The Impact of a Behavioral Weight Management Program on Disordered Eating Attitudes and Behaviors in Overweight Children

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Abstract

Background—Behavioral interventions targeting overweight children have been successful in facilitating weight loss; however, there is concern that these programs produce disordered eating attitudes among youth.

Objective—The purpose was to (1) to determine if overweight youth receiving one of two behavioral interventions were more likely to report an increase in disordered eating attitudes over time compared to a waitlist control; and (2) to determine psychosocial predictors of eating disordered attitudes at six-month follow-up.

Design—Participants were randomized to one of two behavioral lifestyle interventions or a waitlist control. Data was collected at baseline, post-treatment, and six-month follow-up.

Participants/Setting—Participants were 68 overweight youths, ages 8–13, and their parent(s) who lived in rural north central Florida. The project ran from January 2006 to January 2008.

Intervention—Each treatment condition consisted of 12 group sessions over 16 weeks.

Main outcome measures—Parents completed a demographic form and the Child Feeding Questionnaire. Children completed the Children's Eating Attitudes Test, Schwartz Peer Victimization Scale, and Children's Body Image Scale.

Statistical Analyses Performed—Mixed 2×2 ANOVAs were used to examine the effect of treatment on eating attitudes. Hierarchical linear regression was used to assess whether baseline levels of psychosocial variables predicted disordered eating attitudes at follow-up, controlling for baseline eating attitudes and treatment condition.

Results—Youth who participated in the behavioral interventions did not report significant increases in disordered eating attitudes over time compared to the waitlist control. Across all conditions, higher levels of body dissatisfaction, peer victimization, parent restrictive feeding practices and concern for child weight at baseline predicted higher levels of disordered eating attitudes at follow-up.

Conclusion—These findings do not provide evidence that behavioral interventions lead to an increase in unhealthy eating attitudes and behaviors. Future research should examine the impact of incorporating eating disorder prevention in pediatric weight management programs.

Keywords

pediatric obesity; behavioral weight management; rural health; weight control behaviors

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Pediatric obesity is a major public health concern (1). Obesity has been associated with chronic health conditions and impaired psychosocial functioning (2–4). Family-based behavioral lifestyle programs have been developed to address weight status in obese youth (5), and have been associated with weight loss and improved physiological markers of health and psychosocial functioning (5–9). However, there is a growing debate as to whether or not behavioral weight management interventions that encourage reductions in caloric intake may create or exacerbate disordered eating attitudes and behaviors. Some argue that adhering to prescriptive diets in the context of an intervention can lead families to become entrenched in a struggle related to feeding (10–11). This may foster an unhealthy preoccupation with food and encourage youth to place extreme value on their weight and shape (12).

Indeed, dieting has been implicated in the pathogenesis of eating disorders (13). For example, adolescent females who endorse moderate to severe dieting are five to eighteen times more likely to develop eating disorders over a three-year period, compared to their non-dieting peers (14). Furthermore, self-reported endorsement of dieting predicts use of extreme weight-control behaviors and increased weight status five years later (15). This relationship is of particular concern given that overweight youth are more likely than their normal weight peers to engage in unhealthy weight control behaviors (16). Studies reporting that greater parent control over child feeding is associated with an increased tendency for children to eat in the absence of hunger (17–18) are often cited to highlight the danger of parent restriction.

Others argue that professionally administered pediatric weight management programs do not lead to increases in disordered eating attitudes or behaviors. First, many of the studies reporting associations between dieting and eating disordered behaviors were conducted with community samples of youth engaged in self-directed dieting rather than participating in professionally administered weight management programs (15). In addition, opposed to self-directed diets, these programs promote the development of healthy eating patterns by teaching families to make gradual, moderate, and individualized changes with an emphasis on developing sustainability (19–20).

Relatively little research has assessed the potential iatrogenic effects of pediatric weight management treatment. In their review Butryn and Wadden (2005) found no evidence that treatment for pediatric overweight increased the prevalence of unhealthy attitudes or behaviors (21); however; only one study included a control group. Carter and Bulik (2008) evaluated the extent to which eating pathology was assessed and reported in research examining the effectiveness of pediatric overweight prevention programs (22). Among the 22 studies reviewed, not only were disordered eating symptoms not commonly evaluated as outcome variables, but the measurement techniques were often insufficient, particularly with

respect to identifying the rate of high-risk behaviors (e.g., binging, purging). In light of these limitations, it remains unclear whether pediatric weight management programs cause or exacerbate disordered eating behaviors and attitudes.

It is possible that certain individuals may be at greater risk for developing maladaptive eating attitudes during treatment on the basis of preexisting characteristics. For instance, body dissatisfaction has been consistently linked to the development of eating disorders (23). Higher rates of body dissatisfaction have been found among overweight youth compared to their normal weight peers, which suggests that children of a higher weight status may be more vulnerable to developing pathological eating attitudes (24). Additional peer and parent factors, such as peer victimization or parent attitudes about child eating and weight, may also influence this process (25–27). Unfortunately, there are no studies reporting on potential predictors of disordered eating behaviors in youth in the context of a behavioral weight management program.

The purpose of the present study was twofold. To test the assumption that behavioral weight management interventions lead to increases in disordered eating attitudes and behaviors, it was hypothesized that children participating in the behavioral weight management programs would exhibit greater disordered eating attitudes and behaviors at post-treatment and six-month follow-up compared to children in the waitlist condition. Second, to determine psychosocial predictors of eating disordered attitudes and behaviors, it was hypothesized that higher child self-reported peer victimization and body dissatisfaction, and higher parent-reported concern about child weight and restrictive feeding practices at baseline would predict higher levels of disordered eating attitudes and behaviors at six-month follow-up.

Methods

Participants

Participants were 68 overweight and obese children, ages eight to 13 years, and their parent or legal guardian living in of three rural counties (7,20). Each child and participating parent spoke English as the primary language. Families were excluded if: (1) the child was currently prescribed antipsychotics, systemic corticosteroids, or weight loss medication; or (2) the family was currently enrolled in another weight loss intervention. Fifty parent-child dyads (74%) completed the six-month follow-up.

Procedure

The governing Institutional Review Board approved the current protocol. Participants were recruited through direct mailings, presentations to community leaders, and distribution of brochures in schools. Interested families completed an initial screening visit to determine eligibility and obtain informed consent and assent. This research utilized a randomized, controlled design with three arms: a behavioral family-based intervention, a behavioral parent-only intervention, and a waitlist control. Each of the behavioral interventions consisted of twelve 90-minute group-based sessions over 16 weeks. Groups occurred weekly for eight weeks then biweekly for eight weeks. The project was conducted from January 2006 to January 2008.

In the family-based intervention, parents and children participated in simultaneous but separate groups. In the parent-only intervention, children did not attend the weekly intervention sessions. Content in both intervention conditions focused on improving dietary intake using an adapted version of the Stoplight Program, which teaches participants to classify foods into three categories based on nutritional and caloric content (28). Participants were asked to record everything they ate but not to count calories during the four months of the treatment program. Children and parents were encouraged to increase physical activity

through a pedometer-based step program and to reduce time spent in sedentary activities. Weekly goals were set to gradually reduce high-calorie foods, increase fruits and vegetables, and increase physical activity. Additional topics addressed self-esteem, body image, healthy and unhealthy eating patterns, and parent use of behavioral management techniques. Youth in the family-based intervention participated in a fun, physical activity and sampled a healthy snack each week.

Measures

All measures were completed at baseline, post-treatment, and six-month follow-up. Participants were assessed for height and weight. Children's BMI results were converted into z-scores for analyses. A demographic questionnaire was used to collect background information about the family.

The Children's Eating Attitudes Test (ChEAT) was used to assess child-reported disordered eating attitudes and behaviors (29). The ChEAT yields a total score, in addition to four subscale scores; the total score was used for analyses in this study. Items are rated on a six point Likert scale. A total score of 20 or above suggests clinically elevated disordered eating attitudes and behaviors (30). Good internal reliability ($\alpha = 0.87$) and good concurrent validity with measures of body dissatisfaction and weight control behaviors have been reported (31).

The Schwartz Peer Victimization Scale was used to assess child perceptions of peer victimization (32). The child was asked to rate the frequency of occurrence for each item in the previous two weeks on a four point Likert scale. Items are summed to create a total score. Good internal consistency has been reported ($\alpha = 0.75$) (32). Cronbach's alpha for the present sample was 0.88.

The Children's Body Image Scale is a self-report measure that consists of seven silhouettes of male or female children that correspond to increasing weight status (33). Children were asked to identify the body figure most like their own (perceived figure) and the body figure they would most like to have (ideal figure). Body dissatisfaction was calculated as the absolute value between the perceived and ideal figures selected.

The Child Feeding Questionnaire is a parent report measure that assesses the extent to which parents exert control over their children's eating (34). The measure consists of 31 items that are rated on a five point Likert scale, and yields scores across seven factors. Only two factors, the restriction and the parent concern about child weight subscales, were used in this study. Confirmatory factors analysis has provided support for the structure of this measure, and each of the factors has good internal consistency (34).

Data Analysis

The data was first examined for outliers. One participant was identified as endorsing disordered eating attitudes greater than three standard deviations above the mean at baseline, and exhibited an invalid response pattern. This participant was excluded from analysis resulting in a final sample of 67 youth. Pearson product moment correlations and independent *t* tests were used to identify significant relationships between baseline variables (i.e., disordered eating attitudes, child age, gender), BMI z-score change from baseline to six-month follow-up, and disordered eating attitudes at follow-up to determine the need to control for covariates in the regression.

Mixed 2×2 analyses of variance were used to examine the main effect of treatment condition on disordered eating attitudes from baseline to post-treatment and baseline to six-month follow-up, and to test the interaction between treatment condition and time.

A hierarchical linear regression was used to assess whether baseline levels of child-reported body dissatisfaction and peer victimization and parent-reported restrictive feeding and concern about child weight predicted disordered eating attitudes at six-month follow-up. Covariates (baseline disordered eating attitudes, treatment condition) were entered in the first model, followed by child-reported variables in the second model, and finally parent-reported variables in the third model. All analyses were conducted using SPSS (version 16.0, 2008, SPSS, Inc., Chicago, Illinois).

Results

Descriptive Data

Baseline weight status and demographic information are presented in Table 1. Fifty-eight child-parent dyads completed post-treatment (85%) and 50 child-parent dyads (74%) completed the six-month follow-up. Relative to study completers, non-completers were younger [$t(65)=-2.16$, $p=0.04$] and had a higher BMI z-score at baseline [$t(65)=-2.90$, $p=0.005$]. Child age, gender, and BMI z-score change score were unrelated to eating attitudes.

Weight status outcomes were previously published (7). Relative to baseline, at six-month follow-up children in both the family-based and parent-only conditions exhibited significantly greater improvements in weight status than children in the waitlist condition. There was no significant difference in weight status outcomes between the family-based and parent-only conditions.

Disordered Eating Attitudes

There were no significant differences between the parent-only and family-based conditions on the measure of ChEAT total score at baseline, post-treatment, or follow-up. Thus, those two groups were collapsed for subsequent analyses.

Eating attitudes and psychosocial data for each assessment are displayed in Table 2. The mean level of disordered eating attitudes endorsed by children in the intervention and waitlist conditions at all time points were well below the clinical cutoff score for the ChEAT (30). Mixed 2×2 analyses of variance revealed no main effect for time from baseline to post-treatment [$F(1,43)=0.002$, $p=0.96$, partial eta squared=0.00], or from baseline to six-month follow-up [$F(1,46)=0.98$, $p=0.34$, partial eta squared=0.02]. In addition, the interaction between group and time was not significant from baseline to post-treatment [$F(1,43)=0.16$, $p=0.70$, partial eta squared=0.01], or from baseline to six-month follow-up [$F(1,46)=0.26$, $p=0.61$, partial eta squared=0.01].

Child responses to individual items on the ChEAT that described more pathological eating attitudes and behaviors were also examined (see Table 3). Responses were dichotomized into absence/presence to facilitate interpretation of the frequency with which these items were endorsed. Due to the small number of participants who endorsed each item, statistical tests could not be conducted. Further, there were approximately twice as many children in the collapsed intervention condition relative to the waitlist control, so caution must be taken in comparing the raw data across groups. The data suggests that few children in either condition admitted to thoughts or behaviors believed to pose more significant health risks at any assessment. In addition, though not tested statistically, there was a downward trend in the number of youth in both the intervention and waitlist groups whose total ChEAT score fell in the clinical range from baseline (12.5% and 31.6%, respectively) to follow-up (8.6% and 13.3%, respectively) (see Table 3).

Predictors of Disordered Eating Attitudes

As there were no significant differences between treatment and waitlist conditions with respect to eating disordered attitudes, all groups were collapsed for the following analyses. As displayed in Table 4, baseline levels of child-reported disordered eating attitudes, body dissatisfaction, and peer victimization, and parent-reported concern about child weight and restrictive feeding practices were all positively correlated with disordered eating attitudes at follow-up. Results of the hierarchical regression analysis examining predictors of ChEAT scores at follow-up are displayed in Table 5. After controlling for baseline levels of child-reported disordered eating attitudes and treatment condition, baseline child psychosocial variables accounted for a significant amount of variance in follow-up ChEAT scores. Moreover, the addition of baseline parent variables in Model 3 also accounted for a significant amount of variance in follow-up ChEAT scores. The addition of the psychosocial variables accounted for an additional 17% of the variance in ChEAT scores at six-month follow-up.

Discussion

Overall, the intervention program was not associated with increases in disordered eating attitudes. Youth who received either intervention did not report an increase in unhealthy eating attitudes from baseline to post-treatment or follow-up compared to youth in the waitlist control. To provide a more robust understanding of the data, the clinical relevance of the findings was also examined. On average, children across conditions fell well below the clinical cutoff for disordered eating at all three time points. In addition, weight status change over time was not related to level of disordered eating attitudes, which suggests that successful weight change was not associated with an increase in unhealthy eating behaviors.

These findings are consistent with existing research in this area that has not generally substantiated the concern that professionally administered pediatric behavioral weight interventions cultivate eating pathology among participants. In their review Carter and Bulik (22) noted that out of 22 randomized controlled studies, only one reported that children receiving an intervention were more likely to endorse unhealthy weight control behaviors. Similarly, a non-overlapping review of professionally administered weight intervention programs found that out of five studies, none reported significant within child increases in unhealthy eating attitudes with treatment, nor significant differences between treatment and control conditions (21).

Self-directed dieting has been linked to a rise in disordered eating attitudes (13–15), especially among overweight youth (16,24). In fact, dieting prospectively predicts extreme weight control behaviors and increases in weight status over five years (15). Overweight children may receive overt and covert encouragement from doctors, parents, and peers to lose weight, yet lack the adequate support or knowledge to effectively and healthfully manage their weight on their own. In this case, misguided attempts may instead catalyze unhealthy and even dangerous eating patterns. In contrast, behavioral family-based interventions for overweight children provide close supervision while encouraging small, gradual, and sustainable changes that are tailored to individual families (20,35). These programs also encourage, at most, moderate levels of dietary restriction as opposed to the high level of parent restriction that have previously been associated with problematic eating behaviors (17–18). In addition, these programs strive to help children and parents learn strategies to improve body image and self-esteem, as well as how to deal with peer victimization. The structure and support that children and parents receive during their participation in behavioral interventions may help to explain why hypothesized iatrogenic effects of increased eating disordered behaviors have not been supported.

The second purpose of this study was to identify psychosocial risk factors that might predispose individual children to experience a rise in disordered eating attitudes in the context of treatment. Consistent with previous research in non-clinical samples (17,25,36), results from this investigation suggested that higher levels of child-reported peer victimization and body dissatisfaction at baseline predicted higher levels of disordered eating attitudes at follow-up. After controlling for baseline eating attitudes and treatment condition, child psychosocial factors accounted for an additional 14% of variance in eating attitudes at follow-up.

The role that parents play in terms of raising children's risk for developing disordered eating attitudes over time was examined. Together, parent concern about child weight and restrictive feeding practices accounted for an additional 3% of variance in disordered eating attitudes at follow-up. Each of these processes may support the development of unhealthy eating patterns and as such are important to consider in the context of family-based treatment.

While no apparent group differences emerged with respect to disordered eating habits, some children did engage in unhealthy weight control behaviors. This suggests that incorporating prevention education about unhealthy weight control behaviors in these treatment programs may help to promote more healthful behaviors (38). Furthermore, specific psychosocial risk factors accounted for a sizeable amount of variance in disordered eating attitudes. Early identification of youth who meet a specific risk profile could help professionals better detect any signs of maladaptive attitudes or behaviors throughout the course of treatment and thereby attenuate the chance for a deleterious outcome.

Concern about the safety of behavioral interventions for pediatric overweight persists despite the growing body of research that has uncovered little evidence of unintended psychological harm. In part, this is because the methodological problems that characterize the extant literature dampen the strength of those findings. Carter and Bulik (22) outlined some of these flaws as failure to assess eating disorders as an outcome of treatment, inadequate assessment of unhealthy weight control behaviors, reporting only group means as opposed to individual behaviors, and not including appropriate control groups (21). The present study represents an extension of the literature in several important ways as it included a control group, used a well-validated measure to assess eating attitudes, and reported rates of specific unhealthy attitudes and behaviors.

This study was not without limitations. First, it utilized primarily self-report measures, which were not corroborated. Second, the peer victimization measure used in this research assessed general experiences of bullying, whereas the literature suggests that weight-related teasing may be particularly detrimental in overweight youth (25,40). Third, the sample of youth in this study was relatively young. Disordered eating patterns and body image concerns tend to become more prevalent with advancing age (15,41).

Future studies should include a more comprehensive assessment of eating disordered behaviors. This data provided information on the number of youth who engaged in bingeing and purging, however, there are other behaviors such as smoking cigarettes, using laxatives, and skipping meals that may also pose significant threats to health. Similarly, other potential risk factors for disordered eating behaviors should be investigated, such as depression and self-esteem (41). Finally, future research should also examine the effectiveness of integrating eating disorder prevention with weight status intervention. Obese children appear to be especially vulnerable to developing maladaptive eating patterns over time, thus weight management programs may be an efficient and practical way to deliver dual services to at-risk youth (42).

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Table 1

Baseline Demographic Information: Project STORY

Characteristic	Parent-Only	Condition Family-Based	Waitlist
N	24	24	19
Child age	10.9	10.8	10.4
Boys/girls (n)	16/8	10/14	9/10
Parent age	43.8	41.2	44.4
Two parent households (%)	91.8	66.8	73.7
Chlild race/ethnicity			
Caucasian	20	20	17
African American	0	2	1
Hispanic	2	1	1
Bi-racial	2	0	0
Other	0	1	0
Family income			
Below $19,999	3	3	1
$20,000–$59,999	12	12	15
Over $60,000	9	7	3
Child weight status			
BMI z-score, baseline	2.15 (0.24)	2.15 (0.46)	2.15 (0.42)
BMI z-score, six-month follow-up	2.03 (0.37)	2.06 (0.60)	2.16 (0.44)
BMI z-score, Δ	−0.12 (.21)	−0.09 (0.26)	0.01 (0.21)
% overweight, baseline	64 (20)	71 (33)	68 (26)
% overweight, six-month follow-up	59 (23)	70 (37)	70 (27)
% overweight, Δ	−5 (10)	−1 (15)	2 (5)
Completed 6-month follow-up (n)	18	17	15

Table 2

Means and Standard Deviations for Psychosocial Variables: Project STORY

	Intervention	Waitlist
ChEAT[a]		
Total score, baseline	10.38 (6.77)	11.70 (7.53)
Total score, post-treatment	10.57 (7.68)	12.26 (7.82)
Total score, six-month follow-up	9.84 (7.22)	9.95 (8.40)
Total score, Δ baseline to follow-up	−.56 (7.78)	−1.75 (6.90)
Above clinical cutoff (n), baseline	6	6
Above clinical cutoff (n), post-treatment	5	2
Above clinical cutoff (n), six-month follow-up	3	2
Body dissatisfaction, baseline	2.56 (1.38)	2.68 (1.16)
Peer victimization, baseline	9.17 (4.04)	8.16 (3.37)
CFQ[b]		
Parent concern about child weight, baseline	9.84 (2.24)	9.84 (2.24)
Restrictive feeding practices, baseline	19.42 (6.91)	19.42 (6.91)

[a]Children's Eating Attitudes Test

[b]Child Feeding Questionnaire

Table 3

Number of Youth Who Endorsed Specific Unhealthy Behaviors: Project STORY

	Intervention			Waitlist		
	Baseline	Post-Tx	Follow-up	Baseline	Post-Tx	Follow-up
"I feel very guilty after eating"	3	1	3	4	2	1
"I like my stomach to be empty"	3	4	1	2	2	3
"I vomit after I have eaten"	0	0	0	0	0	0
"I have the urge to vomit after I have eaten"	0	1	0	0	0	0
"I have gone on eating binges where I feel that I might not be able to stop"	3	3	2	3	1	0
"I think that food controls my life"	3	2	2	1	3	0

Items selected from the Children's Eating Attitudes Test (ChEAT) (29)

Table 4

Pearson Product Correlations Among Psychosocial Variables: Project STORY

Variable	1	2	3	4	5	6
1. ChEAT[a] total, baseline	--					
2. Body dissatisfaction, baseline	0.43**	--				
3. Peer victimization, baseline	0.29*	0.33**	--			
4. Restrictive feeding, baseline	0.10	0.08	0.24	--		
5. Concern about child weight, baseline	0.15	0.25*	0.30*	0.52**	--	
6. ChEAT total, six-month follow-up	0.48**	0.45**	0.42**	0.28	0.35*	--

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*p<.05

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*p<.01

[a]Children's Eating Attitudes Test

Table 5

Baseline Psychosocial Variables Predicting Eating Attitudes at Follow-up: Project STORY

	B	Standard Error	β	t	R^2 of Model	ΔR^2	F
Model 1: ChEAT[a] total score					0.23	-	6.76**
ChEAT, baseline	0.52	0.24	0.48	3.65**			
Treatment condition	0.48	1.24	0.05	0.39			
Model 2: Child variables					0.37	0.14	6.41**
ChEAT, baseline	0.34	0.15	0.31	2.34*			
Treatment condition	0.85	1.17	0.09	0.73			
Body dissatisfaction, baseline	1.27	0.86	0.21	1.47			
Peer victimization, baseline	0.57	0.27	0.29	2.15*			
Model 3: Parent Variables					0.40	0.03	4.58**
ChEAT, baseline	0.34	0.15	0.31	2.34*			
Treatment condition	0.79	1.19	0.08	0.66			
Body dissatisfaction, baseline	1.24	0.87	0.2	1.43			
Peer victimization, baseline	0.43	0.29	0.21	1.48			
Parent restrictive feeding	0.03	0.18	0.02	0.14			
Parent concern about child weight	0.46	0.43	0.17	1.07			

B = Unstandardized Beta; β = Standardized Beta

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$p<.05$

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$p<.01$

[a]Children's Eating Attitudes Test