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Self-reported binge eating in severe pediatric obesity: Impact on weight change in a randomized controlled trial of family-based treatment

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Abstract

Objective—This study sought to document self-reported binge eating in a large sample of severely obese children and to examine the impact of binge eating on changes in percent overweight among children randomized to family-based behavioral treatment (Intervention) versus control (Usual Care).

Participants and Methods—As part of a larger randomized controlled trial, 192 children ages 8–12 years ($M = 10.2$, $SD = 1.2$) with a mean BMI percentile of 99.2 ($SD = 0.7$) completed assessments at baseline and 6-, 12- and 18-months post-randomization. A parent or guardian also participated. Child psychological symptoms, including binge eating, were measured prior to randomization using self-report questionnaires. Child height and weight were measured at baseline, 6-, 12- and 18-months. The primary study outcome was percent overweight (i.e., percent over median BMI for age and sex).

Results—Twenty-two children (11.5%) endorsed binge eating at baseline (Binge Eating Group). Children in the Binge Eating Group were younger and had more depressive, anxiety and eating disorder symptoms and lower self-esteem than children in the rest of the sample (No Binge Eating Group). There also were differences between the Binge Eating and No Binge Eating groups with respect to the short-term effects of treatment group assignment on change in percent overweight during the study. Specifically, improvements in percent overweight in the Intervention condition relative to Usual Care were documented in the No Binge Eating Group only. Among children in the Binge Eating Group, those assigned to Intervention showed a 2.6% increase in percent overweight, on average, at the completion of acute treatment as compared to an 8.5% decrease among children without binge eating. However, these effects were not maintained during follow-up.

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Conclusion—Results of this study suggest the importance of considering binge eating in the development of weight management programs for severely obese youth.

Keywords

childhood obesity; binge eating; eating disorder; treatment moderator; clinical trial

There is growing evidence that episodes of broadly-defined binge eating, that is, eating episodes characterized by the subjective feeling of loss of control over eating whether or not the amount of food consumed is objectively large, are common in overweight and obese youth. Studies that have evaluated broadly-defined binge eating in non-treatment seeking samples of overweight children have documented prevalence rates ranging from 9% to 33% (1-3). Moreover, there is evidence that rates of broadly-defined binge eating are especially high among obese children presenting for weight-loss treatment (4-8). For example, Goosens and colleagues (8) reported that 17.9% of a treatment-seeking sample of obese children ages 10-16 years endorsed episodes of broadly-defined binge eating during the previous three months. There were no differences between males and females with respect to the prevalence of binge eating episodes. However, children who endorsed binge eating had higher levels of depressive symptomatology and greater concerns about eating, weight and shape compared to children with no binge eating. These findings are consistent with a growing body of research documenting the association of broadly-defined binge eating to depressive and anxiety symptoms, the cognitive correlates of disordered eating and poor self-esteem in obese youth (4, 5, 9).

Less is known about the impact of binge eating on response to behavioral weight management in obese children. An initial report by our research group found no relation between broadly-defined binge eating and weight loss in severely obese children assigned to receive 10-12 sessions of a family-based behavioral weight control intervention (10). However, the sample was small ($N = 27$), and only 50% (2/4) of children with binge eating completed treatment. Goosens and colleagues (11) also found no relation between broadly-defined binge eating and weight loss following a 10-month inpatient treatment program for pediatric obesity. In contrast, Braet (12) reported that general eating disorder symptoms were associated with poorer outcome two years after inpatient treatment in obese children. These findings mirror results from adult samples in which support for the moderating role of binge eating on response to behavioral weight-loss interventions is equivocal [for review, see (13)]. Nevertheless, given that binge eating has been linked to weight gain (14, 15) and a range of negative psychosocial outcomes in overweight youth (4, 5, 8, 9), there is a need for additional research to determine whether binge eating might affect response to family-based behavioral weight management in obese children.

Thus, the present study had two primary aims. First, we sought to document the prevalence and correlates of self-reported binge eating in a large sample of severely obese children presenting for family-based behavioral weight management. Consistent with previous work, we hypothesized that self-reported binge eating would be associated with increased levels of depressive, anxiety and eating disorder symptoms and decreased levels of self-esteem in this group. Second, we aimed to examine whether self-reported binge eating at treatment entry

would diminish the effect of a family-based behavioral weight-loss intervention on change in percent overweight at treatment completion and at 6- and 12-months post-intensive intervention. This is the first study to our knowledge to address the impact of binge eating on response to outpatient behavioral weight management in a large sample of severely obese youth.

Participants and Methods

Participants

Participants were 192 children, ages 8-12 years, enrolled in a randomized controlled trial comparing family-based behavioral weight management to usual care in the treatment of severe pediatric obesity. The study inclusion and exclusion criteria, randomization procedure, treatment groups (i.e., Intervention versus Usual Care) and baseline sample characteristics have been detailed elsewhere (16). Of note, psychiatric symptoms were neither an inclusion criterion nor an exclusion criterion for the study (except in cases in which a child required immediate psychiatric treatment), and no child was excluded because of binge eating. At study enrollment, children were an average of 10.2 years old ($SD = 1.2$), had a mean BMI percentile of 99.2 ($SD = 0.7$) and a mean percent overweight of 90.3 ($SD = 27.6$). There were 109 females (56.8%) and 83 males (43.2%). The majority of participants were white (73.4%; $n = 141$); 26.1% ($n = 50$) were black and 0.5% ($n = 1$) was Asian. There were no significant differences between individuals randomized to the Intervention ($n = 97$) and Usual Care ($n = 95$) groups with respect to baseline demographic or anthropometric characteristics (16).

Measures and Procedures

The study protocol was reviewed and approved by the University of Pittsburgh Institutional Review Board. Parents or guardians provided written informed consent, and children provided assent. Prior to randomization, children and their parents completed baseline assessments including measurement of height and weight and a battery of self-report questionnaires. To ensure comprehension, child questionnaires were administered orally by trained project staff. Follow-up assessments were conducted at 6- (corresponding to post-treatment in the Intervention group), 12- and 18-months post-randomization.

Child measures—Child height and weight were assessed at baseline, 6-, 12- and 18-months using a stationary stature board and digital scale. Children were measured in street clothes without shoes. Child percent overweight, calculated as percent over median BMI for age and sex (17), was used as the primary study outcome, as it has been recommended for reporting changes in adiposity in children (18).

Eating disorder symptoms were assessed at baseline using the Children's Eating Attitudes Test (ChEAT) (19), a 26-item self-report questionnaire designed to assess attitudes and behaviors related to eating disorders in school-aged children. To assess binge eating, children's responses to the ChEAT item "I have gone on eating binges where I feel that I might not be able to stop" were coded as symptomatic or non-symptomatic based on established ChEAT scoring guidelines (19). Specifically, children who reported eating

binges “always” (score = 3), “very often” (score = 2) or “often” (score = 1) were coded as symptomatic (Binge Eating Group), and children who reported eating binges “never,” “rarely” or “sometimes” (all scored 0) were coded as non-symptomatic (No Binge Eating Group). The ChEAT has demonstrated good internal consistency and test-retest reliability in community-based samples of school children (19, 20).

Self-reported depressive and anxiety symptoms were assessed at baseline using the Children's Depression Inventory (CDI) (21) and the State-Trait Anxiety Inventory for Children (STAIC) trait anxiety scale (22), respectively. Child self-esteem was measured using the global self-worth score from the Self-Perception Profile for Children (SPPC) (23). The CDI, STAIC and SPPC all have well-established psychometric properties and are used widely in research.

Parent measures—At baseline, parents self-reported demographic information and completed the Child Behavior Checklist for ages 6-18 years (CBCL) (24) as a measure of parent-reported child psychopathology. T-scores for the CBCL Internalizing, Externalizing and Total Problems scales were examined in the current study. The CBCL is a well-validated screening tool for psychiatric symptoms in children.

Statistical Analyses

We used descriptive statistics to evaluate the baseline prevalence and correlates of self-reported binge eating in the current sample. Children in the Binge Eating and No Binge Eating groups were compared on demographic and clinical characteristics at study entry using independent samples t-tests (with Welch t' correction for data that violated the homogeneity of variance assumption) or Fisher's exact tests.

The association between self-reported binge eating at baseline and change in percent overweight was examined at the end of treatment (6 months) and at post-treatment follow-up (12 and 18 months) using mixed-effects models. Specifically, we ran a repeated measures mixed-effects model on the baseline, 6-, 12- and 18-month percent overweight outcomes with treatment assignment (Intervention versus Usual Care), binge eating category (Binge Eating Group versus No Binge Eating Group), time (0, 6, 12 and 18 months) and their two-way and three-way interactions included as fixed terms. Subject was included as a random term to control for between-person variability within the sample. Planned contrasts were set to compare the effects of Intervention and Usual Care on change in percent overweight from baseline to 6-, 12- and 18-months in children assigned to the Binge Eating and No Binge Eating groups. Effect sizes were calculated using Cohen's d. All tests were two-tailed with alpha level set at $p < 0.05$.

Results

Prevalence and Correlates of Self-Reported Binge Eating

At baseline, 191 children (99.5%) completed the binge eating item on the ChEAT, of whom 22 (11.5%) endorsed symptomatic levels of binge eating (i.e., eating binges “always” [$n = 9$], “very often” [$n = 5$] or “often” [$n = 8$]).¹ Demographic and clinical characteristics of the Binge Eating Group compared to the rest of the sample are presented in Table 1. As shown,

children in the Binge Eating Group were younger and endorsed more depressive, anxiety and eating disorder symptoms than did children in the No Binge Eating Group. Levels of self-esteem also were lower in the Binge Eating Group relative to the No Binge Eating Group.

Impact of Binge Eating on Weight Change

Figure 1 presents observed and modeled means for change in percent overweight from baseline to 18 months as a function of binge eating status and treatment group assignment. Planned contrasts, reported in Table 2, revealed differences between children in the Binge Eating and No Binge Eating groups with respect to the effects of treatment assignment on change in percent overweight during the study. Specifically, among children in the Binge Eating Group, there were no differences between the Intervention and Usual Care conditions with respect to change in percent overweight at 6, 12 or 18 months; that is, Intervention was not associated with a significant benefit on weight trajectories. However, among children in the No Binge Eating Group, there was a significant effect of treatment assignment on short-term change in percent overweight. As documented in Table 2, Intervention was associated with significant decreases in percent overweight at 6 months among children in the No Binge Eating Group, but improvements were not maintained at 12 and 18 months.

Discussion

This study replicates and extends previous research by documenting that self-reported binge eating is prevalent in severely obese children presenting for family-based behavioral weight management and is associated with symptoms of distress and attenuated treatment response. Taken together, these findings highlight the clinical significance of evaluating binge eating in obese children. Moreover, our data provide initial support for the idea that binge eating may decrease the short-term effectiveness of family-based behavioral weight control for severely obese children. If replicated, these findings indicate a need for the development of tailored treatment approaches to address binge eating in weight management programs.

Consistent with previous research [e.g., (5, 6, 8, 10)], a significant proportion of severely obese children in this study (i.e., 11.5%) endorsed binge eating at presentation for family-based treatment. As expected, binge eating was associated with increased levels of depressive, anxiety and eating disorder symptoms and decreased self-esteem. Furthermore, children in the Binge Eating Group were younger than children in the No Binge Eating Group, which replicates at least one previous study of aberrant eating in obese children (5). There also was evidence that binge eating was associated, at a trend-level, with a greater degree of overweight in our sample, which is noteworthy given that all of the children were severely obese. Collectively, the present findings converge with previous work [e.g., (7-9)] in suggesting that binge eating may serve as a marker for a psychiatric subtype of obesity in children characterized by greater levels of general psychopathology and decreased psychosocial functioning.

¹n = 169 children endorsed asymptomatic levels of binge eating on the ChEAT as follows: eating binges “sometimes” (n = 32), “rarely” (n = 56), or “never” (n = 81)

Results from this study also provide initial evidence that self-reported binge eating at treatment entry is associated with a poor short-term response to behavioral weight control in severely obese children, which contrasts with the findings of two previous reports from smaller samples (10, 11). Although differences in study methodology (e.g., the use of a self-report questionnaire to assess binge eating rather than a structured interview) may account for the disparate findings between this and prior investigations, our results offer preliminary support for the notion that binge eating moderates the effect of behavioral weight-loss treatment in obese youth. Indeed, among children assigned to the Intervention condition, those with self-reported binge eating showed a 2.6% increase in percent overweight, on average, at the completion of acute treatment as compared to an 8.5% decrease in percent overweight among children without symptomatic binge eating. This difference was obscured in the primary outcome paper in which we found a significant effect of Intervention relative to Usual Care on weight change at treatment completion (i.e., 7.6% decrease in Intervention versus 0.7% decrease in Usual Care) (16), but we did not evaluate the impact of binge eating on treatment outcome.

Weight maintenance during the year following intensive intervention was inadequate in all study groups. Nevertheless, the difference between children with and without binge eating in short-term treatment response is notable, particularly given that short-term weight loss has been shown to predict longer term success (25), and there are promising approaches to weight maintenance that involve on-going contact (26, 27) and goal setting (28). Although the present findings require replication, further study is indicated because a growing body of evidence has suggested that binge eating is associated with distress and weight gain in community samples of children (3, 14, 15). Thus, this pattern may be a marker for a behavioral pediatric obesity phenotype that requires development of novel interventions.

Strengths of this study include a large sample of severely obese children and the use of data from a randomized controlled trial to examine the impact of self-reported binge eating on response to family-based behavioral weight management. However, two limitations must be noted. First, binge eating was assessed using a single item from a self-report questionnaire rather than an interview-based assessment. Although self-report questionnaires are useful for screening eating disorder symptoms in children, they do not provide accurate diagnostic information (29, 30). In an effort to decrease the likelihood that children without clinically significant binge eating were assigned to the Binge Eating Group, we used established ChEAT scoring guidelines (19) to set the threshold for symptomatic behavior in the current study. Nevertheless, it is possible that some children might have misunderstood the response options on the ChEAT and thus could have been mis-categorized. Likewise, there is some evidence that infrequent episodes of binge eating (e.g., binge eating once per month) are associated with clinically significant impairment in children (3) and thus the current approach in which children who endorsed eating binges “sometimes” or “rarely” were classified as asymptomatic might have resulted in misdiagnosis. Future studies using well-validated interview assessments of binge eating are needed to replicate the present findings. Second, the number of children in the Binge Eating Group was small relative to the total sample size, which may limit the generalizability of the present results. Sample size restrictions also prevented us from examining the effect of binge eating in the context of other covariates that might impact weight change in severely obese youth.

In conclusion, results of the present study suggest the importance of considering binge eating in the development of weight management programs for severely obese children. In particular, our data lend support to the idea that self-reported binge eating is prevalent in obese youth presenting for family-based behavioral weight control and is associated with a poor short-term response to treatment. Given the potential clinical significance of the present findings, future research is needed to determine if binge eating moderates the effect of behavioral weight control in other large samples of severely obese children. Research also should focus on the identification of biological and behavioral markers that may distinguish obese children at-risk for the development of future binge eating. For example, prospective research in older adolescent and adult samples has indicated that unhealthy dietary restraint (e.g., fasting), as opposed to modest caloric restriction prescribed during a behavioral weight-control intervention, predicts the onset of binge eating and bulimic behaviors (31), but little is known about these relations in children. Finally, there is a need for research to develop effective interventions to prevent and treat binge eating and other psychological symptoms in severely obese youth.

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Figure 1.

Change in percent overweight from baseline to 18 months as a function of binge eating status and treatment group assignment: Observed and modeled means.

Table 1

Demographic and Clinical Characteristics of Children in the Binge Eating and No Binge Eating Groups (N = 191)

	Binge Eating Group (n = 22) Mean (SD)	No Binge Eating Group (n = 169) Mean (SD)	Between-group p
Age (years)	9.53 (1.20)	10.26 (1.18)	0.007
Percent overweight	105.44 (37.74)	88.67 (25.24)	0.05
CDI Total	10.77 (8.57)	5.49 (5.38)	< 0.001
STAIC – Trait Anxiety	38.95 (8.05)	34.96 (8.31)	0.04
ChEAT Total ¹	23.41 (14.14)	11.34 (7.73)	0.001
SPPC Global Self-Worth ²	2.98 (0.87)	3.40 (0.62)	0.04
CBCL Internalizing ³	60.14 (10.64)	56.75 (10.41)	0.16
CBCL Externalizing ³	53.50 (10.82)	49.92 (10.72)	0.14
CBCL Total Problems ³	59.77 (10.21)	55.19 (10.70)	0.06
Female (%)	54.55	56.80	0.99
White (%)	63.64	74.56	0.31
Family income (%) ³			
\$0 - \$30,000	36.36	26.06	0.32
> \$30,000	63.64	73.94	
Treatment assignment (%)			
Intervention	31.82	53.25	0.07
Usual Care	68.18	46.75	

¹ Due to a clerical error, one item focusing on avoidance of sweets (i.e., “I stay away from foods with sugar in them”) was omitted from the ChEAT in the present study. The binge eating item also was removed prior to comparing children in the Binge Eating and No Binge Eating groups on severity of eating disorder symptoms.

² 8 cases with missing data (1 from the Binge Eating Group; 7 from the No Binge Eating Group); N = 183

³ 4 cases with missing data (all in the No Binge Eating Group); N = 187

CDI = Children's Depression Inventory; STAIC = State-Trait Anxiety Inventory for Children; ChEAT = Children's Eating Attitudes Test; SPPC = Self-Perception Profile for Children; CBCL = Child Behavior Checklist

Table 2

Modeled Effects of Treatment Assignment on Change in Percent Overweight at 6-, 12- and 18-Months in the Binge Eating and No Binge Eating Groups^f

Binge Eating Group					
Month	Intervention Mean Change in Percent Overweight (SE)	Usual Care Mean Change in Percent Overweight (SE)	Treatment Effect (SE)	Effect Size (Cohen's d)	Between-group p
6	2.58 (5.58)	0.22 (2.81)	2.36 (6.25)	0.18	0.71
12	-4.04 (5.88)	0.16 (2.90)	-4.19 (6.56)	0.31	0.52
18	2.43 (5.88)	-0.09 (2.89)	2.52 (6.55)	0.18	0.70
No Binge Eating Group					
Month	Intervention Mean Change in Percent Overweight (SE)	Usual Care Mean Change in Percent Overweight (SE)	Treatment Effect (SE)	Effect Size (Cohen's d)	Between-group p
6	-8.51 (1.66)	-0.81 (1.32)	-7.71 (2.12)	0.56	0.0003
12	-3.88 (1.76)	-0.80 (1.41)	-3.08 (2.26)	0.21	0.17
18	-1.46 (1.73)	-0.15 (1.25)	-1.31 (2.13)	0.10	0.54

^f Negative numbers refer to a decrease in percent overweight relative to baseline