological Services.

Piers, E. V., & Harris, D. B. (1969). *Manual for the Piers-Harris Self-Concept Scale*. Nashville, TN: Counselor Recording and Tests.

Rand, C., & MacGregor, A. (1994). Adolescents having obesity surgery: A 6-year follow-up. *Southern Medical Journal, 87*, 1208–1213.

Renman, C., Engstrom, I., Silfverdal, S., & Aman, J. (1999). Mental health and psychosocial characteristics in adolescent obesity. *Acta Paediatrics, 88*, 998–1003.

Rohrbacher, R. (1973). Influence of a special camp program for obese boys on weight loss, self concept, and body image. *Research Quarterly, 44*, 150–157.

Rosenberg, M. (1965). *Society and the adolescent self-image*. Princeton, NJ: Princeton University Press.

Rosenberg, M., & Simmons, R. (1972). *Black and white self-esteem: The urban school child*. Washington, DC: American Sociological Association.

Rumpel, C., & Harris, T. B. (1994). The influence of weight on adolescent self-esteem. *Journal of Psychosomatic Research, 38*, 547–556.

Sacher, P. M., Chadwick, P., Wells, J. C., Williams, J. E., Cole, T. J., & Lawson, M. S. (2005). Assessing the acceptability and feasibility of the MEND programme in a small group of obese 7–11-year-old children. *Journal of Human Nutrition and Diet, 18*, 3–5.

Sahota, P., Rudolf, M., Dixey, R., Hill, A., Barth, J., & Cade, J. (2001). Randomised controlled trial of primary school based intervention to reduce risk factors for obesity. *British Medical Journal, 323*, 1029–1032.

Savoye, M., Berry, D., Dziura, J., Shaw, M., Serrecchia, J. B., Barbetta, G., et al. (2005). Anthropometric and psychosocial changes in obese adolescents enrolled in a weight management program. *Journal of the American Dietetic Association, 105*, 364–70.

Secord, P. F., & Jourard, S. M. (1953). The appraisal of body-cathexis: Body-cathexis and the self. *Journal of Consulting Psychology, 17*, 343–347.

Sherman, J. B., Alexander, M. A., Gomez, D., Kim, M., & Marole, P. (1992). Intervention program for obese school children. *Journal of Community Health and Nursing, 9*, 183–190.

Sjoberg, R. L., Nilsson, K. W., & Leppert, J. (2005). Obesity, shame, and depression in school-aged children: A population-based study. *Pediatrics, 116*, e389–392.

Stern, M., Mazzeo, S., Gerke, C., Porter, J., Bean, M., & Laver, J. (2006). Gender, ethnicity, psychosocial factors, and quality of life among severely overweight, treatment-seeking adolescents. *Journal of Pediatric Psychology, 32*, 90–94.

Stoner, S., & Fiorillo, M. (1976). A program for self-concept improvement and weight reduction for overweight adolescent females. *Psychology: A Journal of Human Behavior, 13*, 30–35.

Stradmeijer, M., Bosch, J., & Koops, W. (2000). Family functioning and psychosocial adjustment in overweight youngsters. *International Journal of Eating Disorders, 27*, 110–114.

Strauss, R. S. (2000). Childhood Obesity and Self-Esteem. *Pediatrics, 105*, e15.

Strauss, R. S., & Pollack, H. A. (2003). Social marginalization of overweight children. *Archives of Pediatrics and Adolescent Medicine, 157*, 746–752.

Strauss, R. S., Rodzilsky, D., Burack, G., & Colin, M. (2001). Psychosocial correlates of physical activity in healthy children. *Archives of Pediatrics and Adolescent Medicine, 155*, 897–902.

Swallen, K., Reither, E., Haas, S., & Meier, A. (2005). Overweight, obesity, and health-related quality of life among adolescents: The National Longitudinal Study of Adolescent Health. *Pediatrics, 115*, 340–347.

Sweeting, H., Wright, C., & Minnis, H. (2005). Psychosocial correlates of adolescent obesity, 'slimming down' and 'becoming obese'. *Journal of Adolescent Health, 37*, 409.

Thomas-Dobersen, D. A., Butler-Simon, N., & Fleshner, M. (1993). Evaluation of a weight

management intervention program in adolescents with insulin-dependent diabetes mellitus. *Journal of the American Dietetic Association, 93*, 535–540.

Thompson, J., Shroff, H., Herbozo, S. Cafri, G., Rodriguez, J., & Rodriguez, M. (2007). Relations among multiple peer influences, body dissatisfaction, eating disturbance, and self-esteem: A comparison of average weight, at risk of overweight, and overweight adolescent girls. *Journal of Pediatric Psychology, 32*, 24–29.

Wadden, T. A., Stunkard, A. J., Rich, L., Rubin, C. J., Sweidel, G., & McKinney, S. (1990). Obesity in black adolescent girls: A controlled clinical trial of treatment by diet, behavior modification, and parental support. *Pediatrics, 85*, 345–352.

Walker, L., Gately, P., Bewick, B., & Hill, A. (2003). Children's weight loss camps: Psychological benefit or jeopardy? *International Journal of Obesity & Related Metabolic Disorders, 27*, 748–54.

Weiss, R., Dziura, J., Burgert, T., Tamborlane, W., Takasali, S., et al. (2004). Obesity and the metabolic syndrome in children and adolescents. *New England Journal of Medicine, 350*, 2362–2374.

Whitehead, J. R. (1995). A study of children's physical self-perceptions using an adapted physical self-perception profile questionnaire. *Pediatric Exercise Science, 7*, 132–151.

Widhalm, K., Dietrich, S., & Prager, G. (2004). Adjustable gastric binding surgery in morbidly obese adolescents: Experiences with eight patients. *International Journal of Obesity, 28*, S42–S45.

Wilson, D. B., Sargent, R., & Dias, J. (1994). Racial differences in selection of ideal body size by adolescent females. *Obesity Research, 2*, 38–43.

Young-Hyman, D., Herman, L., Scott, D., & Schlundt, D. (2000). Care giver perception of children's obesity-related health risk: A study of African American families. *Obesity Research, 8*, 241–248.

Young-Hyman, D., Schlundt, D., Herman-Wenderoth, L., & Bozylinski, K. (2003). Obesity, appearance, and psychosocial adaptation in young African American children. *Journal of Pediatric Psychology, 28*, 463–472.

Zametkin, A., Zoon, C., Klein, H., & Munson, S. (2004). Psychiatric aspects of child and adolescent obesity: A review of the past 10 years. *Journal of American Academy of Child and Adolescent Psychiatry, 43*, 134–150.

Zeller, M. H., Saelens, B. E., Roehrig, H., Kirk, S., & Daniels, S. R. (2004). Psychological adjustment of obese youth presenting for weight management treatment. *Obesity Research, 12*, 1576–1586.