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Weight Stigma as a Mediator among BMI, Childhood Overweight, Body Image and Depression

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by

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Each person whose signature appears below certifies that this thesis in his/her opinion is adequate, in scope and quality, as a thesis for the degree Doctor of Philosophy.

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ABBREVIATIONS

BMI	Body Mass Index
CDC	Centers for Disease Control and Prevention
WHO	World Health Organization
SEM	Structural Equation Modeling
QEWP-R	Questionnaire for Eating and Weight Patterns—Revised
SSI	Stigmatizing Situations Inventory
CESD-R	Center for Epidemiologic Studies Depression Scale—Revised
PHQ-9	Patient Health Questionnaire—9 items
MBSRQ-AE	Multidimensional Body Self-Relations Questionnaire—Appearance Evaluation
EDI-3-BD	Eating Disorder Inventory—3rd edition—Body Dissatisfaction
CFI	Bentler Comparative Fit Index
SRMR	Standardized Root Mean Square Residual
RMSEA	Root Mean Square Error of Approximation
CI	Confidence Interval

ABSTRACT OF THE THESIS

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by

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Doctor of Philosophy, Graduate Program in Clinical Psychology
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Dr. Sylvia Herbozo, Chairperson

Higher body mass index (BMI), childhood overweight, and weight stigmatization are correlated with depression and body dissatisfaction. Given that overweight/obese individuals are likely to experience significant weight stigma, the goal of the current study was to examine the effects of current weight and childhood overweight on depression and body dissatisfaction, and to examine weight stigmatization as a mediator in these relationships. Participants were 380 undergraduate students from the University of South Florida (84.5% female) with a mean age of 21.18 (*SD* = 4.32) and a mean BMI of 23.86 (*SD* = 5.03). Of these students, 53.4% were White, 24.7% were Hispanic, 10.0% were Black, 7.9% were Asian, and 3.9% reported Other; 31% reported having been overweight as children. A measurement model and three structural models were examined using EQS Version 6.2. The measurement model was found to have very good fit: χ^2 (1) = 0.000, $p > .98$; CFI = 1.0; SRMR = .00; RMSEA = .000, 90% CI [0.00, 0.00]; all correlation residuals < |.10|. The final full model was the best-fitting structural model, with very good fit: χ^2 (8) = 9.607, $p > .29$; CFI = .999; SRMR = .013; RMSEA = .023, 90% CI [0.000, 0.067]; all residuals < |.10|. This is the first study to examine the relationships among weight stigma experience, depression, and body image

dissatisfaction. Results indicated that weight stigma explained some of the variance in the relationships between current BMI and body dissatisfaction and current BMI and depressive symptoms. Weight stigma was also found to explain some of the variance in the relationship between childhood overweight and depressive symptoms. In addition, after controlling for childhood overweight and body image dissatisfaction, higher current BMI predicted lower levels of depressive symptoms. This is the first study to examine weight stigma as a mediator of the effects of BMI and childhood overweight on depression and body image dissatisfaction. The current study highlights the need to address weight stigmatization among overweight/obese individuals and to promote public education on the short- and long-term effects of weight stigma. Future researchers should examine the effect of other variables on the development of depressive symptoms in overweight and obese individuals, as well as potential protective factors.

CHAPTER ONE

INTRODUCTION

Stigma, prejudice, and discrimination are problems faced by many obese individuals. Crandall (1994) compared today's attitudes toward the obese as similar to racist attitudes in the 1940s, describing such attitudes as "overt, expressible, and widely held" (p. 891). Employment discrimination toward obese individuals is especially widespread (Roehling, 1999). The stigma associated with obesity seems to be lifelong, starting in preschool children as young as three years old and continuing into adulthood (Cramer & Steinwert, 1998; Staffieri, 1967). It is pervasive across various populations, even among health professionals who work closely with obese patients and those who conduct obesity research (Schwartz, Chambliss, Brownell, Blair, & Billington, 2003).

Research has shown that weight stigmatization often has negative psychological consequences, such as depression and body dissatisfaction, among overweight and obese individuals (Friedman et al., 2005). It is important to consider these psychological problems when addressing weight stigmatization in treatment with those who are overweight or obese. Prolonged and repeated exposure to this stigma may have a cumulative effect. That is, if a person has been overweight or obese since childhood, the consequences related to weight stigma may be worse than those of a person who became obese in adulthood. However, no research has been conducted in this area. If there was evidence indicating that being obese in childhood predicted more negative outcomes, interventions should also target the effects of weight stigmatization in overweight or obese children to minimize negative outcomes in the future. Finally, the majority of research has focused on depression and body image dissatisfaction as direct results of

obesity, when it may be that weight stigmatization experience could mediate the relationship between obesity and depression and between obesity and body image dissatisfaction. If this relationship exists, then education on weight stigmatization and efforts to reduce weight discrimination may be needed.

CHAPTER TWO

LITERATURE REVIEW

Obesity

Obesity is commonly assessed using body mass index (BMI). This measure typically is obtained by dividing a person's weight in kilograms by his or her height in meters squared. While this measure does not take into account muscle mass in addition to fat percentage, BMI has been shown to function well as a general measure of overweight and obesity (Deurenberg, Weststrate, & Seidell, 1991). A person with a BMI at or above 25 is considered overweight, while a person with a BMI at or above 30 is considered obese (Centers for Disease Control and Prevention, 2013).

According to the World Health Organization (2013), the rates of obesity worldwide have nearly doubled since 1980. In 2008, it was estimated that the BMIs of 1.4 billion adults aged 20 and older fell within or above the overweight interval. Of this number, 500 million were obese. In 2011, it was estimated that, worldwide, over 40 million children under the age of five were overweight (WHO, 2013). Some reports have suggested that the rates of obesity may have leveled off in many developed countries, including the United States, at least among the higher socioeconomic classes of society (Rokholm, Baker, & Sørensen, 2010). However, even if these obesity rates remain relatively stable, they are notably high and highlight both a significant public health concern and a major shift in the population demographics.

Specifically in the United States, obesity rates have increased significantly over the past 20 years. A study by Mokdad et al. (1999) found that between 1991 and 1998, the prevalence of obesity increased from 12.0% to 17.9%. While the increase occurred

among all groups, the largest increases were among those in early adulthood, those with some college education, and those of Hispanic ethnicity. The current obesity rate is 35.7% of all US individuals, with another approximately 33% of the population falling in the overweight BMI range (Centers for Disease Control and Prevention, 2013). If this trend continues, Wang and Beydoun (2007) estimated that as much as 75% of US adults will be overweight by 2015, with 41% of these being obese.

Wang and Beydoun (2007) found that the prevalence of obesity in minority ethnic groups was an average of 10% higher than those in the majority group (i.e., non-Hispanic Whites). Non-Hispanic blacks tend to have the highest levels of obesity, with black women having a rate as high as 20% above that of non-Hispanic White women. According to the CDC (2013), non-Hispanic blacks have an age-adjusted obesity rate of 49.5%. Nearly all other minority groups have higher rates of obesity than White Americans; the only exception is Asian Americans, who have obesity rates at about half of the average. However, given the considerable diversity within each broad ethnic category, large differences exist among subgroups of Asian Americans, with Native Hawaiians and Samoans having a much higher prevalence of obesity than other groups (Wang & Beydoun, 2007).

While rates of obesity may be higher among different ethnic groups as measured by BMI, the nature of this measure may render some conclusions invalid. Some studies have shown that with the same BMI, blacks have a lower percentage body fat and higher lean body mass than Whites, while Asian Americans have higher body fat and lower lean body mass than Whites (Flegal, Carroll, Ogden, & Curtin, 2010). However, some researchers recommend using BMI as the indicator for obesity across all ethnic groups,

citing no significant differences among groups (Gu et al., 2006). Others have suggested the use of other possible measures of obesity, including body fat percentage (measured by skinfold calipers or densitometry) and waist circumference (Womersley & Durnin, 1977). While some have asserted that body fat percentage is more accurate than BMI (defined as classifying more individuals as obese; Shah & Braverman, 2012), BMI has been shown to predict health outcomes as well as or better than other methods including body fat percentage (Tulloch-Reid et al., 2003). In addition, BMI is faster, cheaper, and easier to obtain than body fat percentage. Regardless of the measure, ethnic disparities in obesity rates should be carefully considered and perhaps controlled for before conclusions are drawn.

Psychosocial Consequences of Obesity

Weight Stigmatization

Although overweight and obese individuals make up such a large percentage of the US population, there is still much stigma associated with being obese. Goffman (1963) described a stigmatized person as "possessing an attribute that makes him different from others . . . and of a less desirable kind—in the extreme, a person who is quite thoroughly bad, or dangerous, or weak[,] . . . reduced in our minds from a whole and usual person to a tainted, discounted one" (p. 3). When a person holds negative views of obese persons, such as ideas that they are lazy, weak-willed, or gluttonous, he or she is more likely to treat them in an unkind or cruel manner.

Weight stigmatization has been documented in many populations. For instance, Powlishta, Serbin, Doyle, and White (1994) found that children were less likely to play

with an obese classmate and more likely to attribute to them negative traits, such as "emotional," "weak," or "cruel." Chambliss, Finley, and Blair (2004) found a strong implicit bias against obese individuals among young adults studying exercise science. This stigma is also evident across various ethnic groups. Wang, Brownell, and Wadden (2004) found that stigma toward obese persons was widespread, with no differences between Caucasians and African Americans or among those of different weight groups on either explicit or implicit measures. Greenleaf, Chambliss, Rhea, Martin, and Morrow Jr. (2006) also found prejudice toward overweight or obese individuals across a range of ethnicities, with no differences between Hispanic and White adolescents.

However, others have found differences between ethnic groups. A study by Latner, Stunkard, and Wilson (2005) found that some groups, specifically Whites, males, and individuals who were not obese, generally held more stigma toward obese persons. In addition, Schwartz, Vartanian, Nosek, and Brownell (2006) found that those with a higher BMI had lower implicit and explicit stigma against obese persons. In contrast, an early study of children by Harris and Smith (1982) found no relationship between weight status and stigma against the obese, and Rich et al. (2008) found that, in children, stigma toward obese individuals actually increased as respondent BMI increased. Friedman et al. (2005) also found that having a higher BMI was related to greater weight stigmatization. Despite the inconsistent findings, it remains evident that stigma against obese persons is widespread and potentially harmful.

Obese individuals report experiencing stigma and discrimination from many sources, including medical professionals (Kaminsky & Gadaleta, 2002; Vartanian & Shaprow, 2008), peers (Carr, Jaffe, & Friedman, 2008), and family (van den Berg,

Neumark-Sztainer, Eisenberg, & Haines, 2008; Vartanian & Shaprow, 2008). They also report experiencing weight stigmatization from strangers and acquaintances with whom they interact in daily life, such as neighbors, police, or cashiers (Ashmore, Friedman, Reichmann, & Musante, 2008; Carr & Friedman, 2005; Friedman, Ashmore, & Applegate, 2008; Friedman et al., 2005; Puhl, Moss-Racusin, Schwartz, & Brownell, 2008). Not only do these numerous sources of weight stigma highlight the pervasiveness of the problem, but the effects may be compounded when stigma is present in more than one situation.

Weight discrimination has been directly linked in previous research to psychological problems. Carr and Friedman (2005) found a positive relationship between obesity and lower self-acceptance that was mediated by the experience of discrimination. In addition, Friedman et al. (2005) found that the effect of stigma on body image was mediated by negative attitudes about one's own weight. More recently, Hunger & Major (2014) found a relationship between BMI and psychological health including self-esteem, depressive symptoms, and quality of life that was mediated by perceived weight discrimination. Researchers have reported additional negative psychological and physical outcomes associated with obesity stigma and discrimination, such as depression (Fettich & Chen, 2012; Friedman et al., 2008; Friedman et al., 2005), body image distress (Friedman et al., 2008; Friedman et al., 2005), low self-esteem (Friedman et al., 2008), general psychological distress (Ashmore et al., 2008), increased binge eating or emotional eating (Ashmore et al., 2008; Puhl, Moss-Racusin, & Schwartz, 2007), and refusal to diet (Puhl et al., 2007).

Experiencing stigma may also make it difficult for obese persons to develop the healthy lifestyle necessary to relieve their health and medical problems. While Sharma, Wharton, Forhan, and Kuk (2011) found that, while increased experience of weight discrimination was correlated with higher weight loss goals, the increased discrimination rendered it more difficult to achieve those goals. A study by Carels et al. (2009) showed that among those undergoing weight-loss treatment, individuals with more positive attitudes toward obese persons were more likely to stay in treatment, to self-monitor, to lose more weight, and to adhere better to every treatment goal. Alegria, Drury, and Louis (2002) found a positive correlation between BMI and avoidance of health care, indicating that individuals with higher BMIs were less likely to seek health care services. It is likely that these individuals avoided such services because of previous stigmatizing experiences. Unfortunately, avoiding healthcare can deter overweight or obese individuals from pursuing their weight loss goals. Similarly, Vartanian and Shaprow (2008) found a strong association between perceived stigma from doctors and family members and exercise avoidance among obese individuals. Individuals who experienced more stigma were less likely to exercise. Thus, weight stigmatization appears to have negative clinical implications, especially with regard to weight loss goals.

Body Image Disturbance

Along with the negative psychological effects of weight stigma, researchers have examined other psychological consequences of obesity, including body image disturbance. Grogan (2008) defined body image as "a person's perceptions, thoughts, and feelings about his or her body" (p. 3). The term "body image disturbance" generally

refers to various types of problems with body image and researchers often disagree on its exact parameters. Therefore, many researchers often use the construct of body dissatisfaction to measure problems with body image. Grogan described body dissatisfaction as "a person's negative thoughts and feelings about his or her body," adding that this "usually involves a perceived discrepancy between a person's evaluation of his or her body and his or her ideal body" (p. 4). Body image dissatisfaction is a strong predictor of negative psychological outcomes, including eating disorders, and has been specifically linked with Binge Eating Disorder (BED) in obese individuals (Schwartz & Brownell, 2004).

Most of the research in this area suggests that obese individuals experience more body dissatisfaction than those of average weight. For example, Adami et al. (1998) found that body image dissatisfaction was higher among obese persons than among those of normal weight, even when compared to formerly obese persons. Friedman, Reichmann, Costanzo, and Musante (2002) reported similar results, showing a positive association between BMI and body satisfaction in a clinical sample of obese individuals. In addition, Eisenberg, Neumark-Sztainer and Story (2003) conducted a study on a diverse sample of 4746 adolescents in grades 7-12 and found that girls who were overweight had 2.18 times greater odds than girls who were not overweight of having low body satisfaction. Compared to boys who were not overweight, overweight boys had 2.06 times greater odds of having low body satisfaction.

Research that has focused only on women has found a significant relationship between being obese and body dissatisfaction, although the studies used slightly different indicators. For instance, Annis, Cash, and Hrabosky (2004) compared currently

overweight/obese women (categorized using BMI) with formerly- or never-overweight/obese women and reported an association between being overweight/obese and having higher body dissatisfaction. It was not clear why the categories of overweight and obese were not examined separately. Of those who were currently overweight, 83% fell into the "obese" category (BMI $\geq$ 30), indicating that most of the overweight/obese group was obese.

Two additional studies have examined different indices to define obesity. However, both studies found a significant positive relationship between higher weight status and higher body dissatisfaction. In the study by Kreitler and Chemerinski (1990), the authors compared participants' weights to Bray's weight tables to obtain a measure of percent overweight. This study showed a positive relationship between obesity and body dissatisfaction. In addition, Sarwer, Wadden, and Foster (1998) found the same relationship using BMI to compare samples of obese and non-obese women..

In contrast, a few studies have found no significant associations between obesity and body image disturbance. It is important to note, however, that these studies seem to have methodological problems. The study by Faubel (1989) classified women into weight categories defined by life insurance tables from 1983, the validity and reliability of which the author does not describe. In addition, Faubel excluded from the analysis women who answered positively to questions of binge eating, laxative abuse, or vomiting. While these unhealthy behaviors could be considered confounding variables, it would have been more helpful to include these individuals into the analyses and control for these variables, which would allow the researcher to examine their influence on psychological problems. As noted by Faubel, much of the research on obesity and body image has been conducted

on those seeking treatment for their condition—a group of people that she did not examine. It may be that overweight or obese people who do not seek treatment have lower levels of psychological problems than those who do seek treatment.

Grilo, Masheb, Brody, Burke-Martindale, and Rothschild (2005) conducted a study of gastric bypass candidates and found no association between obesity and body image dissatisfaction. However, it is important to consider that all participants in this study were obese. Perhaps once a person is obese, degree of obesity may no longer significantly affect his or her body image satisfaction. In addition, the sample size of men was small compared to the sample of women (44 and 216, respectively). It is possible that with a larger sample size, an association could be found between obesity and body image dissatisfaction for men.

Depression

Research on clinical populations has shown that depression is related to body image. While the majority of the studies examined levels of depressive symptoms as measured by self-report rather than a diagnosis of depression, the term "depression" will be used throughout the document for simplicity. In a study conducted by Grilo et al. (2005) in a clinical sample of obese men and women, higher levels of body dissatisfaction were positively correlated with higher levels of depression. Friedman et al. (2002) found this same trend among obese individuals in a weight-loss facility. Rosenberger, Henderson, and Grilo (2006) also reported a positive association between body dissatisfaction and depression in a sample of obese women undergoing weight-loss surgery. Friedman, Reichmann, Costanzo, and Musante (2002) found that body image

dissatisfaction partially mediated the relationship between extent of obesity (BMI) and depression. However, a study by Wardle, Waller, and Rapoport (2001), found the opposite—depression may mediate the relationship between obesity and body dissatisfaction. While the exact relationship may be unclear, it is well-established that the body image dissatisfaction and depression are linked.

Depression is another psychological variable affected by obesity, and in recent years much research has focused on the link between obesity and depression, with most studies finding that obese individuals are more depressed than their normal-weight peers. This trend has been observed across studies of different populations and using a variety of methods. For example, Dong, Sanchez, and Price (2004) examined families in a genetic study and reported that higher BMI was a significant predictor of depression, even after controlling for variables such as family history, familial depression, and demographic risk factors. In a longitudinal study with a nonclinical sample, Roberts, Kaplan, Shema, and Strawbridge (2000) found that obesity at baseline predicted depression one year later. A number of studies have also shown this relationship between higher levels of weight status and depressive symptoms within clinical populations (Friedman et al., 2002; Grilo et al., 2005). Despite the methodological differences, studies in this area generally indicate that obese individuals have higher rates of depression than non-obese individuals (Roberts, Deleger, Strawbridge, & Kaplan, 2003; Ross, 1994).

Research examining obese and non-obese children and adolescents has shown that obese children often develop depression during adulthood. In a sample of 9- to 16-year-old Caucasian children, Mustillo et al. (2003) found that boys, but not girls, who had been obese since childhood had 3.7 times greater odds of being depressed than those who

had never been obese. Sanderson, Patton, McKercher, Dwyer, and Venn (2011) also reported an effect of childhood obesity on later depression, but the effect was stronger among girls. Among those women who were obese as children, those who had become non-obese by adulthood had a prevalence rate of 9.4% for depression, which is slightly higher than in the general population (CDC, 2013), while those who were still obese by adulthood had a rate of 24%.

Conversely, other researchers have found no relationship between depression and obesity; however, these differences could be due to sampling factors. Besides the methodological issues mentioned previously, it is possible that the study by Faubel (1989) had a sample that was not representative of the entire population, as the sample consisted only of women recruited from Los Angeles churches and business groups. Eisenberg, Neumark-Sztainer, and Story (2003) studied a sample of adolescents in grades 7-12 and found no difference in rates of depression between overweight adolescents and adolescents of average weight. However, this study only included overweight, average weight, and underweight students. It is likely that the lack of an obese group of students influenced the findings regarding obesity and depression.

Additional studies with inconsistent findings have been conducted on representative community samples. However, these communities were located in Germany, which may have different characteristics than the US population under study (Hach, Ruhl, Klotsche, Klose, & Jacobi, 2006; John, Meyer, Rumpf, & Hapke, 2005). According to the International Association for the Study of Obesity (2007), Germany has an obesity rate of about 20%, which is lower than the US's rate of 35.7%. The difference in obesity's prevalence may have led to the difference in depression rates. In addition, the

study conducted by John et al. (2005) used BMI as a measure of obesity, which is the norm measure of weight class, whereas the previously noted study by Hach et al. (2006) used waist circumference. This difference in measurement may have led to the difference in results.

Obesity in Childhood

Another area that requires further investigation is the specific effects of being overweight in childhood. Researchers have found that weight differences exist between early and late obesity onset groups. For example, Grilo et al. (2005) found that those with childhood onset obesity tend to have a higher BMI than those with adult onset. In addition, Mills and Andrianopoulos (1993) found that obese adult outpatients who had been obese since childhood were significantly more overweight than those who had become obese in adulthood. Similarly, Sorbara and Geliebter (2002) also found that individuals with childhood onset obesity weighed more and had higher BMIs than those with adult onset, but that there was no difference in percentage body fat between the two groups. Finally, a study on obese women by Wardle, Waller, and Fox (2002) found that those who were obese by age 16 had higher BMIs than those with obesity onset after age 16.

If higher rates of body image dissatisfaction and depression are associated with greater weight, then those who become obese as children may be more susceptible to such outcomes. In addition, given that the experience of weight stigmatization is related to the development of body dissatisfaction and depression in overweight and obese individuals, it is likely that individuals would experience more stigma over their lifetimes

the earlier they become overweight or obese. Finally, childhood and adolescence is a critical period for development and the occurrence of weight stigmatization during this period may be particularly harmful. For example, Puhl and Latner (2007) asserted that up to 96% of overweight or obese girls experience weight stigma in the form of negative comments or other bullying. It is possible that the effects of stigma could be even stronger during childhood than during adulthood.

Body Image Disturbance

A split exists in the literature on differences in body image dissatisfaction between those with adult and childhood onset obesity. Some researchers have documented an increase in body dissatisfaction among those with childhood onset obesity compared to those with adult onset. For example, in a sample of obese outpatients, Sorbara and Geliebter (2002) found that those with childhood onset obesity had higher rates of body dissatisfaction than those with adult onset. In addition, Wardle et al. (2002) demonstrated that women in clinical settings who were obese by the age of 16 had higher body dissatisfaction than those who had become obese later in life. Grilo, Wilfley, Brownell, and Rodin (1994) also examined obese women in a clinical setting and reported that those with childhood onset had higher body dissatisfaction than those with adult onset. Finally, Adami et al. (1998) found a trend toward significance in a sample of obese patients, with childhood onset predicting higher body dissatisfaction than adult onset. These findings suggest that earlier onset of obesity may lead to higher levels of body dissatisfaction in adults.

However, other researchers have not found a significant difference in body image between those with childhood and adult onset obesity. For example, Grilo et al. (2005) examined adults seeking bariatric surgery and found no difference in body dissatisfaction between individuals with childhood and adult onset obesity. In addition, a study by Jackson, Grilo, and Masheb (2000) that examined obese female patients with BED reported no significant differences in body dissatisfaction among those with childhood, adolescent, or adult onset obesity. Furthermore, in an earlier study by Faubel (1989) with a non-clinical sample of Los Angeles women, age of obesity onset did not significantly predict rates of body dissatisfaction, although the potential methodological problems with this study have been reviewed above.

It is possible that issues with sampling could explain the differences in findings on body image. Of the studies examined above, only three examined both men and women (Adami et al., 1998; Grilo et al., 2005; Sorbara & Geliebter, 2002). These three studies had somewhat conflicting findings. Sorbara and Geliebter (2002) found a significant positive relationship between childhood obesity onset and body image dissatisfaction. Adami et al. (1998) found a non-significant trend toward a positive relationship between childhood onset and body image dissatisfaction. However, Grilo et al. (2005) found no relationship between these two variables. The other studies examined above included only women and, in general, found a significant positive relationship between childhood obesity onset and body image dissatisfaction (Faubel, 1989; Jackson et al., 2000). Given that levels of body image dissatisfaction have been shown to vary between men and women (Eisenberg et al., 2003; Friedman et al., 2002), there is a need for more research on this relationship in men.

In addition, previous research with the exception of one study (Faubel, 1989) was conducted on clinical populations, which have been shown to have different characteristics than nonclinical populations. According to Fitzgibbon, Stolley, and Kirschenbaum (1993), obese people seeking treatment for weight control exhibit more psychopathology and binge eating than obese people not seeking treatment. Baumeister and Härter (2007) also found that while obese people in the general population have slightly higher prevalence of mood disorders than those of average weight, obese rehabilitation inpatients have significantly higher rates of mood disorders than both average-weight and obese people in the general population. These differences are important to consider in regard to the generalizability of the findings.

Depression

Studies have shown that individuals with early onset obesity may have higher rates of depression than those with adult onset. However, other studies suggest contradictory findings. Mills and Andrianopoulos (1993) found that age of onset was positively correlated with frequency and severity of psychological distress. In addition, using a 20-year longitudinal design Sanderson et al. (2011) found that being overweight as a child was associated with a greater likelihood of having a mood disorder as an adult. Sanderson et al. also reported that obese adult women who had been obese as children had more than twice the likelihood as never-obese women of having a mood disorder.

A longitudinal study of families by Anderson, Cohen, Naumova, Jacques, and Must (2007) produced slightly different results. This study demonstrated that women who were obese in adolescence had approximately three times greater odds as women who

were not overweight of developing major depressive disorder in adulthood. There was no effect for men who were obese in adolescence. In contrast, Mustillo et al. (2003) reported that male adolescents who became obese as children had 3.7 times greater odds of being depressed as those who had never been obese. No difference in depression was exhibited among females. Other studies have found that those with adult onset actually have higher rates of psychological problems than those with childhood onset (Viner & Cole, 2005). Finally, some studies have shown no difference in rates of depression between those with early and late onset obesity (Faubel, 1989; Grilo et al., 2005). Few studies support similar types of relationships among age of onset, gender, and depression. With this lack of consensus, it is clear that this area of research requires further investigation. As mentioned earlier, it is possible that different samples may be the cause of these discrepancies.

Additional Factors

Little research has been conducted examining the effects of losing weight on depression and/or body image. What happens to obese children who become normal-weight adults? Only one study by Adami et al. (1998) has examined the difference between obese individuals and formerly obese individuals. The findings indicated that individuals who had been obese in childhood but had lost weight by adulthood had lower body image dissatisfaction than those who had become obese as children and remained obese. It was also reported that those who had been previously obese (whether in childhood or adulthood), but were currently normal weight, reported lower body image dissatisfaction than did the currently obese. However, those who had been obese only in

childhood still showed higher body dissatisfaction than normal-weight adults who had never been obese. Those who been obese only as children also scored higher in body dissatisfaction than individuals who had become obese as adults, but had since lost weight (Adami et al., 1998).

If losing weight can have significant effects on a person's body image and/or depression, and if the age of losing weight makes a difference, then weight-loss interventions could be tailored to the age of the patient. In addition, little research has examined the effects of being overweight in childhood on an individual's experience of weight stigma. While these findings may highlight a potential area of intervention, more research is necessary to better understand these relationships.

In light of the stigma faced by obese individuals, it is not surprising that many experience psychological problems. With such a high percentage of the US population overweight or obese, these problems warrant additional research attention. While the research appears to support relationships between body image disturbance, depression, and obesity, the relationship between these factors and childhood obesity is less clear. In addition, while research has established the occurrence of weight stigmatization and has consistently shown that obesity is related to body dissatisfaction and depression, no research could be identified that examined all of these variables together in one model. Given these limitations in the literature, this study will examine the relationships among obesity, childhood obesity, weight stigmatization, body image dissatisfaction, and depression.

Aims

The proposed study includes three aims with a total of five hypotheses.

Aim 1: To examine the effects of current and past weight on experience of weight stigma

Hypothesis 1a. Higher BMI will be significantly associated with greater levels of exposure to weight stigma.

Hypothesis 1b. Having been overweight as a child (before age 16) will be significantly associated with greater levels of exposure to weight stigma.

Aim 2: To investigate the effects of current and past weight on body image dissatisfaction.

Hypothesis 2a. Higher BMI will be significantly associated with more body dissatisfaction; this effect will be mediated though the effects of weight stigma, with higher BMI predicting higher weight stigma.

Hypothesis 2b. Having been overweight as a child (before age 16) will be significantly associated with more body dissatisfaction.

Aim 3: To examine effects of BMI on depressive symptoms.

Hypothesis 3. Higher BMI will be significantly associated with more depressive symptoms; this effect will be mediated though the effect of weight stigma, with higher BMI predicting higher weight stigma.

CHAPTER THREE

METHOD

Participants

For structural equation modeling (SEM), Kline (2011) asserted that determining a sample size for a model based on predicted power depends not only on power and effect size, but also on the number of parameters and degrees of freedom. This would indicate that a model with fewer degrees of freedom would need a smaller sample size, something that Kline does not recommend. Instead, Kline suggested that although the mean sample size for studies using SEM is approximately 200, this number may be too limited when examining large numbers of parameters or when the data are non-normal. Therefore, a sample of at least 300 individuals was deemed an appropriate size. Participants were recruited from the subject pool at the University of South Florida and consisted of 380 college undergraduate students (84.5% female) with ages ranging from 18 to 50 (M = 21.18, SD = 4.32) and a mean BMI of 23.86 (SD = 5.03). See Tables 1 and 2 for additional demographic information. The study was approved by the university ethics committee for research.

Table 1

Demographic variables for sample

Variable	*N*	%	Variable	*N*	%
Gender			Race/Ethnicity		
Female	321	84.5	White (non-Hispanic)	203	53.4
Male	56	14.7	Hispanic	94	24.7
Missing	3	0.8	Black (non-Hispanic)	38	10.0
BMI Category			Asian	30	7.9
Underweight	24	6.3	Other/Missing	15	3.9
Normal Weight	228	60.0	Lost/Gained 20 Lbs.		
Overweight	74	19.5	Never	268	70.5
Obese	46	12.1	Once or twice	87	22.9
Missing	8	2.1	Three or four times	14	3.7
Education			Five times or more	8	2.1
High School/ Equivalent	42	11.1	Missing	3	0.8
Some College/ Associate's	311	81.8	Overweight as Child		
Finished college	23	6.1	Yes	116	30.5
Other/Missing	3	0.8	No or Not Sure	261	68.7
			Missing	3	0.8

Table 2

Descriptive statistics and covariates for study variables

Variable	*M*	*SD*
1. BMI	23.86[abdc]	4.86
2. Childhood Overweight	0.62[ab]	0.46
3. SSI	1.10[b]	40.83
4. CESD-R	12.48[b]	13.53
5. PHQ-9	9.95 [ab]	5.36
6. MBSRQ-AE	0.10 [bde]	6.64
7. EDI-3-BD	65.21 [ab]	10.89

Note. BMI = Body Mass Index; SSI = Stigmatizing Situations Inventory; CESD-R = Center for Epidemiologic Studies Depression Scale—Revised; PHQ-9 = Patient Health Questionnaire (9-item); MBSRQ-AE = Multidimensional Body Self-Relations Questionnaire, Appearance Evaluation subscale; EDI-3-BD = Eating Disorder Inventory 3 - Body Dissatisfaction subscale.
[a] Significant difference for gender at $p < .05$. [b] Significant difference for education at $p < .05$. [c] Significant relationship with age at $p < .05$. [d] Significant difference for ethnicity at $p < .05$

Measures

Demographic Information

Participants were asked for demographic information, including age, height, weight, race/ethnicity and year in school.

Body Mass Index (BMI)

For the current study, the English formula was used to calculate BMI: ratio of weight (in pounds) to squared height (in inches) multiplied by 703. BMI is often used as

a variable in body image and obesity research to account for the effects of body mass. Higher BMI values represent higher levels of body mass (Garrow & Webster, 1985).

Weight History

An item from the Questionnaire for Eating and Weight Patterns—Revised (QEWP-R) by Spitzer, Yanovski, and Marcus (1993) was used to measure weight history. This measure has received strong empirical support (Gladis, Wadden, Foster, Vogt, & Wingate, 1998) and has been used in previous studies to assess binge eating disorder as well as other eating disorders. The question asked whether the participant was overweight by at least 10 pounds at any time in his or her childhood. The variable for childhood overweight history is dichotomous (0 = not overweight as a child; 1 = history of childhood overweight).

Weight Stigmatization

The Stigmatizing Situations Inventory (SSI; Myers & Rosen, 1999) consists of 50 items assessing weight stigmatization. Each item includes a description of a stigma experience and asks the participant to rate how often the experience occurred on a 10-point Likert scale, ranging from 0 (*never*) to 9 (*daily*). Categories of items include comments from children, being stared at, and encountering physical barriers. This inventory has shown excellent reliability, with a Cronbach's alpha of .95 and demonstrates good validity (Myers & Rosen, 1999). For the current study, the Cronbach's alpha was .97.

Depressive Symptoms

The Center for Epidemiologic Studies Depression Scale—Revised (CESD-R; Eaton, Smith, Ybarra, Muntaner, & Tien, 2004) is a 20-item measure of depressive symptomatology. The scale is used to examine how often the individual has experienced certain symptoms of depression. It uses a five-point Likert scale from 0 (*not at all* or *less than 1 day*) to 4 (e*very day for 2 weeks*). The internal consistency of the CESD-R has been shown to be high, with Cronbach's alpha above .92 (Van Dam & Earleywine, 2011). For the current study, the Cronbach's alpha was .95.

The Patient Health Questionnaire (PHQ; Spitzer, Kroenke, & Williams, 1999) is a measure designed to screen for mental disorders. The nine-item version of the Patient Health Questionnaire (PHQ-9; Kroenke, Spitzer, & Williams, 2001) is actually a subscale of the full PHQ that assesses depression symptom frequency. This measure uses a four-point Likert scale ranging from 0 (*not at all*) to 3 (n*early every day*). The scale has demonstrated good reliability, especially considering its short length, with a Cronbach's alpha between .86 and .89 (Kroenke, Spitzer, & Williams, 2001). It has also been shown to have good specificity and sensitivity to change (Löwe, Kroenke, Herzog, & Gräfe, 2004). For the current study, the Cronbach's alpha was .91.

Body Image Disturbance

The Multidimensional Body Self-Relations Questionnaire, Appearance Evaluation subscale (MBSRQ-AE; Brown, Cash, & Mikulka, 1990) is a seven-item subscale that assesses global dissatisfaction of appearance using a five-point Likert scale which ranges from 1 (*definitely disagree*) to 5 (*definitely agree*). This scale has shown

adequate internal consistency reliability (Cronbach's alpha = .88) and good one-month test retest reliability (.91). It has also shown good validity across studies (Brown, Cash, & Mikulka, 1990; Cash, 1994; Cash, Winstead, & Janda, 1986). For this the current study, the Cronbach's alpha was.92.

The Eating Disorder Inventory 3 - Body Dissatisfaction subscale (EDI-3-BD; Garner, 2004) is a 10-item measure that assesses the extent to which a person is dissatisfied with certain parts of his or her body. It uses a six-point Likert scale, ranging from 1 (*always*) to 6 (*never*). The EDI-BD has shown high internal consistency for clinical populations (Cronbach's alpha of .90) and for nonclinical controls (Cronbach's alpha of .91; Garner, Olmstead, & Polivy, 1983). This subscale has also shown adequate validity (Cooper, Cooper, & Fairburn, 1989). For the current study, the Cronbach's alpha was .87.

Procedure

Those who were interested in completing the study were directed to an online survey in which they responded to a series of questionnaires. Participants were first presented with an electronic informed consent document. They were provided with the contact information for the primary investigator to address any questions and concerns or to receive the results of the study. Upon agreeing to participate in the study, participants proceeded to the online survey. All participants received credit for a psychology course as compensation for their participation.

Statistical Analysis

Analyses were performed using EQS Version 6.2 and the maximum likelihood estimation method (Bentler, 2005). The maximum likelihood estimation method allows all paths to be examined simultaneously and iteratively.

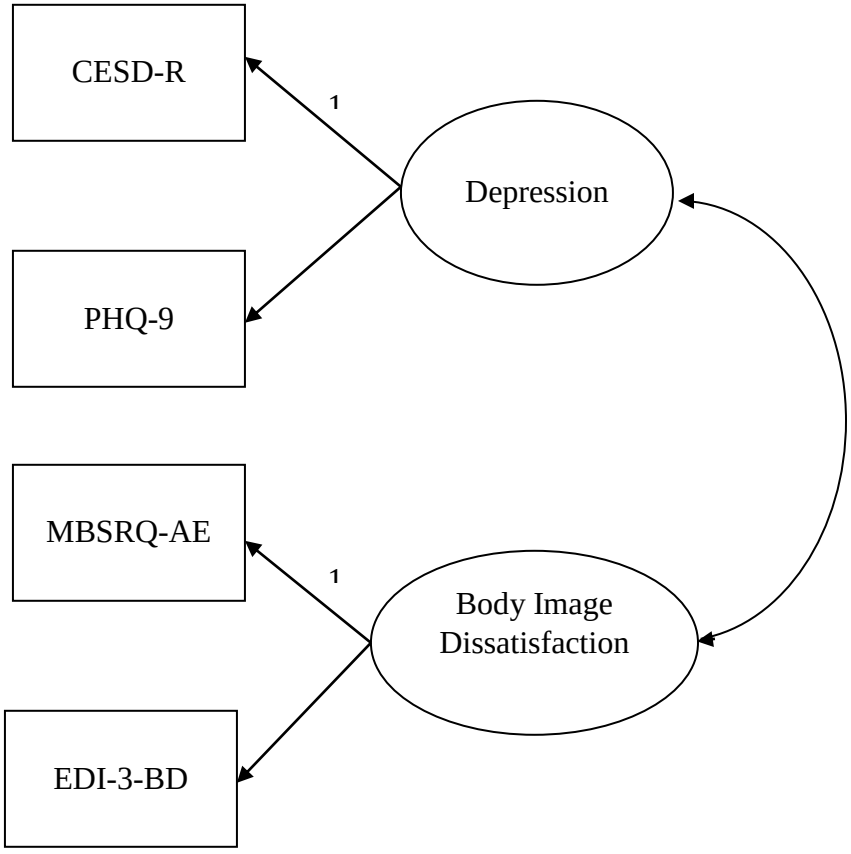

Figure 1. Measurement Model.

First, the measurement model (Figure 1) was evaluated for goodness of fit and adjusted if necessary to examine the hypothesized model of body image dissatisfaction as a latent construct composed of the scores from the MBSRQ-AE and the EDI-BD, as well as the

hypothesized model of depression as a latent construct composed of the scores from the CESD-R and the PHQ-9.

Next, to test the previously specified relationships among factors, the structural portion of the model was added and a full analysis was conducted on three separate models (see Figures 2, 3, and 4). Exogenous variables included BMI and history of childhood overweight. These variables were allowed to covary. The endogenous variables include experience of stigma, depression, and body image dissatisfaction. The models were examined for goodness of fit using the model test statistics suggested by Kline (2011). These statistics test whether the covariance matrix predicted by the model is close enough to the covariance matrix of the observed data that any differences can be attributed to chance. The fit indices include the model chi-square, which estimates whether the model matrix fits the data matrix; the Bentler Comparative Fit Index (CFI), which measures the improvement of the model over a baseline model; the Standardized Root Mean Square Residual (SRMR), which examines differences between expected and obtained residual matrices; and the Root Mean Square Error of Approximation (RMSEA), which is a badness-of-fit index in which a value of zero indicates best fit. Good fit is typically indicated by nonsignificant χ^2; CFI > .90; SRMR < .10; RMSEA < .05; 95% CI Upper Limit RMSEA < .10, and all correlation residuals < |.10|

Modifications to the model suggested by the Lagrange Multiplier test and the Wald test were implemented if necessary to improve model fit. However, relevance to theory was considered before changes were made to the model. The new models were reevaluated based on the fit indices indicated above. There were no problems observed

with the presence of a dichotomous variable (childhood overweight) that needed to be addressed.

CHAPTER FOUR

RESULTS

Demographic information for participants is provided in Tables 1 and 2. Preliminary analyses were conducted to identify any significant differences in obesity, childhood obesity, weight stigmatization, body image dissatisfaction, or depression based on gender, year in school, age, or ethnicity. Age was found to influence BMI; gender was found to influence BMI, childhood overweight, the PHQ-9 score, and the EDI-3-BD score. Education was found to influence BMI, childhood overweight, the SSI score, the CESD-R score, the PHQ-9 score, the MBSRQ-AE score, and the EDI-3-BD score. Ethnicity was shown to influence BMI and the MBSRQ-AE score (see Table 2). The effects of these covariates (i.e., age, gender, education, and ethnicity) were controlled for using regression residuals. In this process, regression analyses were conducted for each variable. In each regression, the covariates shown to influence the specific variable were entered as the predictors and the variable was entered as the dependent variable. Residuals were taken from these regression analyses. These residuals were then centered using the mean from the original variable. This made it possible to control for potential confounding variables while still rendering the model interpretable.

To test the hypothesized relationships among BMI, childhood overweight, body image dissatisfaction, depression, and experience of stigma, a series of structural regression models were tested. Correlations among study variables are presented in Table 3. The data were examined for outliers and normality. While some outliers were found (i.e., *z*-score +/- 3), they were not extreme and, given the large sample size, were left intact to preserve the integrity of the data. Weight stigmatization was found to be

moderately skewed and greatly kurtotic. This is expected given it is likely that individuals who are not overweight or obese would not experience much weight stigma; however, a logarithmic transformation was performed on the weight stigmatization variable to correct for non-normality and the transformed variable was used in the analyses. The data were also examined for violations of the assumptions of structural regression, including qualifications for model identification (Kline, 2011). No other violations were found.

Table 3

Correlations for study variables.

Variable	1	2	3	4	5	6
1. BMI						
2. Childhood Overweight	.556***					
3. SSI	.466***	.411***				
4. CESD-R	.146**	.158**	.420***			
5. PHQ-9	.136*	.124*	.385***	.893***		
6. MBSRQ-AE	.385***	.309***	.388***	.387***	.407***	
7. EDI-3-BD	.458***	.377***	.447***	.457***	.481***	.745***

Note. BMI = Body Mass Index; SSI = Stigmatizing Situations Inventory; CESD-R = Center for Epidemiologic Studies Depression Scale—Revised; PHQ-9 = Patient Health Questionnaire (9-item); MBSRQ-AE = Multidimensional Body Self-Relations Questionnaire, Appearance Evaluation subscale; EDI-3-BD = Eating Disorder Inventory 3 - Body Dissatisfaction subscale.
*$p < .05$. **$p < .01$. ***$p < .001$.

The measurement model fit the data well. Therefore, no respecification was necessary. Results of the measurement model indicated good fit: χ^2 (1) = 0.000, $p > .98$; CFI = 1.0; SRMR = .00; RMSEA = .000, 90% CI [0.00, 0.00]. All correlation residuals

were < |.10|. All indicators demonstrated acceptably high loadings on their respective factors (see Table 4 for loadings and variance explained).

Table 4

Factor loadings for measurement model.

Factor	Indicator	Unstandardized Loadings	Standard Error	Standardized Loadings	R^2
Depression	CESD-R	1.00	—	.921	.849
	PHQ-9	.417*	.021	.969	.940
Body Image Dissatisfaction	MBSRQ-AE	1.00	—	.794	.631
	EDI-3-BD	1.938*	.164	.938	.880

Note. CESD-R = Center for Epidemiologic Studies Depression Scale—Revised; PHQ-9 = Patient Health Questionnaire (9-item); MBSRQ-AE = Multidimensional Body Self-Relations Questionnaire, Appearance Evaluation subscale; EDI-3-BD = Eating Disorder Inventory 3 - Body Dissatisfaction subscale.
*$p < .05$

Next, Models 1, 2, and 3 were tested (see Table 5 for model fit statistics).

Table 5

Fit indices for Models 1, 2, and 3.

Model	χ^2 (*df*)	*p*-value	CFI	SRMR	RMSEA	90% CI RMSEA
1	49.503(10)	< .00001	.972	.055	.102	[.075, .131]
2	33.189 (9)	< .001	.983	.050	.084	[.055, .116]
3	9.60 (8)	> .29	.999	.013	.023	[.000, .067]

Model 1 (see Figure 2) did not fit the data: χ^2 (10) = 49.503, p < .00001; CFI = .972; SRMR = .055; RMSEA = .102, 90% CI [0.075, 0.131]. In addition, three residuals were above |.10|, with two of these representing the relationship between BMI and the body image dissatisfaction variable. Three more residuals approached |.10| and two of these represented the relationship between BMI and the depression variable. Although this model includes a test of the hypothesis that the effects of BMI on depression and body image dissatisfaction would be entirely mediated through experience of stigma, these high residuals suggest that this is not the case. Consistent with this finding, the Lagrange Multiplier modification indices suggested that adding a relationship between BMI and depression would greatly increase the fit of the model.

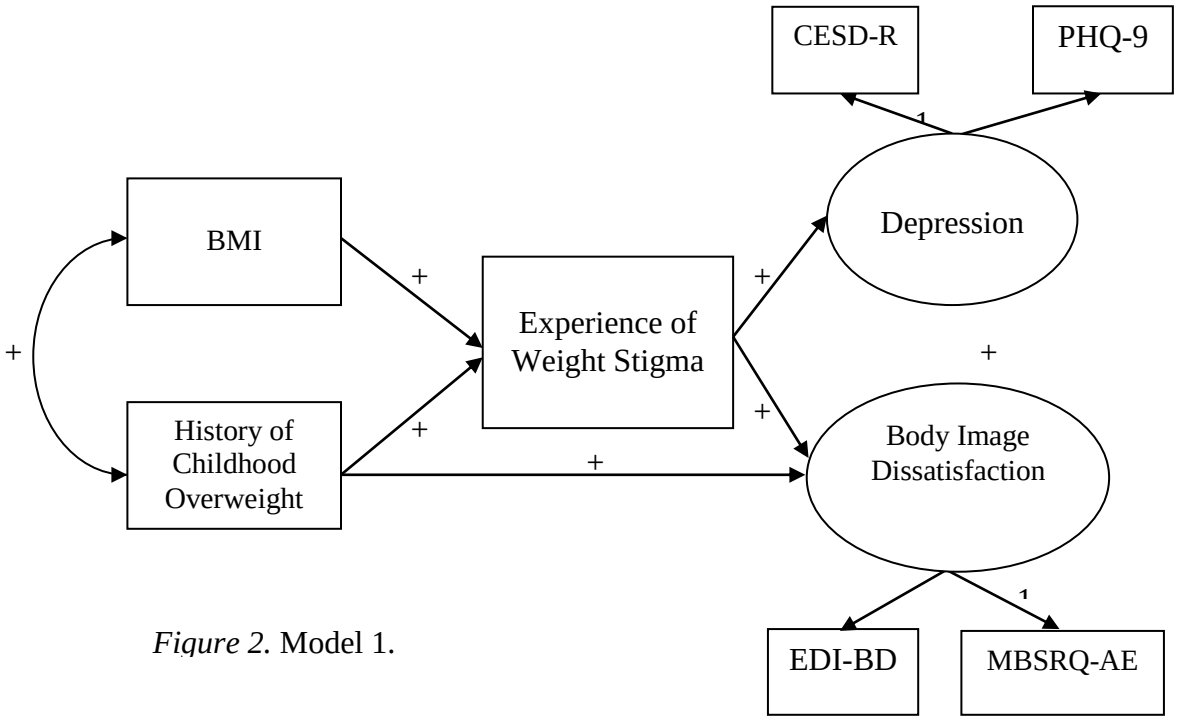

Figure 2. Model 1.

Therefore, Model 2, in which a path from BMI to depression was added (see Figure 3), was tested next. While Model 2 demonstrated better fit than Model 1 (see Table 5), the model still did not fit the data well: χ^2 (9) = 33.189, p < .001; CFI = .983; SRMR = .050; RMSEA = .084, 90% CI [0.055, 0.116]. In addition, two residuals were above |.10| and both were between BMI and the body image dissatisfaction variables. Similar to the previous model, this suggests that perhaps the effects of BMI on body image dissatisfaction are not entirely mediated by experience of stigma. Consistent with this finding, the Lagrange Multiplier modification indices suggested that adding a relationship between BMI and body image dissatisfaction would greatly improve the fit of the model.

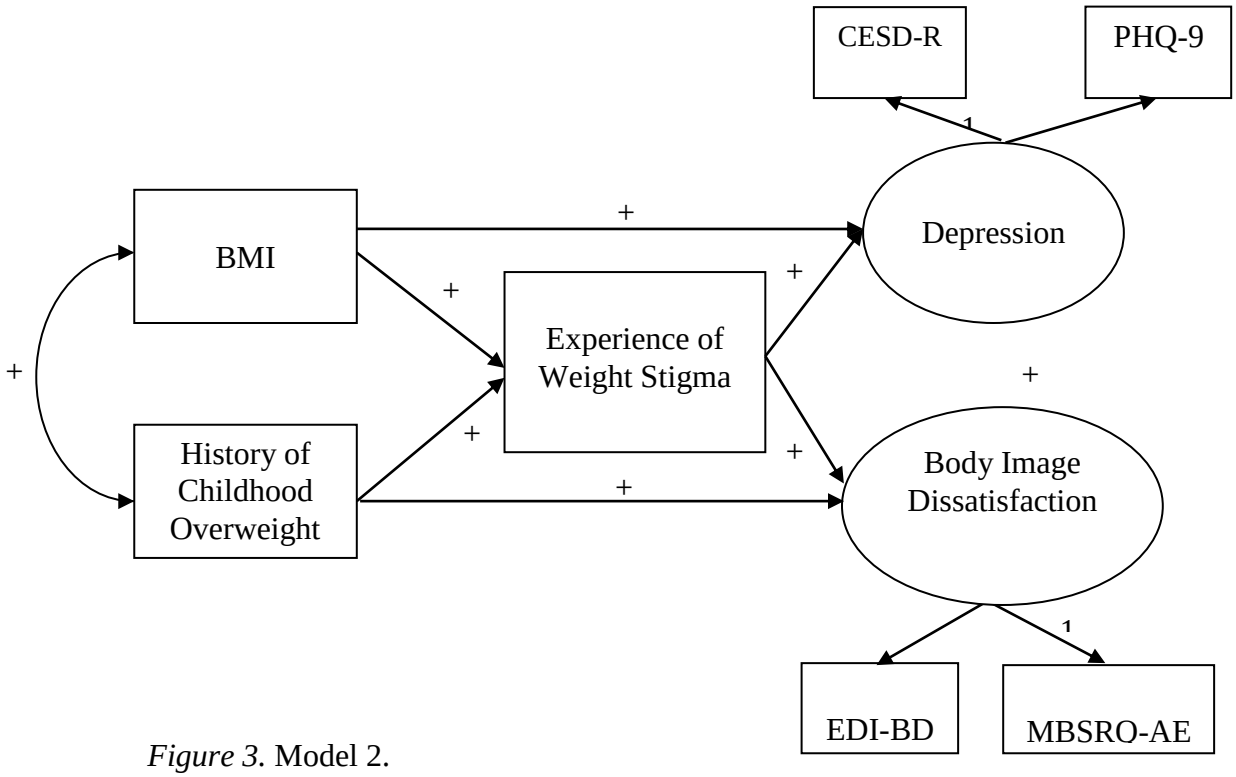

Figure 3. Model 2.

Therefore, Model 3, in which a path from BMI to body image dissatisfaction was added (see Figure 4), was tested next.

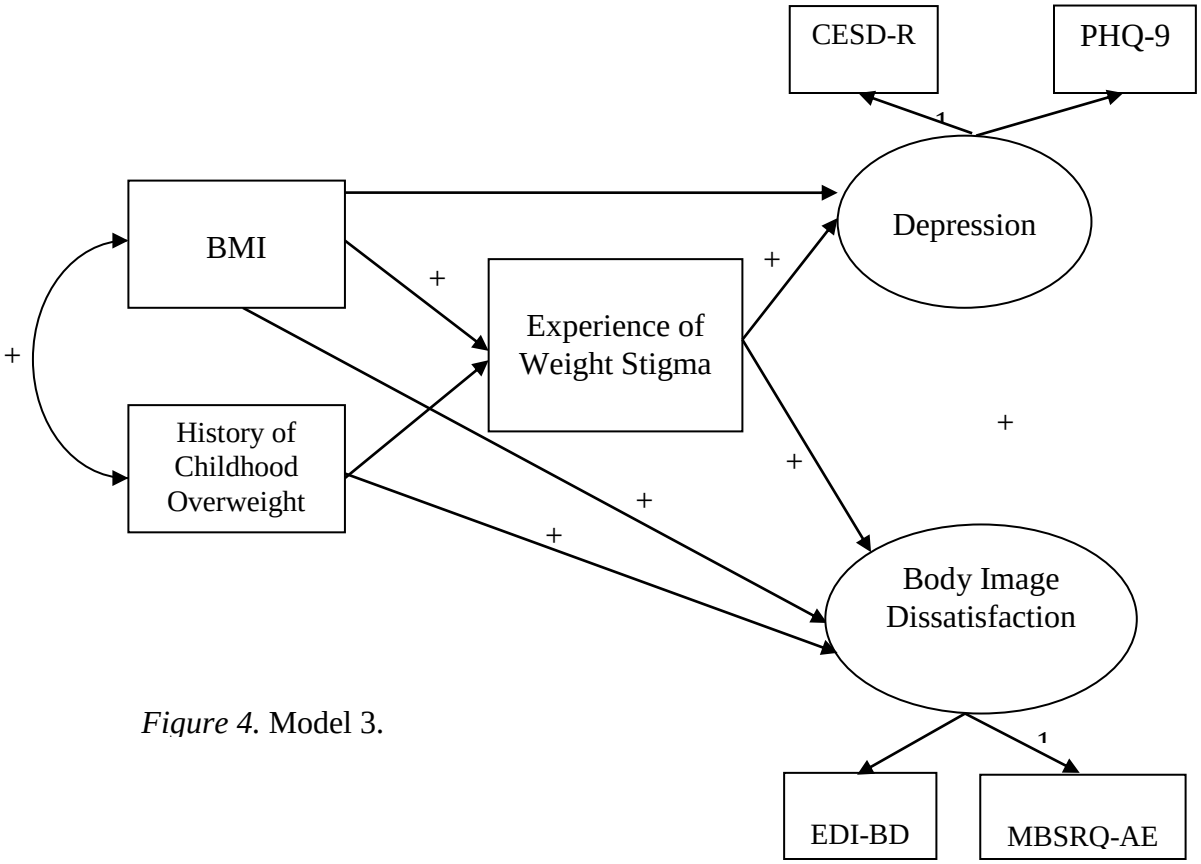

Figure 4. Model 3.

Model 3 demonstrated excellent fit (see Table 5): χ^2 (8) = 9.607, p >.29; CFI = .999; SRMR = .013; RMSEA = .023, 90% CI [0.000, 0.067]. In addition, all residual statistics were below |.10|. Because this model fit the best of the three and because no modifications were consistent with theory, logic, and research, Model 3 was chosen as

the final structural model to be interpreted. See Figure 5 for the full model with direct effects and factor loadings.

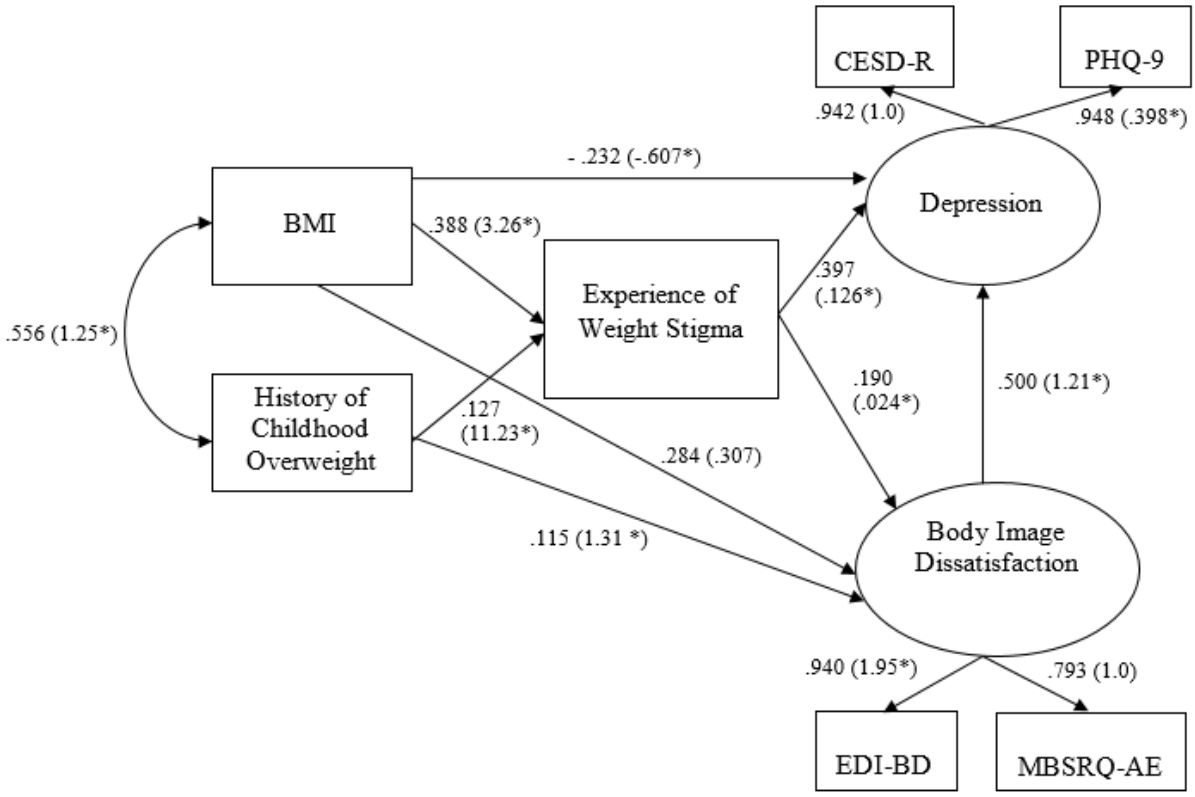

Figure 5. Final structural model. Both standardized and unstandardized paths are given. Unstandardized paths are in parentheses. * $p < .05$

An alternative Model 3 was examined. This model involved the weight stigmatization variable in its untransformed form. Table 6 shows the differences between the two models' fit statistics.

Table 6

Comparison of model 3 with transformed and untransformed variable.

Model	χ^2 (*df*)	*p*-value	CFI	SRMR	RMSEA	90% CI RMSEA
Transformed	9.60 (8)	> .29	.999	.013	.023	[.000, .067]
Untransformed	11.687 (8)	> .17	.997	.013	.035	[.000, .075]

Given that the untransformed model fit the data nearly as well as the transformed model, and the standardized path coefficients are very similar, the paths between weight stigma and its related variables from the untransformed model will be reported for ease of interpretation. See Table 7 for differences in the path coefficients between the transformed and untransformed model.

Table 7

Comparison of path coefficients for SSI, transformed and untransformed.

IV	DV	Transformed Model			Untransformed Model		
		Unstd Loading	Standard Error	Std Loading	Unstd Loading	Standard Error	Std Loading
BMI	SSI	0.039*	0.006	0.344	3.264*	0.458	.388
Childhood Overweight	SSI	0.264*	0.064	0.220	11.228*	4.817	.127
SSI	Depression	6.754*	1.241	0.294	0.126*	0.016	.397
SSI	BID	2.832*	0.520	0.298	0.024*	0.007	.190

Note. SSI = Stigmatizing Situations Inventory; BID = Body Image Dissatisfaction

As hypothesized, BMI was significantly positively related to experience of weight stigma, as was history of childhood overweight. In addition, BMI was significantly related to depression and body image dissatisfaction; however, the relationships between BMI and depression and between BMI and body image dissatisfaction were not entirely mediated by experience of weight stigma. In fact, BMI was negatively related to depression after controlling for experience of weight stigma. History of childhood overweight was significantly positively related to higher body image dissatisfaction. Finally, the effect of childhood overweight on depression was significantly mediated through the effects of weight stigma experience and body image dissatisfaction.

More specifically, as BMI and childhood overweight increased by one point, experience of weight stigma increased by 3.26 and 11.23 points, respectively ($p < .05$). As experience of weight stigma increased by one point, depression and body image dissatisfaction increased by 0.13 points and 0.02 points, respectively ($p < .05$). Individuals who were overweight in childhood scored 1.79 points higher on body image dissatisfaction than those who were not ($p < .05$). As BMI increased by one point, depression decreased by .737 points and body image dissatisfaction increased by .336 points ($p < .05$). In addition, an increase of one point in body image dissatisfaction predicted an increase of .500 points in depression.

CHAPTER FIVE

DISCUSSION

The current study examined experience of weight stigma, depression, and body image in relation to BMI and childhood overweight in a sample of college men and women.

Hypothesis 1a stated that higher BMI would be significantly associated with greater exposure to weight stigma, a relationship that was indeed demonstrated by the data. In fact, according to the model, a one standard deviation increase in BMI was associated with approximately one-third of a standard deviation increase in experience of weight stigma (see Figure 5). This is in line with the literature delineating the numerous sources from which overweight and obese individuals experience weight stigma, including from medical professionals, peers, family, strangers, and acquaintances (Ashmore et al., 2008; Carr & Friedman, 2005; Carr et al., 2008; Friedman et al., 2008; van den Berg et al., 2008; Vartanian & Shaprow, 2008). In addition, it is line with the expectation that lower BMI would predict a lower exposure to weight stigma.

Hypothesis 1b stated that having been overweight as a child (i.e., before age 16) would be significantly associated with greater levels of exposure to weight stigma. This relationship was also demonstrated by the data. Specifically, being overweight in childhood was associated with a one-fourth standard deviation increase in experience of stigma; however, the relationship was not as strong as the relationship between BMI and weight stigma. Given that childhood overweight and BMI were covaried in the model, the effects of childhood overweight on experience of weight stigma would be above and beyond those already accounted for by BMI.

This relationship between childhood overweight and experience of stigma is consistent with research on weight stigmatization. Being overweight at any time has been shown to predict experience of stigma and the more time a person has been overweight, the more stigma he or she may have been exposed to. Experiencing weight stigma as a child or adolescent may be more harmful, as children are still developing their weight-related self-image during this time (Smolak, 2004). Furthermore, the literature has shown that even children hold negative views of their overweight or obese peers, viewing them as "emotional," "weak," or "cruel" (Powlishta et al., 1994). Rich et al. (2008) also found that among children, a higher BMI was related to more negative views of overweight or obese individuals. Finally, Sikorski et al. (2012) found that adults view overweight or obese children more negatively than they view overweight or obese adults or elderly individuals.

Next, Hypothesis 2a predicted that higher BMI would be significantly associated with increased body dissatisfaction and that this relationship would be mediated through the effects of weight stigma. This hypothesis was partially supported. Weight stigma experience was found to mediate the relationship between BMI and body image dissatisfaction. This mediation effect indicated that as BMI increased, weight stigma experience increased, and as stigma experience increased, so did body image dissatisfaction. However, the relationship could not entirely be explained by this mediator. A significant direct path was also present between BMI and body image dissatisfaction, indicating that higher BMI predicted higher body dissatisfaction. Similar findings have been reported in previous research (e.g., Adami et al., 1998; Eisenberg et al., 2003; Friedman et al., 2002). However, very little, if any, research has examined the

effects of weight stigma experience on body image dissatisfaction. The novel finding in the current study provides a valuable addition to the literature. While this model did not show the effects of BMI on body image dissatisfaction to be entirely mediated by experience of weight stigma, it was evident that weight stigma does play a role in the relationship. It would be helpful for future research to focus on identifying additional mediators for the relationship between BMI and body image dissatisfaction, including self-esteem, binge eating, and interpersonal effectiveness, among others.

Hypothesis 2b predicted that having been overweight before age 16 would significantly predict higher body image dissatisfaction. There was a significant, although small, direct positive relationship between childhood overweight and body dissatisfaction. As previously explored, this relationship is in line with prior studies (Powlishta et al., 1994), as an overweight child's identity is being formed during a time when he or she is experiencing discrimination. Even if a person has become a normal weight adult, it is likely that the effects of overweight status on body image during childhood continue into adulthood.

Finally, Hypothesis 3 predicted that higher BMI would be significantly positively associated with more depressive symptoms and that this relationship would be mediated through the effects of weight stigma. While the model did show that weight stigma partially mediated the relationship between BMI and depressive symptoms (i.e., as BMI increased, weight stigma experience increased and as stigma experience increased, so did depressive symptoms), a direct effect was also shown between BMI and depression. As in the relationship between BMI and body image, the majority of the literature has focused on the direct relationship between BMI and depression without considering

mediators such as weight stigmatization. The current study extends previous research in this area by indicating that the experience of weight stigma is a mediator between BMI and depression. This finding is important to consider because previous research has not examined many mediators of the relationship between body image and depression. Weight, in particular, has not been explored in this context.

Of particular note is the direct relationship between BMI and depression—the relationship is actually negative. As BMI increases by one standard deviation, depression actually *decreases* by approximately one-fourth of a standard deviation. The majority of the research in this area has demonstrated a positive relationship between BMI and depression (Dong et al., 2004; Friedman et al., 2002; Grilo et al., 2005; Roberts et al., 2003; Roberts et al., 2000; Ross, 1994). However, as noted earlier, a number of studies reported no relationship between depression and overweight/obesity (Eisenberg et al., 2003; Faubel, 1989; Hach et al., 2006; John et al., 2005). While lower rates of depression have been associated with obesity for postmenopausal women with low education (Jasienska, Ziomkiewicz, Gorkiewicz, & Pajak, 2005) and the elderly (Chang & Yen, 2012; Dong et al., 2012; Palinkas et al., 1996), these two groups were not represented in the current sample. It is therefore likely that other variables may be influencing this relationship.

It is important to note that this model controls for the effects of childhood overweight, weight stigma, and body image dissatisfaction. Therefore, the observed negative relationship exists in the presence of zero weight stigma, no body image dissatisfaction, and no history of childhood overweight. Given that the effects of childhood overweight were controlled for, it is possible that, for individuals who have

been overweight since childhood, higher BMI may predict higher depression, while the relationship is negative for individuals who became overweight or obese as adults. This is in line with some research in which childhood obesity onset predicted higher levels of depressive symptoms (Anderson et al., 2007; Mills & Andrianopolis, 1993; Mustillo et al., 2003; Sanderson et al., 2011). Future studies should examine the relationship between childhood overweight and depression.

Furthermore, some studies within clinical populations have found a positive correlation between body image dissatisfaction and depression (Friedman et al., 2002; Grilo et al., 2005; Wardle et al., 2001). In fact, Friedman et al. (2002) found that that body image dissatisfaction partially mediated the relationship between BMI and depression. However, to date no research has found that after controlling for body image, the relationship between BMI and depression is reversed. This is another potential relationship to examine in more detail in future research.

It is therefore likely that weight stigma and body image dissatisfaction influence the observed reversal of the relationship between BMI and depressive symptoms. A negative relationship between BMI and depression was hypothesized in the 1970s. During this time, it was thought that overweight individuals were happier than those of average weight—this was called the "Jolly Fat" hypothesis (Crisp & McGuiness, 1975). However, in the early to mid-1990s, researchers began to find results in the opposite direction (i.e., obesity contributed to negative affect and depression) and the literature has been generally consistent in this area since that time. It may be that the more recent studies have focused on different populations, such as medical samples of obese

individuals, while previous studies may have focused on community samples which have been shown to have lower rates of psychopathology in general (Fitzgibbon et al., 1993).

In addition, it is possible that with the growing popularity of the "thin ideal," society has become more disparaging toward overweight or obese individuals. This may have contributed to increased weight stigma and body image dissatisfaction. Only one study to date has examined weight stigma as a mediator between BMI and psychological health. Hunger and Major (2014) found that perceived weight discrimination mediated the relationship between BMI and poor psychological health, partially by increasing stigma concerns. However, unlike the current study, these researchers defined psychological health as a construct comprising depressive symptoms, self-esteem, and quality of life. This study also did not find a negative direct relationship between BMI and psychological health after controlling for the experience of stigma, possibly because depression was not examined independently. Finally, Hunger and Major (2014) did not use SEM or control for the influence of childhood overweight, both of which were done in the current study. Thus, the current study further examines areas that have received little research attention.

The current study has some limitations. Self-report questionnaires were used which are subject to social desirability bias and human error. Furthermore, the use of a cross-sectional design does not allow for the examination of casual relationships. With regard to the sample, a small number of men were included, which limits the generalizability of the results to women, although gender was controlled for in the model. Similarly, the use of a college sample may limit the generalizability of the findings to non-college samples.

While this study may have limitations, there are a number of strengths that are also important to note. To our knowledge, this is the first study that has examined weight stigma's influence on body image and depression specifically. The results of this study make a valuable contribution to the literature, especially to an area that has received limited attention. Other strengths of this study include the high reliability of the measures and the use of SEM. SEM allows the researcher to examine all variables simultaneously which helps to reduce any Type I error that may occur when running multiple analyses. In addition, the final model fit the data very well, lending further credence to the existence of the hypothesized relationships.

To our knowledge, this is the first study to examine the relationships among weight stigma experience, depression, and body image dissatisfaction in college women and men. The findings suggest that while weight stigma experience may not completely mediate the relationships between BMI and depression and between BMI and body image dissatisfaction, weight stigma does account for much of the variance in these variables. In addition, the current study provides initial support for the notion that there may be a negative relationship between overweight/obesity and depression when controlling for weight stigma and childhood overweight. Results also indicated that both childhood overweight and current overweight/obesity increase an individual's risk for body image dissatisfaction. The current study highlights the need to address weight stigmatization and body image dissatisfaction among overweight and obese individuals, particularly in interventions aimed at reducing the negative consequences of obesity.

This study also has implications for public health and clinical work. The results indicate that a decrease in stigma toward individuals who are overweight or obese may

predict better mental health. This finding may help inform public health campaigns focusing on education about the causes and social consequences of obesity and weight stigma, both in the short- and the long-term. In addition, the results of this study could be helpful for clinicians working with individuals who are overweight or obese. It is important when working with this population to understand and assess for the possible impact of weight stigma, as well as the presence and impact of body image dissatisfaction and depression. In addition, clinicians who work with overweight or obese clients can focus on coping skills for individuals affected by weight stigma and on cultivating protective factors (such as education or social support).

Future researchers should examine the effect of other variables on the development of depressive symptoms in overweight and obese individuals. Recently, Preiss, Brennan, and Clarke (2013) published a review examining variables shown to influence the relationship between obesity and depression. A number of variables were identified, including binge eating, interpersonal effectiveness, self-esteem, alcohol consumption, and physical activity. These findings provide research avenues to explore further in future studies. In addition, it would be helpful to examine potential factors that may protect overweight/obese individuals from experiencing depressive symptoms and body image dissatisfaction. Potential protective factors may include education on the causes of obesity, social support, and cultural perceptions of weight.

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APPENDIX A

DEMOGRAPHICS, BMI, AND WEIGHT HISTORY/CYCLING

1. Age: _____ years

2. Sex: Male Female

3. What is your ethnic/racial background?

1 Black (not Hispanic)
2 Hispanic
3 White (not Hispanic)
4 Asian
5 Other (please specify: _____)

4. How far did you get in school?

1 Grammar school, junior high school or less
2 Some high school
3 High school graduate or equivalency (GED)
4 Some college or associate degree
5 Completed college

5. How tall are you? _____ feet _____ inches

6. How much do you weigh now? _____ lbs.

7. Have you been overweight by at least 10 lbs at any point in your childhood (i.e., before age 16)?

1 Yes 2 No or not sure

8. How many times (approximately) have you lost 20 lbs. or more – when you weren't sick and then gained it back?

1 Never
2 Once or twice
3 Three or four times
4 Five times or more

APPENDIX B

THE STIGMATIZING SITUATIONS INVENTORY (SSI)

Below is a list of situations that people encounter because of their weight. Indicate whether, and how often, each of these situations happens to you. In the spaces below, write the number which best describes how often you encounter each situation. Use the scale below:

Never	Once in your life	Several times in your life	About once a year	Several times a year	About once a month	Several times a month	About once a week	Several times a week	Daily
0	1	2	3	4	5	6	7	8	9

____ 1. A child coming up to you and saying something like, "You're fat!"

____ 2. A doctor blaming unrelated physical problems on your weight.

____ 3. A parent or other relative nagging you to lose weight.

____ 4. A spouse/partner calling you names because of your weight.

____ 5. A spouse/partner telling you to lose weight in order to be more attractive.

____ 6. As an adult, having a child make fun of you.

____ 7. Being called names, laughed at, or teased by other children when you were young.

____ 8. Being glared at or harassed by bus passengers for taking up "too much" room.

____ 9. Being hit, beaten up or physically attacked because of your weight.

___ 10. Being offered fashion advice from strangers.

___ 11. Being passed up for a promotion, given bad assignments, or otherwise discriminated against at work.

___ 12. Being sexually harassed (cat-calls, wolf-whistles, etc.) because of your weight.

___ 13. Being singled out as a child by a teacher, school nurse, etc. because of your size.

___ 14. Being stared at in public.

___ 15. Being the only heavy person, or the heaviest person, at a family gathering.

___ 16. A doctor saying that your weight is a health problem, even when you are in good health.

___ 17. Being told, "All you really need is a little willpower."

___ 18. Being unable to get a date because of your size.

___ 19. Children loudly making comments about your weight to others.

___ 20. Friends, acquaintances, co-workers, etc. making fun of your appearance.

___ 21. Groups of people pointing and laughing at you in public.

___ 22. Having a doctor make cruel remarks, ridicule you, or call you names.

___ 23. Having a doctor recommend a diet even if you did not come in to discuss weight loss.

___ 24. Having a romantic partner exploit you, because s/he assumed you were "desperate" and would put up with it.

___ 25. Having a spouse or partner be ashamed to admit to being with you.

___ 26. Having family members feel embarrassed by you or ashamed of you.

___ 27. Having friends not notice weight loss, or not encourage your efforts to lose weight.

___ 28. Having people assume that you overeat or binge-eat because you are overweight.

___ 29. Having people assume you have emotional problems because you are overweight.

___ 30. Having strangers suggest diets to you.

___ 31. Having strangers take photographs of you, as if you were an exhibit.

___ 32. Having your children tease or insult you because of your weight.

___ 33. In the supermarket, having people criticize or make comments about your food choices.

___ 34. Losing a job because of your size.

___ 35. Not being able to find clothes that fit.

___ 36. Not being able to find medical equipment in a size that works for you.

___ 37. Not being able to find sports equipment in a size that fits you.

___ 38. Not being able to fit into bus or airplane seats, into small cars, or into standard seatbelts.

___ 39. Not being able to fit into seats at restaurants, theaters, and other public places.

___ 40. Not being able to fit through turnstiles, on amusement park rides, or other places not already mentioned.

___ 41. Not being hired because of your weight, shape, or size.

___ 42. Other people having low expectations of you because of your weight.

___ 43. Overhearing other people making rude remarks about you in public.

___ 44. Parents or other relatives telling you how attractive you would be, if you lost weight.

___ 45. People telling you that you will never find a partner if you don't lose weight.

___ 46. Seeing bumper stickers, t-shirts, advertising, etc. that ridicules fat people.

___ 47. Strangers asking intrusive, personal questions about your weight.

___ 48. Strangers making abusive remarks to you (e.g. saying you are disgusting, or that you don't deserve to live).

___ 49. When eating in public, being told “You really shouldn't be eating that."

___ 50. When walking outside, having people drive by and laugh or shout insults

APPENDIX C

THE CENTER FOR EPIDEMIOLOGIC STUDIES DEPRESSION SCALE—REVISED

Below is a list of the ways you might have felt or behaved. Please check the boxes to tell me how often you have felt this way in the past week or so.

Last Week				Nearly every day for 2 weeks
Not at all *or* Less than 1 day	1-2 days	3-4 days	5-7 days	
0	1	2	3	4

1. My appetite was poor. 0 1 2 3 4
2. I could not shake off the blues. 0 1 2 3 4
3. I had trouble keeping my mind on what I was doing. 0 1 2 3 4
4. I felt depressed. 0 1 2 3 4
5. My sleep was restless. 0 1 2 3 4
6. I felt sad. 0 1 2 3 4
7. I could not get going. 0 1 2 3 4
8. Nothing made me happy. 0 1 2 3 4
9. I felt like a bad person. 0 1 2 3 4
10. I lost interest in my usual activities. 0 1 2 3 4
11. I slept much more than usual. 0 1 2 3 4
12. I felt like I was moving too slowly. 0 1 2 3 4
13. I felt fidgety. 0 1 2 3 4
14. I wished I were dead. 0 1 2 3 4

15. I wanted to hurt myself. 0 1 2 3 4

16. I was tired all the time. 0 1 2 3 4

17. I did not like myself. 0 1 2 3 4

18. I lost a lot of weight without trying to. 0 1 2 3 4

19. I had a lot of trouble getting to sleep. 0 1 2 3 4

20. I could not focus on the important things. 0 1 2 3 4

APPENDIX D

PATIENT HEALTH QUESTIONAIRE—9

Over the last 2 weeks, how often have you been bothered by any of the following problems?

Not at all	Several days	More than half the days	Nearly every day
0	1	2	3

1. Little interest or pleasure in doing things 0 1 2 3

2. Feeling down, depressed, or hopeless 0 1 2 3

3. Trouble falling or staying asleep, or sleeping too much 0 1 2 3

4. Feeling tired or having little energy 0 1 2 3

5. Poor appetite or overeating 0 1 2 3

6. Feeling bad about yourself—or that you are a failure or have let yourself or your family down 0 1 2 3

7. Trouble concentrating on things, such as reading the newspaper or watching television 0 1 2 3

8. Moving or speaking so slowly that other people could have noticed? Or the opposite—being so fidgety or restless that you have been moving around a lot more than usual 0 1 2 3

9. Thoughts that you would be better off dead or of hurting yourself in some way 0 1 2 3

If you checked off any problems, how difficult have these problems made it for you to do your work, take care of things at home, or get along with other people?

Not difficult at all	Somewhat difficult	Very difficult	Extremely difficult
0	1	2	3

APPENDIX E

MBSRQ-AE

Using the scale below, please circle the number that best matches your agreement with the following statements.

Definitely Disagree 1	Mostly Disagree 2	Neither Agree Nor Disagree 3	Mostly Agree 4	Definitely Agree 5

1. My body is sexually appealing. 1 2 3 4 5
2. I like my looks just the way they are. 1 2 3 4 5
3. Most people would consider me good-looking. 1 2 3 4 5
4. I like the way I look without my clothes on. 1 2 3 4 5
5. I like the way my clothes fit me. 1 2 3 4 5
6. I dislike my physique. 1 2 3 4 5
7. I am physically unattractive. 1 2 3 4 5

APPENDIX F

EDI-3-BD

For the items below, please indicate to what extent each statement is true of you.

1 = Always 2 = Usually 3 = Often 4 = Sometimes 5 = Rarely 6 = Never

		Always					Never
1.	I think that my stomach is too big.	1	2	3	4	5	6
2.	I think that my thighs are too large.	1	2	3	4	5	6
3.	I think that my stomach is just the right size.	1	2	3	4	5	6
4.	I feel satisfied with the shape of my body.	1	2	3	4	5	6
5.	I like the shape of my buttocks.	1	2	3	4	5	6
6.	I think my hips are too big.	1	2	3	4	5	6
7.	I feel bloated after eating a normal meal.	1	2	3	4	5	6
8.	I think that my thighs are just the right size.	1	2	3	4	5	6
9.	I think my buttocks are too large.	1	2	3	4	5	6
10.	I think that my hips are just the right size.	1	2	3	4	5	6