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Psychosocial Correlates of Shape and Weight Concerns in Overweight Pre-Adolescents

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Abstract Shape and weight concerns among overweight pre-adolescents heighten risk for eating disorders and weight gain. Treatment and prevention efforts require consideration of psychosocial factors that co-occur with these concerns. This study involved 200 overweight pre-adolescents, aged 7–12 years (M age = 9.8; SD = 1.4), presenting for family-based weight control treatment. Hierarchical regression was

used to examine the influence of pre-adolescents' individual characteristics and social experiences, and their parents' psychological symptoms, on shape and weight concerns as assessed by the Child Eating Disorder Examination. Findings revealed that higher levels of dietary restraint, greater feelings of loneliness, elevated experiences with weight-related teasing, and higher levels of parents' eating disorder symptoms predicted higher shape and weight concerns among overweight pre-adolescents. Interventions addressing overweight pre-adolescents' disordered eating behaviors and social functioning, as well as their parents' disordered eating behaviors and attitudes, may be indicated for those endorsing shape and weight concerns.

Keywords Weight/shape concerns · Social relationships · Overweight · Pre-adolescents

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Introduction

Pre-adolescent and adolescent obesity is a serious and prevalent condition (Ogden et al. 2008) associated with a host of physical and psychological correlates that may impede weight control. In particular, a subset of overweight pre-adolescents and adolescents present with shape and weight concerns (Neumark-Sztainer et al. 2002), defined as excessive distorted attitudes regarding shape (e.g., 'If your shape [what you see in the mirror] had changed had changed over the past 4 weeks would this have made a difference to how you think/feel about yourself?') and weight (e.g., 'Over the past 4 weeks have you felt dissatisfied with your weight [the number on the scale]?'). These concerns exacerbate risk for eating disorder behaviors (Goldschmidt et al. 2008; Killen et al. 1996;

Taylor et al. 2003) such that overweight pre-adolescents and adolescents often report higher levels of unhealthy and extreme weight control behaviors and binge eating (Goldschmidt et al. 2008). Shape and weight concerns also increase risk for excessive weight gain, likely through associations with unhealthy eating patterns (e.g., binge eating, emotional eating, excessive dietary restraint) (Goldschmidt et al. 2008) and reduced participation in regular physical activity due to appearance-related discomfort (Deforche et al. 2006; Zabinski et al. 2003).

Studies identifying modifiable influences associated with shape and weight concerns in overweight pre-adolescents appear warranted. Such research may, through refinement of weight control treatments, reduce potential barriers to healthy weight control and risk for eating disorder symptoms and weight gain during adolescence. To this end, the current study sought to examine overweight pre-adolescents' (ages 7–12) psychological symptoms and social experiences and their parents' psychological symptoms as predictors of their shape and weight concerns.

Individual Predictors of Pre-Adolescents' Shape and Weight Concerns

As noted above, shape and weight concerns are associated with eating disorder behaviors, including dietary restraint and binge eating, in overweight youth (Goldschmidt et al. 2008). In addition, a recent review reveals that internalizing, externalizing, and disordered eating behaviors are the most frequently endorsed psychosocial deficits associated with childhood obesity (Puder and Munsch 2010). Elaborating on this, internalizing symptoms (e.g., anxiety, depression) have been associated with shape and/or weight concerns in older overweight adolescents (Doyle et al. 2007; Eddy et al. 2007). Similarly, externalizing symptoms, as reported by participants' parents, appear associated with eating disorder symptoms (e.g., binge eating) in overweight youth ages 6–13 (mean age 10.4; Tanofsky-Kraff et al. 2004). Adolescent-reported externalizing symptoms including delinquency and aggression have also been linked to shape and weight concerns (ter Bogt et al. 2006) and eating disorder symptoms (Aime et al. 2008). Careful attention to the concurrent presentation of shape and weight concerns and both internalizing and externalizing symptoms is required, and examining these associations prior to adolescence may be important for reducing adolescents' eating disorder symptoms. The current study addresses this by examining whether parental reports of internalizing and externalizing symptoms are associated specifically with shape and weight concerns in a sample comprised only of overweight pre-adolescents (ages 7–12).

Social Experiences as Predictors of Pre-Adolescents' Shape and Weight Concerns

A broad examination of influences on overweight pre-adolescents' shape and weight concerns requires consideration of their social experiences. In support of this, several studies highlight associations between teasing and loneliness and eating disorder symptoms among overweight youth (Hayden-Wade et al. 2005; Libbey et al. 2008; Puhl and Latner 2007). For example, Hayden-Wade et al. 2005 noted associations between weight-related teasing and weight concerns in youth ages 10–14 and, more specifically, between weight-related teasing and binge eating among overweight youth in their sample. Similarly, loneliness has been concurrently linked to weight concerns in the same 10–14 year old youth (Hayden-Wade et al. 2005) and also with disordered eating in college students (Wright and Pritchard 2009). Of concern, weight-related teasing experiences have predicted the onset of eating disorder symptoms in community-based adolescent samples (Haines et al. 2008) and samples involving only overweight pre-adolescents and adolescents (ages 8–18; Eddy et al. 2007). Thus, the current study's inclusion of overweight pre-adolescents' teasing experiences and feelings of loneliness as potential influences on their shape and weight concerns may have implications for the prevention of adolescent eating disorder symptoms.

Parents' Predictors of Pre-Adolescents' Shape and Weight Concerns

It is also imperative to elucidate if parents' psychological symptoms are associated with elevated shape and weight concerns in this younger group of overweight pre-adolescents, as parents' mental health broadly impacts a number of developmental outcomes in youth. Of relevance to the current study, older overweight adolescents' negative shape- and weight-related attitudes have been associated with greater eating disorder symptoms in their parents, particularly body dissatisfaction and unhealthy weight control behaviors (Cromley et al. 2010). In addition, parents' psychological symptoms, including eating disorder symptoms and general well-being, predict broader indicators of psychological functioning in overweight pre-adolescents (Decaluwé et al. 2006; Goldschmidt et al. 2010). A next step is to expand on these separate, but related, findings by examining the influence of parents' general and eating disorder-specific psychological functioning on shape and weight concerns in overweight pre-adolescents.

Current Study

In sum, the current study's inclusion of pre-adolescents' psychological symptoms and social experiences (e.g., teasing, loneliness) and parents' psychological symptoms (e.g., general, eating disorder related) is intended to clarify which of these psychosocial factors are associated with shape and weight concerns in pre-adolescent overweight youth. Although previous work has linked several of these concepts to eating disorder symptoms in other samples, no one study has focused specifically on examining this range of constructs in the prediction shape and weight concerns in pre-adolescents who are overweight. Studying this specific population is critical as shape and weight concerns among pre-adolescents who are overweight may predict future eating disorder symptoms and/or weight gain during adolescence.

The current analyses focused on examining individual, social, and parents' factors as predictors of shape and weight concerns as endorsed by pre-adolescents classified as overweight in order to have a general prediction of shape and weight concerns in this population. In line with the reviewed literature, it was hypothesized that pre-adolescents' psychological symptoms (e.g., internalizing symptoms, externalizing symptoms, dietary restraint, eating concerns), pre-adolescents' negative experiences within the social domain (e.g., greater loneliness and more exposure to teasing), and parents' general psychological and specific eating disorder symptoms would significantly predict shape and weight concerns.

Method

Participants

Participants were 204 overweight pre-adolescents aged 7–12 years, who had at least one overweight parent (body mass index [BMI] ≥ 25 kg/m²), involved in a randomized, controlled trial investigating weight maintenance treatment following an initial 20-week family-based behavioral weight loss treatment. A detailed description of recruitment and exclusion criteria has been provided elsewhere (Wilfley et al. 2007); of relevance for the present study, seven families were excluded before entering the study due to severe child or parent psychiatric disturbances (e.g., full syndrome eating disorder). All data in the current study were obtained at baseline; demographic characteristics are described in Table 1. Four of the 204 pre-adolescents did not have a measure of shape and weight concerns at baseline and were excluded from analyses, resulting in a final study sample of 200 participants.

Pre-adolescents and parents provided written informed assent and consent, respectively. The study was approved

Table 1 Sample characteristics

Pre-adolescent Age [years], mean (SD)	9.8 (1.3)
Parent Age [years], mean (SD)	41.8 (6.3)
Hollingshead Socioeconomic Status Score, mean (SD)	46.5 (11.4)
Pre-adolescents' Sex, % Female (n)	64.0% (129)
Parents' Sex, % Female (n)	84.0% (167)
Pre-adolescents' Race/Ethnicity, % (n)	
White Non-Hispanic	66.0% (132)
Black	10.5% (21)
Hispanic	20.5% (41)
Other	3.0% (6)
Pre-adolescent z-BMI, mean (SD)	2.2 (0.3)
Parent BMI [kg/m ²], mean (SD)	35.2 (6.3)

Hollingshead Socioeconomic Status Score range 20–66

by Institutional Review Boards at San Diego State University and Southern California Kaiser Permanente, a referral source for recruitment.

Procedures

Data were obtained in a clinical laboratory setting using clinical interviews and self-report measures as described below. Trained research assistants assisted the pre-adolescents as needed and as appropriate with understanding and completing their self-report measures. The same assistants were also available to address parents' questions about their measures.

Measures

Family Demographics

Demographic characteristics of pre-adolescents (i.e., age, sex) and parents (i.e., age, sex, marital status, employment status, highest level of education completed) were reported by parents, and relevant variables were used to compute the Hollingshead Socioeconomic Status (SES) index (Hollingshead 1975). As detailed in the Hollingshead manual, a weighted status score is calculated that comprises parents' educational attainment and parents' occupational status, and also uses marital status to determine which occupations go into the status. Parents reported their child's race/ethnicity, which was categorized for the current study as White/Non-Hispanic, White/Hispanic, African-American, or Other.

Pre-Adolescents' and Parents' Weight Status

Pre-adolescents' and parents' weight and height were measured by trained research assistants using a calibrated

balance beam scale and a stadiometer, respectively. BMI z-scores (z-BMI) for the pre-adolescent participants were determined based on age- and sex-adjusted normative data (Kuczmarski et al. 2000). Parents' body mass index (BMI) was calculated as kg/m^2 .

Pre-Adolescents' Shape and Weight Concern and Eating Disorder Symptoms

The Child Eating Disorder Examination (ChEDE) was administered to pre-adolescents as a measure of eating-related behaviors and attitudes (Bryant-Waugh et al. 1996). The ChEDE is a child version of the gold standard Eating Disorder Examination (Fairburn and Cooper 1993) and is a semi-structured investigator-based interview. The current study used subscales related to dietary restraint (e.g., "Over the past 4 weeks have you tried to stick to certain definite rules about your eating?"), shape concern (e.g., "If your shape [what you see in the" mirror] had changed had changed over the past 4 weeks would this have made a different to how you think/feel about yourself?"), and weight concern (e.g., "Over the past 4 weeks have you felt dissatisfied with your weight [the number on the scale]?"). For the outcome construct, shape and weight concerns, a composite score derived by averaging the shape concern and weight concern subscale scores. The ChEDE has good reliability and validity in pre-adolescents (Bryant-Waugh et al. 1996; Watkins et al. 2005). Cronbach's alpha for both the dietary restraint and composite shape and weight concerns score was 0.85.

Pre-Adolescents' Psychological Symptoms and Social Functioning

The Child Behavior Checklist (CBCL; Achenbach 1991) is a parent-report measure of pre-adolescent's psychological and social problems that has demonstrated good reliability and validity (Achenbach 1991). The internalizing (e.g., anxiety, depression symptoms) and externalizing (e.g., aggression and delinquent behavior) subscales were used in this study. The Perception of Teasing Scale (POTS) is a self-reported measure of experiences with both weight- and competency-related teasing which has acceptable internal consistency and reliability (Thompson et al. 1995). The weight-related teasing subscale was used in the current study; Cronbach's alpha for this subscale in this study was 0.95. The Loneliness and Social Dissatisfaction Scale (LSDS) is a self-report measure used to assess loneliness and associated feelings of social inadequacy (Asher et al. 1984). The LSDS has demonstrated good internal consistency (Asher et al. 1984; Asher and Wheeler 1985). Cronbach's alpha for the current study was 0.84.

Parents' Psychological Symptoms

The Brief Symptom Inventory (BSI; Derogatis 1991) is a self-report measure of adult psychological symptoms; the global severity index was used to assess general parent psychological symptoms. The BSI has good internal consistency and is highly correlated with the Symptom-Checklist-90-R across measured domains of psychological symptoms (Derogatis 1991). Cronbach's alpha for the current study was 0.92. The Eating Disorder Examination-Questionnaire (EDE-Q) is a questionnaire version of the adult "gold standard" Eating Disorder Examination that generates measures of dietary restraint and weight, shape, and eating concern as well as a global eating disorder symptom score, the latter of which was used in this study (Fairburn and Beglin 1994). The EDE-Q has adequate reliability and validity (Fairburn and Beglin 1994; Luce and Crowther 1999). Cronbach's alpha for the global eating disorder subscale in the current study was 0.86.

Statistical Analyses

Prior to conducting analyses, a log transformation was on the weight-related teasing POTS subscales, which was positively skewed. Correlations were conducted to examine associations among all psychosocial variables and *t* tests were used to examine associations between pre-adolescents' sex and race, and their shape and weight concerns. Hierarchical regression was used for the prediction of the shape and weight concern score. Step 1 controlled for pre-adolescents' age and z-BMI given previous research indicating that these constructs may influence shape and weight concerns in pre-adolescent and adolescent populations (Goldschmidt et al. 2008). Step 2 included pre-adolescents' internalizing and externalizing symptoms, restraint, loneliness and weight-related teasing, and Step 3 included parents' general and eating disorder symptoms. Parents' eating disorder symptoms and general psychological symptoms were entered last in order to determine if they significantly contributed to pre-adolescents' shape and weight concerns beyond pre-adolescents' own psychological symptoms and social experiences.

Results

Table 1 summarizes participant demographics. Pre-adolescent males and females did not significantly differ on shape and weight concerns ($t(198) = -1.08, p = .28$). Non-Hispanic Caucasian pre-adolescents did not significantly differ from other race/ethnicity groups on shape and weight concerns ($t(198) = -0.93, p = .35$). Shape and weight concerns were not significantly associated with

Hollingshead SES scores, pre-adolescents' zBMI or age, or parents' BMI (r 's -0.04 – 0.10 , p 's $> .18$).

Correlations among Study Variables

Correlation analyses revealed weak to modest associations between pre-adolescents' shape and weight concerns (r 's 0.14 – 0.36) and the selected predictor variables and weak to modest correlations among the predictor variables (r 's 0.05 – 0.56).

Predictors of Shape and Weight Concerns in Pre-Adolescents Who are Overweight

The full regression model, which included pre-adolescents' z-BMI, age, psychological symptoms, and social functioning, and parents' psychological symptoms, accounted for 31% of the variance in pre-adolescents' shape and weight concerns. Pre-adolescents' psychological symptoms and social functioning (Step 2) accounted for an additional 26.7% of the variance in shape and weight concerns above z-BMI and age entered in Step 1 ($p = .001$). Parents' psychological symptoms (Step 3) accounted for an additional 2.7% of the variance in shape and weight concerns above pre-adolescents' psychological symptoms and social functioning ($p = .04$). See Table 2 for complete regression results.

Discussion

The current study sought to identify psychosocial influences associated with shape and weight concerns in pre-adolescent overweight youth. Both shape and weight

concerns and being overweight have been associated with a range of adverse developmental outcomes, including psychosocial distress and poor emotional well-being (e.g., Goldschmidt et al. 2008; Lawler and Nixon 2011; Mond et al. 2011; Storch et al. 2007; Vaughan and Halpern 2010). Adolescents who are overweight also experience deficits in peer and romantic relationships (Rancourt and Prinstein 2010), academic achievement (Falkner et al. 2001; Krukowski et al. 2009) and physical-health related quality of life (Beebe et al. 2007; Fallon et al. 2005; Swallen et al. 2005). The co-occurrence of shape and weight concerns and overweight would likely exacerbate these psychosocial and health-related outcomes. Indeed, associations among adolescent overweight and emotional well-being appear to have enduring effects into emerging or early adulthood (Loth et al. 2011).

Identifying modifiable factors associated with shape and weight concerns among overweight pre-adolescents may inform intervention efforts designed to help reduce current or future developmental deficits. This study was intended to address this need. Findings highlight the potential importance of addressing pre-adolescents' social functioning, particularly their experiences with weight-related teasing, and both pre-adolescents' and parents' disordered eating symptoms in prevention and treatment programs for overweight pre-adolescents endorsing shape and weight concerns.

The significant associations between shape and weight concerns and weight-related teasing add to literature linking weight-related teasing and risk for eating disorders among overweight youth (Doyle et al. 2007; Eddy et al. 2007; Haines et al. 2006; Hayden-Wade et al. 2005). Of note, findings also suggest that pre-adolescents' feelings of loneliness are also associated with their shape and weight

Table 2 Hierarchical regression results for pre-adolescents' shape and weight concerns

Construct	B	SE B	β	p	R ²	ΔR^2	$p \Delta R^2$
<i>Step 1</i>					0.02	0.02	.17
Pre-adolescents' Age	0.08	0.06	0.11	.15			
Pre-adolescents' z-BMI	0.37	0.24	0.12	.13			
<i>Step 2</i>					0.29	0.27	.001
ChEDE Restraint	0.36	0.09	0.27	.001			
CBCL Internalizing Symptoms	0.00	0.01	0.00	.90			
CBCL Externalizing Symptoms	0.01	0.01	0.09	.27			
POTS Weight-Related Teasing	0.83	0.17	0.34	.001			
LSDS Loneliness	0.29	0.13	0.16	.03			
<i>Step 3</i>					0.31	0.02	.04
EDE-Q Global Eating Disorder Symptoms	0.16	0.08	0.14	.04			
BSI Global Psychological Symptoms	0.01	0.01	0.08	.23			

ChEDE Children's Eating Disorder Examination, CBCL Child Behavior Checklist, POTS Perception of Teasing Scale, LSDS Loneliness and Social Dissatisfaction Scale, EDE-Q Eating Disorder Examination-Questionnaire, BSI Brief Symptom Inventory

concerns, in line with previous studies in which loneliness was heightened among overweight youth ages 10–14 (Hayden-Wade et al. 2005) and associated with disordered eating in college students (Wright and Pritchard 2009). These findings are of concern as stigmatization interferes with treatment for individuals who are overweight and may exacerbate adverse health outcomes for these individuals (Puhl and Heuer 2010). Specifically, recent studies suggest that the co-occurrence of weight criticism and body dissatisfaction lowers engagement in vigorous physical activity, at least among overweight girls (Jensen and Steele 2009), and that weight-related teasing predicts disordered eating behaviors (e.g., binge eating and unhealthy weight control behaviors) among overweight adolescents (Haines et al. 2006; Neumark-Sztainer et al. 2002). Stressful social experiences may also serve as one pathway to developing disordered eating and overweight/excessive weight gain in youth (Goldschmidt et al. 2008). Treatment and prevention programs for pre-adolescents who are overweight should carefully address the range of social deficits that they may encounter and the multiple contexts in which teasing or social isolation may occur in order to remove barriers to healthy weight control behaviors.

In addition, parents' eating disorder symptoms emerged as a significant predictor of shape and weight concerns. This finding extends Cromley et al.'s (2010) work in which parents' unhealthy weight control behaviors were associated with body dissatisfaction in overweight adolescents, indicating that similar patterns may be present in younger overweight samples. Pre-adolescents are likely aware of and may imitate or internalize their parents' eating attitudes and behaviors, which could promote their elevated shape and weight concerns. The current study also adds to literature demonstrating that parents' psychological symptoms appear relevant to understanding characteristics in pre-adolescents that interfere with successful weight control, such as social problems (Goldschmidt et al. 2010). Parents' psychological health may then be an important factor in understanding successful weight loss treatment outcomes in overweight pre-adolescents.

Additional constructs hypothesized to predict shape and weight concerns were not significant. For example, pre-adolescents' relative body weight (z -BMI) was not a significant predictor, perhaps because of the restricted range. This finding is in line with Doyle et al. (2007) who did not find that disordered eating risk status was associated with older overweight adolescents' weight status. Further, although dietary restraint was a significant predictor, which was expected given consistent associations between shape and weight concerns and elevated dietary restraint (Goldschmidt et al. 2008), broader psychological symptoms (e.g., internalizing and externalizing symptoms) did not emerge as significant predictors. The lack of findings

regarding broader indicators of psychological deficits differs from previous studies involving overweight youth and risk for eating disorders (Doyle et al. 2007; Eddy et al. 2007) in which elevated internalizing and externalizing symptoms were associated with concurrent disordered eating attitudes and behaviors. Higher participant age or age range may explain these differences. Participants in Doyle et al.'s, Eddy et al.'s, and Tanofsky-Kraff et al.'s studies were older (mean = 14.0, 11.5, and 10.5 years, respectively) than the youth in the current study (mean = 9.8 years). Different sources of data for these constructs should also be considered—in the current study, parents reported on youth's internalizing and externalizing symptoms, whereas pre-adolescents self-reported teasing experiences. In sum, there appears limited indication that body mass, among already overweight children and adolescents, influences shape and weight concerns. The influence of broader psychological symptoms, though, requires further examination and consideration of potential developmental differences that may underlie associations, or lack thereof, between internalizing and externalizing symptoms and shape and weight concerns in overweight youth.

Several study limitations related to the sample and the nature of the data and related data-collection methods should be noted when interpreting these findings. For example, this study was limited by the use of cross-sectional data, which preclude conclusions about the directionality of findings. Data were from a sample of weight loss treatment-seeking families, reducing the generalizability of findings to all overweight pre-adolescents. In addition, data from self-report measures may have introduced bias, particularly when parents report on the target pre-adolescents because, as noted, they may inaccurately report (i.e., over- or under-report) their pre-adolescents' psychological symptoms.

In conclusion, findings highlight specific, concurrent differences regarding social functioning and dietary restraint in pre-adolescents' and their parents' eating disorder symptoms associated with shape and weight concerns among pre-adolescents who are overweight. Future studies examining the longitudinal progression and directionality of the associations between social functioning and risk for disordered eating among overweight pre-adolescents are warranted to inform prevention and treatment efforts. Of note, findings regarding weight-related teasing, loneliness, and parents' eating disorder symptoms have important clinical implications given emerging evidence that social relationships may influence weight control behaviors in pre-adolescents who are overweight (Frankel et al. 2007; Tanofsky-Kraff et al. 2007; Wilfley et al. 2007) and that parents' psychological functioning may influence healthy weight control behaviors in youth (Zeller et al. 2007). In

addition, the associations among pre-adolescent shape and weight concerns and dietary restraint behaviors require early clinical attention as these behaviors have been linked to weight gain during adolescence (Field et al. 2003; Goldschmidt et al. 2008; Haines et al. 2007; Neumark-Sztainer et al. 2005; Neumark-Sztainer et al. 2007), which is, as noted, associated with a host of long-term psychosocial deficits (Loth et al. 2011). In sum, developmental deficits associated with weight and shape concerns in pre-adolescents who are overweight may be reduced if treatment and prevention efforts include a focus on the pre-adolescents' eating disorder symptoms and social experiences and their parents' eating disorder attitudes and behaviors.

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