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# Binge Eating in Ethnically Diverse Obese Adolescents

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Binge Eating in Ethnically Diverse Obese Adolescents

A dissertation submitted in partial fulfillment of the requirements for the degree of  
Doctor of Philosophy at Virginia Commonwealth University.

by

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Abstract

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Major Director: Suzanne E. Mazzeo, Ph.D.  
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Rates of pediatric obesity in America are reaching epidemic proportions. Studies using both community and treatment-seeking samples of obese adolescents indicate that a subset engage in binge eating behaviors. This study investigated the prevalence and severity of binge eating behaviors among 86 primarily African American 11 to 17 year old adolescents seeking outpatient treatment for obesity. This study also examined the associations of stressful experiences (specifically, weight-related teasing, trauma, and daily hassles) with binge eating, as well as potential mediators and moderators of these relationships. Twenty-eight percent of the sample reported at least one episode of binge eating in the past two weeks and there were no ethnic or gender differences in rates of binge eating, nor in any other measures of eating related pathology. None of the forms of



stress were associated with binge eating. However, weight-related teasing and trauma were associated with overall eating pathology. Therefore, the global measure of eating pathology was used as the dependent variable in the subsequent analysis.

Although it was hypothesized that depressive symptoms would mediate the relationship between stressful experiences and disordered eating, this was not the case. Instead, the upset feelings about being teased mediated the relationship between depressive symptoms and disordered eating. It was also hypothesized that self-esteem and ethnic identity would moderate the relationships between stress and disordered eating. Self-esteem was not a significant moderator, but ethnic identity was among the European American participants only. Interpretation of the moderating role of ethnic identity revealed that European American participants with stronger ethnic identity were more likely to report disordered eating when they had also experienced teasing, trauma, and daily hassles. This result is interpreted using sociocultural theories which posit that the European American culture places individuals at more risk for disordered eating because of the emphasis placed on a thin body image ideal. Therefore, when European American obese adolescents identify highly with their ethnicity, they may be at more risk for developing disordered eating when they have also experienced other risk factors such as stressful life experiences. Future research should attempt to replicate these findings using a longitudinal approach.

## Introduction

Pediatric obesity is considered by many health professionals to be an epidemic. Rates of overweight or obesity in children and adolescents have more than doubled in the past 30 years (Dietz, 2004). Moreover, obesity is recognized as a contributor to physical health problems in childhood, including asthma, hypertension, musculoskeletal problems, and Type II diabetes (Bar-Or et al., 1998). Decreasing pediatric obesity rates is one of the objectives of Healthy People 2010, yet fighting the environmental influences on childhood obesity is an uphill battle. Physical activity is being replaced with sedentary entertainment, while marketing and availability of fast foods have increased dramatically (French, Story, & Jeffery, 2001).

Medical and psychological treatment for obesity can be successful in reducing weight and other physical symptoms. The most successful obesity interventions are those that target children and adolescents (Jeffery et al., 2000). This is likely because children and adolescents' eating and activity habits are less ingrained than adults'. Research has also suggested that early intervention for obesity is important (McTigue, Garrett, & Popkin, 2002). Without intervention, children who are overweight or obese will likely continue to be overweight in adulthood and accumulate the negative physical and psychological symptoms associated with obesity throughout their development (Bar-Or et al., 1998; Zimetkin, Zoon, Klein, & Munson, 2004). Research suggests that 25% of obese 6-year-olds and 75% of obese 12-year-olds become obese adults (Klish, 1998).

Moreover, obesity during adolescence is a risk factor for mortality in adult men and for cardiovascular disease and diabetes among both men and women (Dietz, 2004). Obesity may also be a health risk for psychological illnesses. Although obese and non-obese adolescents in the community differ little in their rates of psychiatric diagnoses, one study found that 70% of adolescents presenting for inpatient obesity treatment had lifetime psychiatric disorders and 34% had three or more disorders, including mood disorders, anxiety disorders, somatoform disorders, and eating disorders (Britz et al., 2000). Pediatric obesity intervention involves encouraging healthy eating and activity habits. However, it is also necessary to examine psychosocial variables that influence the adoption and maintenance of these health behaviors.

In addition, although gender and ethnic differences in anorexia and bulimia are well-documented, research needs to be extended to examine whether such differences occur in rates of binge eating, particularly among adolescents and those seeking obesity treatment. With rates of obesity increasing, it is necessary to investigate potential negative consequences of obesity and their precursors. The current study investigated the relationship between environmental and personal risk factors and binge eating in a diverse sample of obese adolescents in an outpatient weight loss program.

The aims of this research were:

1. To investigate the prevalence and severity of binge eating behaviors among obese adolescents.
2. To investigate potential ethnic and gender differences in rates of binge eating among obese adolescents.

3. To examine the relationship between stressful experiences and binge eating.
4. To investigate potential mediators and moderators of the relationship between stress and binge eating, including self-esteem, depressive symptoms and ethnic identity.

Findings from this study should be useful in contributing to the design of a targeted, culturally relevant obesity intervention. The potential benefits are significant, as obesity is a lifetime chronic disorder exposing individuals to many other potentially fatal diseases. Data obtained through this study could increase understanding of the barriers and risks involved in adolescent obesity and weight loss.

#### *Scope of the Pediatric Obesity Problem*

Data from the most recent National Health and Nutrition Examination Survey (NHANES) indicate that about 16% of children and adolescents are  $\geq$  the 95<sup>th</sup> percentile for body mass index (BMI; Hedley et al., 2004), the Center for Disease Control's criteria for overweight in individuals under the age of 18. At the 85<sup>th</sup> percentile, 30% of children and adolescents are considered "overweight" or "at risk for being overweight." Dietz (2004) suggests three critical periods for the development of overweight: the prenatal period, adiposity rebound, and adolescence. Although research during each of these three periods is important, the current study is focused on correlates and consequences of obesity among adolescents.

Obesity is a growing health problem among children and adolescents. The prevalence of obesity doubled among 6 to 11-year-olds and tripled among 12 to 17-year-olds between 1979 and 1999, while the cost of hospitalization for obesity related

problems tripled among 6 to 17-year-olds (Dietz, 2004). Furthermore, obese children are at increased risk for physical problems (Bar-Or et al., 1998). Overall, obesity accounts for approximately 9% of health care costs in the U.S. (Mokdad et al., 2000). A study by Olshansky and colleagues (2005) suggests that the increase in health conditions associated with obesity could cause life expectancy to level off or even decrease within the first half of the 21<sup>st</sup> century, in contrast to the increase predicted by the Social Security Administration. These authors further suggest that young people could have less healthy and possibly shorter lives than their parents, and that these effects may be strongest among ethnic minority populations that have higher rates of obesity and less access to health care.

Multiple factors have influenced the rise in adolescent obesity over the past 20 years. Consumption of fast food is increasing, possibly in part because as more women enter the workforce, there is less time available to devote to food preparation at home (French et al., 2001). One fast food meal is equivalent to the recommended daily intake of calories for adults (Skidmore & Yarnell, 2004) and in most fast food 45-55% of the caloric content is fat (Zametkin et al., 2004). Americans continue to eat fewer fruits and vegetables than the recommended five servings per day, and consumption of pizza and soft drinks has increased dramatically in the last 20 years (French et al.). It has been estimated that the consumption of one soft drink per day can lead to a weight gain of 50kg over 10 years (Skidmore & Yarnell, 2004). Research with females suggests that physical activity declines throughout adolescence, until by age 18 or 19 regular physical activity is limited to that done in school. Furthermore, heavier girls had a greater decline

and physical activity than less heavy girls (Kimm et al., 2002). In addition, sedentary behaviors, such as TV-watching and computer use, have increased over the last 40 years, and the number of hours spent watching TV is directly related to degree of obesity (Skidmore & Yarnell, 2004). Possible explanations for this relationship include decreased energy expenditure, eating in front of the television (Bar-Or et al., 1998) and the scheduling of food advertisements for times when children are most likely to be watching TV (Skidmore & Yarnell, 2004). In a study of adult nurses, it was estimated that 30% of new cases of obesity and 43% of new cases of diabetes could be prevented by the adoption of a physically active lifestyle ( $< 10$  hours per week of TV viewing and  $\geq 30$  minutes per day of brisk walking; Skidmore & Yarnell, 2004).

Unlike other epidemics, obesity is not a contagion that can be contained by medical treatment alone. Rather, obesity is caused by a complex interplay of genetic, cultural, social, and behavioral factors (Bar-Or et al., 1998; Zimetkin et al., 2004). Obesity has a great deal in common with other disorders commonly treated by psychologists in that its effects can be changed by manipulating environmental and psychological variables that interact with genes. In fact, obesity is associated with certain psychological risk factors and consequences (Friedman & Brownell, 1995; Strauss, 2000). In order to prevent and treat obesity, a fuller understanding of these psychological factors must be gained.

Research indicates that obese children and adults with psychological comorbidities are more likely to present for weight loss treatment in a clinical setting (Friedman & Brownell, 1995; Zimetkin et al., 2004). One study found that while rates of

eating disorders did not differ between obese and non-obese adolescents in community samples, they were significantly higher in a group of obese adolescents seeking treatment (Britz et al., 2000). Past research findings emphasize the importance of examining binge eating symptoms among treatment-seeking obese persons. However, the association between obesity and comorbid psychological symptomatology has not been adequately studied in adolescents from diverse ethnic groups.

### *Binge Eating and Pediatric Obesity*

In the DSM-IV, binge eating is defined as an episode of food consumption that is larger than what most people would eat in a similar amount of time and in similar circumstances, combined with a feeling of not being in control over eating during the episode (APA, 2000). In the eating disorder literature, this definition is usually referred to as objective binge eating. In contrast, subjective binge eating is an eating episode that involves a sense of losing control *without* eating an objectively large amount of food. Past research has demonstrated that as many as 35-45% of obese adults seeking weight loss treatment have concurrent binge eating disorder (BED; Geliebter, Hassid, & Hashim, 2001; Grave, Olios, Todisco, & Vanderlinden, 1997). The prevalence among adolescents is smaller with studies suggesting that between 1-6% of those seeking treatment for obesity have comorbid BED (Britz et al., 2000; Decaluwé & Braet, 2003; Decaluwé & Braet, 2005; Glasofer et al., 2007; Goossens, Braet, & Decaluwé, 2007). Two studies of non-treatment seeking overweight adolescents reported no diagnoses of BED (Tanofsky-Kraff et al., 2004; Tanofsky-Kraff, Faden, Yanovski, Wilfley, & Yanovski, 2005) while one study found that 5% had BED (Morgan et al., 2002).

However, many people have symptoms of BED that do not meet full diagnostic criteria (Friedman & Brownell, 1995). Given that subclinical binge eating is associated with depression, anxiety, low self-esteem and body dissatisfaction, it is important to research the full range of binge eating symptoms in addition to diagnosable BED cases (Isnard et al., 2003). It has also been suggested that research focus on specific eating behaviors, rather than diagnosable eating disorders, to develop a more accurate understanding of disordered eating among adolescents (Muise, Stein, & Arbess, 2003). In contrast to research on BED diagnoses, rates of binge eating episodes among treatment-seeking obese adolescents vary greatly across studies (Britz et al., 2000; Berkowitz, Stunkard, & Stallings, 1993; Decaluwé & Braet, 2003; Decaluwé & Braet, 2005; Decaluwé, Braet, & Fairburn, 2003; Glasofer et al., 2007; Goossens et al., 2007; Levine, Ringham, Kalarchian, Wisniewski, & Marcus, 2006; Nederkoorn, Braet, Van Eijs, Tanghe, & Jansen, 2006). Braet (2006) found that adolescents presenting for inpatient obesity treatment reported an average of 10 binges per month. Some research also gives estimates of overeating and subjective binge eating episodes. For example, Decaluwé and Braet (2003) reported that 12% of their sample engaged in overeating episodes within the last month. In a study by Goossens et al. (2007), 8% of adolescents reported subjective binge eating episodes over the last three months. Finally, Glasofer and colleagues (2007) found that 15% of their sample had a history of remote and infrequent subjective binge eating episodes.

Binge eating is also common among overweight adolescents in community samples. Fourteen percent of overweight (BMI > 85<sup>th</sup> percentile) children reported having



overeating episodes, 18% reported having objective binge eating episodes, and 15% reported having subjective binge eating episodes (Morgan et al., 2002). In another sample, overweight children reported more disordered eating behaviors and attitudes, including subjective and objective binges, than their normal weight peers (Tanofsky-Kraff et al., 2004). In a follow-up study, 30% of overweight adolescents reported experiences of loss of control while eating and this subsample had higher scores on other measures of disordered eating behaviors and attitudes as well as lower self-esteem (Tanofsky-Kraff et al., 2005). In contrast, one population-based study found no relationship between BMI and binge eating frequency (Shisslak et al., 2006).

It is important for providers to have knowledge of eating disorder behaviors, as they may affect the course of weight loss efforts (Zametkin et al., 2004). For example, there is evidence to suggest that children may develop binge eating behaviors as a way to deal with anxiety and stress (Binford, Mussell, Peterson, Crow, Mitchell, 2004). Thus, children who binge eat may be a subset of obese children whose needs are very different from those who do not binge eat. Information from the current study can be used to plan interventions for those children who engage in binge eating, which may ultimately decrease adult obesity (Yanovski, 2003).

#### *Ethnic Differences in Binge Eating Behaviors*

There has been an increase in pediatric obesity across all ethnic groups, and for both boys and girls. However, among females, African-Americans are at greater risk for obesity (Hedley et al., 2004). In the early 1990s, 16% of African American females ages 6 to 17 were obese, in comparison to 7% of European American adolescents (Baskin et

al., 2001). McTigue et al. (2002) found that obesity onset occurred 2.1 times faster (i.e., the number of years from age 17 until becoming obese) for African American women in comparison to European American women. Throughout the 1990s, African American women had the greatest rate of weight gain compared to African-American men and European Americans (Lewis et al., 2000). Data from the most recent NHANES suggest that 23% of African American females ages 6 to 19 are obese, in comparison to 13% of European Americans (Hedley et al., 2004). Furthermore, although physical activity declines among all females during adolescence, the rate of decline is twice as high in African Americans as in European Americans (Kimm et al., 2002).

In addition, the presumption among researchers and clinicians has generally been that African-American women are somehow protected against developing eating disorders (Nasser, 1988; Root, 1990). However, studies conducted in the community indicate that BED appears to affect European American and African-American adult women at similar rates (Fitzgibbon et al., 1998; Smith, Marcus, Lewis, Fitzgibbon, & Schreiner, 1998). Crago and Shisslak (2003) reviewed 28 studies of binge eating behaviors among females (including both children and adults) and reported that most found no ethnic differences in binge eating, although 25% found binge eating to occur more often in European Americans and 11% found higher rates of binge eating in African Americans.

Several studies have found that African-American children and adolescents also exhibit binge eating at rates comparable to European Americans (Croll, Neumark-Sztainer, Story, & Ireland, 2002; Shisslak et al., 2006; White & Grilo, 2005). However,

Johnson, Rohan, & Kirk (2002) found that African American boys reported more binge eating than did European American girls, European American boys, and African American girls. Additionally, Story, French, Resnick, and Blum (1995) reported that African American female adolescents were less likely to have binged or to have had a sense of being out of control while eating than European American females, but these differences were not evident among males. French et al. (1997) also found higher rates of binge eating among European American adolescents than among African Americans, but that correlates of binge eating (i.e., weight dissatisfaction, perceived overweight, low body pride, lower family connectedness, greater peer acceptance concerns, and emotional stress) were the same across ethnic groups. Among overweight children, Morgan et al. (2002) found that African-American children reported more experiences of loss of control while eating than did European American children. In contrast, Tanofsky-Kraff et al. (2005) found that rates of loss of control while eating did not differ between overweight African American and European American children.

#### *Gender Differences in Binge Eating Behaviors*

During adolescence, females are at greater risk for developing obesity than males due to their relative increase in fat mass. Some research suggests that binge eating is up to two times more prevalent in adolescent females compared to males (Ackard, Neumark-Sztainer, Hannan, French, Story, 2001; Croll et al., 2002), although one study found no gender differences in binge eating (Johnson, Kirk, & Reed, 2001) and another found the highest rate of binge eating in African American boys (Johnson et al., 2002). Likewise, some research has not identified gender differences in binge eating among obese

treatment-seeking adolescents (Decaluwe et al., 2003; Isnard et al., 2003), whereas another study found that among children who binge eat, girls reported more objective binge episodes than boys (Decaluwe & Braet, 2003). Loss of control episodes did not vary between male and female samples of non-treatment seeking overweight children (Tanofsky-Kraff et al., 2005) and treatment-seeking obese children (Goossens et al., 2007). Young-Hyman, Schlundt, Herman-Wenderoth, and Bozylinski (2003) found that 5 to 10 year old African American girls had lower appearance self-esteem than their male counterparts. However, this difference was not evident in global self-worth. Although eating disorders and binge eating are more common among females, this pattern is less clear in samples of adults with BED or obesity. There is also lack of consistency in the findings on ethnic differences in binge eating. More research in this area is needed to inform the development of specific, targeted interventions.

### *Stress and Binge Eating*

Individuals with obesity who binge eat or exhibit other psychological comorbidities likely have very different needs than the general treatment population. Research has found that individuals with a personal or family history of obesity and adverse life experiences are at particular risk for binge eating (Marcus & Kalarchian, 2003). One hypothesis, highlighting the functional aspects of binge eating, suggests that binge eating is a maladaptive emotion-focused coping mechanism (Laitinen, Ek, & Sovio, 2002). For example, eating to cope with stress has been found to be more common among heavier adults (Laitinen et al., 2002) and emotional overeating is associated with depression, disinhibition, and binge eating frequency among overweight adults with BED

(Masheb & Grilo, 2006). In a self-report inventory of emotional factors related to weight gain, adult bariatric surgery candidates indicated that eating when stressed was the largest contributor to weight-gain, followed by eating when bored and eating when depressed (Walfish, 2004). However, binge eating is also associated with a next-day increase in negative affect, suggesting that it is not an adaptive coping method (Barker, Williams, & Galambos, 2006).

In a non-clinical sample of adult females, Harrington, Crowther, Henrickson and Mickelson (2006) investigated the relationships among ethnicity, trauma, stress, and binge eating. These researchers found that both traumatic experiences and daily stressors were associated with greater binge eating among European Americans. Among African Americans, stress was significantly associated with binge eating, whereas trauma was a marginally significant correlate. European Americans engaged in greater amounts of binge eating behavior and the relationship between stress and binge eating severity was stronger for European Americans than African Americans. The authors suggest that binge eating may be stress-reactive among European Americans, whereas it may represent a more generalized pattern of overeating among African Americans. For example, although the use of eating as a coping mechanism was related to binge eating among both African Americans and European Americans, it partially mediated the relationship between stress and binge eating for European Americans only.

*Trauma.* Like other eating disorder behaviors, binge eating in children and adolescents has been associated with a history of physical and sexual abuse (Ackard et al., 2001; Wonderlich et al., 2001), although French et al. (1997) found that sexual abuse

was positively associated with binge eating in European American adolescent females, but negatively associated with binge eating in African Americans. Understanding the role of trauma in the development of eating disorder behaviors will aid in the treatment of obesity. Grilo, Masheb, and colleagues have performed a series of studies which indicate that outpatient adults with BED (Grilo & Masheb, 2001; Grilo & Masheb, 2002) and bariatric surgery candidates (Grilo, Masheb, Brody, Toth, Burke-Martindale, & Rothschild, 2005) have experienced two to three times more childhood trauma than community samples of adult women. However, in a sample of adult outpatients with BED, childhood trauma was not significantly associated with weight, shape, or eating concern (as measured by the EDE-Q), nor was it associated with obesity status, BMI, current binge eating, or age of onset for overweight, regular binge eating, or BED. Only one form of trauma (physical neglect) was associated with dietary restraint in women, but not in men. Emotional abuse and neglect were associated with age at onset of first diet. Emotional abuse was associated with body dissatisfaction, depression, and lower self-esteem for both men and women. Sexual abuse was associated with body dissatisfaction in men, but not women (Grilo & Masheb, 2001). Grilo and colleagues (2005) found that emotional neglect occurred more frequently among adult bariatric surgery candidates with BED than those without BED. Emotional abuse and emotional neglect were significantly associated with eating concern, depression, and lower self-esteem. Severity of childhood trauma was not associated with BMI or binge eating. Based on these findings, Grilo, Masheb, and colleagues concluded that childhood trauma seems to be a risk factor for general psychological distress (e.g., body dissatisfaction, depression, and

low self-esteem), but not for variability or severity in obesity, binge eating, or other eating disorder features (Grilo & Masheb, 2001; Grilo et al., 2005).

Previous research has suggested that obese adults with trauma histories may be more resistant to weight loss efforts. For example, in a study of women seeking weight loss treatment, those with a history of childhood sexual abuse lost less weight and had a higher percentage of nonadherence than a control group. Participants with a history of sexual abuse also reported less self-efficacy regarding eating behaviors and more depressive symptoms (King, Clark, & Pera, 1996). Such findings suggest that what may be effective for those without a trauma history may be less effective for those with trauma histories. Awareness of these issues and how they interact with other environmental variables is vital in providing adequate treatment for obese adolescents.

Moreover, while experiences of childhood abuse can have profoundly negative effects on physical and mental health, it is also important to study other experiences of stress. Research on the relationship between chronic stress and binge eating among obese adolescents is sparse. More research has been conducted with adults. Experiences of chronic stress are more prevalent among women with BED than those without psychiatric disorders (Johnson, Spitzer, & Williams, 2001). Furthermore, women with BED are three times more likely to have co-morbid major depression and they seek healthcare treatment significantly more often than those without BED (Johnson et al.). Johnson and colleagues also found that differences in rates of treatment seeking became nonsignificant after controlling for depression, suggesting that depressive disorders may increase healthcare usage among women with BED.

*Daily hassles.* In one study, which included several measures of psychological distress (i.e., alexithymia, trait-anxiety, state-anxiety, depression, and perceived stress), perceived stress was the only significant predictor of BED group membership among obese women (Pinaquy, Chabrol, Simon, Louvet, & Barbe, 2003). Other research has found that adult women who binge reported both laboratory tasks and daily hassles to be more stressful than those who do not binge eat (Crowther, Sanftner, Bonifazi, & Shephard, 2001; Hansel & Wittrock, 1997; Wolff, Crosby, Roberts, & Wittrock, 2000). Furthermore, women who binge consumed more calories on high-stress than low-stress days (Crowther et al.) and engaged in more catastrophizing in high stress situations (Hansel & Wittrock). Similarly, stress and depressed affect have been found to predict same-day binge eating among college women (Barker et al., 2006; Freeman & Gil, 2004).

Fewer studies have investigated the role of stress in eating behaviors among children or adolescents. In one study of 13 to 15-year-old females, the investigators used path analysis to demonstrate that stressful life experiences were significantly associated with both low self-esteem and disturbed eating attitudes. Additionally, low self-esteem mediated the relationships of stress and emotion-focused coping with disturbed eating attitudes (Fryer, Waller, & Kroese, 1997). Likewise, French et al. (1997) found that emotional stress was associated with binge eating in European American and African American adolescent females. Although they did not assess binge eating, a more recent study by Jenkins, Rew, & Sternglanz (2005) found that perceived stress was associated with eating foods high in salt and sugar as well as eating or drinking in response to feeling stressed, nervous, or worried in a sample of 8 to 13 year olds. Clearly, more



research is needed to determine if associations exist between daily stressors and binge eating in adolescents. Adolescents who binge eat may benefit from interventions that promote healthy coping behaviors in response to stress.

*Teasing.* Teasing is another stressor commonly faced by obese adolescents. Ninety-six percent of a sample of European American and African-American obese female adolescents reported experiencing hurtful comments, differential treatment, or rejection because of their weight (Neumark-Sztainer, Story, & Faibisch, 1998). Intentional hurtful comments (such as weight-related teasing and name-calling) were the most common and experienced by three-fourths of the sample. Another study found that obese children were more likely to experience appearance related, weight related and abilities/competencies teasing than their non-obese counterparts (Hayden-Wade et al., 2005). Appearance related teasing was also reported to be more upsetting, occurred more frequently, and was experienced for a greater number of years among the obese children.

A series of studies by Neumark-Sztainer and colleagues provides insight into the prevalence of weight-related teasing and its association with well-being and eating behaviors. In a population-based sample that included both average weight and obese boys and girls, girls reported experiencing more weight-teasing by both peers and family members and also reported being more bothered by the teasing. However, both obese boys and girls were significantly more likely to report weight-teasing by peers and family members and were more likely to report being bothered by the teasing than their average weight peers. In the subsample of overweight children, there were no ethnic differences for girls, whereas weight-teasing by family members was reported most often by Asian

and Native American boys and least often by European American boys. Overweight adolescents who experienced weight-teasing were more likely to engage in unhealthy weight control behaviors and binge eating than those who were not teased (Neumark-Sztainer, Falkner, Story, Perry, Hannan, & Mulert, 2002). In a later report on data from the same sample, weight-teasing was associated with body dissatisfaction, depression, low self-esteem, and suicidal ideation. Among girls, teasing was also associated with having made a suicide attempt. After controlling for teasing, being overweight was associated only with body dissatisfaction (for both genders) and depression (for girls only). There were no ethnic or weight-status differences in these relationships (Eisenberg, Neumark-Sztainer, & Story, 2003).

Five-year follow-up data were gathered from this sample to study the effects of teasing on eating behaviors. At follow-up, although more females than males had developed disordered eating, weight-teasing was predictive of binge eating for both genders. Teasing was also predictive of unhealthy weight-control behavior in males and frequent dieting in females (Haines, Neumark-Sztainer, Eisenberg, & Hannan, 2006). In a study of weight-teasing experienced within the family, teasing was associated with increased depression and decreased self-esteem and body satisfaction among overweight male and female adolescents. In addition, for the male adolescents, weight-teasing was associated with unhealthy weight-control behaviors (Fulkerson, Strauss, Neumark-Sztainer, Story, & Boutelle, 2007).

Weight-related peer teasing has also been found to be associated with lower appearance self-esteem, global self-worth (Young-Hyman et al., 2003) and social quality

of life (Stern et al., 2006) among obese African American children. Depression was positively associated with peer victimization (not necessarily related to weight) among obese children, and partially mediated the relationship between victimization and decreased physical activity (Storch et al., 2007). Weight-related teasing was found to be associated with weight concerns, low confidence in social abilities, loneliness, preference for isolative sedentary activities, and bulimic behaviors among obese children (Hayden-Wade et al., 2005). Taylor et al. (1998) found that the effects of weight-related teasing were positively related to weight concerns among both elementary and middle school female students.

Teasing is also related to psychological stress and disordered eating attitudes and behaviors in primarily non-overweight adolescents. Using path analysis in three different samples of 7<sup>th</sup> and 8<sup>th</sup> graders, Lunner et al. (2000) found that BMI predicted weight-related teasing and body dissatisfaction, and body dissatisfaction predicted drive for thinness. Furthermore, weight-related teasing partially mediated the relationship between BMI and body dissatisfaction. In a different study, adolescents whose family members teased them about their weight reported greater body dissatisfaction, social comparison of appearance, thin-ideal internalization, restriction, bulimia, depression, and lower self-esteem. The mean rate of teasing was also significantly correlated with each of these variables, as well as perfectionism (Keery, Boutelle, van den Berg, & Thompson, 2005).

A longitudinal study indicated that weight-related teasing is associated with lower body esteem in girls at ages 5 and 7 (Davison & Birch, 2002). When participants were placed into categories based on when they were teased, results showed that girls who

were teased when they were 7 years old had lower body esteem than girls who were never teased or teased at age 5, and girls who were teased at ages 5 and 7 had the lowest body esteem of all groups. Peer teasing mediated the relationship between BMI and body esteem at age 7, but not at age 5. These results suggest that weight-related teasing may be more salient to girls' self-perceptions as they age. Another longitudinal study highlighted the role of weight-related teasing in the development of disordered eating in slightly older children. Wertheim, Koerner, and Paxton (2001) found that weight-related teasing predicted later increases in bulimic behaviors (such as binge eating) in seventh and tenth graders.

Retrospective research with adult females with BED also indicates that childhood teasing has far-reaching effects (Jackson, Grilo, & Masheb, 2000). This research found that childhood general appearance teasing and current depression were associated with body image dissatisfaction and low self-esteem, but not weight concern, whereas childhood weight/size teasing was not associated with any of these criterion variables. There was a significant interaction between general appearance teasing and depression such that depressed participants reported higher body image dissatisfaction regardless of teasing history, whereas among participants who were not depressed, body image dissatisfaction was associated with past appearance teasing. General appearance teasing was associated with body image disturbance and depression among both obese and non-obese participants. However, appearance teasing was only associated with binge frequency and lower self-esteem among the obese participants. In the non-obese subsample appearance teasing was associated with dietary restraint. Weight/size teasing

was associated with lower self-esteem among the obese participants only, and not with any other variables. The authors indicate that forms of teasing have differential impacts on psychological variables based on the severity of the eating pathology in the sample. Therefore, the absence of associations with weight-related teasing may be an artifact of the sample selected, in comparison to other studies (e.g., Grilo, Wifley, Brownell, & Rodin, 1994; Thompson, Fabian, Moulton, Dunn, & Altabe, 1991) who used samples of individuals without BED.

#### *Animal Models of Stress and Binge Eating*

Animal research performed by Hagan and colleagues provides important additional insight into the association between stress and eating behavior. This research has found that caloric restriction and acute environmental stress interact synergistically to induce binge-like eating in rats. That is, if rats experience caloric restriction, are stressed, and are then exposed to highly palatable food, they engage in behavior that resembles binge eating among humans. Rats exposed to stress without preceding caloric restriction or who were not in the presence of highly palatable food did not engage in binge-like eating (Hagan, Chandler, Wauford, Rybak, & Oswald, 2002). Furthermore, rats that experienced both prolonged caloric restriction and recent stress engaged in binge-like eating after only one morsel of highly palatable food was introduced (Hagan et al., 2003). These results highlight the importance of considering the impact of stress on the eating behaviors of obese, treatment-seeking adolescents. Given that adolescents typically have little control over food in their environment and poorly developed will-power to resist

eating food that “tastes good,” they may be particularly vulnerable to overeating during periods of stress.

### *Depression and Binge Eating*

There has been considerable debate in the literature about whether childhood trauma and stress are risk factors specifically for eating disorders, or whether they are risk factors for psychological disorders in general (Everill & Waller, 1995; Wonderlich, Brewerton, Jovic, Dansky, & Abbott, 1997). Research suggests that the latter may be the case. Fairburn et al. (1998) found that individuals with BED reported experiencing more negative self-evaluation, parental problems, sexual and physical abuse, and repeated negative comments from family members about weight or eating, in comparison to a healthy control group. However, these factors, aside from low parental contact, childhood obesity, and negative comments about weight, were not significantly different between those with BED and the psychiatric control group.

In a later study, both European American and African American women with BED reported experiencing more sexual abuse, physical abuse, and bullying than a healthy control group. Additionally, European American women reported experiencing more discrimination. However, when compared with a psychiatric control group, the only significant differences were more discrimination for European Americans and more sexual abuse for African Americans (Striegel-Moore, Dohm, Pike, Wilfley, & Fairburn, 2002). Discrimination reported by European American women was generally related to physical attributes associated with belonging to a particular ethnic group. Therefore, the authors indicate that although rates of discrimination were low among European

American women, denigrating experiences related to appearance caused greater rates of BED. These two studies suggest that there are general correlates of psychiatric disorders, and also specific correlates that may make development of BED more likely. For example, a propensity toward obesity and overeating may develop into binge eating when a child is faced with stress, such as abuse and parental problems, or when negative weight-related comments are repeatedly made. It is therefore important to examine the psychosocial factors that may be associated with obesity and binge eating.

Although the relationship between childhood trauma and disordered eating has been well-supported in the literature, it is less clear what might account for such an association. Some suggest that trauma leads to negative emotional states, and eating disorder behaviors such as binge eating are used as coping methods (Wonderlich et al., 2001). Past research has found that obesity is associated with depression in children (Zametkin et al., 2004). Furthermore, depression and eating to improve mood have been found to increase risk for binge eating (Marcus & Kalarchian, 2003; Stice, Presnell, & Spangler, 2002).

Depression is a common correlate of binge eating among overweight men and women (Fitzgibbon et al., 1998) and obese adults who binge eat have been found to be more depressed than those who do not (Geliebter et al., 2001; Mitchell & Mussell, 1995; Pinaquy et al., 2003). Research with adolescents has also documented the association between depression and binge eating (Isnard et al., 2003). In a community sample, adolescents with BED had higher Children's Depression Inventory (CDI) scores than those with either subclinical BED or no BED, and those with subclinical BED had higher

CDI scores than those without BED (Johnson, Grieve, Adams, & Sandy, 1999). Morgan et al. (2002) found that in a community sample, overweight children who reported a history of loss of control while eating had higher global and negative mood CDI scores than those without such a history. In contrast, Tanofsky-Kraff et al. (2004) found no differences on the CDI between non-treatment-seeking adolescents who endorsed abnormal eating episodes and those who did not. This difference may have been caused by the different measures used to assess disordered eating or because Tanofsky-Kraff et al.'s sample included both normal weight and overweight adolescents. Additionally, Morgan et al.'s sample reported higher rates of objective and subjective binge episodes, thus there may have been more variability in the different measures of psychological distress in this sample.

Several studies have also documented the relationship between binge eating and depression among obese, treatment seeking adolescents using the CDI. In one study, those who reported objective binge eating episodes in the past month had higher CDI scores than those without abnormal eating episodes, whereas the subsample that reported subjective binge eating episodes did not differ from either group (Goossens et al., 2007). Glasofer and colleagues (2007) found that adolescents with BED had higher CDI negative mood subscale scores than those with either subclinical BED or no BED and higher global CDI scores than those with no history of binge eating. Berkowitz et al. (1993) also reported a positive correlation between binge eating and CDI scores. In contrast, Decaluwe et al. (2003) reported no differences in CDI scores between adolescents who reported binge eating and those who did not.



In support of a mediation hypothesis, research suggests that experience of trauma per se may not lead to binge eating. However, symptoms of depression that develop post-trauma may induce later binge eating as a means to cope with negative affect (Moyer, DiPietro, Berkowitz, & Stunkard, 1996). Grilo and colleagues (2005) found that emotional and physical abuse and emotional neglect were associated with higher depression among obese adults seeking bariatric surgery, and that those who binge ate were more depressed than those who did not. Van den Berg, Wertheim, Thompson, and Paxton (2002) found that girls with a higher BMI were more likely to experience weight-related teasing. In their study, weight-related teasing was associated with depression, low self-esteem, and bulimia, but these relationships were mediated by body dissatisfaction. Depression and low self-esteem were directly related to bulimia. Similarly, Womble et al. (2001) found that a model which included negative affect as a mediator of the relationship between teasing and binge eating provided the best fit for data collected from male and female undergraduates. The current study extends these prior studies by investigating whether depression may account for a relationship between stress and binge eating in an ethnically diverse sample of obese adolescents.

### *Self-Esteem and Binge Eating*

Although binge eating is common among obese adolescents, not every adolescent who is obese binge eats. It is important to discover possible protective factors that may reduce the likelihood of disordered eating in this population (Friedman & Brownell, 1995). Self-esteem and ethnic identity are two such variables that may buffer the effects of stress among obese adolescents. The self-esteem of obese adolescents may suffer due

to stigmatization by peers. Latner and Stunkard (2003) found that when children were presented drawings of “healthy” children, obese children, and children with various physical disabilities, they ranked the obese child as least likeable. Furthermore, this ranking was even lower than it was in a similar study from 40 years ago (Richardson, Goodman, Hastorf, & Dornbusch, 1961). When shown drawings of children of different sizes, children were less likely to choose the drawing of an obese child as a desirable friend (Cramer & Steinwert, 1998; Goldfield & Chrisler, 1995). Children also attribute negative characteristics (Cramer & Steinwert, 1998) and poorer social, academic, and health/fitness functioning and body satisfaction to drawings of obese children (Hill & Silver, 1995). Children are also more likely to choose drawings of underweight females as being both attractive and healthy in comparison to drawings of normal and overweight females (Markey, Tinsley, Ericksen, Ozer, & Markey, 2002).

Society in general stigmatizes obese people because of their appearance and blames them for their condition (Friedman & Brownell, 1995). These anti-obesity messages may lead to lower self-esteem in some obese children. Although results regarding obesity and self-esteem are inconsistent, lower self-esteem is clearly related to obesity in clinical samples (Zametkin et al., 2004). In a longitudinal study, Strauss (2000) found that obese and non-obese 9 and 10-year-olds did not differ in their level of self-esteem. However, from the ages of 9 and 10 to 13 and 14 years, obesity was related to decreased self-esteem. Because of this overall decrease, 13 and 14-year-old adolescents who were obese had significantly lower self-esteem than their non-obese counterparts.

Among both obese and non-obese adolescents, decreasing self-esteem was related to sadness, loneliness, and nervousness (Strauss).

Davison and Birch (2002) found that body esteem was negatively associated with BMI among girls when they were 5 and 7 years old. In contrast, Young-Hyman and colleagues (2003) found that BMI was not related to appearance self-esteem among 5 to 7-year-old African American boys and girls. However, BMI had a negative relationship with appearance self-esteem in 8 to 10-year-old children. Global self-worth was not associated with BMI in either age group. After controlling for BMI, body dissatisfaction was negatively associated with both appearance self-esteem and global self-worth among the older children, but not among the younger children. Additionally, when parents viewed their children as being overweight, the participants had lower appearance self-esteem, but not global self-worth.

Adults with BED have been found to have lower self-esteem than obese individuals without BED (Mitchell & Mussell, 1995). Additionally, Grilo et al. (2005) found that emotional abuse and neglect were associated with lower self-esteem among obese adults seeking bariatric surgery, and that those with a history of binge eating had lower self-esteem than those without such a history. Binge eating severity was negatively associated with self-esteem in one sample of obese, treatment-seeking adolescents (Isnard et al., 2003). Furthermore, higher self-esteem has been found to act as a protective factor against the later development of binge eating in a community sample of female adolescents (Stice et al., 2002). However, there were no differences on the CDI negative self-esteem subscale between obese adolescents with or without BED in another study

(Glasofer et al., 2007). Wardle, Waller, and Fox (2002) found that women with early-onset overweight (i.e., before the age of 16) had lower self-esteem and reported more childhood weight-related teasing. Further, in their study, a younger age of onset, teasing, and body dissatisfaction were negatively associated with self-esteem. In a path analysis model, body dissatisfaction mediated the relationship between age of onset and self-esteem. However, teasing was not related to body dissatisfaction or self-esteem.

Stern and colleagues (2007) found that self-esteem partially mediated the relationship between weight-related teasing and quality of life in a sample of obese adolescents. In an investigation of the cognitive behavioral model of binge eating in obese adolescents, Decaluwe and Braet (2005) found that self-esteem was related to binge eating through the effects of over-evaluation of eating, weight, and shape and dietary restraint. The current study investigates whether self-esteem might act as a moderator in the relationship between stressful experiences, such as teasing, and disordered eating.

### *Ethnic Identity and Binge Eating*

Ethnic identity is defined as the awareness of being a member of an ethnic group, as well as the importance and emotional value placed on that membership (Phinney, 1992). Ethnic identity can be studied as a group-specific characteristic, but Phinney posited that the experience of belonging is common across ethnic groups. Ethnic identity has generally been found to be associated with indicators of psychological well-being and negatively associated with indicators of pathology, such as depression (Bracey, Bamaca,

& Umana-Taylor, 2004; Carlson, Uppal, & Prosser, 2000; Phinney, Cantu, & Kurtz, 1997; Roberts et al., 1999).

There have been several studies of the role of ethnic identity in psychological well-being in the context of racial discrimination. Some research has found that ethnic identity may buffer the effects of racial discrimination or race-related stress on psychological well-being (Sellers, Copeland-Linder, Martin, & Lewis, 2006). Utsey, Chae, Brown, and Kelly (2002) found that ethnic identity was positively correlated with quality of life. In contrast, cultural racism was negatively associated with quality of life. Using path analysis, Gaudet, Clement, and Deuzeman (2005) found that ethnic identity had an indirect effect on depression and self-esteem through its negative association with the experience of daily hassles related to acculturation. In contrast, other research suggests that, although ethnic identity is negatively associated with psychological distress and perceived stress, it may also lead to the experience of more racial discrimination among African American adolescents (Sellers, Caldwell, Schmeelk-Cone, & Zimmerman, 2003). Scott (2003) also found that ethnic identity was associated with greater perceived discrimination, and that it was also unrelated to the coping mechanisms used by African American adolescents to manage racial discrimination.

There are few studies on the relationship between ethnic identity and disordered eating or obesity. In a study on overweight and depression among urban, African American adult woman, results indicated that after controlling for demographic variables, there was a relationship between overweight and depression that was moderated by ethnic identity such that thinner women with higher ethnic identity were the least depressed

(Siegel, Yancey, & McCarthy, 2000). Bisaga and colleagues (2005) hypothesized that high ethnic identity would be protective against the development of eating disorder symptoms among high school girls, but found no association between the two. Similarly, among college females of South Asian descent, ethnic identity was unrelated to body dissatisfaction or eating pathology, whereas racial teasing, depression, and self-esteem were significant correlates (Iyer & Haslam, 2003). In contrast, in a sample of college females, ethnic identity was positively correlated with drive for thinness, bulimia, and body dissatisfaction among European American participants, but not among African Americans (Petersons, Rojhani, Steinhaus, & Larkin, 2000). Abrams, Allen, and Gray (1993) found that European American college women reported greater dietary restraint, fear of fat, drive for thinness, and body dissatisfaction than African American women. Additionally, among African American women, the Preencounter stage of racial identity development (reflecting assimilation to European American racial identity) was positively related to restraint, fear of fat, and drive for thinness.

Although some data from previous research suggests that ethnic identity acts as a buffer against the effects of stress on psychological distress, results of the research that has been done with disordered eating and obesity does not suggest such a positive role for ethnic identity. Nevertheless, in the current study, ethnic identity was evaluated as a moderating variable in the relationship between various forms of stress and binge eating. The results will add further clarity to this body of research literature.

*Summary and Hypotheses*

There is an urgent need for the development of weight loss treatments to counter the obesity epidemic. The most effective treatments are those that target children and adolescents, as well as address psychosocial factors that interact with biological and medical variables. However, more research is needed in this area. Previous studies have found that binge eating is associated with obesity and environmental stressors. This study contributes to the literature on obesity by examining the relationship between stress and binge eating in ethnically diverse adolescents. It was hypothesized that

1. Stress would be positively associated with binge eating among obese adolescents.
2. Depressive symptoms would mediate the relationship between stress and binge eating.
3. Self-esteem would moderate the relationship between stress and binge eating.
4. Ethnic identity would moderate the relationship between stress and binge eating.

## Method

### *Participants*

Participants in this study were 93 adolescents between the ages of 11 and 18 who were participating in a clinical research trial conducted in the VCU Department of Pediatrics for the treatment of obesity titled “Understanding the Barriers in Treatment of Obesity in Adolescents 11-18 in Central Virginia.” This clinic is a multidisciplinary program that includes medical doctors, psychologists, dieticians, and exercise physiologists. It is a 2 year program that involves behavioral modification of eating and exercise behaviors in a context of family support. Participants visit a dietician and counseling psychology graduate student (referred to as a “behavioral specialist”) every other week and go to a gym at least three times per week. They must have at least one parent or guardian willing to participate in clinic procedures and a primary care provider (PCP). Their PCP is contacted regularly regarding the child’s progress and is responsible for taking care of the child’s physical needs. Participants are referred from schools, pediatricians, and other health care providers in the community. All participants have a body mass index (BMI) greater than the 95<sup>th</sup> percentile for their age and gender at baseline.

Because this study is part of a long-term weight loss program, certain exclusion criteria were established to obtain a sample appropriate for research involving physical activity, diet changes, and weekly follow-up visits. Families that live outside a 30 mile



radius of downtown Richmond were not considered for enrollment because past experience in the clinic has shown that families who travel a long distance to participate are least likely to complete the protocol. Participants that did not have the ability to understand program instructions due to a mental disability or perform the exercises due to a physical disability were excluded, as were children who have a disease that make exercise unsafe.

Participants who were missing more than one of the three data components (survey packet, trauma questionnaire, ChEDE-Q) were eliminated from the analyses, leaving 86 participants. Fifty-nine of the participants were female (69%), 26 were male (30%), and one did not report gender (1%). Sixty-seven of the participants were African-American (78%), 13 were European American (15%), 2 were Hispanic (2%), 2 classified themselves as “Other” (2%), and 2 did not report ethnicity (2%). The range for grade in school was 5<sup>th</sup> through 12<sup>th</sup>, with the modal grade being 6<sup>th</sup> ( $n = 18, 21\%$ ). Age was measured in months ranged from 11 years, 0 months to 17 years, 8 months ( $M = 13$  years, 11 months,  $SD = 22.06$  months). Parental education and family income were used as measures of socioeconomic status (obtained by parental report). Parental education ranged from less than a high school degree to graduate degree, with the mode being some college ( $n = 32, 37\%$ ). The range for family income was less than \$10,000 per year to more than \$50,000 per year and the distribution was bimodal. Specifically, the number of participants with a family income of \$20-30,000 per year was 19 (22%) and the number with a family income of more than \$50,000 per year was 24 (28%).

### *Measures*

*Personal and Family Information.* A form was used to collect information on child and parent race/ethnicity, parents' educational level, and total family income. The child's age and sex are recorded during their General Clinical Research Center (GCRC) 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. The POTS was validated with a sample of female undergraduates. 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. The respondent is asked to respond to two questions for each item, resulting in a "frequency" rating and an "upset" rating for each factor. First, they rate how often they were teased from "never" (1) to "always" (5). Second, they rate how upset they were by the teasing from "not upset" (1) to "very upset" (5). Convergent validity was established using measures of eating disorder symptoms, physical appearance anxiety, and self-esteem. The scale has acceptable internal consistency (Cronbach's  $\alpha = .88$ ) and 2-week test-retest reliability. It has been used in samples of primarily African American adolescents (Stern et al., 2006; Stern et al., 2007) and was found to yield internally consistent scores. In the current study, the alpha for weight teasing was .92.

*Daily Hassles Microsystem Scale.* Daily hassles were assessed using the Daily Hassles Scale (DHS; Seidman et al., 1995). The DHS contains 28 items that assess daily

hassles in five areas: school, family, neighborhood, peers, and lack of resources. In the original DHS, participants circled “yes” or “no” indicating whether each event “hasn’t happened this month.” If the hassle had occurred, they rated how much of a hassle it was. For this study, the scale was changed to make it easier to complete. Participants circled “1” if the event hasn’t happened in the past month. If the event has 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”). Before summing the items, they were recoded to range from 1 to 4, with both “Hasn’t happened” and “Not at all a hassle” equaling 1, leading to a possible total score of 112.

The DHS was designed to be useful for samples with high percentages of poor, urban and ethnically diverse adolescents. Principal factor axis analysis supported the five-factor structure of the DHS (Seidman et al., 1995). Validity was established by examining demographic utility of the measure and scale changes across a school transition. In the current study the total score was used instead of the subscale scores to decrease Type I error caused by multiple comparisons and to obtain an estimate of the overall experience of daily hassles. Cronbach’s alpha was reported to be .89 (Seidman et al., 1995). In the current study the alpha was .84.

*Trauma Interview.* Exposure to trauma was measured using a semi-structured interview adapted from the Traumatic Event Screening Instrument for Children (Ford & Rogers, 1997). The interview contains 16 items to screen for lifetime exposure to potentially traumatic events. There are 15 trauma categories, including accidents, natural disaster, illness/death, physical violence, verbal violence, and sexual violence, and a

sixteenth question for traumatic experiences that were not captured by the previous questions. For each item that the participant endorses, he or she is then asked a series of follow-up questions to determine whether the experience meets the DSM-IV-TR criteria for trauma. The DSM specifies that a traumatic experience must include a response that involves fear, helplessness, horror, or disorganized/agitated behavior. Open-ended questions assessing such characteristics as age of onset, age of offset, frequency, relationship of others involved, and consequences are asked. Estimated administration time is 10 to 30 minutes. A total score is calculated by assigning one point to each trauma category that the child has experienced, for a total possible score of 16 points.

*Coopersmith Self-Esteem Inventory.* The Coopersmith Self-Esteem Inventory was used to measure self-esteem. (SEI; Coopersmith, 1987). It is designed to assess self-evaluation of social, academic, family, personal areas of experience (Adair, 1984). This inventory includes 25 declarative, self-descriptive items worded in the first person. Respondents are instructed to state whether each item is “like me” or “unlike me.” One point is assigned for each item that suggests high self-esteem. Cronbach alphas for the 25-item version of the SEI average around .83; test-retest reliability is good (Blascovich & Tomaka, 1991). The factorial validity for its subscales (School Curriculum, Home-Parent, Social-Peer, and Lie scales) has been supported (Roberson & Miller, 1986). In the current study, the total score was used to obtain an estimate of global self-esteem. The SEI has been used in ethnically diverse samples and no racial differences were evident between African Americans and European Americans (Chapman & Mullis, 2000). The alpha for the current study was .81.

*Children's Depression Inventory.* Depressive symptoms were assessed using the Children's Depression Inventory, which is designed for use up to age 17 (CDI; Kovacs, 1992). The CDI contains 27 items that assess the number and severity of depressive symptoms. Each item consists of three statements and respondents are asked to choose which sentence best describes the way they have been feeling for the past 2 weeks. Item selections are assigned a numerical value from 0 to 2. High scores on the CDI indicate higher levels of depressive symptoms. Discriminant validity has been established for clinic-referred and ethnically diverse children and adolescents in addition to community samples (Ruggiero, Morris, Beidel, Scotti, & McLeer, 1999). The original five-factor structure of the CDI is equivalent across the African American and European American racial groups (Steele et al., 2006). Additionally, a meta-analysis revealed that African American and European American children do not score significantly differently on the CDI (Twenge & Nolen-Hoeksema, 2002). Cronbach's alpha in studies with an ethnically diverse sample ranged from .87 to .90 (Greening, Stoppelbein, Dhossche, & Martin, 2005). The alpha in the current study was .88.

*Multigroup Ethnic Identity Measure.* Ethnic identity was measured using a 12-item version of the Multigroup Ethnic Identity Measure (MEIM; Phinney, 1992). This consists of the Ethnic Identity Achievement subscale without the two items that are reverse-scored, as Roberts et al. (1999) found that these two items did not fit the factor structure. This questionnaire was developed to assess positive ethnic attitudes and sense of belonging, ethnic identity achievement, and ethnic practices and is appropriate for all ethnic groups. In contrast to the three factors proposed by Phinney, research has

consistently found two factors: exploration and commitment (Roberts et al., 1999; Spencer, Icard, Harachi, Catalano, & Oxford, 2000). However, in the current study the total score was used as a measure of overall ethnic identity. It consists of 15 items, 3 of which assess the adolescent, maternal, and paternal ethnicity. The remaining 12 items are scaled from 1 (Strongly disagree) to 4 (Strongly agree). Across twelve different studies, the MEIM has produced a mean alpha coefficient of .86 (Ponterotto, Gretchen, Utsey, Stracuzzi, & Saya, 2003). The alpha for the current study was .79.

*Children's Eating Disorder Examination Questionnaire (ChEDE-Q)*. The Eating Disorder Examination (EDE) is a clinical interview and is considered to be one of the top methods for assessing binge eating and related eating disorder psychopathology (Fairburn & Cooper, 1993). However, its format has limitations (e.g., time and training required for administration) and its questionnaire version, the EDE-Q, has been found to be a good alternative for screening purposes (Fairburn & Beglin, 1994). Both measures include items that assess binge eating and have four subscales: restraint, eating concern, weight concern, and shape concern. The EDE-Q has been used with an ethnically diverse sample of adolescent females (Pernick et al., 2006) and has manifested adequate internal consistency in a sample of African American adult females (Hrabosky & Grilo, 2007).

Recently the EDE-Q has been modified for use with adolescent populations. The two modifications of the ChEDE-Q were shortening the time frame assessed (14 vs. 28 days) and replacing some of the words and phrases with simpler language (Carter, Stewart, & Fairburn, 2001). The ChEDE-Q was used to estimate the prevalence and severity of binge eating in this sample. Additionally, the ChEDE-Q global score was used

as a continuous measure of binge eating and related symptomatology. The alpha for the global score in the current study was .89.

Research on the use of the EDE-Q to assess binge eating episodes has suggested that participants be provided with definitions and examples to clarify the clinical definition of the term “binge” (Goldfein, Devlin, & Kamenetz, 2005). These researchers found that with further instructions, the utility of the EDE-Q for assessing binge eating approached that of the EDE, which is generally considered the more accurate of the two methods (Decaluwe & Braet, 2004; Passi, Bryson, & Lock, 2003; Tanofsky-Kraff et al., 2003). The definitions and examples provided by Goldfein et al. (2005) were altered to make the examples more representative of those encountered by adolescents (e.g., changing the context from work to school).

#### *Procedure*

Participants were typically identified through Virginia Commonwealth University Health Systems (VCUHS) clinics and local physicians’ referrals or from schools (Virginia Action for Healthy Kids). A minority of participants self-refer from word of mouth or viewing the program website. Authorization forms and partial waivers from VCUHS were obtained to ensure Health Insurance Portability and Accountability Act (HIPAA) compliance. To enroll in the study, parents contacted the project coordinator, who sent them information about the program, informed consent forms, and questionnaire packets containing the Personal and Family Information Form, CDI, DHS, POTS, MEIM, and SEI. The project coordinator contacted participants after they had time to review the information and scheduled an initial consent appointment. The

families brought the completed questionnaire packets to this meeting. The coordinator reviewed the program and the consent forms with the parent and child, and parents' consent for their children's participation was obtained via the parental consent form. Children were encouraged to discuss their participation with their parents prior to signing the assent form. After the consent and assent forms were signed, the project coordinator collected the questionnaire packets. The decision to have participants complete the questionnaire packets on their own time was made because the packets are somewhat lengthy (including questionnaires not used in this study) and it is believed that allowing participants to complete them on their own time facilitates honest and thoughtful responses and reduces the likelihood of fatigue.

At the initial consent appointment, participants were scheduled for their behavioral intake, which typically occurs within 1-3 weeks after the consent meeting. The trauma interview and ChEDE-Q were administered during the behavioral intake by counseling psychology graduate students trained in their use. The parent who accompanied the child to the intake was also present for the administration of these measures. Participants responded aloud to questions about potentially traumatic experiences, and follow-up questions were asked as needed. If any information was revealed during the intake or the trauma interview suggesting that the child was experiencing ongoing psychological difficulties, referrals for psychotherapy were provided. Although the ChEDE-Q is a self-report questionnaire, it was read to the participants while they filled it out. This procedure was chosen to ensure that participants



read the information describing a binge and to enable them to ask any questions for clarification of terms used, while allowing them the privacy of writing their answers.

Confidentiality of the questionnaire data was maintained by the identification of each respondent by only an individual code number. Only this code number permits identification of the computer files for each individual. Identifying information is stored in secured locked file cabinets. In addition, all investigators and research staff involved in handling data are required to complete HIPAA training offered by VCUHS. This law includes standards for the protection of identifiable health information. All data were collected and maintained in accordance with these standards.

## Results

### *Descriptive Statistics and Bivariate Correlations*

Table 1 displays the means and standard deviations for the total sample, the European American subsample, and the African American subsample. With the exception of a marginally significant difference in daily hassles, there are no ethnic differences on any of the measures. There was a trend toward African Americans reporting more daily hassles than European Americans,  $t(65) = 1.94, p = .06$ . Additionally, females reported experiencing more daily hassles ( $M = 43.82, SD = 9.87$ ) than males ( $M = 37.52, SD = 9.72$ ),  $t(68) = 2.46, p < .05$ . Age was negatively associated with dietary restraint ( $r = -.22, p < .05$ ), but was not associated with any of the other measures. MANOVAs were conducted to test for associations with socioeconomic status. However, neither parental education nor family income were associated with any of the measures.

Table 1

*Means and Standard Deviations of All Measures*

Measure	Total Sample		European Americans		African-Americans		<i>t</i>
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	
1. POTS-Frequency	13.64	6.34	12.92	6.84	13.45	6.18	0.28
2. POTS-Upset	13.64	7.30	13.31	7.70	13.33	7.21	0.01
3. DHS	41.93	10.18	37.69	10.29	43.61	9.76	1.94+
4. Trauma	2.09	1.77	1.70	1.77	2.15	1.73	0.77
5. CDI	10.78	7.79	9.23	9.66	11.25	7.60	0.83
6. SEI	59.63	19.59	59.67	18.49	59.20	20.46	0.07
7. MEIM	34.91	5.83	33.15	6.77	35.35	5.56	1.22
8. Restraint	1.44	1.19	1.66	1.24	1.39	1.17	0.74
9. Eating Concern	1.02	0.91	1.29	1.39	1.01	0.79	1.00
10. Shape Concern	2.56	1.63	2.66	1.71	2.60	1.62	0.13
11. Weight Concern	2.57	1.43	2.71	1.45	2.60	1.43	0.24
12. Global ChEDE-Q	1.90	1.03	2.08	1.26	1.90	0.97	0.58

*Note:* POTS-Frequency = Perceptions of Teasing-Frequency subscale, POTS-Upset = Perceptions of Teasing-Upset subscale, DHS = Daily Hassles Scale, CDI = Children's Depression Inventory, SEI = Self-Esteem Inventory, MEIM = Multi-group Ethnic Identity Measure, ChEDE-Q = Children's Eating Disorder Examination-Questionnaire. + *p* = .06

Table 2 presents the correlations for the total sample. For the total sample, the degree of emotional upset caused by weight-teasing was more strongly correlated with

eating pathology, as measured by the ChEDE-Q, than was the mere frequency of weight-teasing. Therefore, emotional upset caused by teasing was used as the independent variable in subsequent analyses instead of frequency of teasing. Trauma was also a significant correlate of shape concern and the global score, whereas daily hassles were not associated with any of the ChEDE-Q subscales. As expected, depressive symptoms were positively correlated with eating pathology and self-esteem was a negative correlate. Ethnic identity was not correlated with most of the ChEDE-Q subscales or the global score, but there was a significant positive correlation between ethnic identity and restraint. The correlations of teasing and daily hassles with depressive symptoms and self-esteem were significant and in the predicted direction. Trauma was not related to depressive symptoms or self-esteem.

Table 2

*Inter-correlations for the Total Sample*

Measure	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.
1. POTS-Frequency	--	.78 <sup>c</sup>	.41 <sup>b</sup>	.35 <sup>b</sup>	.33 <sup>b</sup>	-.32 <sup>b</sup>	.16	.12	.19	.25 <sup>a</sup>	.31 <sup>b</sup>	.28 <sup>a</sup>
2. POTS-Upset		--	.34 <sup>b</sup>	.43 <sup>c</sup>	.39 <sup>b</sup>	-.40 <sup>b</sup>	.14	.06	.31 <sup>a</sup>	.46 <sup>c</sup>	.45 <sup>c</sup>	.43 <sup>c</sup>
3. DHS			--	.03	.59 <sup>c</sup>	-.37 <sup>b</sup>	.03	-.13	.10	.23	.18	.13
4. Trauma				--	.05	-.03	.10	.16	.09	.27 <sup>a</sup>	.21	.25 <sup>a</sup>
5. CDI					--	-.70 <sup>c</sup>	-.12	-.05	.34 <sup>b</sup>	.35 <sup>b</sup>	.32 <sup>b</sup>	.31 <sup>b</sup>
6. SEI						--	.08	.13	-.35 <sup>b</sup>	-.35 <sup>b</sup>	-.36 <sup>b</sup>	-.30 <sup>a</sup>
7. MEIM							--	.29 <sup>a</sup>	.14	.01	.02	.14
8. Restraint								--	.31 <sup>b</sup>	.16	.28 <sup>a</sup>	.52 <sup>c</sup>
9. Eating Concern									--	.67 <sup>c</sup>	.62 <sup>c</sup>	.79 <sup>c</sup>
10. Shape Concern										--	.89 <sup>c</sup>	.90 <sup>c</sup>
11. Weight Concern											--	.92 <sup>c</sup>
12. Global ChEDE-Q												--

*Note.* Correlations are nonsignificant unless otherwise demarcated. <sup>a</sup>  $p < .05$ , <sup>b</sup>  $p < .01$ , <sup>c</sup>  $p < .001$

Table 3 presents the intercorrelations for the European American and African American subsamples. Although there were no differences in the mean subscale scores among these two subsamples, there are some interesting differences in absolute sizes of the correlations. Because of the smaller sample sizes, alpha was increased to .10 to minimize Type II error. For African Americans, but not European Americans, ethnic identity was significantly positively correlated with dietary restraint. Although experiencing upset over being teased was significantly correlated with most of the ChEDE-Q scores for both races, the mere experience of being teased was also a significant correlate of eating pathology for the European American participants. There were also differences in the correlations for the other two forms of stress. Although there was a trend for African Americans to report more daily hassles than European Americans, these experiences were not correlated with eating pathology. However, for European Americans, daily hassles were positively associated with eating concern, shape concern, and the global score. In contrast, trauma was associated with each of the subscales and the global score for African Americans, but these correlations were nonsignificant for European Americans.

Table 3

*Inter-correlations for the European American and African American Subsamples*

Measure	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.
1. POTS-Frequency	--	.72 <sup>c</sup>	.40 <sup>b</sup>	.35 <sup>b</sup>	.28 <sup>a</sup>	-.26 <sup>a</sup>	.15	.00	.04	.23	.33 <sup>b</sup>	.22
2. POTS-Upset	.92 <sup>c</sup>	--	.36 <sup>b</sup>	.43 <sup>b</sup>	.38 <sup>b</sup>	-.38 <sup>b</sup>	.09	-.07	.23 <sup>+</sup>	.51 <sup>c</sup>	.52 <sup>c</sup>	.42 <sup>b</sup>
3. DHS	.62 <sup>a</sup>	.40	--	-.02	.52 <sup>c</sup>	-.27 <sup>+</sup>	-.06	-.18	-.11	.19	.15	.05
4. Trauma	.14	.24	.05	--	.06	-.05	.14	.22 <sup>+</sup>	.25 <sup>+</sup>	.41 <sup>b</sup>	.38 <sup>b</sup>	.43 <sup>b</sup>
5. CDI	.65 <sup>a</sup>	.55 <sup>+</sup>	.82 <sup>b</sup>	.04	--	-.71 <sup>c</sup>	-.21	-.16	.17	.26 <sup>+</sup>	.27 <sup>a</sup>	.19
6. SEI	-.72 <sup>b</sup>	-.64 <sup>a</sup>	-.82 <sup>b</sup>	.04	-.72 <sup>b</sup>	--	.21	.19	-.22	-.28 <sup>a</sup>	-.33 <sup>a</sup>	-.22
7. MEIM	.13	.26	.16	-.54	.05	-.46	--	.34 <sup>a</sup>	.05	.01	.01	.14
8. Restraint	.51 <sup>+</sup>	.49 <sup>+</sup>	.13	-.37	.31	-.10	.12	--	.23 <sup>+</sup>	.09	.20	.47 <sup>c</sup>
9. Eating Concern	.75 <sup>b</sup>	.71 <sup>b</sup>	.65 <sup>a</sup>	-.27	.75 <sup>b</sup>	-.81 <sup>b</sup>	.42	.57 <sup>a</sup>	--	.62 <sup>c</sup>	.56 <sup>c</sup>	.74 <sup>c</sup>
10. Shape Concern	.65 <sup>a</sup>	.65 <sup>a</sup>	.53 <sup>+</sup>	-.08	.65 <sup>a</sup>	-.71 <sup>a</sup>	.15	.37	.82 <sup>b</sup>	--	.89 <sup>c</sup>	.90 <sup>c</sup>
11. Weight Concern	.58 <sup>a</sup>	.56 <sup>a</sup>	.32	-.42	.48	-.55 <sup>+</sup>	.19	.57 <sup>a</sup>	.80 <sup>b</sup>	.87 <sup>c</sup>	--	.91 <sup>c</sup>
12. Global ChEDE-Q	.72 <sup>b</sup>	.70 <sup>b</sup>	.48 <sup>+</sup>	-.31	.64 <sup>a</sup>	-.65 <sup>a</sup>	.25	.69 <sup>a</sup>	.92 <sup>c</sup>	.90 <sup>c</sup>	.94 <sup>c</sup>	--

*Note.* African-American sample appears above the diagonal; European American sample appears below the diagonal. All correlations are nonsignificant unless otherwise demarcated. <sup>a</sup>  $p < .05$ , <sup>b</sup>  $p < .01$ , <sup>c</sup>  $p < .001$ , <sup>+</sup>  $p < .10$

*Hypothesis 1*

The first hypothesis was that the various forms of stress measured in this study would be associated with binge eating. In the total sample, none of the measures of stress

were associated with the frequency of objective binge eating, subjective binge eating, or overeating. Among European Americans, subjective binge eating was positively correlated feeling upset about being teased ( $r = .59, p < .05$ ). Additionally, trauma was positively correlated with overeating ( $r = .77, p < .01$ ). As can be seen in Table 1, in the total sample, both the frequency of weight teasing and the degree of upset over weight teasing were related to most of the ChEDE-Q subscale scores (with the exception of Restraint). The total number of types of traumatic experiences was also related to the Shape Concern and the Global score.

### *Hypothesis 2*

The second hypothesis was that depressive symptoms would mediate the relationship between stress and binge eating. However, binge eating was not associated with stress. Therefore, the Global ChEDE-Q score was used as the dependent variable for tests of both mediation and moderation. Age was not associated with any independent variables, potential mediators or moderators, or the dependent variable, therefore it was not entered as a covariate in the regression analyses. Diagnostics were run and there was no indication of problematic multicollinearity. The adjusted R squared is reported in each of the following analyses.

The three stress measures significantly correlated with the Global ChEDE-Q score (POTS-Frequency, POTS-Upset, and Trauma) were entered simultaneously to predict the Global ChEDE-Q score and produced a statistically significant regression model,  $F_{3,61} = 5.02, p < .01, R^2 = .16$ . Of the three predictors, only POTS-Upset accounted for a



significant portion of the variance,  $\beta = .52$ ,  $t = 2.68$ ,  $p = .01$ . Therefore, the only measure of stress used in the mediation analyses was POTS-Upset.

Hypothesis 2 was that depressive symptoms would mediate the relationship between upset about weight teasing and eating pathology. According to Baron and Kenny's (1986) guidelines, the independent variable (upset about weight teasing) must be associated with both the mediator (depressive symptoms) and the dependent variable (eating pathology). These conditions are satisfied by the correlations of POTS-Upset with the CDI ( $r = .39$ ,  $p < .01$ ) and the Global ChEDE-Q ( $r = .43$ ,  $p < .001$ ). Finally, when entered together to predict the eating pathology, depressive symptoms should remain significant, while upset about weight teasing should become non-significant. The overall model was significant,  $F_{2, 66} = 8.30$ ,  $p < .01$ ,  $R^2 = .18$ . However, POTS-Upset remained significant ( $\beta = .37$ ,  $t = 3.10$ ,  $p < .01$ ), while CDI became non-significant ( $\beta = .15$ ,  $t = 1.25$ ,  $p > .05$ ). This relationship is displayed in Figure 1 below.

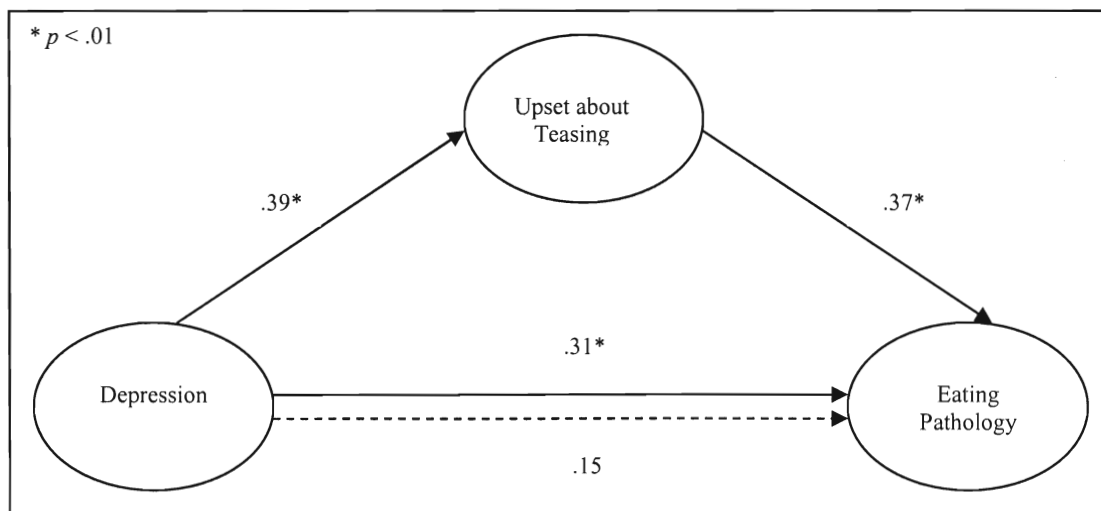


Figure 1: Teasing Mediates the Relationship between Depression and Eating Pathology

### *Hypothesis 3*

The third hypothesis was that self-esteem would moderate the relationship between the various forms of stress and the Global ChEDE-Q score. To assist with interpretation, the independent variables were centered by subtracting the mean from each individual score. To test self-esteem as a moderator, the main effects were entered into the regression in the first step followed by the interaction term. For feeling upset about being teased, the first step was significant ( $F_{2,64} = 8.51, R^2 = .19$ ), with POTS-Upset accounting for a significant portion of the variance,  $\beta = .36, t = 2.99, p < .01$ . However, the interaction term was not significant, thus self-esteem did not moderate the relationship between upset about weight teasing and eating pathology. In the test of self-esteem as a moderator of the relationship between daily hassles and disordered eating, neither step was significant. In the test of self-esteem as a moderator of the relationship between trauma and disordered eating, the first step was significant ( $F_{2,63} = 4.70, R^2 = .10$ ), with self-esteem accounting for a significant portion of the variance,  $\beta = -.30, t = 2.52, p < .05$ . However, the interaction term was not significant, thus self-esteem did not moderate the relationship between trauma and eating pathology.

### *Hypothesis 4*

The fourth hypothesis was that ethnic identity would moderate the relationships between the various forms of stress and the Global ChEDE-Q score. To assist with interpretation, the independent variables were centered by subtracting the mean from each individual score. The first set of analyses evaluated ethnic identity as a potential moderator. Because identifying with a European American identity may be expected to

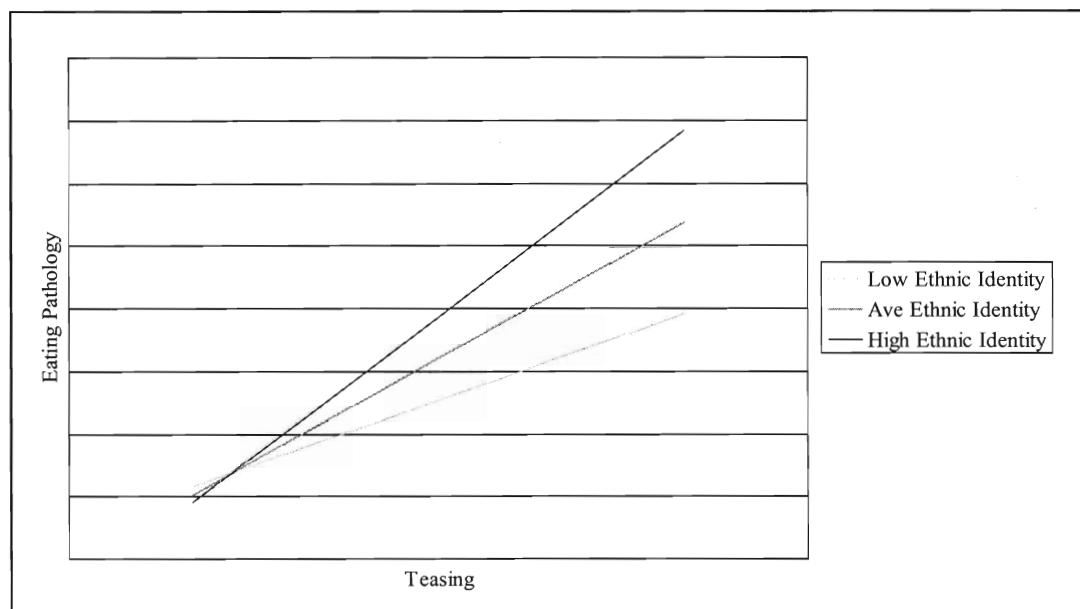
have a different relationship with eating pathology than identifying with an African American identity, based on theory and research (Smolak & Striegel-Moore, 2001), the ethnic identity moderation analyses were run separately in these two ethnic groups. The other ethnic groups were not included in these analyses because of their small sample sizes. To test ethnic identity, the main effects were entered into the regression in the first step, followed by the interaction of independent variable and MEIM.

*Teasing.* As can be seen in Table 4 below, for African Americans, feeling upset about teasing accounted for a significant portion of the variance in eating pathology. However, the interaction term was not significant, thus ethnic identity did not moderate the relationship between upset about weight teasing and eating pathology for African Americans. Feeling upset about teasing also accounted for a significant portion of the variance in eating pathology among European American participants. However, the interaction term was also significant in this subsample, indicating that ethnic identity does moderate the relationship between feeling upset about teasing and eating pathology for European Americans. This relationship is displayed graphically in Figure 2.

Table 4

*Ethnic Identity as a Moderator of the Relationship between Teasing and Eating Pathology*

	<u>African Americans</u>			<u>European Americans</u>				
	$\Delta R^2$	<i>B</i>	<i>SE B</i>	$\beta$	$\Delta R^2$	<i>B</i>	<i>SE B</i>	$\beta$
Step 1	.08+				.39*			
Ethnic Identity		.02	.02	.09		.01	.04	.08
Teasing		.04	.02	.32*		.11	.04	.68*
Step 2	.00				.27*			
Ethnic Identity		.02	.02	.09		-.01	.03	-.04
Teasing		.05	.02	.34*		.08	.03	.46*
Ethnic Identity X Teasing		.00	.00	-.07		.02	.01	.57*

+  $p < .10$ , \*  $p < .05$ *Figure 2: Ethnic Identity Moderates the Relationship between Teasing and Eating Pathology for European Americans*

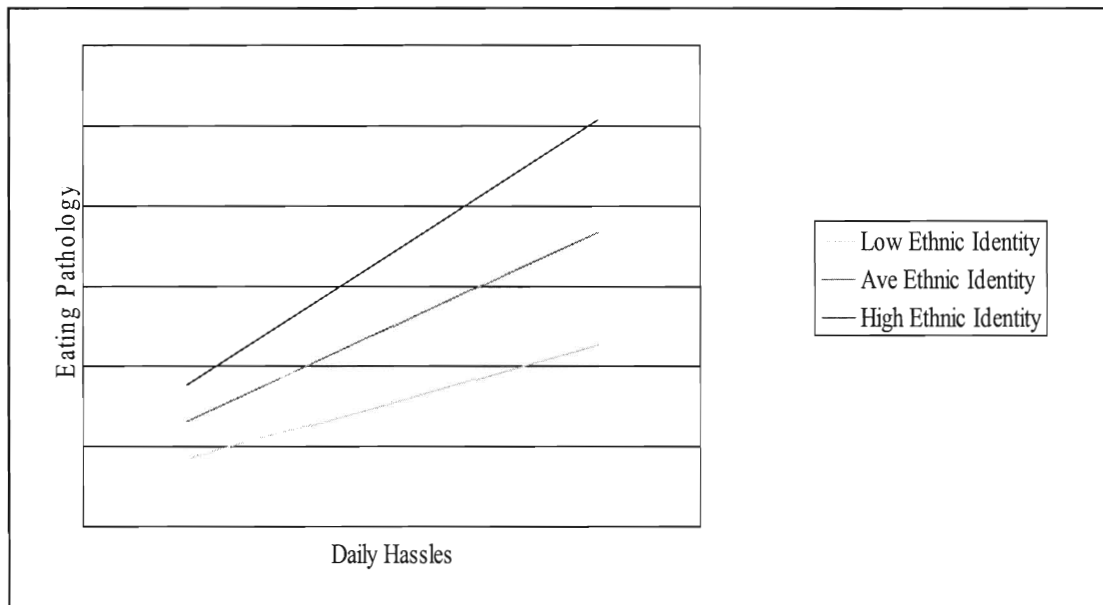
*Daily Hassles.* As displayed in Table 5, for African Americans, neither the step with the main effects nor that with the interaction term was significant, indicating that ethnic identity did not moderate the relationship between daily hassles and eating pathology. For European Americans, the first step was not significant. However, the interaction term was significant, indicating that ethnic identity also moderates the relationship between daily hassles and eating pathology for European Americans. This relationship is displayed graphically in Figure 3.

Table 5

*Ethnic Identity as a Moderator of the Relationship between Daily Hassles and Eating Pathology*

	<u>African Americans</u>				<u>European Americans</u>			
	$\Delta R^2$	<i>B</i>	<i>SE B</i>	$\beta$	$\Delta R^2$	<i>B</i>	<i>SE B</i>	$\beta$
Step 1	.00				.11			
Ethnic Identity		.03	.03	.18		.03	.05	.18
Daily Hassles		-.01	.02	-.07		.06	.03	.45
Step 2	-.02				.46*			
Ethnic Identity		.03	.03	.18		.05	.04	.24
Daily Hassles		-.01	.02	-.07		.01	.03	.04
Ethnic Identity X Daily Hassles		.00	.00	-.07		.02	.01	.76*

\*  $p < .01$



*Figure 3:* Ethnic Identity Moderates the Relationship between Daily Hassles and Eating Pathology for European Americans

*Trauma.* Table 6 displays the data for analyses of ethnic identity as a moderator for trauma. Among African Americans, the first step was significant with trauma accounting for a significant portion of the variance. However, the interaction term was not significant, thus ethnic identity did not moderate the relationship between trauma and eating pathology for African Americans. For European Americans, the first step was not significant, however, the second step was significant. With the addition of the interaction term, the main effects for both ethnic identity and trauma became significant. The interaction term was also significant, indicating that ethnic identity also moderates the relationship between trauma and eating pathology for European Americans. The beta weights for this equation are above 1.0 because there was some multicollinearity among the variables. However, all of the diagnostics are within acceptable ranges according to

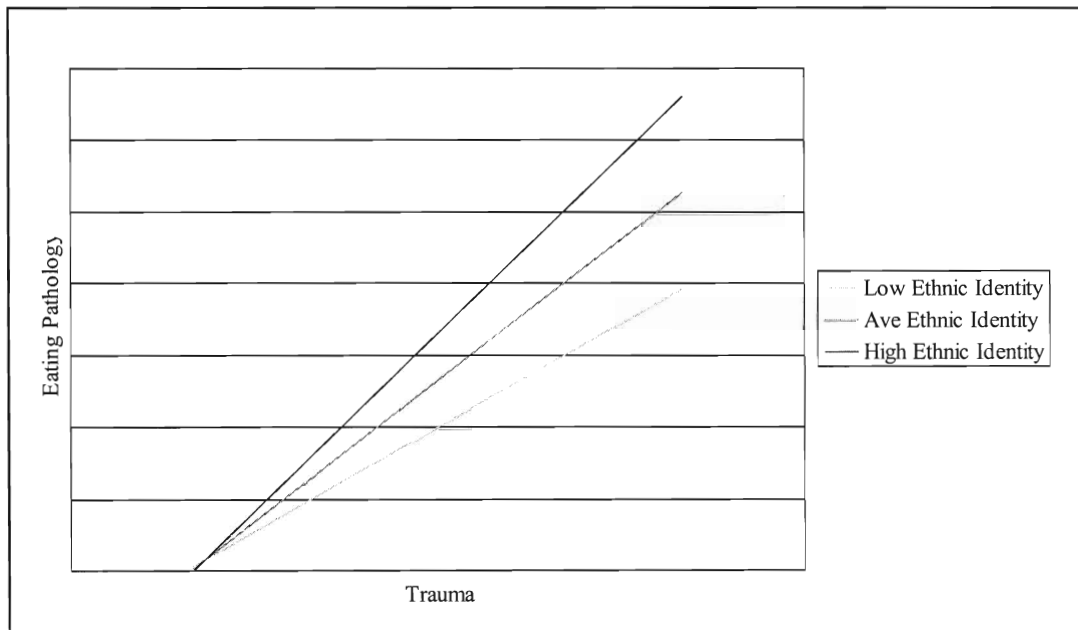
widely-used rules of thumb (VIF < 10, tolerance > .10, condition index < 15), therefore this equation was interpreted and is presented in Figure 4.

Table 6

*Ethnic Identity as a Moderator of the Relationship between Trauma and Eating Pathology*

	<u>African Americans</u>				<u>European Americans</u>			
	$\Delta R^2$	<i>B</i>	<i>SE B</i>	$\beta$	$\Delta R^2$	<i>B</i>	<i>SE B</i>	$\beta$
Step 1	.21**				.16			
Ethnic Identity	.01	.02	.04		.14	.09	.59	
Trauma	.27	.07	.49**		.00	.27	.00	
Step 2	.00				.44*			
Ethnic Identity	.01	.02	.05		.31	.08	1.30*	
Trauma	.26	.08	.47**		.99	.38	1.31*	
Ethnic Identity X Trauma	.01	.02	.06		.19	.06	1.27*	

\*  $p < .05$ , \*\*  $p < .01$



*Figure 4: Ethnic Identity Moderates the Relationship between Trauma and Eating Pathology for European Americans*

As can be seen in Figures 2, 3, and 4, the strength of the relationship between each form of stress and disordered eating varies depending on the level of ethnic identity for European American participants. The positive relationship between stress and eating pathology is strongest among individuals with high ethnic identity and weaker for those with low ethnic identity. For example, between two individuals who have experienced the same amount of daily hassles, the individual with a higher degree of ethnic identity is more likely to report disordered eating behaviors and attitudes than one with lower ethnic identity.

#### *Other Findings*

Table 7 presents frequencies and correlations for objective binge eating episodes, objective overeating episodes, and subjective binge eating episodes. The ChEDE-Q



includes two items which assess objective binge eating. The first asks, “On how many days out of the past 14 days have you had eating binges?” Each participant who endorsed this item at a frequency of at least one day in the past two weeks was counted under Objective Binge 1. The second asks participants whether “over the past two weeks have there been times when you felt that you ate what other people would think was an unusually large amount of food?” and then follows up with “During how many of these episodes of overeating did you have a sense of having lost control?” Each participant who answered “yes” to the first part of this question and also indicated that they experienced simultaneous loss of control was counted under Objective Binge 2. If participants reported episodes of eating that an unusually large amount of food without loss of control they were counted under Overeating. The ChEDE-Q also has an item assessing subjective binge eating (a sense of overeating with loss of control, but without eating an objectively large amount of food). Each participant who endorsed having at least one such episode was counted under Subjective Binge. It is possible for participants to belong to more than one of these groups.

Correlations displayed are for the rates that these episodes were reported to have occurred. The items assessing objective binge eating are significantly correlated, suggesting that participants were interpreting Objective Binge 1 (“On how many days out of the past 14 days have you had eating binges?”) correctly; in line with the instructions they were given prior to administration of the measure. However, when asked more explicitly about the criteria for an objective binge, participants did report fewer of these

episodes. None of the other episodes are correlated, suggesting that engaging in one type of eating behavior did not make participants susceptible to engaging in the others.

Table 7

*Frequencies and Correlations for Objective Binging, Overeating, and Subjective Binging (N = 81)*

Item	<i>n</i>	Percentage	1.	2.	3.	4.
1. Objective Binge 1	36	44%	--	.61*	.12	-.01
2. Objective Binge 2	23	28%		--	.07	.05
3. Overeating	24	30%			--	-.04
4. Subjective Binge	35	43%				--

\*  $p < .001$

With the exception of a significant negative correlation between Objective Binge 1 and self-esteem ( $r = -.24, p < .05$ ), none of the independent variables or proposed mediators and moderators were associated with abnormal eating episodes in the total sample. Among European Americans, subjective binge eating was positively correlated with ethnic identity ( $r = .49, p < .10$ ) and feeling upset about being teased ( $r = .59, p < .05$ ). Additionally, trauma was positively correlated with overeating ( $r = .77, p < .01$ ). As in the total sample, self-esteem was associated with Objective Binge 1 ( $r = -.24, p < .10$ ) among African Americans. Two-way MANOVAs were conducted to investigate gender and ethnic differences in rates of abnormal eating episodes and the ChEDE-Q subscales.

There were no significant main effects or interactions. However, observed power was extremely low (.10-.51), thus there is a 49-90% chance that a Type II error was made.

No participants reported vomiting to control their weight or shape over the past two weeks. Two participants endorsed laxative use. One reported doing this once in the past two weeks and the other reported doing it twice in the past two weeks. One participant reported using diuretics to control her weight and shape six times over the past two weeks. Thirty-one participants reported that they had exercised hard to control their weight over the past two weeks. This item is intended to measure excessive exercise, and the original EDE-Q reflects this (“how many times have you exercised in a “driven” or “compulsive” way). It is likely that many of participants in this study who endorsed this item were reporting normal exercise behaviors intended to assist with weight loss.

As seen in Table 1, the mean number of types of traumatic incidents experienced is two ( $SD = 1.77$ ). Table 8 presents the number of participants who endorsed having experienced each situation, as well as the number of those who considered the experience to be traumatic (according to the DSM-IV definition). For the total sample, the only types of trauma which were significantly correlated with the Global ChEDE-Q score were being in a storm and witnessing non-family physical violence. Witnessing non-family physical violence was also associated with objective binge eating. The same correlations were observed in the African American subsample. In addition, witnessing a car accident, the traumatic experience of being physically attacked, witnessing family physical violence, and witnessing verbal violence outside the home were associated with the Global ChEDE-Q score. The correlations in the European American subsample were

different. The traumatic experience of knowing someone who got sick or died was associated with objective binge eating and overeating. Being hospitalized or having an operation was associated with overeating. The traumatic experience of sexual abuse was associated with objective binge eating, overeating, and subjective binge eating.

Chi-square tests were used to evaluate differences in rates of trauma in European Americans and African Americans. More African Americans (52%) reported witnessing non-family physical violence than European Americans (9%),  $X^2 = 6.84, p < .01$ . More African Americans (53%) also reported witnessing non-physical, non-family violence than European Americans (9%),  $X^2 = 7.31, p < .01$ . However, when evaluating how many members of each ethnic group reported these experiences as traumatizing, there were no ethnic differences. Chi-square tests were also used to evaluate differences in rates of trauma in males and females. Of males, 54% reported having a surgery or hospital stay, compared to 30% of females,  $X^2 = 4.17, p < .05$ . Additionally, 31% of males reported being the victim of physical violence compared to 11% of females,  $X^2 = 4.87, p < .05$ . More males reported being kidnapped than females, because the only two participants who endorsed this experience were male. However, when evaluating how traumatic these experiences were, there was a trend toward more females (38%) than males (19%) reporting knowing people who had been sick or died and finding it traumatizing,  $X^2 = 2.74, p = .10$ . There was also a trend toward more males (15%) than females (4%) experiencing traumatizing non-physical, non-family violence,  $X^2 = 3.65, p = .06$ .

Table 8

*Trauma Frequencies*

Type	Total Sample Endorsed / Traumatized	African American Endorsed / Traumatized	European American Endorsed / Traumatized
1. Been in accident	29 (35%) / 23 (28%)	24 (36%) / 19 (29%)	4 (36%) / 3 (27%)
2. Witnessed accident	36 (43%) / 19 (23%)	27 (41%) <sup>a</sup> / 16 (24%)	6 (55%) / 2 (18%)
3. Natural disaster	52 (63%) <sup>a</sup> / 22 (27%) <sup>a</sup>	41 (62%) <sup>a</sup> / 20 (30%) <sup>a</sup>	8 (73%) / 1 (9%)
4. Known someone who got sick/died	78 (94%) / 26 (31%)	63 (96%) / 22 (33%)	11 (100%) / 3 (27%) <sup>b, c</sup>
5. Hospitalized/had operation	32 (39%) / 15 (18%)	25 (38%) / 11 (17%)	5 (46%) <sup>c</sup> / 2 (18%)
6. Physically attacked	14 (17%) / 6 (7%)	10 (15%) / 3 (5%) <sup>a</sup>	2 (18%) / 1 (9%)
7. Threatened physical attack	10 (12%) / 7 (8%)	8 (12%) / 6 (9%)	1 (9%) / 1 (9%)
8. Mugged/held up	3 (4%) / 2 (2%)	2 (3%) / 1 (2%)	0 (--) / 0 (--)
9. Kidnapped/taken away	2 (2%) / 2 (2%)	2 (3%) / 2 (3%)	0 (--) / 0 (--)
10. Family violence	23 (28%) / 15 (18%)	18 (27%) <sup>a</sup> / 11 (17%)	4 (36%) / 4 (36%)
11. Family yelling	48 (59%) / 12 (15%)	36 (55%) / 8 (12%)	8 (67%) / 3 (27%)
12. Non-family violence	39 (47%) <sup>a, b</sup> / 10 (12%) <sup>a</sup>	34 (52%) <sup>a, b</sup> / 9 (14%) <sup>a</sup>	1 (9%) / 0 (--)
13. Non-family yelling	37 (45%) / 6 (7%)	35 (53%) <sup>a</sup> / 6 (9%) <sup>a</sup>	1 (9%) / 0 (--)
14. Sexual abuse	8 (10%) / 6 (7%)	5 (8%) / 4 (6%)	2 (18%) <sup>c</sup> / 1 (9%) <sup>b, c, d</sup>
15. Threatened sexual abuse	2 (2%) / 2 (2%)	2 (3%) / 2 (3%)	0 (--) / 0 (--)
16. Other	2 (2%) / 2 (2%)	2 (3%) / 2 (3%)	0 (--) / 0 (--)

<sup>a</sup>Significantly correlated with Global ChEDE-Q    <sup>b</sup>Significantly correlated with objective bingeing

<sup>c</sup>Significantly correlated with overeating

<sup>d</sup>Significantly correlated with subjective bingeing

## Discussion

Rates of pediatric obesity are increasing, with negative effects on both physical and psychological health. Children who seek treatment for weight problems are more likely to report comorbid psychological problems, including binge eating and disordered eating attitudes. The purpose of this study was to investigate the prevalence of binge eating behavior in a sample of treatment-seeking obese adolescents. Additionally, this study provides information on associations among different forms of stress that obese adolescents may face (i.e., trauma, weight related teasing, and daily hassles) and binge eating and related concerns. Finally this study investigated potential mediators and moderators of the relationship between stress and disordered eating.

Twenty-eight percent of the sample reported that they had episodes of overeating with loss of control (the definition of a clinical or objective binge) within the past two weeks. The percentage of those endorsing episodes of overeating without loss of control was 30 percent. Forty-three percent of the sample reported subjective binge eating episodes, or experiences of loss of control without eating an unusually large amount of food. However, the correlations among the items which assess abnormal eating suggest that participants who engage in one type of abnormal eating are not more likely to engage in other types. Unfortunately, the ChEDE-Q does not include items to diagnosis the full criteria for BED, which includes at least two binge episodes per week. However, six (7%) of the participants did report four or more binge episodes in the past two weeks and

therefore may have met the criteria with further investigation. There were no gender or ethnic differences in overall eating pathology or in frequency of binge episodes.

The first hypothesis, that the forms of stress included in this study, teasing, daily hassles, and trauma, would be associated with greater frequency of binge eating, was not supported. None of the forms of stress were associated with objective binging, subjective binging, or overeating. Among African Americans, trauma was associated with dietary restraint, while teasing was a positive correlate of restraint within the European American subsample. In the total sample, teasing was associated with disordered eating attitudes, such concerns over eating, weight, and body shape, and trauma was associated with body shape concern and the global score. Among European Americans, all of the forms of stress, except trauma, were significantly associated with eating, weight, and body shape concerns, as well as the total score. In the African American subsample, trauma was significantly associated with all of the ChEDE-Q subscales and the total score.

In examining the total sample correlations, it appears that experiencing stress is associated with the attitudes that are common to various eating disorders instead of actual eating disorder behaviors (restraint and binge eating). Exceptions to this conclusion include race-specific correlations, e.g., the correlations of teasing with subjective binge eating and restraint and the association of trauma with overeating among European Americans. Likewise, there was a correlation between trauma and restraint among African Americans. The correlations among feeling upset over being teased with the ChEDE-Q concern subscales were similar for both ethnic groups. For African Americans,

traumatic experiences were associated with disordered eating attitudes, whereas daily hassles were a strong correlate of these attitudes among European Americans.

Because binge eating was not associated with the hypothesized independent variables, mediator, and moderators, the Global ChEDE-Q score was used as the dependent variable for analyses of mediation and moderation. The hypothesis that depressive symptoms would mediate the relationship between teasing and disordered eating was not supported. Instead, when entered simultaneously, teasing did not drop from significance, but depressive symptoms did. This suggests that feeling upset over being teased actually mediates the relationship between depressive symptoms and disordered eating. Although regressions can only suggest causality, the Baron and Kenny (1986) mediation procedures are used when one wishes to model a causal relationship with cross-sectional data. That is, to show “that the independent variable influences the mediator which, in turn, influences the outcome” (Holmbeck, 1997, p. 600). Because teasing meets the criteria for mediation (associated with both other variables, and reduces the association of the other predictor on the outcome variable), it suggests that teasing mediates the relationship between depressive symptoms and eating pathology. This result is counterintuitive because it is more difficult to conceptualize how teasing could channel the effects of depressive symptoms on eating pathology. However, an advantage of the POTS is that it allows for the measurement of emotional upset caused by teasing, and this was the subscale used in these procedures. Again, although the analysis does not prove causality, it suggests that depressive symptoms may affect a negative emotional reaction



to weight teasing which then leads to an increase in eating pathology among obese adolescents.

The third hypothesis was not supported. Self-esteem did not moderate the relationships of teasing, daily hassles, or trauma with disordered eating. Ethnic identity analyses were run separately for African American and European American participants because it was suspected that identifying strongly with African American ethnicity would have a different meaning in terms of eating pathology than identifying with European American ethnicity. Indeed, ethnic identity was not a significant moderator of the relationships of teasing, daily hassles, and trauma with eating pathology among African Americans. However, it was a moderator of these relationships among European Americans. European American participants with strong ethnic identity who also experienced each type of stress were more likely to also report eating pathology.

Past research has reported a wide range of binge eating prevalence in samples of obese and overweight adolescents, from 0% in a sample of 8-13 year old obese children seeking outpatient treatment (Levine et al., 2006), to 50% in a sample of 12-15 year old obese adolescents seeking inpatient treatment (Nederkoorn et al., 2006). The current sample is most similar to that of Glasofer and colleagues (2007) in terms of recruitment procedure (weight loss studies), region of the country (Bethesda, MD and Boston, MA), gender ratio (58% female) and ethnic ratio (54% African American). The major difference is that Glasofer et al. used the interview version of the ChEDE. However, the rate of objective binge eating (30%) was quite similar to that of the current study (28%), whereas the rate of subjective binge eating (15%) was less than the current study (43%).

Glaser et al. did not report rates of overeating without loss of control. In general, the rate of binge eating in the current study is about what would be expected in the context of past research.

Although the function of eating per se was not assessed in this study, the results do not support the hypothesis that the participants binge eat in order to deal with stressful situations. Trauma was not associated with binge eating, in contrast to Ackard et al. (2001) and Wonderlich et al. (2001), both of whom found that physical and sexual abuse were associated with binge eating in children. However, this result supports the conclusion of Grilo and colleagues (Grilo & Masheb, 2001; Grilo et al., 2005) that childhood trauma is not a reliable predictor of variability or severity of binge eating among obese individuals.

There is strong evidence to suggest that adults binge eat to cope with stress (Barker et al., 2006; Crowther et al., 2001; Freeman & Gil, 2004; Hansel & Wittrock, 1997; Harrington et al., 2006; Walfish, 2004; Wolff et al., 2000), but only two studies to support this relationship in adolescents (French et al., 1997; Fryer et al., 1997). The current study does not support the hypothesis that obese adolescents binge eat in response to daily hassles.

There is some evidence to suggest that weight teasing is associated with binge eating in ethnically diverse overweight adolescents (Haines et al., 2006; Neumark-Sztainer et al., 2002). In the current study, feeling upset over teasing was associated with subjective binging in European Americans only, but teasing was not associated with

objective binge eating. This result is consistent with Jackson et al. (2000), who found that weight teasing was not associated with binge frequency in adult women with BED.

It was hypothesized that depressive symptoms would mediate the relationship between teasing and eating pathology and there is one previous study which supported this hypothesis. Womble et al. (2001) found that negative affect (consisting of depression, low self-esteem, and neuroticism) mediated the relationship between weight teasing and binge eating in college undergraduates. However, when Baron and Kenny's (1986) procedures were used to test this hypothesis, it was revealed that feeling upset about being teased actually acted as the mediator. That is, when entered simultaneously to predict eating pathology, depressive symptoms dropped from significance while teasing remained significant. This indicates that the emotional reaction to being teased mediated the relationship between depressive symptoms and eating-related pathology. One previous study does support the finding of the current study. In a prospective study of bulimic behaviors, weight-teasing predicted later binge eating in adolescent females. However, although low self-esteem and depression predicted bulimic behaviors on a univariate level, they did not add significantly to the explained variance in a path model, which the authors indicate suggests the presence of mediating variables (Wertheim et al., 2001). In the current study, depressive symptoms were associated with disordered eating, but this relationship was also mediated by emotional distress related to being teased.

Unlike past research, the current data did not indicate that African Americans had higher levels of ethnic identity than European Americans (Bracey et al., 2004; Carlson et al., 2000; Phinney et al., 1997; Spencer et al., 2000; Yancey, Aneshensel, & Driscoll,

2001). However, ethnic identity operated differently in the relationships between stress and eating pathology for African Americans and European Americans. Ethnic identity has typically been conceptualized as a protective factor against psychopathology (e.g., Bisaga et al., 2005). However, the finding that strong ethnic identity may place European American adolescents at more risk for disordered eating is not surprising. Past research has found that are differences in the way that ethnic identity is associated with self-esteem and other pertinent variables among African Americans and Caucasians. For example, Phinney et al. (1997) found that “American identity” (a sense of belonging to the nation of America) was positively associated with ethnic identity and self-esteem only among European Americans. In contrast, American identity was negatively associated with ethnic identity and positively associated with negative attitudes toward other ethnic groups among African Americans. Carlson et al. (2000) found that despite its bivariate association with self-esteem, ethnic identity did not mediate the relationships of authoritative parenting and teacher support with self-esteem for European Americans in the way that it did for African Americans.

Marsiglia, Kulis, and Hecht (2001) also found different relationships between ethnic identity and unhealthy behaviors depending on ethnic groups. Although ethnic identity alone was not associated with drug use, the interaction of ethnic identity and ethnic label did account for a significant portion of the variance in drug use. African American adolescents with a strong sense of ethnic pride reported less frequent drug use and drug exposure, but the opposite relationship was found among European American adolescents such that those with higher ethnic pride reported more drug use.

Although there were no differences between African Americans and European Americans in rates of binge eating or ChEDE-Q scores, the results regarding ethnic identity as a moderator among European Americans are consistent with past research suggesting that membership in the European ethnic group is a risk factor for the development of eating problems. For example, body image dissatisfaction, a precursor of eating disorder symptoms (Polivy & Herman, 1993), is greater among European American females than African Americans (Cash, Morrow, Hrabosky, & Perry, 2004; Grabe & Hyde, 2006; Roberts, Cash, Feingold, & Johnson, 2005; Wildes, Emery, & Simons, 2001).

Similar ethnic differences are also found in children and adolescents. European American girls perceive themselves as more overweight, have greater personal weight concern, and perceive greater family and friend concern about weight than African American girls (Thompson, Raifiroiu, & Sargent, 2003). When compared to boys and African American girls, European American girls had the lowest rates of accurately perceiving themselves as normal weight, were the most likely to inaccurately categorize themselves as overweight and the least likely to inaccurately categorize themselves as underweight (Logio, 2003). Furthermore, when abuse history and accurate and inaccurate perceptions of being overweight were entered in regressions to predict disordered eating and dieting behaviors, accurate perceptions of being overweight was significant for European American and African American adolescents. However, abuse and inaccurate perceptions of being overweight were only significant for the European American adolescents.

Differences in perceptions of overweight may be related to the extent to which adolescents are aware of and internalize the thin body size idealized by majority Western culture (i.e., the “thin ideal”). However, results regarding ethnic differences in thin-ideal internalization are inconsistent. Abrams and Stormer (2002) found that European American adolescents reported higher levels of both awareness and internalization of the thin-ideal than African Americans. Likewise, in a sample of adolescents and young adults, among several measures of variables related to disordered eating, ethnic differences were only found in thin-ideal internalization, with European Americans reporting higher levels than African Americans (Shaw, Ramirez, Trost, Randall, & Stice, 2004). In contrast, Hermes and Keel (2003) found that non-European American girls had greater internalization, but not awareness of, the thin-ideal than did European American girls. This unusual finding was perhaps due to Hermes and Keel collapsing non-European American ethnicities into a single group comprised of African American, Asian, Hispanic, and mixed, whereas Abrams and Stormer (2002) and Shaw et al. (2004) compared European Americans, African Americans, Hispanics, and Asians separately.

Many previous studies have demonstrated that European American ethnicity increases the risk of developing disordered eating attitudes and behaviors. Past research on the relationship between ethnic identity and disordered eating is inconsistent, with two studies finding no relationship (Bisaga et al., 2005; Iyer & Haslam, 2003) and two studies suggesting that values associated with the European American identity are associated with disordered eating among female undergraduates (Abrams et al., 1993; Petersons et al., 2000). The current study found no ethnic differences in disordered eating, and except

for the positive relationship between ethnic identity and restraint among African Americans, ethnic identity was not associated with disordered eating at the bivariate level. However, this study is unique in that identifying highly with the European American ethnicity appeared to increase the risk of developing disordered eating in the context of stressful experiences. There is a greater emphasis on the thin-ideal within the European American culture and Petersons et al. (2000) suggested that for some European American women, the thin body ideal has merged with their identity as European American women. Thus, obese adolescents who identify with the European American culture may be more susceptible to developing disordered eating when they are also faced with the stress of teasing, trauma, and daily hassles. However, research is needed to explore whether this is indeed the case, or whether some other aspect of European American ethnic identity may account for its moderating role. For example, in their meta-analysis of ethnic differences in body dissatisfaction, Roberts et al. (2005) concluded weight-focused models do not fully explain ethnic differences in body image satisfaction.

The results of this study have several implications for the prevention and treatment of pediatric obesity. First, this study provides further evidence that rates of binge eating in adolescents who seek treatment for obesity are quite high, with nearly one-third reporting at least one episode of binge eating within the last two weeks. These behaviors may have implications for participants' success in losing weight. For example, Braet (2006) reported that EDE scores were negatively associated with weight loss at two year follow up in her study of pediatric obesity treatment. However, Levine et al. (2006) reported that in their sample of treatment-seeking obese adolescents, weight loss results

did not differ for children with and without subjective binge eating. In one study of a behavioral weight loss program for adult women, it was found that individuals with BED actually lost more weight and reported the greatest improvement in depressive symptoms during the program (Gladis et al., 1998). There was no difference in weight loss or weight re-gain at one year follow-up between those who did and did not binge eat. There is also a concern that behavioral weight-loss treatment may worsen binge eating, a concern which follows the logic of the restraint model (Polivy & Herman, 1985). However, in a review of weight-loss studies with overweight children and adolescents, Butryn and Wadden (2005) concluded that these programs were not generally associated with an increase in eating disorder symptoms, but were associated with improvement in psychosocial outcomes. In fact, Neumark-Sztainer (2005) suggests that because of the overlap between disordered eating and obesity, programs should provide a more integrated treatment of these two health concerns.

Second, this study highlights the salience of weight-related teasing among obese adolescents. Teasing was a nearly ubiquitous experience in this sample, with 92% of the sample reporting experiencing weight-related teasing, and 77% of the sample reporting being upset over weight-related teasing. Out of the three forms of stress measured, it was the most highly correlated with the ChEDE-Q subscales and global score. Additionally, mediation analyses demonstrated that feeling upset about being teased accounted for the relationship between depressive symptoms and disordered eating. Therefore, weight-loss programs may wish to include a treatment component focused on coping with the stigma of obesity as well as the teasing that can result from this stigma.



This study does have some limitations which must be addressed. Most significantly, the cross-sectional design does not permit causal interpretations of the data. Additionally, the results from this study are not generalizable to all obese adolescents, but only to the subset who seeks treatment for their obesity. The relative large proportion of African American participants in this study may be considered an asset because this subsample is generally understudied in eating disorder research. However, other ethnic minorities were underrepresented, which also limits the external validity of these findings. In particular, the low number of Latino participants is curious given the high rates of obesity in this population. Latinos are a demographic minority in the Richmond area, but have a significant presence in the community nonetheless. Further research and development of the project may wish to consider how to make it more culturally appropriate for this ethnic group.

Also, although interesting results were found in the European American subsample, this group was also quite small. Perhaps non-parametric statistics could also be used to analyze group differences. Finally, interview measures of eating disorders are generally preferred over questionnaire measures because of their greater validity in assessing DSM-IV binge eating episodes (Decaluwe & Braet, 2004; Passi, Bryson, & Lock, 2003; Tanofsky-Kraff et al., 2003). However, practical limitations did not permit the use of an interview and the rates of disordered eating episodes should be considered estimates. Finally, this study does not have a control group of non-treatment seeking or non-obese adolescents. The inclusion of such control groups would have provided even

more useful information about rates of binge eating and the relationships of stressful experiences with disordered eating.

This study also has several strengths. One was the inclusion of additional instructions to clarify the definition of binge eating, as suggested by Goldfein et al. (2005). When participants were asked whether they had episodes of binge eating in the past two weeks, 44% reported that they had. However, when asked whether they had episodes of overeating that included a sense of loss of control, only 28% reported that they had. However, these two items were positively correlated with one another, but not with the other types of eating episodes. This suggests that participants did interpret the question about binge eating correctly, giving further support to the use of instructions and examples when assessing binge eating using the ChEDE-Q.

Second, this study extended past research on childhood trauma in disordered eating by including an interview measure of several types of potentially traumatic experiences in addition to abuse. Furthermore, the interview allowed for investigation of whether participants experienced these events as traumatic according to DSM criteria. Eighty percent of the sample reported experiencing a potentially traumatic event that met the DSM criteria. Not surprisingly, children were more likely to report being traumatized by events that are not uncommon in life (i.e., being in an accident, witnessing an accident, being in a natural disaster, knowing someone who has gotten sick or died, or being hospitalized). Trauma was a significant predictor of eating pathology, therefore, this study speaks to the importance of assessing various forms of commonly experienced trauma in addition to the usual suspects of physical and sexual violence.

This study is also unique in its investigation of the relationships among the variables which are typically associated with disordered eating in obese adolescents. Most previous studies have been limited to bivariate correlations or simultaneous entry in regression equations. The current study provides more information on how variables may mediate and moderate the relationships among stressful experiences, psychological distress, and disordered eating. Furthermore, this study is unique in that it goes beyond the study of main effects of ethnicity in obesity and disordered eating by including a measure of ethnic identity. Although sociocultural hypotheses of ethnic differences in disordered eating abound, very few have considered whether the degree of identification with an ethnic group is an important consideration.

This study suggests many routes for future research. Follow-up data are currently being collected in this sample. Therefore, it would be interesting to see if the relationships among the variables in this study persist over time and with treatment for obesity. Past research has not generally found binge eating to be problematic in weight-loss treatment or that treatment exacerbates binge eating. However, it would be useful to know whether binge eating is associated with weight loss or whether rates of binge eating change as treatment progresses. Finally, future research could investigate the moderating effect of ethnic identity in the relationship between stressful experiences and disordered eating among European American participants. It would be useful to investigate whether individuals with high levels of European American ethnic identity also have greater body dissatisfaction or internalization of the thin ideal, and if so, whether these factors account for the moderating role of ethnic identity.

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### Vita

Clarice Karine Gerke was born on November 12, 1978 in Peoria, Illinois, and is an American citizen. She graduated from Illinois Valley Central High School in Chillicothe, Illinois in 1996 and went on to major in psychology at the University of Illinois at Urbana-Champaign. She graduated with a Bachelor of Science in 2000 and worked for two years to gain research and clinical experience before attending graduate school. She enrolled in the Counseling Psychology Doctoral Program at Virginia Commonwealth University in Richmond in 2002 under the mentorship of Dr. Suzanne Mazzeo. She did her master's thesis on the role of dissociation and depression in the relationship between childhood trauma and bulimia and obtained her Master of Science in 2004. This project earned her the American Psychological Association Counseling Health Psychology Student Research Award. In 2004, Clarice began work in the T.E.E.N.S. program, an interdisciplinary clinical research trial for the treatment of adolescent obesity. Her work in this program earned her the Corazzini Award for Therapeutic Group Work and the John P. Hill Award for Adolescent Research, both in 2006. Clarice did her clinical internship at an APA-accredited site, Eastern Virginia Medical School, in 2006-2007. She subsequently graduated with a Doctor of Philosophy in Counseling Psychology and began work as a psychologist in the Forensic Program at Eastern State Hospital in Williamsburg, Virginia.

