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Overvaluation of shape and weight among overweight children and adolescents with loss of control eating

Dr. Andrea Goldschmidt, Ph.D.¹, Denise E. Wilfley, Ph.D.², Kamryn T. Eddy, Ph.D.³, Kerri Boutelle, Ph.D.⁴, Nancy Zucker, Ph.D.⁵, Carol B. Peterson, Ph.D.⁶, Dr. Angela Celio-Doyle, Ph.D.¹, and Dr. Daniel Le Grange, Ph.D.¹

Andrea Goldschmidt: goldschmidta@uchicago.edu; Denise E. Wilfley: wilfleyd@psychiatry.wustl.edu; Kamryn T. Eddy: keddy@partners.org; Kerri Boutelle: kboutelle@ucsd.edu; Nancy Zucker: zucke001@mc.duke.edu; Carol B. Peterson: peter161@umn.edu; Angela Celio-Doyle: acdoyle@uchicago.edu; Daniel Le Grange: legrange@uchicago.edu

¹Department of Psychiatry and Behavioral Neuroscience, The University of Chicago, 5841 South Maryland Avenue, MC 3077, Chicago, Illinois, 60637, USA

²Department of Psychiatry, Washington University School of Medicine, 660 South Euclid Avenue, Box 8134, St. Louis, MO, 63110, USA

³Department of Psychiatry, Massachusetts General Hospital and Harvard Medical School, 55 Fruit Street, Boston, Massachusetts, 02114, USA

⁴Department of Pediatrics and Psychiatry, University of California San Diego, 9500 Gilman Drive, La Jolla, California, 92037, USA

⁵Department of Psychiatry and Behavioral Sciences, Duke University Medical Center, P.O. Box 3842, Durham, North Carolina, 27710, USA

⁶Department of Psychiatry, University of Minnesota Medical School, F282/2A West, 2450 Riverside Avenue South, Minneapolis, Minnesota, 55454, USA

Abstract

Little is known about the phenomenology of pediatric loss of control (LOC) eating. Overvaluation of shape and weight, however, appears to be diagnostically meaningful among binge eating adults. We explored the significance of shape and weight overvaluation among children and adolescents with LOC eating. Participants ($n=526$) included 149 overweight youth with LOC eating and 377 overweight controls (CON). Participants were categorized as those reporting at least moderate overvaluation (LOC-Mod, $n=74$; CON-Mod, $n=106$) or less than moderate overvaluation (LOC-Low, $n=75$; CON-Low, $n=271$), and compared on measures of eating-related and general psychopathology. LOC-Mod evidenced lower self-esteem than CON-Low, and greater behavioral problems than CON-Mod and CON-Low, but did not differ from LOC-Low in these domains. With the exception of LOC-Low and CON-Mod, all groups differed on global eating disorder severity, with LOC-Mod scoring the highest. Overvaluation of shape and weight appears to be of questionable importance in defining subtypes of youth with LOC eating. However, as overvaluation and LOC eating each independently predicts eating disorder onset, their confluence may confer even further risk for eating disorder development. Longitudinal studies should address

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Corresponding Author: Andrea B. Goldschmidt, Department of Psychiatry and Behavioral Neuroscience, The University of Chicago, 5841 S. Maryland Ave., MC 3077, Chicago, Illinois, 60637; TEL: (773) 834-4118; FAX: (773) 702-9929; goldschmidta@uchicago.edu.

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this possibility. Developmentally appropriate discussion about body image disturbance may be indicated in interventions targeting pediatric LOC eating and/or obesity.

Keywords

Binge eating; loss of control; overvaluation of shape and weight

Overvaluation of shape and weight refers to self-judgment or self-worth that is largely, or solely, contingent upon one's appearance and weight (Fairburn, 2008b). Overvaluation of shape and weight is currently a criterion for both anorexia nervosa (AN; "undue influence of body shape and weight on self-evaluation") and bulimia nervosa (BN; "self evaluation [that is] unduly influence by body shape and weight"; American Psychiatric Association, 2000), and empirical evidence suggests that this construct may be a useful marker of comorbid psychopathology and treatment outcome in binge eating disorder (BED) as well (Goldschmidt et al., 2010; Grilo et al., 2009; Grilo et al., 2008; Grilo, Masheb, & White, 2010; Hrabosky, Masheb, White, & Grilo, 2007; Masheb & Grilo, 2008; Mond, Hay, Rodgers, & Owen, 2007). Although a significant proportion of children and adolescents report symptoms of binge eating (Tanofsky-Kraff et al., 2004), relatively little is known about the phenomenology and distinguishing features of binge eating syndromes in younger populations (Hilbert & Czaja, 2009). In particular, the significance of overvaluation of shape and weight among children and adolescents with binge eating-related disturbances is currently unclear.

Overvaluation of shape and weight is purported by some (P. J. Cooper & Fairburn, 1993; Fairburn, 2008b), but not all (Waller, 2008), investigators to mark the core psychopathology of eating disorders. Overvaluation of shape and weight is a stable construct that appears to be unique to eating disorders (Goldfein, Walsh, & Midlarsky, 2000; McFarlane, McCabe, Jarry, Olmsted, & Polivy, 2001), and critical in the maintenance of eating-disorder symptomatology (Fairburn, Peveler, Jones, Hope, & Doll, 1993; Fairburn et al., 2003). Overvaluation of shape and weight has been proposed to be related to self-esteem in the sense that one's physical appearance constitutes the criterion upon which one judges his or her value as a person (P. J. Cooper & Fairburn, 1993). That is, rather than appreciating the unique confluence of personality features, behavioral traits, talents, and interests that make all individuals unique, those with eating disorders who endorse this feature evaluate their self-worth mainly, or solely, in terms of their physical attributes. Thus, overvaluation of shape and weight is distinct from body dissatisfaction in that it reflects a core sense of inadequacy given the tenuous nature of physical appearance and body weight. In contrast, body dissatisfaction is common in the general population (Rodin, Silberstein, & Striegel-Moore, 1985) and often fluctuates in response to mood, changes in body weight, and other environmental stressors (Eisenberg, Neumark-Sztainer, & Paxton, 2006). Overvaluation is also distinct from shape and weight concerns, which are broader constructs encompassing a range of shape- and weight-related attitudes and cognitions (e.g., fear of weight gain, discomfort about exposing one's body; Fairburn & Cooper, 1993).

Loss of control (i.e., the subjective experience that one cannot control what or how much one is eating) and binge eating (i.e., loss of control accompanied by the consumption of an unambiguously large amount of food; American Psychiatric Association, 2000) are among the most frequently reported eating disorder behaviors in children and adolescents (Goldschmidt, Aspen, Sinton, Tanofsky-Kraff, & Wilfley, 2008). Loss of control eating is associated with obesity and excess body fat (Stice, Presnell, Shaw, & Rohde, 2005; Stice, Presnell, & Spangler, 2002; Tanofsky-Kraff et al., 2009; Tanofsky-Kraff, et al., 2004) as well as a broad range of psychosocial impairments (Eddy et al., 2007; Goldschmidt et al.,

2008; Goossens, Braet, & Decaluwe, 2007). Similar to adults with BED (e.g., Striegel-Moore et al., 2001; Wilfley, Schwartz, Spurrell, & Fairburn, 2000), youth with loss of control eating disturbances have reported higher levels of shape and weight concerns than their peers (Goossens, et al., 2007; Tanofsky-Kraff, et al., 2004), with one study demonstrating that youth with recurrent loss of control eating endorse these concerns at a level commensurate to those with full-syndrome eating disorders (Hilbert & Czaja, 2009).

To date, few studies have explored overvaluation of shape and weight among youth. One prospective study of community-based children, aged 8–13 (Allen, Byrne, McLean, & Davis, 2008), found that overvaluation was relatively stable over time, but did not predict the onset of binge eating or other problematic psychosocial outcomes. However, shape and weight overvaluation have been found to be concurrently associated with eating disorder symptoms and self-esteem in female adolescents, aged 13–18 (Geller, Srikameswaran, Cockell, & Zaitsoff, 2000). More recently, Hilbert and Czaja (2009) found that among children aged 8–13, higher levels of overvaluation were associated with a more severe eating disorder profile that was characterized by more frequent loss of control eating and greater eating disorder psychopathology. Moreover, the presence of overvaluation of shape and weight seemed to improve the classification scheme of loss of control eating in children by creating a more sensitive boundary between more and less severe cases. Thus, this construct may be diagnostically meaningful among children with loss of control eating problems; however, it is unknown whether the presence of overvaluation of shape and weight is associated with other psychiatric features among youth reporting loss of control eating, and the extent to which this construct accurately distinguishes between those with and without loss of control eating disturbances.

In a broader context, given that loss of control eating remains ill-defined as a clinical syndrome in children and adolescents, further research on its distinguishing features and correlates is needed to inform classification and treatment research. Few interventions for pediatric loss of control eating have been developed and tested, despite its public health significance given associations with obesity and weight gain (Stice, et al., 2005; Stice, et al., 2002; Tanofsky-Kraff, et al., 2009; Tanofsky-Kraff, et al., 2004). Cognitive behavioral therapy features a strong focus on directly modifying overvaluation of shape and weight (Fairburn, 2008a), and preliminary research suggests that this treatment can reduce both shape and weight concerns and loss of control eating in adolescents (Jones et al., 2008). It is unclear whether cognitive behavioral therapy and other interventions for pediatric loss of control eating should include a more specific focus on overvaluation of shape and weight to improve psychosocial outcomes.

The goal of the current study was to explore the construct validity of clinically significant overvaluation of shape and weight (reflecting that shape and weight are of at least moderate importance in one's scheme for self-evaluation, according to research convention; Fairburn & Cooper, 1993) among children and adolescents reporting loss of control eating. Specific aims were to: 1) compare overweight youth with loss of control eating who reported significant shape and weight overvaluation to those who reported minimal or no overvaluation, as well as to overweight controls without loss of control eating reporting different levels of shape and weight overvaluation, on measures of eating-related and general psychopathology; and 2) examine how effectively overvaluation distinguishes children and adolescents with loss of control eating from overweight controls. Based upon the previous literature (Hilbert & Czaja, 2009), we hypothesized that youth with loss of control eating who reported significant shape and weight overvaluation would endorse the greatest levels of eating-related and general psychopathology, followed by, in descending order, youth with loss of control eating reporting minimal or no overvaluation, controls with significant overvaluation, and controls with minimal or no overvaluation. We also expected

that overvaluation would distinguish children and adolescents with loss of control eating from overweight controls relatively well.

Method

Participants

Participants were 526 youth (M age=10.9±2.3) who were mostly female (65.2%; n =334) and Caucasian (56.3%; n =296), with a minority of participants describing themselves as African-American (21.3%; n =112), Hispanic (11.4%; n =60), or other (11.0%; n =58; see Table 1). All participants were overweight or obese (M z-BMI=2.22±0.37). We used a convenience sample of individuals presenting for non-intervention research protocols, weight loss treatment studies, or clinic-based eating disorders or obesity treatment at five research institutions (Washington University School of Medicine, Missouri; The University of Chicago, Illinois; Children's Hospital Boston, Massachusetts; San Diego State University/University of California San Diego, California; and University of Minnesota, Minnesota). Of these, 149 (28.3%) reported at least one episode of loss of control eating over the past three months in the absence of regular compensatory behaviors (i.e., use of self-induced vomiting, laxatives or diuretics, fasting, or driven exercise for weight control more than once a week, on average, over the past three months; LOC), while the remaining 377 (71.7%) participants denied the occurrence of loss of control eating or regular compensatory behaviors in the past three months (control; CON). The LOC group inclusion criterion was based on evidence that loss of control eating in children and adolescents is associated with psychosocial impairments regardless of episode size or frequency (Glasofer et al., 2007; Goldschmidt, Jones, et al., 2008; Tanofsky-Kraff, et al., 2004).

Washington University School of Medicine, Missouri—Participants were drawn from two research protocols conducted at Washington University School of Medicine. The first study examined an Internet-delivered weight loss intervention for overweight and obese adolescents (12–17 years; Doyle et al., 2008). Exclusion criteria included current or past diagnosis of a full-syndrome eating disorder; medical conditions resulting in significant weight changes or precluding moderate physical activity; and use of medication significantly affecting weight.

The second was a laboratory-based study investigating the relation between mood and binge eating among overweight and obese girls (6–12 years; Goldschmidt, Tanofsky-Kraff, & Wilfley, 2011). Exclusion criteria included medications or medical conditions affecting appetite, body weight, or ability to sustain attention; severe food restriction or very limited food preferences; current psychosis or suicidality; and a current diagnosis of bulimia nervosa.

The University of Chicago, Illinois—Participants were overweight and obese children and adolescents (7 to 18 years) presenting for an initial assessment at the University of Chicago's Eating and Weight Disorders Program (Eddy, Celio Doyle, Hoste, Herzog, & Le Grange, 2008). Participants were excluded from the current study if they met DSM-IV criteria for anorexia nervosa or bulimia nervosa.

Children's Hospital Boston, Massachusetts—Participants were overweight and obese children and adolescents (8 to 18 years) presenting for behavioral weight loss treatment at the Optimal Weight for Life Clinic (Eddy, et al., 2007). Participants were excluded for the following reasons: obesity-related disorders associated with mental retardation, psychotic disorders, or developmental disorders associated with cognitive impairment.

San Diego State University/University of California San Diego, California—

Participants were drawn from a study of weight loss maintenance treatments for overweight and obese children (7–12 years old; Wilfley et al., 2007). Exclusion criteria included the presence of medical or psychiatric disturbances limiting treatment participation; use of medications significantly affecting appetite and/or weight; and concurrent involvement in weight loss or psychological treatment.

University of Minnesota, Minnesota—

Participants were overweight and obese children (8–12 years old) presenting for a treatment study investigating two interventions focused on reducing overeating (Boutelle et al., under review). Exclusion criteria included concurrent participation in a weight loss program; medication that could influence weight and/or eating; food allergies or dietary restrictions; and the presence of a psychiatric disorder or physical disease for which physician supervision of diet and exercise prescription were needed.

Procedures

All data presented in the current study were collected before participation in experimental or treatment protocols. Participants provided written assent and their parents provided written informed consent. All protocols were approved by Institutional Review Boards at each respective site.

Measures

Demographics—Participants' z-BMI was calculated based on measured height and weight. Children with a z-BMI at or above the 85th percentile for age and gender were identified as overweight (Kuczmarski et al., 2000). Race/ethnicity was categorized as Caucasian, African-American, Hispanic, or other.

Eating Disorder Examination—Participants completed the Eating Disorder Examination (EDE; Fairburn & Cooper, 1993) or the EDE adapted for children (ChEDE; Bryant-Waugh, Cooper, Taylor, & Lask, 1996). The EDE and ChEDE are semi-structured, investigator-based instruments used to diagnose eating disorders and assess eating disorder attitudes, cognitions, and behaviors. The adult and child versions of the EDE are nearly identical in form and content. Modifications to the ChEDE include the use of more basic language to facilitate comprehension in younger children, and the addition of a card-sort task to augment items concerning overvaluation of shape and weight. In this latter modification, children are instructed to list the attributes that contribute to their feelings of self-worth, and to then arrange these items in order of importance, or contribution to self-worth. Both the adult and child EDE have very good reliability and validity (Bryant-Waugh, et al., 1996; Z. Cooper, Cooper, & Fairburn, 1989; Watkins, Frampton, Lask, & Bryant-Waugh, 2005). The EDE yields four subscale scores (Restraint, Eating Concern, Weight Concern, and Shape Concern) and a global score measuring the overall severity of eating disorder psychopathology. The EDE also distinguishes two types of binge eating episodes: objective binge episodes (OBEs; episodes of loss of control eating accompanied by consumption of an unambiguously large amount of food); and subjective binge episodes (SBEs; episodes of loss of control eating *not* accompanied by consumption of an unambiguously large amount of food, but considered excessive by respondents). Youth who reported OBEs and/or SBEs were included in the LOC group in the current study.

The EDE was used to measure shape and weight overvaluation. For each participant, individual items assessing overvaluation of shape and overvaluation of weight over the past three months were averaged to form a composite "overvaluation of shape and weight" item; responses ranged from 0 (not at all) to 6 (markedly). Based on research convention (Fairburn & Cooper, 1993), an overvaluation of shape and weight score of four or greater (indicating

that shape and weight are one of the main aspects of self-evaluation) was used to denote clinically significant overvaluation.

Child Behavior Checklist—The Child Behavior Checklist (CBCL; Achenbach, 1991) is a parent-reported measure of child functioning across a range of behavioral domains (e.g., depression, anxiety, social problems). The total score is considered a measure of global behavioral problems. T-scores range from 0 to 100. The CBCL has good reliability and validity (Achenbach, 1991; Achenbach & Elderbrock, 1991). For the purposes of the present study, only the total problems score was examined.

Rosenberg Self-Esteem Scale—The Rosenberg Self-Esteem Scale (RSE; Rosenberg, 1965) is a child-reported measure of global self-esteem. Scores range from 0–30, with higher scores indicating higher self-esteem. The RSE has good reliability and validity in youth samples (Hagborg, 1993, 1996).

Statistical Analyses

Most analyses included four groups: LOC reporting moderate overvaluation (LOC-Mod); LOC reporting minimal or no overvaluation (LOC-Low); CON reporting moderate overvaluation (CON-Mod); and CON reporting minimal or no overvaluation (CON-Low). We attempted to stratify the analyses by age group (i.e., children versus adolescents), but the cell sizes for most analyses were too small to derive any meaningful interpretations. We also considered using a more stringent threshold overvaluation score of 5 (i.e., indicating that shape and weight are among the most important aspects of one's self-evaluation) for denoting clinical significance, and although the sample sizes were reduced for these analyses, the pattern of results was largely similar to results based on the threshold of 4. To maintain consistency with the existing literature, the results reported henceforth are based on an overvaluation threshold score of 4. Analyses were conducted using SPSS 18.0.

Preliminary descriptive analyses were conducted using ANOVA and chi-square tests. Due to inconsistencies among the data collection sites in terms of the measures administered, we conducted a total of three separate ANCOVAs to compare LOC-Mod, LOC-Low, CON-Mod, and CON-Low on each of the concurrent variables measuring current psychological functioning (i.e., EDE global severity score¹; CBCL total behavioral problems scores; and RSE total score). Post-hoc simple contrasts were used to examine pairwise differences in the dependent variables. Each ANCOVA controlled for group differences in age and race/ethnicity, both of which have been associated with body dissatisfaction in previous studies (Neumark-Sztainer et al., 2002; Striegel-Moore et al., 2000). Site was also included as a covariate. We considered controlling for sex as well, but since it did not significantly contribute to any of the ANCOVA models, it was ultimately not included as a covariate in these analyses. Chi-square analysis was used to compare LOC-Mod and LOC-Low with respect to their likelihood of reporting OBEs (with or without SBEs) versus SBEs only. ANCOVA, controlling for age, race/ethnicity, and site, was used to compare LOC-Mod and LOC-Low in terms of frequency of LOC eating episodes over the past 3 months. Lastly, a discriminant function analysis was performed to determine if clinically significant shape and weight overvaluation accurately predicted membership into the LOC vs. CON group.

¹In order to minimize concerns about the overlap between the independent (i.e., shape and weight overvaluation composite score) and dependent (i.e., EDE global severity score) variables in the ANOVA, an EDE global severity score was recalculated omitting overvaluation of shape and weight items. There was a very high correlation between EDE global severity scores derived by including and excluding the overvaluation items ($r=.97$; $p<.001$).

Results

Descriptive characteristics

Overall, LOC youth reported an average overvaluation score of 3.5 ± 0.1 (median=3.7) over the past 3 months, while CON youth reported an average overvaluation score of 2.7 ± 0.1 (median=2.5) over the past 3 months. Approximately half ($n=74$ out of 149; 49.7%) of LOC youth and 28.1% of CON youth ($n=106$ out of 377) endorsed levels of shape and weight overvaluation at or above the threshold value of 4. There were significant group differences in average levels of overvaluation over the past 3 months [$F(3,526)=374.81$; $p<.001$]. LOC-Mod participants reported an average overvaluation score of 5.0 ± 0.7 over the past 3 months, and CON-Mod participants reported an average overvaluation score of 4.9 ± 0.7 over the past 3 months; these values did not significantly differ ($p=.78$). Meanwhile, LOC-Low participants reported an average overvaluation score of 1.9 ± 1.1 over the past 3 months, and CON-Low participants reported an average overvaluation score of 1.8 ± 1.2 over the past 3 months, values which were also statistically equivalent ($p=.62$). Both LOC-Mod and CON-Mod reported significantly greater overvaluation than both LOC-Low and CON-Low ($ps<.001$).

There were significant group differences in age [$F(3,526)=3.01$; $p=.03$], with post-hoc Tukey's tests indicating that LOC-Mod participants were significantly older than CON-Mod and CON-Low participants ($ps<.05$). CON-Low participants were comprised of a significantly lower proportion of African-Americans and LOC-Mod were comprised of a significant higher proportion of African-Americans relative to CON-Mod and LOC-Low [$\chi^2(9, N=526)=32.82$; $p<.001$]. The four groups did not differ on z-BMI [$F(3,526)=1.97$; $p=.12$] or sex [$\chi^2(3, N=526)=4.29$; $p=.23$]. See Table 2 for a full description of demographic characteristics.

Current Psychological Functioning

The ANCOVA for ChEDE global severity score was significant [$F(3,526)=60.41$; $p<.001$]. Post-hoc simple contrasts indicated that LOC-Mod reported significantly greater eating disorder symptoms than CON-Mod, CON-Low, and LOC-Low ($ps<.001$), whereas CON-Low reported significantly *lower* eating disorder severity than both CON-Mod and LOC-Low ($ps<.001$). CON-Mod and LOC-Low did not significantly differ on eating disorder severity ($p=.37$). LOC-Mod and LOC-Low participants did not differ with respect to their likelihood of reporting OBEs, with or without SBEs, versus SBEs only [$\chi^2(1, N=149)=0.54$; $p=.46$], nor did they differ in terms of frequency of LOC eating episodes over the past 3 months [$F(3,149)=2.56$; $p=.11$]. There were significant group differences on CBCL total problem scores [$F(3,391)=3.76$; $p=.01$], with LOC-Mod and LOC-Low exhibiting significantly greater behavior problems relative to CON-Mod and CON-Low ($ps<.03$). LOC-Mod and LOC-Low did not significantly differ in terms of behavioral problems ($p=.74$), nor did CON-Mod and CON-Low ($p=.72$). Finally, the ANCOVA for RSE total score was significant [$F(3,117)=3.42$; $p=.02$]. Post-hoc simple contrasts indicated that LOC-Mod endorsed significantly lower self-esteem than CON-Low ($p=.004$), but did not differ from LOC-Low ($p=.25$) or CON-Mod ($p=.39$); there were no other significant group differences on RSE total score ($ps>.05$). See Table 2 for group means and test statistics.

Prediction of Diagnostic Status

Discriminant function analysis revealed that 65.6% of cases were correctly classified into their respective diagnostic group (LOC vs. CON) based on an overvaluation of shape and weight score of 4. Specifically, among participants reporting clinically significant levels of shape and weight overvaluation, 41.1% ($n=74$ out of 180) were correctly classified as LOC, versus 58.9% ($n=106$ out of 180) who were classified as CON. Among those with less than

moderate overvaluation of shape and weight, 78.3% ($n=271$ out of 346) were correctly classified as CON, versus 21.7% ($n=75$ out of 346) who were classified as LOC. The corresponding chi-square value was highly significant [$\chi^2(1, N=526)=22.03; p<.001$].

Discussion

The purpose of the current study was to examine the diagnostic significance of overvaluation of shape and weight among overweight children and adolescents with loss of control eating disturbances. Approximately half of participants with loss of control eating reported at least moderate levels of overvaluation (i.e., indicating that shape and weight are a main aspect of one's scheme for self-evaluation). These individuals were characterized by lower self-esteem than overweight controls with minimal or absent overvaluation, and greater behavioral problems than overweight controls regardless of overvaluation status, but did not differ from youth with loss of control eating reporting minimal or absent overvaluation across these domains. Thus, in contrast to findings in adults with BED (Goldschmidt, et al., 2010; Grilo, et al., 2009; Grilo, et al., 2008; Grilo, et al., 2010; Hrabosky, et al., 2007; Masheb & Grilo, 2008; Mond, et al., 2007), overvaluation of shape and weight does not seem to demarcate meaningful subtypes among youth with loss of control eating.

However, before overvaluation of shape and weight is abandoned as a meaningful construct in children, several considerations are warranted. It has previously been argued that certain cognitive features of eating disorders are inappropriate for children as endorsement of these features demands capacities for abstract reasoning that are not yet fully developed (Bravender et al., 2007). The concept of self-worth is in itself abstract, and arranging aspects of self-worth according to magnitude demands compound abstract reasoning. It may be that further qualitative exploratory work into the nature of overvaluation of shape and weight in children is needed. Moreover, despite the fact that overvaluation did not distinguish subtypes of youth with loss of control eating, interventions targeting this behavior may benefit from a focus on overvaluation and other shape- and weight-related constructs to prevent or minimize chronicity (Fairburn, et al., 1993; Fairburn, et al., 2003), especially as this construct is related to poorer treatment outcome in adults (Masheb & Grilo, 2008).

Interestingly, a substantial proportion of overweight controls reported relatively high levels of overvaluation. Indeed, their mean overvaluation score ($M=4.9\pm0.7$) was similar to that reported by LOC-Mod participants ($M=5.0\pm0.7$). This could explain the results of the discriminant function analysis, in which clinically significant overvaluation did only a modest job of classifying participants as LOC vs. CON. It may be indicated for health care providers to inquire about the importance of shape and weight among their overweight patients, given that this is often considered a core feature of eating disorders (Fairburn, 2008b) and hence may reflect increased risk for the development of pathological eating disturbances. Although existing pediatric weight control treatments often address shape and weight concerns (Follansbee-Junger, Janicke, & Sallinen, 2010), for youth exhibiting extreme concerns, a more overt or prolonged focus on the role of shape and weight in one's self-evaluative scheme may be necessary.

Although we could not examine the relation between overvaluation and treatment-seeking status given that the vast majority of participants were presenting for eating- or weight-disorders treatment ($n=476/526$), motivation for treatment should be further studied in relation to overvaluation of shape and weight among youth with loss of control eating. It is possible that eating-related distress is enough to impel youth with loss of control eating disturbances to seek treatment; however, modest levels of body dissatisfaction have been shown motivate youth to improve eating and physical activity behaviors (Heinberg,

Thompson, & Matzon, 2001). For youth with loss of control eating who report low levels of overvaluation, identifying other factors that could potentially facilitate engagement in treatment should be a priority.

The only measure on which loss of control participants differed by overvaluation status was global severity of eating-related symptoms. This finding may be due to assessment issues, in that participants were reporting on similar symptoms within a similar timeframe; thus, those reporting high levels of overvaluation may have been more likely to report high levels of other eating-related concerns. However, it is also possible that higher levels of shape and weight overvaluation are associated with a more severe profile of eating disorder symptomatology, as other research has suggested (Hilbert & Czaja, 2009). As such, overvaluation may signal a need for more rapid identification and treatment of loss of control eating; indeed, future research should investigate whether overvaluation moderates treatment response among youth with loss of control eating. Because of the cross-sectional nature of our data, it is impossible to deduce whether overvaluation precedes loss of control eating, or vice versa; however, some studies have found that appearance overvaluation is a risk factor for binge eating onset in adolescents (Stice, et al., 2002). Thus, prevention programs targeting youth at high risk for developing loss of control eating should address overvaluation of shape and weight, perhaps through helping youth identify other valued aspects of their identity. Furthermore, interventions addressing overvaluation among youth with loss of control eating may help improve both overt eating behavior and the more covert cognitive features with which it is associated (Jones, et al., 2008).

Our results stand in contrast to studies of adults, which have found that overvaluation of shape and weight is a useful diagnostic specifier in discriminating a more generally impaired subset of individuals with BED (Goldschmidt, et al., 2010; Grilo, et al., 2008). Given that loss of control eating tends to persist over time, and is associated with conversion to partial- or full-syndrome eating disorders (Tanofsky-Kraff et al., 2010), overvaluation of shape and weight may become more clinically meaningful as youth progress through development and eating-related concerns become a more salient aspect of one's identity. Indeed, longitudinal data suggest that persistent loss of control eating is related to worsening of eating-related attitudes (Tanofsky-Kraff, et al., 2010); research is needed to further disentangle directionality with respect to these two constructs in order to inform prevention and intervention efforts. Conversely, the divergence of our findings from the adult literature may be related to children and adolescents' different cognitive developmental level and understanding of the meaning of loss of control and/or overvaluation of shape and weight as compared to adults. Although we did not find gender differences, this may be especially pronounced in boys, who may not readily admit to experiencing eating- and weight-related concerns given that they are generally considered to belong in the female domain.

Limitations to the current study include the cross-sectional nature of the data, which precludes speculation about the timing of loss of control eating onset relative to the onset of shape and weight overvaluation. Our sample included only overweight youth, thus results are not generalizable to normal-weight individuals. It was not possible to stratify the sample by age group, limiting our ability to detect differences in the clinical significance of overvaluation of shape and weight during different developmental periods. Hence, future studies should seek to replicate our findings in children and adolescents separately. Some participants completed the adult EDE, and some the ChEDE, which could have led to small alterations in ratings of shape and weight overvaluation given the ChEDE's addition of a card-sort task to score participants on this construct; these small alterations may have in turn affected overvaluation group membership. However, only a small minority ($n=23$) of participants completed the adult EDE, and when our analyses were re-run excluding these participants from the dataset, the pattern of results was the same. Finally, our measurement

of psychological distress was limited to self-esteem and general behavioral problems; future studies should examine other psychological variables, such as depression and anxiety, in relation to overvaluation in loss of control eating. Strengths include the large sample, which included both treatment-seeking and non-treatment seeking individuals. Further, we included well-validated measures delivered to both parents and children. In particular, the use of a semi-structured interview to assess loss of control eating, overvaluation of shape and weight, and other eating-related attitudes enhances the validity of our findings.

In summary, overvaluation of shape and weight appears to be prevalent among overweight children and adolescents with and without loss of control eating problems. However, its diagnostic significance among those with loss of control is questionable, as the presence of clinically significant overvaluation did not seem to demarcate a more severely impaired subset within the loss of control sample. Research suggests that this construct is diagnostically meaningful in adults with full-syndrome BED; hence, future studies should determine its trajectory over time in youth with loss of control eating disturbances, as this group is at high risk for the development of a full-syndrome eating disorder. Further research should also examine whether addressing overvaluation of shape and weight improves psychosocial outcomes within the context of pediatric loss of control eating and/or obesity treatment.

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- We studied shape and weight overvaluation in youth with loss of control eating.
- Overvaluation did not demarcate subtypes of youth with loss of control eating.
- Future research should explore the nature and trajectory of overvaluation in youth.

Table 1

Full sample characteristics and comparisons between youth with loss of control eating and overweight controls on demographic variables ($M \pm SD$, unless otherwise indicated)

Variable	Full Sample (N=526) ^a	LOC (n=149)	CON (n=377)	Test Statistic for LOC vs. CON Comparison
Age, y	11.0 \pm 2.3	11.3 \pm 2.3	10.8 \pm 2.3	$t(524)=-2.12^*$
Female, % (n)	65.2 (343)	67.8 (101)	64.2 (242)	$\chi^2(1, N=526)=0.61$
z-BMI	2.22 \pm 0.37	2.24 \pm 0.38	2.21 \pm 0.37	$t(524)=0.90$
Race/ethnicity, % (n)				
Caucasian	56.3 (296)	45.0 (67)	60.7 (229)	
African-American	21.3 (112)	34.2 (51)	16.2 (61)	
Hispanic	11.4 (60)	8.7 (13)	12.5 (47)	$\chi^2(3, N=526)=22.58^{**}$
Other	11.0 (58)	12.1 (18)	10.6 (40)	

* $p < .05$

** $p < .001$

Note: LOC=loss of control; CON=overweight control; z-BMI=age- and sex-adjusted body mass index (kg/m²)

Table 2

Demographic characteristics and psychological functioning of loss of control participants reporting at least moderate shape and weight overvaluation, loss of control participants reporting less than moderate shape and weight overvaluation, overweight controls participants reporting at least moderate shape and weight overvaluation, and overweight controls reporting less than moderate shape and weight overvaluation ($M \pm SD$, unless otherwise indicated)

Variable	LOC-Mod (n=74)	LOC-Low (n=75)	CON-Mod (n=106)	CON-Low (n=271)	Test Statistic
<i>Demographics</i>					
Age, y	11.7±2.3 ^a	10.9±2.3 ^{ab}	10.7±2.3 ^b	10.9±2.3 ^b	$F(3,526)=3.01^*$
Female, % (n)	74.3 (55)	61.3 (46)	67.9 (72)	62.7 (170)	$\chi^2(3, N=526)=4.29$
z-BMI	2.30±0.37	2.19±0.38	2.25±0.36	2.19±0.38	$F(3,526)=1.97$
Race/ethnicity, % (n)					
Caucasian	43.2 (32)	46.7 (35)	57.5 (61)	62.0 (168)	
African-American	40.5 (30)	28.0 (21)	17.0 (18)	15.9 (43)	$\chi^2(9, N=526)=32.82^{***}$
Hispanic	9.5 (7)	8.0 (6)	10.4 (11)	13.3 (36)	
Other	6.8 (5)	17.3 (13)	15.1 (16)	8.9 (24)	
<i>Psychosocial functioning</i>					
EDE Global Severity Score	2.0±0.8 ^a	1.4±0.9 ^b	1.3±0.8 ^b	0.8±0.6 ^c	$F(3,526)=60.41^{**}$
CBCL Total Problems Score	57.8±9.5 ^a	57.0±11.6 ^a	53.7±9.9 ^b	53.3±9.8 ^b	$F(3,391)=3.76^*$
RSE Total Score	17.6±6.2 ^a	19.7±4.2 ^{ab}	19.4±6.1 ^{ab}	21.9±4.7 ^b	$F(3,117)=3.42^*$

Note: LOC-Mod=loss of control eating accompanied by at least moderate overvaluation of shape or weight; LOC-Low=loss of control eating accompanied by minimal or absent overvaluation of shape and weight; CON-Mod=overweight control reporting at least moderate overvaluation of shape or weight; CON-Low=overweight control reporting minimal or absent overvaluation of shape and weight; z-BMI=age- and sex-adjusted body mass index (m/kg²); EDE=Eating Disorder Examination (range=0 to 6; higher scores indicate more severe psychopathology); CBCL=Child Behavior Checklist (range=0 to 100; higher scores indicate greater behavioral problems); RSE=Rosenberg Self-Esteem Scale (range=0 to 30; higher scores indicate better self-esteem). Differing superscript letters indicate significant between-group differences.

* $p < .05$

** $p < .001$