

# The Stress Process and Eating Pathology Among Racially Diverse Adolescents Seeking Treatment for Obesity

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**Objective** This study examined the associations of weight-related teasing and daily hassles with eating pathology, as well as potential mediators of these relations, among a racially diverse sample of adolescents.

**Methods** Participants were 92 primarily African American 11–17-year-olds seeking treatment for obesity.

Data were collected at baseline. **Results** Both daily hassles and weight-related teasing were significantly correlated with eating pathology at  $r = .22$  and  $r = .25$ , respectively. Feeling upset about teasing mediated the associations of daily hassles ( $PE = .0093$ ,  $SE = .0054$ , 95% BCa bootstrap CI of .0001–.0217) and teasing ( $PE = .0476$ ,  $SE = .0198$ , 95% BCa bootstrap CI of .0093–.0873) with eating pathology.

**Conclusions** These results highlight the importance of psychological interventions in the treatment of weight-loss among adolescents, as stressors may impact eating behaviors.

**Key words** African American adolescents; daily stressors; eating pathology; obesity; teasing.

Recent years have seen a proliferation of treatments to address the epidemic of weight gain among young people. It is also essential to study unhealthy eating behaviors among obese adolescents, as dieting and unhealthy weight control behaviors lead to maintenance of overweight in this age group (Haines, Neumark-Sztainer, Wall, & Story, 2007b; Neumark-Sztainer et al., 2007). Stress may also influence eating behaviors and weight gain, such as through its association with dietary habits that support obesity (Cartwright et al., 2003; Jenkins, Rew, & Sternglanz, 2005). Stressors may also affect life-long health. The experience of negative life events during childhood (e.g., family violence) has been linked to obesity in adulthood, an association that is partially accounted for by the use of food in response to stress (Greenfield & Marks, 2009). The process of social stress consists of the sources of stress, the mediators of stress, and the manifestations of

stress (Pearlin, 1999; Pearlin, Menaghan, Lieberman, and Mullan, 1981). The disability-stress-coping model proposes that certain risk factors (i.e., disease characteristics, functional independence, and stress) predict psychosocial functioning in children with illnesses, but that these associations are influenced by intrapersonal and environmental variables and stress processing variables (i.e., cognitive appraisal and coping; Wallander & Varni, 1992, 1995). An application of stress-and-coping models to disordered eating suggests that individuals who lack effective coping or problem-solving may turn to disordered eating behaviors, such as emotional eating or bingeing, as a means to cope (Greenfield & Marks, 2009; Shatford & Evans, 1986).

The current study applies the process of stress to eating-related pathology among obese adolescents. We focus on sources of stress identified in research, including environmental stressors (e.g., Barker, Williams, &

Galambos, 2006) and psychological status variables such as low self-esteem (e.g., Womble et al., 2001) and depressive symptoms (e.g., Eddy et al., 2007). Pearlin et al. (1981) identified lowered self-esteem as a secondary source of stress impacted by life events, such as job loss, and viewed depressive symptoms as one manifestation of these stressors. In a later study, Shatford and Evans (1986) discovered that depressive symptoms functioned similarly to low self-esteem as a source of stress contributing to bulimic behavior. In the current study, self-esteem and depressive symptoms are conceptualized as possible mediating variables in the relationship between stressors and eating pathology among obese adolescents. The outcome variable is a global measure of eating pathology comprised of weight concern, shape concern, eating concern, and restraint.

Two types of environmental stressors were considered in the current investigation: Daily hassles and weight teasing. Daily hassles are associated with increased snacking, particularly in those who engage in emotional eating (O'Connor, Jones, Conner, McMillan, & Ferguson, 2008), and women who binge eat consume more calories on high stress days (Crowther, Sanftner, Bonifazi, & Shepherd, 2001). Teasing and rejection are pervasive among obese children and adolescents (van den Berg, Neumark-Sztainer, Eisenberg, & Haines, 2008), and teasing among obese adolescents is associated with behaviors that contribute to overweight (Hayden-Wade et al., 2005; Storch et al., 2007). In this study, we were interested in how daily hassles and teasing might be associated with eating pathology among obese adolescents. Previous research has shown that negative affect mediates the relations between teasing and eating pathology in treatment-seeking overweight youth (Eddy et al., 2007), young adults (Womble et al., 2001), and female adolescents (Hutchinson, Rapee, & Taylor, 2010; Suisman, Slane, Burt, & Klump, 2008; van den Berg, Wertheim, Thompson, & Paxton, 2002). Fewer studies have focused on daily hassles' relation with eating pathology among adolescents, although some have studied stress more generally. Celio Doyle, le Grange, Goldschmidt, and Wilfley (2007) found that overweight adolescents at risk for eating disorders reported more stress than those at low-risk. Stress and negative affect were associated with same-day binge eating among undergraduates (Barker et al., 2006), and low self-esteem mediated the relations of stress and emotion-focused coping with disturbed eating attitudes in female adolescents (Fryer, Waller, & Kroese, 1997).

At this time, the literature is bereft of research that applies models of the psychological and behavioral

manifestations of stress (Pearlin, 1999; Pearlin et al., 1981; Wallander & Varni, 1992, 1995) to children who suffer from obesity. The current study fills this gap by investigating how stressors such as daily hassles and weight-teasing may be related to unhealthy eating. It also adds to our knowledge via its inclusion of a form of stress that is highly relevant to obese adolescents, weight-teasing, as well as that which may be commonly experienced by adolescents of all sizes, daily hassles. In addition to lower self-esteem and depressive symptoms, this study also included a measure of emotional upset specific to weight-teasing. Although obese adolescents are likely to show higher levels of depressive symptoms and decreased self-esteem in the face of environmental stress, it is possible that the experience of being teased may cause specific emotional distress (Quinlan, Hoy, & Costanzo, 2009). Additionally, the current study adds to the literature by investigating these relations in a primarily African American sample of adolescents. Weight-teasing has been shown to be equally problematic (Stern et al., 2007; van den Berg et al., 2008) and to have similar relations with emotional health across ethnic groups (Eisenberg, Neumark-Sztainer, & Story, 2003). However, there is evidence that White females experience more weight-related distress, which is associated with greater depressive symptoms (Young-Hyman et al., 2006), and White adolescents appear to experience greater eating pathology than their Black counterparts (Bisaga et al., 2005; Elliott, Tanofsky-Kraff, & Mirza, 2013). To our knowledge, ethnic differences have not been examined in models that seek to explain eating pathology.

## Method

### Participants

Participants in this study were 92 adolescents enrolled in the T.E.E.N.S. (Teaching, Encouragement, Exercise, Nutrition, Support) weight management program. Data for this study were taken at baseline. Participants were eligible for the program if aged 11–18, were  $\geq 95$ th BMI percentile for their age and gender, had at least one adult in the household committed to the program, and had a primary care physician. Because this study was part of a clinical trial, exclusion criteria were established. Families that lived  $>30$  miles from the study location were not enrolled because analyses from previous iterations of data collection indicated that those who lived furthest from the study were more likely to drop out. In previous samples, such participants were least likely to complete the protocol. Participants who did not have the ability to understand program instructions because of a mental disability or perform exercises because of a physical disability were

excluded, as were children with a disease that make exercise unsafe. The mean BMI z-score for this sample is 2.50 ( $SD = .25$ ; range = 1.82–3.12). Seventy-eight percent of the sample was  $\geq 99$ th BMI percentile. Sixty-two of the participants were female (67.4%) and 30 were male (32.6%). The racial/ethnic distribution was 72 African American (78%), 16 White (17%), 2 Latino (2%), 1 participant identified as “Other” (1%), and 1 who did not report their race (1%). Age ranged from 11 years, 0 months to 17 years, 8 months ( $M = 13$  years, 11 months,  $SD = 22.05$  months). Parental education ranged from less than high school to a graduate degree, with a mode of some college ( $n = 39$ , 42.4%). The range for family income was  $< \$10,000$  to  $> \$50,000$  per year. The median family income reported by parents was  $\$30$ – $\$40,000$  per year, and one-third reported being enrolled in Medicaid.

## Measures

### Personal and Family Information

Child and parent race/ethnicity, parents’ educational level, and total family income and the child’s age and sex were recorded during an initial visit.

### Perceptions of Teasing Scale

Teasing was measured using the Perceptions of Teasing Scale (POTS; Thompson, Cattarin, Fowler, & Fisher, 1995). The POTS is a revised version of the Physical Appearance Related Teasing Scale. It has 11 items and consists of two factors: Weight-related teasing and teasing about abilities/competencies. For this study, only the weight-related teasing subscales were used. Adolescents were asked to respond to two questions for each item, resulting in a “frequency” of weight teasing rating and a degree of “upset” rating for each factor. In the current study, the alpha for weight was .94.

### Daily Hassles Microsystem Scale

Daily hassles were assessed using the Daily Hassles Microsystem Scale (DHMS; Seidman et al., 1995). The DHMS contains 28 items assessing daily hassles in five areas: School, family, neighborhood, peers, and lack of resources. Examples of items from the DHMS include “living in a noisy neighborhood” and “getting caught in arguments between family members.” For this study, participants circled “1” if the event had not occurred in the past month. If the event had occurred, they indicated how much of a hassle it was on a scale from 2 (“Not at all a hassle”) to 5 (“A very big hassle”). The DHMS was designed to be useful for samples with high percentages of poor, urban, and ethnically diverse adolescents. In the current study, the alpha was .85.

### Coopersmith Self-Esteem Inventory

The Coopersmith Self-Esteem Inventory was used to measure self-esteem (SEI; Coopersmith, 1981). This inventory includes 25 declarative self-descriptive items, and respondents are instructed to state whether each item is “like me” or “unlike me.” The alpha for the current study was .79.

### Children’s Depressive symptoms Inventory

Depressive symptoms were assessed using the Children’s Depressive symptoms Inventory (CDI; Kovacs, 1992). The CDI contains 27 items assessing the number and severity of depressive symptoms. High scores on the CDI indicate higher levels of depressive symptoms. The alpha for the current study was .89.

### Children’s Eating Disorder Examination Questionnaire (ChEDE-Q)

The EDE-Q has been found to be a good alternative to a clinical interview (the EDE) for screening purposes (Fairburn & Beglin, 1994). Further, the EDE-Q has been modified for use with adolescent populations. The two modifications of the ChEDE-Q were a shorter time frame (14 vs. 28 days) and the replacement of some words and phrases with simpler language (Carter, Stewart, & Fairburn, 2001). The ChEDE-Q global score was used in this study as a continuous measure of disordered eating and related symptomatology. The alpha for the global score in the current study was .88.

## Procedure

This study was approved by the Virginia Commonwealth University Institutional Review Board. Participants were typically identified through Virginia Commonwealth University Health Systems clinic and local physician referrals or from schools. To enroll, parents contacted the project coordinator, who sent an information packet with informed consent forms and baseline questionnaire measures. The project coordinator contacted participants after they had time to review the information and of these, 41% enrolled in the study. The most typical reasons for not enrolling were inability of the project coordinator to re-contact the family, the family not calling back after reviewing the packet, or not keeping the initial consent appointment. When parents gave a reason for not participating, it was most often that they were unable to commit to participating in physical activity three times per week, as required by the study. For those who did enroll, participation began with an initial consent appointment to which families brought the completed questionnaire packets. The coordinator reviewed the consent forms with the parent and child, and parents’ consent was obtained. Children

were encouraged to discuss their participation with their parents prior to signing an assent form. After the consent and assent forms were signed, the project coordinator collected the questionnaire packets. Participants were also scheduled for their behavioral intake with psychology graduate student clinicians, usually within 1–3 weeks after the consent meeting. During the intake, the ChEDE-Q was read to the participants while they completed it. This procedure, and therefore the delay in its administration, was chosen to ensure that participants read the information describing a binge and to allow them to ask any questions for clarification of terms used in the questionnaire, while allowing them the privacy of writing their answers instead of responding aloud. Other data not used in this study were also collected during the intake. The parent was present for the intake, and if any information was revealed suggesting that the child was experiencing psychological difficulties, referrals for therapy were provided.

### **Analysis**

Multiple mediation models have been recommended for analysis when researchers hypothesize that multiple variables may account for the relationship between single independent (IV) and dependent variables. There are several advantages to using a multiple mediation model over numerous simple mediation models (Preacher & Hayes, 2008). In each of the two multiple mediation models, depressive symptoms, self-esteem, and upset about weight teasing served as potential mediators for the relationship between an environmental variable (daily hassles and weight teasing) and eating pathology. Bootstrap techniques using bias-corrected and accelerated (BCa) confidence intervals (CI) were used to provide estimated effects and their significance.

## **Results**

### **Descriptive Statistics and Bivariate Correlations**

Table I displays the means, standard deviations, and intercorrelations for each variable. There were no significant ethnic or gender differences on any of the measures. BMI, age, and family income were not correlated with any study variables. The Global ChEDE-Q score for this sample is comparable with that which has been reported in other samples of obese, treatment-seeking adolescents (Braet, 2006; Goldschmidt, Celio Doyle, & Wilfley, 2007). All study variables (daily hassles, teasing, upset about teasing, depressive symptoms, and self-esteem) were significantly correlated with eating pathology, as measured by the Global ChEDE-Q score.

### **Mediation Analyses**

Daily hassles and weight-related teasing were positively associated with eating pathology at  $r = .22$  and  $r = .25$ , respectively ( $p < .05$ ). To investigate what might account for these associations, analyses were conducted in two multiple mediation models with nonparametric bootstrapping (re-sampling procedure; Preacher & Hayes, 2008).

#### **Daily Hassles**

We first evaluated whether depressive symptoms, self-esteem, and teasing upset (psychological status variables) mediate the association between daily hassles and eating pathology. Results from a multiple mediator model indicated that all three psychological variables together do mediate the relationship between daily hassles and eating pathology ( $Z = 2.56$ ,  $p = .011$ ). As seen in Table II, bootstrapping techniques supported these results, as the difference between total and direct effects is the total indirect effect through the three mediators. These indicate that greater daily hassles leads to greater depressive symptoms, lower self-esteem, and feeling more upset about weight teasing, which then leads to greater eating pathology. An examination of the specific indirect effects indicates that only teasing upset is a significant individual mediator between daily hassles and eating pathology. However, a contrast between all three mediators indicated no significant differences between the specific indirect effects of teasing upset, depressive symptoms, and self-esteem.

#### **Weight Teasing**

Second, we evaluated whether depressive symptoms, self-esteem, and teasing upset mediate the association between weight teasing and eating pathology. Results from a multiple mediator model indicated that all three psychological variables together do mediate the relationship between weight teasing and eating pathology ( $Z = 3.35$ ,  $p = .001$ ). As seen in Table III, bootstrapping techniques supported these results, as the difference between total and direct effects is the total indirect effect through the three mediators. This indicates that greater weight teasing leads to greater depressive symptoms, lower self-esteem, and feeling more upset about weight teasing, which then leads to greater eating pathology. An examination of the specific indirect effects indicates that only teasing upset is a significant individual mediator between weight teasing and eating pathology. A contrast between all three mediators indicated a significant difference between the specific indirect effect of teasing upset and self-esteem.

Table I. Means, Standard Deviations, and Intercorrelations

Measure	M (SD)	Range	1.	2.	3.	4.	5.	6.
1. Daily hassles	46.55 (11.44)	30–72	–	.46***	.41***	.60***	–.42***	.22*
2. Weight-teasing	14.17 (6.84)	6–30		–	.79***	.40***	–.33**	.25*
3. Upset teasing	13.39 (7.54)	6–30			–	.43***	–.40**	.40***
4. Depressive symptoms	10.64 (8.11)	0–36				–	–.73***	.31**
5. Self-esteem	60.09 (19.24)	12–100					–	–.28**
6. Eating pathology	1.96 (1.01)	0.37–5.15						–

Note. \**p* < .05, \*\**p* < .01, \*\*\**p* < .001.

Table II. Mediation of the Effect of Daily Hassles on Eating Pathology Through Adolescent’s Self-Esteem, Depressive symptoms, and Feeling Upset about Weight Teasing

	Point Estimate	Product of Coefficients		Bootstrapping BCa 95% CI	
		SE	Z	Lower	Upper
SEI	.0036	.0057	.6230	–.0062	.0149
CDI	.0064	.0090	.7140	–.0135	.0269
Upset	.0093	.0047	1.9612	.0001	.0217
Total	.0193	.0075	2.5588	.0009	.0416
SEI vs. CDI	–.0028	.0134	–.2110	–.0287	.0240
SEI vs. Upset	–.0058	.0077	–.7437	–.0226	.0101
CDI vs. Upset	–.0029	.0107	–.2742	–.0262	.0187

Note. BCa = bias corrected and accelerated, 5,000 bootstrap samples; SEI = Coopersmith Self-Esteem Inventory; CDI = Children’s Depressive symptoms Inventory; Upset = Perceptions of Teasing Scale.

Table III. Mediation of the Effect of Weight Teasing on Disordered Eating Through Adolescent’s Self-Esteem, Depressive symptoms, and Feeling Upset about Weight Teasing

	Point Estimate	Product of Coefficients		Bootstrapping BCa 95% CI	
		SE	Z	Lower	Upper
SEI	.0031	.0072	.4277	–.0102	.0180
CDI	.0095	.0100	.9501	–.0084	.0412
Upset	.0476	.0184	2.5802	.0093	.0873
Total	.0602	.0185	3.3499	.0254	.0992
SEI vs. CDI	–.0065	.0158	–.4083	–.0468	.0208
SEI vs. Upset	–.0445	.0205	–2.1676	–.0835	–.0010
CDI vs. Upset	–.0380	.0216	–1.7580	–.0905	.0145

Note. BCa = bias corrected and accelerated, 5,000 bootstrap samples; SEI = Coopersmith Self-Esteem Inventory; CDI = Children’s Depressive symptoms Inventory; Upset = Perceptions of Teasing Scale.

### Discussion

The purpose of this study was to increase our understanding of stress processes that may be associated with eating pathology among obese adolescents. Environmental stressors were selected as IVs, as well as psychological

variables that have been identified as key in the development and maintenance of obesity and eating pathology (e.g., Eddy et al., 2007; Womble et al., 2001). When mediation models were tested, teasing upset, self-esteem, and depressive symptoms as a set explained how the IVs (teasing and daily hassles) influenced eating pathology. However, in both models, only teasing upset had a significant indirect effect when the other mediators were included. That is, neither depressive symptoms nor self-esteem contributes to the associations of daily hassles and teasing with eating pathology beyond that of teasing upset. Pairwise comparisons of the magnitude of the indirect effects were made. In the model with daily hassles as an IV, no significant differences among the specific indirect effects of teasing upset, depressive symptoms, and self-esteem were observed. However, the specific indirect effect of teasing upset was significantly greater than that of self-esteem on the association between weight teasing and eating pathology. Although we cannot presume causality, interpretation of the results in the context of theory suggests that daily hassles and the frequency of weight teasing each influence the distress that one feels about being teased, which then influences disordered eating symptoms. It appears that these forms of stress increase youth’s susceptibility to experiencing distress when they are teased. They may then tend to develop disordered eating as a result of this distress.

These results add to that which has been contributed by past research on teasing and daily hassles. Several studies have reported that negative affect mediates the relation between teasing and eating pathology (Eddy et al., 2007; Hutchinson et al., 2010; Suisman et al., 2008; Womble et al., 2001). Less research has been performed on daily hassles in the context of obesity and eating pathology. This study is the first, to our knowledge, that investigates these two forms of stress and includes the emotional reaction to weight teasing in addition to more typical measures of negative affect, such as depressive symptoms and low self-esteem. The finding that depressive symptoms and low

self-esteem do not mediate the association between stress and eating pathology differs from our expectations based on a review of the literature. For example, in a study of female undergraduates, Shatford and Evans (1986) found that self-esteem and mastery were associated with environmental stress and depressive symptoms, which were indirectly associated with bulimia through the mediating effect of coping. More recent research has also shown that negative affect, a construct which is conceptually similar to depressive symptoms and low self-esteem, mediates the relation between teasing and eating pathology (Eddy et al., 2007; Hutchinson et al., 2010; Suisman et al., 2008; van den Berg et al., 2002; Womble et al., 2001). Based on the few studies that exist on the association between daily hassles and eating pathology, it appears that negative affect and low self-esteem may act as mediators (Barker et al., 2006; Fryer et al., 1997). Unfortunately, past research does not tend to report descriptive statistics of the instruments used to measure these variables, making it difficult to compare our findings. It may also be that negative affect acts as a moderator in the presence of stress. For example, Kubiak, Vogeles, Siering, Schiel, and Weber (2008) found among obese treatment-seeking girls that experiencing a daily hassle was associated with a desire to eat and that this link was enhanced in the presence of negative affect and rumination. Future research should evaluate the moderating versus mediating roles of variables such as trait negative affect, depressive and anxiety symptoms, and low self-esteem.

Results of this study have implications for the prevention and treatment of pediatric obesity. First, it provides further evidence for the importance of assessing eating pathology among adolescents who present for obesity treatment. The relatively large proportion of African American participants in this study is an asset because this population is generally understudied in eating disorder research. It is important to note that eating pathology in this sample was comparable with previous research. These behaviors may have implications for participants' success in losing weight (Braet, 2006; Wildes et al., 2010). Dieting and unhealthy weight control practices also contribute to extreme weight control, binge eating, and overweight longitudinally (Neumark-Sztainer, Wall, Story, & Sherwood, 2009). Suggestions that address concerns common to both disordered eating and obesity include regular meal intake, monitoring hunger and satiety cues, and encouragement of enjoyable physical activity (Neumark-Sztainer, 2005).

Second, this study highlights the salience of forms of stress that are commonly encountered. Weight teasing and daily hassles were associated with all forms of psychological distress, including eating pathology. These findings are

particularly relevant for treatment-seeking samples, as research has shown that children with the highest BMIs who are also teased are less involved in treatment activities and with their peers (Quinlan et al., 2009). Although this study did not assess coping directly, unhealthy behaviors are believed to be attempts to cope with stress, at least in some circumstances. Emotion-focused and avoidance coping has been shown to mediate the association between environmental stressors and bulimia among adult women (Shatford & Evans, 1986). Therefore, it is suggested that among adolescents who report the frequent experience of life stress from hassles, using cognitive-behavioral techniques to encourage active coping and adaptive appraisal of life events may reduce or prevent disordered eating. The same techniques are likely to be useful in helping teens cope with or problem solve teasing experiences. Additional recommendations to reduce teasing or prevent its effect on eating-related pathology include implementing practice guidelines that prohibit teasing in schools and increasing peer empathy for the experience of teasing through role-plays and stories about teasing (Haines, Neumark-Sztainer, & Thiel, 2007a). Specific interventions at the individual or group level are to improve body image, teach skills to intervene in weight-teasing situations, increase media literacy, and encourage healthy eating and physical activity (Haines, Neumark-Sztainer, Perry, Hannan, & Levine, 2006).

This study does have limitations. Most significantly, the cross-sectional design does not permit causal interpretations of the data, and spurious correlations may have been identified owing to shared variance among the variables because they were measured at the same point in time. Therefore, the conclusions from this study need to be confirmed using a longitudinal design. These results also have some limits to external validity. They are not generalizable to obese adolescents in general, but only to the subset who seek weight loss treatment. This sample of treatment-seeking adolescents was additionally limited to those who lived within a 30-mile radius of the study and were able to commit to participating in physical activity 3 days per week. Therefore, these adolescents may have experienced fewer barriers to participating, which further limits the generalizability of these findings. Many parents who did not enroll their children cited the time commitment as rationale for not participating, thus resulting in a participation rate of only 41% of those who were referred or initially expressed interest. Additionally, parents initiated the enrollment process. While this may be seen as a limitation, the family component of this intervention was essential; thus, parental initiation ensured that the adolescent had this support. Finally, this study does not have a

control group of nontreatment-seeking or nonobese adolescents. The inclusion of such control groups would have provided even more useful information about the relations of stressful experiences with disordered eating. Future research in this area should include investigation of whether the associations identified persist over time and with treatment for obesity. Inclusion of measures of coping would also be useful to explore whether a particular style of coping is more associated with eating pathology in the context of stress.

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