Predicting Weight Loss and Improvement in Quality of Life in Behavioral Weight Management: The Influence of Perceived Stigma, Psychological Functioning, Coping Style, and Adherence.

Dissertation

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Abstract

Introduction: Obesity is a common, chronic medical condition associated with increased morbidity and mortality as well as decrements in psychosocial functioning. Behavioral and psychosocial variables associated with obesity and impaired quality of life are an important focus of investigation as predictors and/or mediators of weight loss treatment outcomes. This exploratory study was designed to examine the degree to which behavioral and psychological changes during behavioral weight loss treatment mediate the relationship of baseline perceptions of stigmatization with weight loss and improvement in quality of life over the course of treatment. Additionally, this study examined the moderating effect of bariatric status on these relationships.

Methods: One hundred four adults with overweight and obesity participating in a comprehensive behavioral weight management program participated in the study, completing self-report questionnaires at the beginning and end of their weight management program and allowing study personnel access to their medical records. Questionnaires assessed quality of life, perceived stigma, psychological distress, and coping styles. Objective measures included program attendance, dietary and physical activity log completion, demographic information, and anthropometric data. Regression, mediation, and moderated mediation models were used to examine the hypothesized relationships among variables.

Results: Changes in depressive and anxious symptomatology mediated the relationship of perceived stigma at baseline with mental quality of life at program completion after controlling for mental quality of life at baseline. Higher perceived stigma was associated with poorer mental quality of life at program completion via the influence of perceived stigma increasing depressive and anxious symptoms. Increased symptoms of depression and anxiety, in turn, were associated with poorer mental quality of life. Similarly, changes in depressive symptomatology mediated the relationship of perceived stigma at baseline with physical quality of life at program completion after controlling for physical quality of life at baseline. Again, higher perceived stigma was associated with poorer physical quality of life at program completion via the influence of perceived stigma increasing depressive symptoms. In turn, increased depressive symptoms was associated with poorer physical quality of life. No other hypothesized mediation models were supported by the data, and bariatric status did not moderate the relationship of perceived stigma with change in any potential mediators.

Conclusions: Results suggest that greater attention to the expression of distress among weight management participants reporting prior stigmatizing experiences may help identify individuals at risk for poorer mental and physical quality of life at the conclusion of behavioral weight loss treatment. The data also may suggest a need for research examining the efficacy of interventions aimed at reducing perceived stigma among individuals entering behavioral weight management.

Dedication

To my husband, Steven Truong.

Acknowledgments

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Fields of Study

Major Field: Psychology

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Chapter 1: Introduction

Although rates of obesity appear to be leveling off (Flegal, Carroll, Kit, & Ogden, 2012), obesity remains a public health crisis that currently affects over 78 million adults in the United States (Ogden, Carroll, Kit, & Flegal, 2012) and approximately 600 million adults worldwide (World Health Organization, 2015). Individuals with obesity have unhealthy levels of body fat, typically defined as having a body mass index (BMI) of 30 or greater. BMI is an indirect measure of adiposity that is often used as a proxy for body fat because it can be easily calculated as the ratio of an individual's mass (in kilograms) divided by the square of his/her height (in meters). BMI is often described as existing along a continuum from underweight (BMI less than or equal to 18.5) to obese (BMI greater than or equal to 30) with various clinical cut-points. Individuals with a BMI of 40 or higher are typically diagnosed with extreme obesity (Centers for Disease Control, 2009). Obesity is also sometimes characterized into classes (class I obesity = BMI between 30 and 34.9; class II = BMI between 35 and 39.9; class III obesity = BMI between 40 and 44.9; and class IV = BMI 45 and greater) with each increase in class reflecting increased risk for medical complications due to obesity (Ruhm, 2007).

Obesity places individuals at increased risk for a variety of chronic diseases including coronary heart disease, type 2 diabetes, cancer, and hypertension (Ogden, Carrol, McDowell, & Flegal, 2007). Excess body fat also is likely to increase strain on the body, affecting multiple organ systems, limiting role functioning, and increasing

overall pain and discomfort (Kushner & Foster, 2000). Furthermore, there is evidence of a dose-response curve such that risk for mortality increases at increasing levels of adiposity (Calle, Thun, Petrelli, Rodriguez, & Heath, 1999). As a result of the exceedingly high prevalence of obesity in the United States, life expectancy at 50 years of age has been reduced by 1.5 years in women and 1.9 years in men (Preston & Stokes, 2011). Obesity also is associated with reduced functional status (Wiczinski, Döring, John, & von Lengerke, 2009), significant weight-related stigmatization and discrimination (Andreyeva, Puhl, & Brownell, 2008), and reduced quality of life (Wiczinski et al., 2009).

As rates of obesity and obesity-related healthcare costs have increased (Flegal et al., 2012; Trogdon, Finkelstein, Feagan, & Cohen, 2012), research on treatments for obesity also has increased. Unfortunately, despite more than forty years of research, there have been no significant improvements in outcomes for individuals attempting weight loss (Brownell, 2010). In a review and meta-analysis of clinical trials targeting weight loss, Franz and colleagues (2007) found that individuals participating in weight loss programs that included a reduced-calorie diet and/or weight-loss medications were able to lose an average of five to nine percent of their initial weight in six months. Individuals in exercise-only or advice-only interventions lost minimal weight. However, some individuals fail to lose weight despite treatment, and others regain weight immediately following treatment. Data from the National Weight Control Registry indicate that only 20 percent of the population is able to lose five to ten percent of original body weight and maintain that lower weight (Wing & Phelan, 2005). More encouraging data come from a national sample of 14,306 participants in which 36.6 percent of individuals who had ever

been overweight or obese were able to lose at least five percent of initial weight and maintain that loss for at least one year. A smaller proportion of participants (17.3%) reported successfully losing 10% of initial weight and maintaining the loss for at least one year (Kraschnewski et al., 2010). For individuals with extreme obesity, even those who achieve a ten percent weight loss will remain obese upon treatment completion.

Due to high failure rates across treatment modalities, a substantial body of literature has begun to explore predictors of weight loss. However, the current literature on weight loss treatments is plagued by heterogeneity, making definitive conclusions difficult or impossible. Most models predicting weight loss incorporate a wide range of predictors that only account for 20-30% of the variance and differ across behavioral interventions (Stubbs et al., 2011). As noted by Kelly Brownell, Co-founder and Former Director of The Rudd Center for Food Policy and Obesity at Yale, "Obesity has humbled one research group after another. Some of the field's brightest scientists have attempted to subdue obesity by treating it, but now, after decades of work, treatment gains remain small, maintenance is poor, and the field produces effects far below what patients want or expect." Given the lack of improvement over time, some researchers believe that that the likelihood of developing highly efficacious, disseminable, and cost-effective treatments is low; however, it has been suggested that researchers have a moral imperative to continue working to improve treatment outcomes for patients with obesity (Brownell, 2010).

Due to poor outcome data and high levels of individual variability, it has been suggested that researchers examine other treatment outcomes in weight management programs in addition to weight loss (Atkinson, 1993). Improvement in quality of life is one such outcome that is sometimes, but not always, correlated with weight loss during

behavioral weight loss treatment (Maciejewski, Patrick, &Williamson, 2005). Quality of life and weight appear to have a reciprocal relationship such that quality of life declines as BMI increases and quality of life improves as BMI decreases (Kushner & Foster, 2000). In a large, multisite clinical trial involving 5145 individuals with overweight or obesity and type 2 diabetes mellitus, health-related quality of life improved substantially more among individuals receiving a comprehensive lifestyle intervention than among individuals receiving diabetes support and education. Specifically, physical quality of life (physical component summary (PCS) from the Medical Outcomes Study Short-form Health Survey; SF-36; Ware & Sherbourne, 1992) scores improved in the intervention arm, with the greatest improvements among patients with the lowest baseline quality of life. In this study, weight loss, increases in physical fitness, and decreases in physical symptoms were mediators of the effect of treatment on PCS scores (Williamson et al., 2009). Thieszen and colleagues (2011) also found that improvements in the role-emotional, social, and mental health aspects of quality of life occurred in conjunction with decreases in BMI among participants in the Coronary Health Improvement Project (CHIP). Odds ratios were between 1.3 and 1.9 across measures, suggesting that improvements in psychological health may be due, at least in part, to reductions in BMI. Fontaine, Barofsky, Bartlett, Franckowiak, and Andersen (2004) also found that weight loss in a 13-week behavioral weight management program was associated with improvements in several areas of health-related quality of life immediately following treatment. Palmeira and colleagues (2009) found that weight loss was a partial mediator of the relationship between treatment and change in weight-related quality of life in a year-long behavioral treatment. Thus, although weight loss remains the primary or

exclusive focus in weight loss treatment studies (Teixeira, Going, Sardinha, & Lohman, 2005), research is increasingly examining improvement in quality of life as an alternative measure of "success" (Palmeira et al., 2009). Quality of life is an appropriate study outcome given that changes in quality of life may occur regardless of weight loss (Lillis, Levin, & Hayes, 2011).

Quality of life is a construct sometimes confused with overall health (Ware, 1987), but is actually much broader and includes physical, environmental, and economic factors that may have an effect on well-being (Fontaine & Barofsky, 2001). Health-related quality of life includes all aspects of health status that may have an effect on well-being (Guyatt & Cook, 1994) while obesity specific measures of quality of life examine all aspects of weight that may negatively impact quality of life (Kolotkin, Head, Hamilton, & Tse, 1995). Research indicates that health related quality of life decreases as BMI increases (Fontaine, Cheskin, & Barofsky, 1996), and the influence of weight on quality of life increases as BMI increases (Kolotkin & Crosby, 2002). Fontaine and colleagues (1996) examined health-related quality of life in an obese sample (mean BMI = 38.1). Compared with norms from the general population, respondents scored significantly lower on all domains of health- related quality of life (i.e., physical and mental health, pain, physical and emotional role limitations, general health perception, vitality, and social functioning). In addition, pain-related functional impairment in this sample was comparable to that of patients suffering from chronic migraines. Extreme obesity (mean BMI=48.7) was associated with significantly worse general health, physical functioning, social functioning, bodily pain, and role functioning than lower levels of obesity (i.e., BMI<40).

In addition to examining change in quality of life as a treatment outcome (e.g. Lillis et al., 2011), modifiable behavioral and psychosocial variables associated with obesity and impaired quality of life could be important targets for health care providers (Delahanty et al., 2013). In particular, there is evidence that stigmatization, depressive and anxious symptomatology, coping skills, and adherence all may influence weight loss and/or improvement in quality of life over the course of weight loss treatment. Thus, these variables warrant additional examination as predictors and/or mediators of weight loss treatment outcomes.

Stigmatization

Because body weight is often perceived to be under the control of the individual, overweight and obese people may be perceived as having negative traits or characteristics. To this end, prejudice against overweight and obese individuals may stem from the belief that overweight and obese people deserve any negative consequences of their weight (Crandall, 1994). It is also possible that the overt visibility of overweight and obesity contributes to the perceived stigmatization and discrimination associated with excess body fat (Koball, 2009).

Stigmatization has been associated with obesity (e.g. Friedman, Ashmore, & Applegate, 2008) and decrements in quality of life (e.g. Lillis et al., 2011), and it may be associated with weight loss in behavioral interventions (e.g. Wott & Carels, 2010). The relationship of obesity with perceived stigmatization has been well established, especially in treatment-seeking samples. For example, in a qualitative study, individuals with obesity reported weight-related stigmatization across a variety of situations, the worst of which were with close family members, spouses, and friends (Puhl, Moss-Racusin,

Schwartz, & Brownell, 2008). Similarly, Friedman, Ashmore, and Applegate (2008) found high rates of experienced stigmatization in a sample of 94 adults with obesity seeking surgery for weight loss. During the prior month, 88% had experienced physical barriers, 72% received nasty comments from others, 65% received nasty comments from family members, and 61% received inappropriate comments from doctors.

Additionally, research examining the effects of stigmatization on health behaviors suggests that stigmatizing experiences may undermine weight loss. For example, Puhl, Moss-Racusin, and Schwartz (2007) surveyed a sample of over 1000 female members of a nonprofit weight loss organization in the United States. Women who believed negative stereotypes about individuals with obesity engaged in more maladaptive eating behaviors and were more likely to refuse to diet following stigmatizing experiences than those who did not believe negative stereotypes. Puhl and Brownell (2006) found that 80% of obese men and women reported eating and 75% reported having refused to diet in response to stigmatizing experiences. Similarly, Schvey, Puhl, and Brownell (2011) examined the effect of exposure to weight stigmatizing media on consumption of snack foods in normal weight and overweight women. They found an interaction between weight and stigmatizing media such that women with overweight who watched a stigmatizing video consumed significantly more calories than overweight women who watched a neutral video or normal weight women in either condition. Wott and Carels (2010) found that interpersonal stigma predicted increased calorie consumption and decreased calorie expenditure during exercise in a sample of 55 adults with overweight and obesity. In fact, some researchers have posited that stigma leads to poorer mental and physical health

because it threatens identity, increases stress, and undermines health behaviors (Major, Hunger, Bunyan, & Miller, 2014; Hunger, Major, Blodorn, & Miller, 2015).

Despite this research suggesting that experiences of stigmatization predict maladaptive health behaviors (e.g. Wott & Carels, 2010, Schvey et al. 2011), there is conflicting information about the relationship between perceived stigmatization and weight loss. According to Puhl and Heuer (2009), weight stigmatization is unlikely to reduce rates of obesity because it hinders intervention and perpetuates health disparities. Ogden and Clementi (2010) interviewed 46 obese or formerly obese participants about the influence of their body weight on self-identity. Regardless of current weight status, participants used negative, derogatory words to describe their physical appearance and themselves. Participants spoke of both the negative and positive consequences of stigmatizing experiences, explaining that stigma usually undercuts the desire to change but can also be the impetus for weight loss. In fact, Gudzune, Bennet, Cooper, and Bleich (2014) found that individuals who perceived judgments about their weight from their primary care providers were more likely to attempt weight loss but less likely to achieve weight loss. Similarly, Wott and Carels (2010) found that greater history of interpersonal stigmatization was associated with reduced weight loss in their sample of overweight and obese adults participating in group behavioral weight loss treatment. However, Latner, Wilson, Jackson, and Stunkard (2009) examined the effects of past stigmatizing experiences on weight loss in a sample of 185 individuals involved in a self-help, group weight loss program. History of stigmatization was associated with negative body image and increased fear of fat at baseline, but regression analyses showed that stronger history of stigmatization was predictive of increased weight loss over time.

Stigmatization also is a known predictor of reduced quality of life in obesity and related medical conditions (Lillis et al., 2011). For example, in a sample of 117 adults seeking bariatric surgery for extreme obesity, BMI was unrelated to frequency of stigmatizing experiences, but stigmatization was associated with poorer obesity-specific quality of life (Sarwer, Fabricatore, Eisenberg, Sywulak, & Wadden, 2008). Similarly, in a sample of 87 adults with mild to moderate obesity seeking treatment in a weight-loss clinic, weight -related stigmatization, as measured with the weight self-stigma scale, was a significant predictor of poorer health-related quality of life (Lillis et al., 2011). No prior research has addressed the relationship between stigmatization and change in quality of life with behavioral weight loss treatment.

Perceived stigmatization is an increasingly studied correlate of obesity associated with negative health behaviors and poor psychosocial functioning (Puhl, Moss-Racusin, & Schwartz, 2007). However, the relationship of stigmatization to weight loss treatment outcomes has received less attention in the research literature. The body of literature examining the association of perceived stigmatization as a predictor of weight loss is equivocal. There is a dearth of research examining the association of stigmatization with changes in quality of life during weight loss treatment despite research suggesting that stigmatization negatively influences quality of life (e.g. Wott & Carels, 2010; Latner et al., 2009; Sarwer et al., 2008). Therefore, additional research is needed to determine the degree to which perception of stigmatization predicts weight loss and quality of life in behavioral interventions. Research also is necessary to address the potential mechanism[s] by which stigma may influence weight management outcomes.

Potential mechanisms that may account for the relationships between perceptions of stigmatization and weight loss treatment outcomes include improvements in psychological functioning (depressive and anxious symptomatology), increases in adaptive coping/decreases in maladaptive coping, and adherence to treatment recommendations. For example, individuals who perceive high levels of weight-related stigmatization prior to starting treatment may experience an increase in depressive and/or anxious symptomatology during treatment and thus may lose less weight or show less improvement in quality of life over the course of treatment. Similarly, individuals who perceive weight-related stigmatization before treatment may experience either an increase in maladaptive coping or a decrease in adaptive coping during treatment and thus may be at risk for adverse outcomes (poor weight loss or little improvement in quality of life). In addition, individuals who perceive weight-related stigmatization before treatment may fail to adhere to treatment recommendations and thus may be at risk for reduced weight loss or negligible improvement in quality of life. However, stigma also may serve as the impetus for change and thus lead to weight loss and increased quality of life through adaptive psychological and behavioral changes. To address the dearth of literature examining the mechanisms by which stigma is related to weight loss treatment outcomes, this study explored the roles of psychological functioning, coping, and adherence as mediators of the relationship of stigma with weight loss treatment outcomes.

Depressive Symptomatology

Depression has been linked to obesity, decrements in functioning, and weight-related stigmatization. A meta-analysis of longitudinal studies examining depression and obesity suggests a possible reciprocal relationship between obesity and depression such

that clinical depression is associated with the development of obesity and obesity is associated with the development of depression (Luppino et al., 2010). A bidirectional theoretical model describing the relationship between depression and obesity has been posited (Markowitz, Friedman, and Arent, 2008). Data from a large, state-based telephone survey indicated that participants with a lifetime diagnosis of depression were significantly more likely to be obese (Strine et al., 2008). Research also shows a relationship between depression and reduced quality of life in obesity. In a sample of pre-bariatric candidates, Fabricatore, Wadden, Sarwer, and Faith (2005) found that individuals with impaired health-related quality of life were more likely to meet criteria for clinically significant depression after controlling for body mass index.

Furthermore, research among treatment-seeking individuals with extreme obesity suggests that weight-related stigma may account for the relationship between obesity and depression. In a sample of 60 adults with extreme obesity seeking bariatric surgery, weight-related stigma, as measured by the public distress subscale of the Impact of Weight on Quality of Life-Lite (IWQOL-Lite), was the only independent predictor of depressive symptomatology, as measured by the Beck Depression Inventory, and accounted for approximately 33 percent of the variance (Chen et al., 2007). Stigmatization also was associated with depressive symptomatology in a sample of 117 adults with extreme obesity seeking bariatric surgery (Sarwer et al., 2008).

Despite relationships between obesity and depressive symptomatology (Markowitz, Friedman, & Arent, 2008), there is not a clear relationship between depression and weight loss outcomes. For example, depressive symptoms at baseline failed to predict weight loss following an intensive lifestyle intervention in a large sample

of overweight and obese adults with type II diabetes (Faulconbridge et al., 2012). A review of pretreatment predictors of weight loss also found no relationship between mood symptomatology and weight loss (Teixeira et al., 2005). However, Munro, Bore, Munro, and Garg (2011) found that neuroticism, particularly the facets of depression, anxiety, anger, self-consciousness, and vulnerability, was associated with greater weight loss among individuals with mild to moderate obesity following a very low calorie diet.

Change in depressive symptoms has been correlated with weight loss in pharmacological and behavioral treatment (Faulconbridge et al., 2009; Simon, et al., 2010; Palmeira et al., 2010). Similarly, in a sample of overweight and obese postmenopausal women, decreases in depression over the course of treatment were associated with improvements in role-physical, vitality, and mental health subscales of health-related quality of life above and beyond weight loss and other psychosocial variables (Imayama et al., 2011). Change in depressive symptoms also was predictive of improvement in quality of life among obese adults who lost less than 5kg in a comprehensive lifestyle intervention (Wright et al., 2012).

Overall, the literature suggests that obese individuals with depression are, on average, more likely to be obese, and individuals with obesity are at increased risk for depression (e.g. Strine et al., 2008). Furthermore, the relationship between obesity and depression may be influenced by stigmatization (Chen et al., 2007), and individuals with obesity and depression are at increased risk for decrements in quality of life (Fabricatore et al., 2005). Research also suggests that depressive symptoms may be associated with outcomes in weight loss treatment, but most studies do not support baseline depressive symptoms as predictors of weight loss (Teixeira et al., 2005; Wadden et al. 1992). Studies

have found that decreases in depressive symptoms over the course of treatment are associated with weight loss and improvements in quality of life (Wright et al., 2012). Taken together, this body of literature suggests that change in depression over the course of treatment holds promise as a mediator of the relationship of baseline stigmatization with weight loss and improvement in quality of life.

Anxious Symptomatology

Anxious symptoms, like depressive symptoms, have been associated with obesity and reduced quality of life, but there are fewer studies of anxiety and obesity. Meta-analytic data indicate a positive association between obesity and anxiety disorders (Gariepy, Nitka, & Schmitz, 2010), and data from a large, state-based telephone survey indicated that participants with a lifetime diagnosis of anxiety were significantly more likely to be obese (Strine et al., 2008). Anxiety also was associated with poorer obesity-related well-being in a sample of 147 adults with moderate levels of obesity (Mannucci et al., 1999) and higher rates of obesity-related stigmatization in a sample of pre-bariatric patients (Friedman, Ashmore, & Applegate, 2008).

There also is a dearth of literature examining anxiety as a predictor of weight loss treatment outcomes. Neither state nor trait anxiety were associated with weight loss among women in a behavioral intervention (Wadden et al., 1992), but the anxiety facet of neuroticism was associated with greater weight loss among individuals with mild to moderate obesity following a very low calorie diet (Munro et al., 2011). Change in anxiety was not predictive of change in quality of life among a sample of obese adults who lost less than 5kg in a comprehensive lifestyle intervention (Wright et al., 2012).

Overall, there is a paucity of research examining anxiety in obese populations and further research is clearly needed. Research suggests that anxiety may be associated with obesity (e.g. Strine et al., 2008), poorer quality of life in obesity (Mannucci et al., 1999), and obesity-related stigmatization (Friedman et al., 2008). However, there is a relative lack of research examining anxiety as a predictor and/or mediator of weight loss outcomes. To the degree that anxiety is associated with stigmatization and weight loss, it is plausible to examine changes in anxiety as a mediator of the relationship between stigma and weight loss outcomes.

Coping Style

The negative impact of impaired physical and psychosocial functioning on psychological functioning among individuals with obesity may be buffered or modified by coping strategies. Myers and Rosen (1999) identified stigmatizing situations and common ways of coping with experiences of perceived stigmatization among obese individuals, including positive self-talk, socially disarming people to avoid negative evaluations, and turning to faith. The authors also identified three negative coping strategies: negative self-statements, crying and isolation, and avoiding or leaving situations that could be stigmatizing (Myers & Rosen, 1999). In a study of a national weight-loss support group, the most commonly used coping strategies included "heading off negative comments," "using positive self-talk," "coping through faith, religion, or prayer," "responding by eating more food," and "seeking social support" (Puhl & Brownell, 2006). Additionally, Mensinger, Calogero, and Tylka (2016) compared the effects of internalized weight stigma on eating behavior among individuals participating in either conventional behavioral weight management or a weight neutral program that

emphasized well-being and self-care (without emphasis on weight loss). Results indicated greater adaptive eating among individuals with low internalized weight stigma regardless of treatment group. However, only weight neutral participants low in internalized weight stigma showed improvement in disordered eating. Participants high in internalized weight stigma did not show improvements in eating regardless of treatment group.

Furthermore, maladaptive coping is associated with impairment in quality of life among individuals with obesity. For example, in a sample of treatment-seeking adults with obesity, frequent binge eating was associated with poorer quality of life as indicated by higher IWQOL-Lite scores (Rieger, Wilfley, Stein, Marino, & Crow, 2005). Similarly, binge eating predicted poorer functioning on mental domains of health-related quality of life in a sample of 183 individuals with mild to moderate obesity participating in a university-based weight management program (Marchesini et al., 2000).

Despite known associations between coping style and stigma, obesity, and quality of life (Myers & Rosen, 1999; Marchesini et al., 2000), coping does not consistently predict outcomes in weight loss treatment. For example, maladaptive eating behavior is one coping mechanism that has been well-studied as a predictor of poorer weight loss in obesity treatment. However, pretreatment disordered eating, specifically binge eating and eating disinhibition and restraint, is not associated with weight loss in behavioral interventions (Teixeira et al., 2005). Data from a large study comparing enhanced treatment as usual versus a comprehensive lifestyle intervention for patients with overweight or obesity and diabetes showed that baseline binge eating was not associated with weight loss during a lifestyle intervention (Gorin et al., 2008). Similarly, there was no relationship between baseline eating behaviors and weight loss in a sample of 112

middle-aged women completing a four-month lifestyle intervention (Teixeira et al., 2002) or in a sample of 96 obese adults attending a 20-week commercial weight loss program (Bas & Donmez, 2009).

Unlike pretreatment coping, there is a substantial body of literature suggesting that changes in coping behavior during the course of treatment are associated with greater weight loss. Disordered eating during treatment is associated with reduced weight loss, but positive changes in eating behavior are associated with increased weight loss. Reduced weight loss was found among participants in a large study of individuals with overweight or obesity and comorbid diabetes who reported binge eating both at baseline and at the conclusion of treatment and those who began binge eating over the course of the study (Gorin et al., 2008). Riesco and colleagues (2009) found that disinhibition and hunger decreased with weight loss while restriction increased during a short-term, comprehensive behavioral intervention. Unlike leaner participants, women in this sample with BMIs over 35 displayed increased flexible restriction, which was thought to be associated with greater long-term weight control. Improvement in eating self-regulation also was predictive of weight loss in a behavioral treatment program based on social cognitive theory (Annesi, 2011), and improvement in dietary restraint was predictive of weight loss in an Italian hospital-based treatment program (Dalle, Calugi, Corica, Domizio, & Marchesini, 2009).

Improvements in other aspects of coping over the course of weight loss treatment also correlate with weight loss. In a German sample of 98 individuals with obesity, individuals who lost weight during a six-month observational study reported reductions in their use of problem-focused disengagement, namely wishful thinking and problem

avoidance, although BMI was not associated with coping at baseline (Conradt et al., 2008). Similarly, in a sample of 272 middle-aged women with obesity participating in a six-month lifestyle intervention, improvements in problem-solving abilities partially mediated the relationship between adherence (defined by number of food logs completed) and weight loss. In addition, participants who lost at least 10% of their starting weight showed greater improvements in problem-solving than individuals who lost less than 5% of starting weight (Murawski et al., 2009).

Limited research has examined coping styles as predictors of change in quality of life over the course of weight loss treatment. In a sample of adults who had completed a six-month behavioral weight loss treatment program, increases in psychological flexibility and weight-specific acceptance coping following a brief Acceptance and Commitment Therapy workshop were associated with improvements in quality of life three months after the workshop. In this sample, improvement in quality of life was not accounted for by weight loss (Lillis, Hayes, Bunting, & Masuda, 2009).

Thus, there appears to be an important role of coping in weight loss treatment. Individuals with obesity engage in a variety of adaptive and maladaptive coping strategies to deal with the stigma of obesity (e.g. Myers & Rosen, 1999), and these coping strategies influence quality of life (e.g. Rieger et al., 2005). While pretreatment coping does not appear to be related to treatment outcomes, changes in coping over the course of treatment have been associated with weight loss and limited improvements in quality of life (e.g. Conradt et al., 2008; Annesi, 2011; Imayama et al., 2011). Additional research is needed examining the relationship between changes in coping with changes in quality of life during weight loss treatment as well as the degree to which improvements

in coping mediate the relationship between baseline stigmatization and weight loss treatment outcomes.

Adherence

Adherence to weight management recommendations is poor among obese samples, and adherence generally declines over time. In a sample of 151 adults with overweight and obesity participating in standard behavioral treatment, adherence to all intervention components declined significantly over the course of the year-long intervention (Acharya et al., 2009). By treatment end, attendance dropped to 44% and self-monitoring dropped to 22%. Similarly, attendance decreased dramatically over the course of a year-long behavioral weight control program for patients with obesity and type 2 diabetes (Wing, Blair, Marcus, Epstein, & Harvey, 1994). In this sample, participants attended approximately 83 percent of the educational classes during the first three months versus 43 percent during the last three months.

Furthermore, poor treatment adherence is associated with poorer weight loss in behavioral treatment. Alhassan, Kim, Bersamin, King, and Gardner (2008) examined dietary adherence, defined as the difference between participants' self-reported intake of macronutrients and the macronutrient goals recommended in their weight loss diet (Atkins, Ornish, or Zone), in a sample of 181 women with overweight or obesity. The authors found that better adherence to the goals of the diet was associated with greater weight loss regardless of diet, suggesting that adherence may be more important than the actual macronutrient composition of the diet. Adherence measured by attendance at a greater number of meetings was predictive of 5 percent weight loss in a 12-week, government-funded weight loss program in Great Britain (Lloyd & Khan, 2011) as well

as a large combined pharmacological and behavioral intervention (Venditti et al., 2008). Dietary adherence and behavioral adherence (self-monitoring and attendance) during the first six months of a behavioral intervention were associated with increased weight loss at both six and twenty-four months (Williamson et al., 2009). Similarly, Williamson and colleagues found that behavioral adherence over the first six months of treatment predicted weight loss at six months and twenty-four months in a sample of 170 adults with mild to moderate obesity participating in a two-year dietary weight loss program (Williamson et al., 2010). In a sample of adults participating in an 18-month behavioral intervention, adherence to recommended dietary fat intake was associated with weight loss, but adherence to a kilocalorie goal was not predictive of weight loss (Warziski, Sereika, Styn, & Burke, 2008). Adherence to treatment recommendations has not been evaluated as a predictor of quality of life or improvement in quality of life in obesity, but adherence is associated with quality of life in other patient populations such as HIV/AIDs and schizophrenia (e.g. Mannheimer et al., 2005; Hayhurst, et al., 2013).

Stigmatization appears to influence adherence to treatment recommendations in weight loss treatment. For example, Wott and Carels (2010) examined the influence of interpersonal and institutional stigma on adherence in a behavioral weight management program. Caloric intake and physical activity were not assessed as measures of adherence to treatment, but both types of stigma were associated with decreased caloric expenditure during exercise, and institutional stigma was associated with increased calorie consumption, suggesting that stigmatization may impede compliance with treatment recommendations. Interestingly, Pearl, Puhl, and Dovidio (2015) found that weight stigma was positively associated with exercise behavior, however, the relationship of

weight stigma and exercise behavior was mediated by weight bias internalization such that weight stigma predicted greater weight bias internalization which in turn predicted lower levels of exercise. Additional research is needed to determine the extent to which stigmatization is associated with poorer treatment adherence.

Poor adherence to treatment recommendations is problematic in behavioral weight loss treatment because it predicts poorer weight loss (e.g. Williamson et al., 2009). However, adherence has not been examined as a predictor of quality of life or as a predictor of change in quality of life among obese individuals. There is also a dearth of research examining stigmatization as a potential barrier to adherence. Thus, additional research is necessary to determine whether adherence mediates the relationship between stigmatization and weight loss and change in quality of life.

Bariatric Status

Prebariatric weight loss is often recommended for patients seeking bariatric surgery because of its association with lower frequency of both total complications and major complications, even after controlling for age, sex, baseline BMI, and type of surgery (Benotti et al., 2009). Despite a dearth of research supporting its efficacy for postsurgical outcomes (e.g. Ochner, Dambkowski, Yeomans, Teixeira, & Pi-Sunyer, 2012; Ochner, Puma, Raevuori, Teixeira, & Geliebter, 2010), preoperative behavioral treatment is often required by insurance providers. However, it is possible that prebariatric patients participating in behavioral weight loss interventions to fulfill insurance requirements may not be highly motivated to engage in adaptive behavior change during behavioral weight management because they are relying on the surgical intervention to facilitate weight loss. Thus, prebariatric patients may exhibit poorer

outcomes at the conclusion of behavioral treatment. In these patients, stigma may have more negative effects than among patients not seeking bariatric surgery.

Demographic Variables

Demographic variables are often examined as predictors of weight loss (e.g. Stubbs et al., 2011) and quality of life (e.g. Fontaine, Barofsky, & Cheskin, 1997; Bentley et al., 2011) in studies of obese individuals, and it will be important to account for demographic variables in any model predicting weight loss outcomes. For example, higher initial BMI and male gender have been documented as robust predictors of weight loss in reviews of behavioral interventions (Stubbs et al., 2011; Teixeira et al., 2005). In a large, multisite European study examining predictors of weight loss among individuals with moderate obesity following an eight-week low-calorie diet, baseline body weight and male gender were the only independent predictors of weight loss, accounting for a total of 42% of the variance (Handjieva-Darlenska et al., 2010). Higher initial BMI also was predictive of increased weight loss in a six-month self-help behavioral intervention (Latner et al., 2009) and in a large, two-year randomized controlled trial examining the effects of sibutramine on weight loss (Hansen et al., 2001). However, Lloyd and Khan (2011) found that patients with class I obesity at baseline lost more weight than patients with overweight or patients with class II or class III obesity in a three-month behavioral intervention, indicating that the relationship between baseline weight and weight loss may not be linear.

Several additional studies have found a similar gender difference in behavioral weight loss interventions. Presnell, Pells, Stout, and Musante (2008) found that men lost more weight than women in their four-week residential treatment program, and Lloyd

and Khan (2011) found that men were more likely to achieve five percent weight loss than women in a 12-week, government-funded weight loss program in Great Britain. Svetkey and colleagues (2012) also found a gender difference in weight loss in their sample of middle-aged adults participating in an intensive six-month behavioral intervention with three-year follow-up. Among individuals who achieved the four kilogram weight loss minimum, men lost significantly more weight than women, and white participants lost significantly more weight than black participants regardless of gender. Although racial differences are not as well replicated as the findings for gender, Fabricatore and colleagues (2009) also found that Caucasian ethnicity predicted weight loss in a sample of patients participating in a year-long study comparing pharmacotherapy, behavioral treatment, and a combination treatment.

Decrements in quality of life with increasing levels of adiposity have been well-documented in the clinical literature. For example, using data from the 1999 Behavioral Risk Factor Surveillance Survey, Heo, Allison, Faith, Zhu, and Fontaine (2003) found a J-shaped relationship between BMI and health-related quality of life. Individuals with BMIs in the normal range had significantly better health-related quality of life than individuals who were underweight, overweight, or obese after controlling for other demographic variables. Similarly, in a review of the literature, Fontaine and Barofsky (2001) generally found a positive correlation between BMI and decrements in health-related quality of life with BMI having a greater impact on the physical component of quality of life than on the mental component of quality of life.

Obesity has been associated with poor quality of life, specifically health-related quality of life (Wiczinski et al., 2009; Hassan, Joshi, Madhavan, & Amonkar, 2003),

however this relationship differs across demographic subgroups (Bentley et al., 2011). In an extremely obese sample, white women reported the greatest impairment in obesity-specific quality of life and African American men reported the least impairment. Furthermore, the relationship between BMI and impairment differed across demographic subgroups such that white women reported greater detrimental effects of obesity on quality of life at lower BMIs than other race/gender groups (White, O'Neil, Kolotkin, & Byrne, 2004).

Data also suggest that the amount of change in obesity-specific quality of life with weight loss treatment may differ by gender. In a predominantly female sample of obese adults participating in a year-long combined pharmacological and nutritional weight loss treatment, women exhibited significant improvements in all areas of weight-specific quality of life. Men exhibited significant improvements in only physical function, self-esteem, public distress, and overall quality of life. However, this study did not control for weight loss (Kolotkin, Crosby, Williams, Hartley, & Nicol, 2001).

Data on demographic predictors of weight loss treatment outcomes indicate a need for additional research examining predictors of change in quality of life. Higher initial BMI and Caucasian ethnicity have been identified as predictors of weight loss and poorer quality of life in obesity (Stubbs et al., 2011; Fabricatore et al., 2009; White et al., 2004), but neither have been studied as predictors of change in quality of life. Also, while male gender is a predictor of weight loss (Stubbs et al., 2011), female gender has been associated with lower quality of life in obesity and increased improvement in quality of life during treatment (White et al., 2004; Kolotkin et al., 2001). This study provides an opportunity to confirm previous relationships found between demographic variables and

weight loss, identify the extent to which demographic variables also are predictive of improvement in quality of life, and control for demographic variables as potential confounds in the proposed mediation and moderated mediation analyses.

Summary

Obesity is a common, chronic medical condition associated with increased morbidity and mortality as well as decrements in psychosocial functioning (Calle et al., 1999; Wiczinski et al., 2009). Despite decades of research, weight loss treatment outcomes remain subpar (Brownell, 2010). Also, while weight loss remains the primary outcome of interest in weight loss treatment, improvement in quality of life is increasingly evaluated as a supplemental outcome of interest due to its positive relationship with weight loss and as a separate treatment benefit (Palmeira et al., 2009; Lillis et al., 2011).

Perceived weight-related stigmatization is one psychosocial variable that is receiving increasing attention as a predictor of poor quality of life in obesity and a potential predictor of weight loss. However, previous research on the relationship between stigma and weight loss has produced divergent findings (e.g. Wott & Carels, 2010; Latner et al., 2009; Sarwer et al., 2008), and stigma has not been examined as a predictor of change in quality of life. Additionally, several modifiable variables such as depressive and anxious symptomatology, coping style, and adherence to treatment recommendations hold promise as potential mediators of the relationship between stigmatization and weight loss, as well as stigmatization and quality of life. Therefore, the current exploratory study examined the degree to which behavioral and psychological changes during behavioral weight loss treatment mediate the relationship between

baseline perceptions of stigmatization and weight loss and improvement in quality of life over the course of treatment. The study also examined the extent to which the relationships between stigmatization and the hypothesized mediators (changes in depressive and anxious symptomatology, changes in coping style, and adherence to treatment recommendations) differed between individuals participating in behavioral weight management as a stand-alone weight loss intervention and individuals participating as a precursor to bariatric surgery.

Study Hypotheses

The first two hypotheses aimed to replicate findings from past studies. The remaining study hypotheses were exploratory in nature and evaluated novel relationships to better understand change processes in weight management:

1. Weight loss during a structured behavioral weight management program will be correlated with increased quality of life from baseline to program completion.

2. Higher initial BMI, male gender, and Caucasian ethnicity will predict weight loss in the program.

3. Higher initial BMI, female gender, and Caucasian ethnicity will predict greater improvement in quality of life in the program.

4. Baseline depression and anxiety will not be associated with weight loss or improvement in quality of life during the program.

5. Reductions in depression and anxiety will mediate the relationship between baseline stigma and weight loss after controlling for baseline demographic predictors of weight loss. These relationships will be moderated by bariatric status.

6. Reductions in depression and anxiety will mediate the relationship between baseline stigma and improvement in quality of life after controlling for baseline demographic predictors of quality of life. These relationships will be moderated by bariatric status.

7. Improvements in coping (e.g. reduction in emotional eating, and increase in eating self-efficacy, increase in approach coping, decrease in avoidance coping, increase in use of emotional support, and increase in use of instrumental support) will mediate the relationship between baseline stigma and weight loss after controlling for demographic predictors of weight loss. These relationships will be moderated by bariatric status.

8. Improvements in coping (e.g. reduction in emotional eating, and increase in eating self-efficacy, increase in approach coping, decrease in avoidance coping, increase in use of emotional support, and increase in use of instrumental support) will mediate the relationship between baseline stigma and improvement in quality of life after controlling for demographic predictors of quality of life. These relationships will be moderated by bariatric status.

9. Adherence to treatment (e.g. attendance, dietary log completion, physical activity log completion) will mediate the relationship between baseline stigma and weight loss after controlling for baseline demographic predictors of weight loss. These relationships will be moderated by bariatric status.

10. Adherence to treatment (e.g. attendance, dietary log completion, physical activity log completion) will mediate the relationship between baseline stigma and reduced quality of life after controlling for baseline demographic predictors. These relationships will be moderated by bariatric status.

Chapter 2: Methods

Participants

The current study utilized archival data from 104 men and women with overweight and obesity who were recruited from "Living Well," a comprehensive behavioral weight management program at The Ohio State University's Wexner Medical Center. Most study participants were extremely obese at baseline with a mean body mass index of 47.9 (*SD*=12.1, range 28.2 to 98.5) and a mean age of 45.4 (*SD*=11.8, range 19 to 73). The sample was approximately 76% female and 81% Caucasian. Most participants had at least a college degree. Participants were recruited at the beginning of "Living Well" and followed over the course of their program. Patients seeking bariatric surgery following their participation in "Living Well" as well as patients interested in only behavioral modification were included in this study. In this sample, approximately 48 percent of participants were planning to have bariatric surgery following behavioral treatment.

The "Living Well" program is a six-month comprehensive weight management program consisting of educational classes, individualized reduced-calorie dietary plans, access to exercise facilities and classes, and optional individual meetings with dietitians, exercise physiologists, nurses, health coaches, and behaviorists. Educational classes with 10-15 patients are held on a weekly basis and include information on diet, fitness, and behavioral change. Because admission into the "Living Well" program occurs on a

rotating basis, patients do not necessarily proceed through the educational classes with a fixed cohort. "Living Well" staff collect information about physical fitness, anthropometric measurements, health behaviors, and diet prior to the start of the program, Staff members collect information about physical fitness and anthropometric measurements again at three months, and after six months. The "Living Well" program meets the pre-bariatric behavioral treatment requirements established by many insurance companies. All participants are encouraged to complete the 6-month program, but many prebariatric patients and some non-bariatric patients choose to complete a condensed 3-month version of the 6-month program.

Procedures

Participants were recruited and provided written consent during the first week of the weight management program. Participants completed questionnaires at baseline, upon completion of the program, and six months after completion of the program. However, only data from the first two time points were used for this study. After providing written consent, participants were given a packet of questionnaires to complete and return the following week. Participants were paid $10 for completion of the packet. Participants also allowed investigators to access their "Living Well" assessment and behavioral records.

At the second-to-last educational class, participants were given the second packet of questionnaires to complete and return at the last educational class. If participants were unable to return the packet at the last educational class, they were given a self-addressed, stamped envelope in which to return the packet. If participants dropped out of "Living Well," they were mailed a packet of questionnaires and asked to return the packet via

mail using an included self-addressed, stamped envelope. Participants were paid another $10 for the completion of the second packet. Participants who failed to return the packet either in person or via mail received three reminder calls. If the questionnaire was not returned after the reminder calls, the data were considered missing.

Measures

Self-report and objective data were collected. Questionnaires assessed quality of life, perceived stigma, psychological distress, and coping styles. Objective measures included program attendance, dietary and physical activity log completion, demographic information, anthropometric data, and indicators of physical fitness.

The self-report measures listed below were completed at both times of measurement.

Two separate measures of quality of life were used in this study: a generic health-related quality of life measure as well as an obesity-specific measure of the influence of weight on quality of life. The use of a generic measure of health-related quality of life facilitates comparison with other patient populations while the obesity-specific measure of quality of life assesses outcomes that primarily affect individuals with obesity (Wadden & Phelan, 2002).

Medical Outcomes Study, Short Form-36 (SF-36). The SF-36 is a 36-item generic measure of quality of life across eight domains: physical functioning, social functioning, limitations caused by physical problems, limitations caused by emotional problems, pain, mental health, vitality, and perceptions of general health. Two composite scores also can be generated: the mental component summary (MCS) and the physical component summary (PCS; Ware & Sherbourne, 1992). Ware, Snow, Kisinski, and Gandek (1993)

conducted a review of the first 15 published studies using the SF-36, finding mean reliability coefficients of .76 for each of the subscales. T-scores are generated for all subscales and component scores. Cronbach's α ranged from .66 to .88 across all subscales.

Impact of Weight on Quality of Life Questionnaire- Lite Version (IWQOL-Lite). The IWQOL-Lite is a 31-item measure assessing the influence of body weight on quality of life. This measure has good reliability (.96), validity, and sensitivity to weight change. Each item is rated on a 5-point likert scale, and total scores range from 31 to 155. The correlation between the IWQOL-Lite and the original IWQOL is .97, indicating that they are measuring the same construct. The measure is made up of five subscales: physical function, self-esteem, sexual life, public distress, and work (Kolotkin, Crosby, Koloski, & Williams, 2001). Cronbach's α in this sample was .96.

Social Impact Scale (SIS). The SIS is a 24-item questionnaire originally developed to examine facets of stigma and assess the impact of perceived stigma among individuals with chronic illnesses. Each item is rated on a 5-point likert scale. The questionnaire includes four subscales representing social rejection, financial insecurity, internalized shame, and social isolation. Total scores range from 0 to 96. Subscale scores range from 0 to 36 for social rejection, from 0 to 12 for financial insecurity, from 0 to 20 for internalized shame, and from 0 to 28 for social isolation. Correlations between the subscales range from .28 to .66, indicating that while they are related, each subscale is measuring a different aspect of stigma (Fife & Wright, 2000). For the current study, the word "illness" was replaced with "condition" throughout the measure. Cronbach's α was .94 in the current study.

Hospital Anxiety and Depression Scale (HADS). The HADS is a 14-item scale that assesses anxious and depressive symptoms in medical populations. Each item is rated on a 4-point likert scale. Scores on each subscale range from 0 to 21. Scores from 0 to 7 place individuals in the normal range, scores from 8 to 10 place individuals in the borderline abnormal range, and scores from 11 to 21 place individuals in the abnormal range. Patient ratings on anxiety and depression subscales are significantly correlated with interview ratings of anxiety and depression (.54, .79; Zigmond & Snaith, 1983). Cronbach's α was .86 for the total scale, .82 for the anxiety subscale, and .74 for the depression subscale.

Four separate measures of coping were included in this study: an emotional eating scale, a measure of dietary self-efficacy, a generic coping measure, and a questionnaire examining approach versus avoidant coping. The use of multiple measures of coping allows for investigation of coping techniques that are common among individuals with overweight and obesity as well as general coping strategies and styles.

Emotional Eating Scale (EES). The EES is a 25-item measure assessing tendency to eat due to anger/frustration, anxiety, and depression. Each item is rated on a 5-point likert scale. Total scores range from 25 to 125. The scale has adequate internal consistency (.81) and temporal stability across 2 weeks (.79). The measure is highly correlated with binge eating and differentiates between binge eaters with obesity and patients with anxiety disorders (Arnow, Kenardy, & Agras, 1995). In the current study, Cronbach's α was .95 at baseline.

Eating Self Efficacy Scale (ESES). The ESES is a 25-item scale assessing eating in response to negative affect and eating in social situations with good internal

consistency (.92), test-retest reliability over seven weeks (.70), and construct validity (.39 between subscales). Each item is rated on a seven-point likert scale with higher scores indicating lower self-efficacy. Total scores range from 25 to 175. The scale consists of two factors assessing eating due to negative affect and eating when it is socially acceptable (Glynn & Ruderman, 1986). Cronbach's α was .95.

Coping Orientation to Problems Experienced- Short Form (COPE). The COPE is a 28-item scale assessing 14 different coping styles. Each item is rated on a 4-point likert scale. Total scores range from 28 to 112. The scale has adequate Cronbach's alpha reliability with only one subscale (mental disengagement) falling below .6 and test-retest correlations indicate that coping tendencies are relatively stable in two different samples (.42 and .89; Carver, Scheier, & Weintraub, 1989). Cronbach's α was .74 for the COPE total, .85 for emotional support, and .67 for instrumental support.

Brief Approach/Avoidance Coping Questionnaire (BACQ). The BACQ is a 12-item questionnaire assessing coping strategies, approach and avoidance. The factor of avoidant coping has been further divided into resignation/withdrawal and diversion. Each item is rated on a 5-point likert scale. Total scores range from 12 to 60. The scale has adequate reliability with a Cronbach's alpha of .68 and adequate validity as shown through moderate correlations with relevant COPE subscales assessing approach and avoidance (.34-.57; Finset, Steine, Haugli, Steen, & Laerun, 2002). In the current sample, Cronbach's α was .49 for the total scale, .67 for the approach subscale, and .66 for the avoidance subscale.

In addition to self-report measures, objective measures of adherence and functioning were collected from patient records. The "Living Well" program conducts

fitness evaluations at program entry, the midpoint of their program (3 months), and at the conclusion of the program (6 months). The following information was obtained from patient medical records:

Participant attendance at educational classes, dietary log completion, and physical activity log completion were recorded as measures of adherence to treatment. Demographics including gender, age, education and race; BMI; and waist circumference, an indicator of central adiposity were also recorded. Higher waist circumference is associated with greater risk of negative health consequences and mortality, and reduction of waist circumference is associated with lowered risk (Després, Lemieux, & Prud'homme, 2001).

Sample Size Calculations

It was hypothesized that there would be medium effect sizes for all predicted relationships. For the first hypothesis examining the correlation between weight loss and improvement in quality of life, 67 participants would be needed to obtain power of 0.80 when alpha is 0.05 and r is 0.3 (Faul, Erdfelder, Lang, & Buchner, 2007). For the mediation analyses using bias-corrected bootstrapping, Fritz and MacKinnon (2007) reported that 71 participants would be needed to obtain power of 0.80 when alpha is set at 0.05 and both the effect size for the relationship between the predictor and the mediator and the effect size for the relationship between the mediator and the outcome after controlling for the predictor are medium in size. For the moderated mediation analyses using bias-corrected bootstrapping, Preacher, Rucker, and Hayes (2007) reported that power would be .706 for a medium effect size with a sample of 50 and .962 for a medium effect size with a sample size of 100.

Data Analyses

To assess demographic differences (e.g. age, gender, race, and initial BMI) between participants in the study and patients who chose not to participate in the study, one-way ANOVAs and chi-square tests were used. Chi-square and ANOVA were also used to determine baseline differences between participants who completed the program and patients who dropped out of the program. Baseline differences in demographic variables (e.g. age, gender, initial BMI, education, surgery status, program length) and study variables (e.g. stigma, quality of life, anxiety, depression, coping) were assessed. Correlational analyses and ANOVAs were used to examine the relationships between possible covariates (i.e., initial BMI, initial quality of life, gender, ethnicity, surgical status, program length), self-report measures (i.e., stigma, depression, anxiety, coping style), and adherence.

Hypothesis 1 Pearson correlations examined the relationships between weight loss and change in quality of life. Weight loss was conceptualized as change in BMI from baseline to program completion and change in quality of life was conceptualized using the change in the mental component score of the SF-36, the physical component score of the SF-36, and total score of the IWQOL-Lite from baseline to program completion. All change scores were calculated such that a positive score reflects improvement in the variable.

Hypothesis 2 Multiple linear regression examined the influence of initial BMI, male gender, and Caucasian ethnicity on BMI at program completion controlling for BMI at baseline.

Hypothesis 3 Three separate multiple linear regressions examined the influence of initial BMI, female gender, and Caucasian ethnicity on MCS, PCS, and IWQOL-Lite total score

at program completion. The first regression was run controlling for MCS at baseline, the second regression was run controlling for PCS at baseline, and the third regression was run controlling for IWQOL-Lite total score at baseline.

Hypothesis 4 Eight separate linear regressions examined the impact of pretreatment depression and anxiety on changes in weight and quality of life. Four regressions were conducted with each of two baseline variables (depression and anxiety) predicting BMI, MCS, PCS, and IWQOL-Lite total score at program completion after controlling for the outcome (e.g. BMI, MCS, PCS, IWQOL-Lite total score) at baseline and relevant covariates.

Hypothesis 5 To test the simple mediation models for the indirect effect of pretreatment stigma on weight loss through the intervening variables of change in depression from baseline to program completion and change in anxiety from baseline to program completion, two separate 95% bias-corrected bootstrap confidence intervals were created. The indirect effect of change in depression is equal to the product of the effect of pretreatment stigma on change in depression and the effect of change in depression on weight at program completion after controlling for weight, stigma, and depression at baseline. Mediation analyses were based on the steps identified by Hayes (2013) using PROCESS. Ten thousand random samples were taken from the original sample with replacement. For each of the 10,000 bootstrap samples, the indirect effect of stigma on weight loss through change in depression was estimated, and the estimates were sorted from low to high. This distribution of the indirect effect was used to create a confidence interval for the true value of the indirect effect. First, the proportion of bootstrap estimates for the indirect effect that was below the value of the indirect effect found in

the original sample was determined and the z-score that corresponds with this proportion was calculated. In mediation, the lower bound of the confidence interval is equal to the negative of the z-score associated with a 95% confidence interval (1.96) plus two times the z-score that corresponds with the proportion of bootstrap estimates of the indirect effect that are below the original estimate of the indirect effect. Similarly, the upper bound of the confidence interval is equal to 1.96 plus two times the z-score that corresponds with the proportion of bootstrap estimates of the indirect effect that are below the original estimate of the indirect effect. The proportion of the distribution that was below the lower bound of the confidence internal was calculated and the value of the corresponding bootstrap estimate of the indirect effect was the lower bound of the bias-corrected bootstrap confidence interval. Similarly, the proportion of the distribution that was above the upper bound of the confidence interval was calculated and the value of the corresponding bootstrap estimate of the indirect effect was the upper bound of the bias-corrected bootstrap confidence interval. Significance was determined based on whether this confidence interval contained zero. Confidence intervals that do not contain zero provide evidence of a statistically significant indirect effect of change in depression on weight loss. The same procedure was utilized to test the indirect effect of change in anxiety.

To test the conditional indirect effect of bariatric status on the relationship between baseline stigma and weight loss through change in depression and change in anxiety, separate moderation analyses were conducted examining conditional effect of perceived stigma at baseline on change in depression and on change in anxiety. For models with evidence of moderation, conditional process analysis was conducted with

95% bias-corrected bootstrap confidence intervals to create two separate confidence intervals. The conditional indirect effect of bariatric status on the relationship between baseline stigma and weight loss through the mediator was estimated separately for nonbariatric and prebariatric participants and separate 95% bias-corrected bootstrap confidence intervals of the indirect effect were created for each subgroup of participants using the same methodology described above for simple mediation. If the confidence interval for either subgroup did not contain zero, then there was evidence of a statistically significant conditional indirect effect.

Hypothesis 6 To test the simple mediation models for the indirect effect of pretreatment stigma on change in quality of life through the intervening variables of change in depression and change in anxiety, two separate 95% bias-corrected bootstrap confidence intervals were created using the same procedure used to examine simple mediation in hypothesis 5. These analyses were repeated with the MCS at program completion, the PCS at program completion, and the IWQOL-Lite total score at program completion entered as the outcome variable. To test the moderated mediation models for the conditional indirect effect of bariatric status on the relationship between baseline stigma and change in quality of life through change in depression and change in anxiety, moderation analyses were first conducted. When appropriate, conditional process analyses were planned to create 95% bias-corrected bootstrap confidence intervals using the same procedure used to examine moderated mediation in hypothesis 5. Analyses were conducted separately for anxiety and depression with MCS at program completion, PCS at program completion, and IWQOL-Lite score at program completion as outcomes.

Hypothesis 7 To test the simple mediation model for the indirect effect of pretreatment stigma on weight loss through the intervening variable of change in emotional eating score, a 95% bias-corrected bootstrap confidence interval were created using the same procedure used to examine simple mediation in hypothesis 5. These analyses were repeated with change in eating self-efficacy score. Change in approach coping, change in avoidance coping, change in use of emotional support measured with the COPE, and change in use of instrumental support measured with the COPE also were examined as mediators in exploratory analyses. To test the moderated mediation models for the conditional indirect effect of bariatric status on the relationship between baseline stigma and weight loss through change in emotional eating, moderation analyses were conducted. When appropriate, a 95% bias-corrected bootstrap confidence interval was created using the same procedure used to examine moderated mediation in hypothesis 5. These moderation and, when appropriate, moderated mediation analyses were repeated with change in eating self-efficacy score. Change in approach coping, change in avoidance coping, change in use of emotional support measured with the COPE, and change in use of instrumental support measured with the COPE also were examined as mediators in exploratory analyses.

Hypothesis 8 To test the simple mediation model for the indirect effect of pretreatment stigma on change in quality of life through the intervening variable of change in emotional eating score, a 95% bias-corrected bootstrap confidence interval was created. To test this model, the same procedure used to examine simple mediation hypothesis 5 was utilized, however, quality of life was the outcome. These analyses were repeated with the MCS, PCS, and IWQOL-Lite total score at program completion entered as the

outcome variable. Additionally, these analyses were repeated with change in eating self-efficacy score as the mediator. Change in approach coping, change in avoidance coping, change in use of emotional support measured with the COPE, and change in use of instrumental support measured with the COPE also were examined as mediators in exploratory analyses. To test the moderated mediation models for the conditional indirect effect of bariatric status on the relationship between baseline stigma and change in quality of life through change in emotional eating, moderation analyses were conducted. When appropriate, a 95% bias-corrected bootstrap confidence interval was created using the same procedure used to examine moderated mediation in hypothesis 5. These analyses were repeated with the MCS, PCS, and IWQOL-Lite total score entered as the outcome variable. These analyses were repeated with change in eating self-efficacy score. Change in approach coping, change in avoidance coping, change in use of emotional support measured with the COPE, and change in use of instrumental support measured with the COPE also were examined in exploratory analyses.

Hypothesis 9 To test the simple mediation model for the indirect effect of pretreatment stigma on weight loss through the intervening variable of adherence, a 95% bias-corrected bootstrap confidence interval was created using the same procedure used to examine simple mediation in hypothesis 5. These analyses were conducted with the three different measures of adherence (education class attendance, dietary log completion, and physical activity log completion) as mediators. To test the moderated mediation models for the conditional indirect effect of bariatric status on the relationship between baseline stigma and weight loss through adherence, a 95% bias-corrected bootstrap confidence interval was created using the same procedure used to examine moderated mediation in

hypothesis 5. This was conducted in three separate analyses with education class attendance, dietary log completion, and physical activity log completion as mediators.

Hypothesis 10 To test the simple mediation model for the indirect effect of pretreatment stigma on change in quality of life through the intervening variable of adherence, a 95% bootstrap confidence interval was created using the same procedure used to examine hypothesis 5. These analyses were repeated with the three different measures of adherence (education class attendance, dietary log completion, and physical activity log completion) as mediators and three different aspects of quality of life (MCS, PCS, IWQOL-Lite at program completion) as the outcome variables. To test the moderated mediation models for the conditional indirect effect of bariatric status on the relationship between baseline stigma and change in quality of life through adherence, moderation analyses were used. When significant, a 95% bias-corrected bootstrap confidence interval was created using the same procedure used to examine moderated mediation in hypothesis 5. These analyses were repeated with the MCS, PCS, and IWQOL-Lite total score at program completion entered as the outcome variable and education class attendance, dietary log completion, and physical activity log completion entered as the mediator.

Chapter 3: Results

A total of 105 adults with overweight and obesity consented to participate in the study. One participant withdrew consent prior to data collection. Of the 104 remaining participants, 97 completed the baseline questionnaire packet, and 76 completed both the baseline questionnaire packet and the program completion questionnaire packet. Demographic and anthropometric data were collected from participants' electronic medical records. When available, BMI at the participant's baseline and final fitness evaluations were used. If a participant dropped out of the Living Well program prior to completing the final fitness evaluation, the most recent weight and height recorded in the Living Well program were used to calculate a final BMI.

As shown in Table 1, most (74%) study participants were extremely obese at baseline. Approximately 64 percent of participants completed the full 6-month Living Well program and the remaining participants opted to complete an abbreviated 3-month program.

Analysis of variance and chi-square analyses were utilized to evaluate differences between participants who enrolled in the study and individuals who entered the Living Well Program during the recruitment window but chose not to enroll in the study or were not approached for enrollment (n=151). Due to changes in patients' electronic medical records during the recruitment window, data were not available for all non-participants, but all available data were utilized in these analyses. As shown in Table 2, results

indicated no differences between participants and non-participants on baseline BMI, age, gender, or race. Thus, the study sample appeared to be representative of the patients entering the Living Well program during the recruitment interval.

Univariate analyses examining potential outliers, skewness, and kurtosis were conducted for all relevant variables. Descriptive statistics for demographic variables at baseline can be found in Table 1, and descriptive statistics for baseline psychological variables can be found in Table 3. BMI at baseline and program completion both exhibited high kurtosis. There also were several outliers across a number of variables. However, the majority of analyses utilized bootstrapping, a nonparametric resampling procedure that does not assume data are normally distributed and provides asymmetrical confidence intervals, therefore no transformations were utilized and no potential outliers were excluded from analyses (Preacher & Hayes, 2008; Preacher et al., 2007).

Correlational analyses among psychological variables at baseline indicate that stigma was positively associated with baseline anxiety ($r = .58$, $p < .001$), depression ($r = .68$, $p < .001$), emotional eating ($r = .52$, $p < .001$), eating self-efficacy ($r = .49$, $p < .001$), and avoidance coping ($r = .44$, $p < .001$) as shown in Table 4. Additionally, there were significant correlations among measures of distress, measures of eating behavior, and some aspects of coping. As shown in Table 5, baseline stigma was positively associated with baseline BMI ($r = .36$, $p < .001$) and impact of weight on quality of life ($r = .81$, $p < .001$) and negatively associated with baseline MCS score ($r = -.52$, $p < .001$) and baseline PCS score ($r = -.38$, $p < .001$). In addition to stigma, baseline BMI was correlated with depression ($r = .30$, $p = .003$) and use of instrumental support ($r = .21$, $p = .041$), but was not correlated with other psychosocial variables at baseline. Baseline MCS was

negatively associated with distress, eating behavior, and some aspects of coping. Baseline PCS was negatively associated with depressive symptoms (r = -.43, p < .001), eating self-efficacy (r = -.24, p = .024), and total coping on the COPE (r = -.30, p = .005), but not associated with any other psychosocial variables. Greater impact of weight on quality of life was associated with more symptoms of distress, poorer eating behavior, and greater use of several coping strategies.

Analyses of variance and chi-square analyses were utilized to evaluate differences between study completers, defined as individuals who completed both questionnaire packets, and non-completers, defined as individuals who did not complete both questionnaire packets. As shown in Table 6, completers and non-completers were similar on all demographic variables and baseline self-report measures.

T-tests were utilized to evaluate the extent of change in each of the outcomes among the completers over the course of weight management (see Table 3). Participants lost an average of 1.77 BMI points over the course of weight management (t = 6.46, p < .001), but the effect size was small (Cohen's d = .16). Participants experienced no improvement in mental quality of life (t = -1.34, p = .19), but did report a significant improvement in physical quality of life (t = -2.54, p = .01) with a small-to-moderate effect size (Cohen's d = .26). Participants also reported a significant reduction over the course of weight management in the impact of their weight on quality of life (t = 4.82, p < .001) with a small-to-moderate effect size (Cohen's d = .31).

Correlation analyses were utilized to examine relationships between the documented change in BMI and changes in various aspects of quality of life over the course of the weight management program. For these analyses, all change scores were

calculated to reflect improvement such that a positive score on change in BMI reflects improvement in BMI (and thus a reduction in BMI over the course of weight management) and a positive score on MCS reflects improvement in mental quality of life (and thus an increase in MCS over the course of weight management). As shown in Table 7, improvement in BMI was associated with improvement in physical quality of life and with improvement in weight-related quality of life, but not with improvement in mental quality of life. Improvement in weight-related quality of life was associated with improvements in both mental quality of life and physical quality of life. Surprisingly, improvement in physical quality of life was associated with worsening mental quality of life.

Multiple regression analysis was conducted to examine initial BMI, gender, and ethnicity as predictors of change in BMI over the course of weight management. Change in BMI was calculated by subtracting BMI at program completion from BMI at baseline. As shown in Table 8, initial BMI and gender were not associated with change in BMI. Race was associated with change in BMI at the level of a trend ($t = 1.82$, $p = .073$) such that Caucasian ethnicity was associated with greater change in BMI over the course of weight management.

Three separate regression analyses were conducted to examine initial BMI, gender, and ethnicity as predictors of change in quality of life by predicting quality of life at program completion after controlling for quality of life at baseline. As shown in Table 9, initial BMI, gender, and ethnicity were not significant predictors of change in MCS. However, initial BMI ($t = -1.78$, $p = .081$) and race ($t = 1.94$, $p = .058$) were predictive of PCS at the level of a trend, such that higher initial BMI was associated with poorer

physical quality of life at program completion and non-Caucasian ethnicity was associated with better physical quality of life at program completion. Additionally, initial BMI was predictive of change in IWQOL ($t = 2.33$, $p = .024$) such that higher initial BMI was associated with reduced weight-related quality of life at program completion. Gender and ethnicity were not associated with change in IWQOL.

Four separate hierarchical regression analyses were conducted to examine baseline anxiety as a predictor of change in BMI, MCS, PCS, and IWQOL. Four additional hierarchical regression analyses were conducted to examine baseline depression as a predictor of change in BMI, MCS, PCS, and IWQOL. As shown in Table 10, higher baseline anxiety predicted decreased MCS at program completion ($t = -2.85$, $p = .006$), but was not a significant predictor of change in BMI, PCS, or IWQOL. Baseline depression did not predict change in any of the outcomes.

Hypothesis 5 proposed that the relationship between baseline stigma and weight loss would be mediated by reductions in depression and anxiety. It was further proposed that the relationship between baseline stigma and change in each measure of distress would be moderated by bariatric status. Mediation and moderation analyses were conducted to test these hypotheses. Separate analyses were conducted examining change in depression and change in anxiety as potential mediators.

As shown in Table 11, the total effect, which measures the effect of baseline stigma on BMI at program completion, was not significantly different from zero (point estimate = -.02, bias-corrected CI = -.07 to .04). Please note that the total effect of baseline stigma on BMI at program completion does not depend on the potential mediator in each model (in this case, change in depression). As a result, it should not change

substantially with different potential mediators and thus the total effect is only listed once for each outcome using the sample with change in depression as the mediator. Any variations across models would be due to differences in covariates (e.g. the mediator at baseline) or differences in sample size resulting from missing data or and thus not reflective of true differences in the total effect across analyses.

To assess the indirect effect of baseline stigma on BMI at program completion through improvement in depression, standard path analysis methods in PROCESS and bootstrapping were utilized (Hayes, 2013; Preacher & Hayes, 2004). Improvement in depression was calculated by subtracting depressive symptoms at program completion from depressive symptoms at baseline. The indirect effect of baseline stigma on BMI at program completion through change in depression is quantified as the product of the effect of baseline stigma on change in depression and the effect of change in depression on BMI at program completion controlling for baseline stigma. These paths were estimated using unstandardized regression coefficients from OLS regression models in PROCESS while controlling for BMI at baseline, depression at baseline, and age (because age was associated with BMI at program completion). As shown in Table 12, the effect of baseline stigma on change in depression (controlling for baseline BMI, baseline depression, and age) was statistically significant (*a* path = -.0647). The effect of change in depression on BMI at program completion controlling for baseline stigma (and baseline BMI, baseline depression, and age) was not statistically significant (*b* path = -.1104). Thus, the indirect effect of baseline stigma on BMI at program completion through change in depression was -.0647 x -.1104 = .0071. To test whether this indirect effect was statistically different from zero, 10,000 bootstrap samples of the indirect effect

were created in PROCESS (Hayes, 2013). For each bootstrap sample, an empirical estimate of the indirect effect was created after sampling from the existing data set with replacement. Then, each of the 10,000 bootstrap samples of the indirect effect were sorted to find the values of the indirect effect associated with the bounds of the confidence interval used for inference about the indirect effect. This study utilized a 95% bias-corrected bootstrap confidence interval for the estimate of the indirect effect. The confidence interval for the indirect effect contained zero (point estimate = .01, 95% bias-corrected CI = -.00 to .03), indicating that change in depression did not mediate the relationship of baseline stigma with BMI at program completion after controlling for BMI at baseline and age. In this analysis, the direct effect, which measures the effect of baseline stigma on BMI at program completion independent of change in depression, was not significantly different from zero (point estimate = -.02, bias-corrected CI = -.08 to .03).

To assess whether bariatric status moderated the effect of baseline stigma on change in depression, an OLS regression model predicting change in depression from baseline stigma, bariatric status, and their product (as well as the control variables of BMI at baseline, depression at baseline, and age) was estimated using PROCESS (Hayes, 2013). As shown in Table 13, the effect of baseline stigma on change in depression was not dependent on bariatric status. As a result, it was unnecessary to run the moderated mediation model.

The indirect effect of baseline stigma on BMI at program completion through change in anxiety also was estimated using unstandardized regression coefficients from OLS regression models in PROCESS while controlling for BMI at baseline, anxiety at

baseline, and age, and 10,000 bootstrap samples of the indirect effect were created in PROCESS (Hayes, 2013). As shown in Table 12, the confidence interval for the indirect effect contained zero (point estimate = .00, 95% bias-corrected CI = -.01 to .02), indicating that change in anxiety did not mediate the relationship of baseline stigma with BMI at program completion after controlling for BMI at baseline, anxiety at baseline, and age. In this analysis, the direct effect (point estimate = .03, bias-corrected CI = -.02 to .09) also was not significantly different from zero.

To assess whether bariatric status moderated the effect of baseline stigma on change in anxiety, an OLS regression model was estimated using PROCESS (Hayes, 2013). As shown in Table 13, the effect of baseline stigma on change in anxiety was not dependent on bariatric status. As a result, it was unnecessary to run the moderated mediation model.

Hypothesis 6 proposed six similar moderated mediation models. The relationship of perceived stigma at baseline with quality of life at program completion was hypothesized to be mediated by change in distress, and the relationship between perceived stigma and change in distress moderated by bariatric status. Separate models were tested with change in depression as the mediator and change in anxiety as the mediator. Separate analyses also were conducted using each of the three measures of quality of life in this study: mental quality of life (MCS), physical quality of life (PCS), and impact of weight on quality of life (IWQOL).

As shown in Table 14, the first model examined change in depression as a mediator of the relationship of baseline stigma with MCS at program completion controlling for MCS and depression at baseline. The confidence interval for the indirect

effect of baseline stigma on MCS at program completion through change in depression did not contain zero (point estimate = -.11, 95% bias-corrected CI = -.29 to -.02), indicating that change in depression mediated the relationship of baseline stigma with MCS at program completion after controlling for MCS and depression at baseline. In this analysis, the direct effect of baseline stigma on MCS at program completion (point estimate = -.10, bias-corrected CI = -.31 to .12) and the total effect (see Table 11; point estimate = -.20, bias-corrected CI = -.43 to .03) were not significantly different from zero. Thus, two individuals differing by one unit on baseline stigma are estimated to differ by -.20 units on MCS at program completion. They differ by -.11 units on mental quality of life at program completion on average as a result of the effect of perceived stigmatization at baseline on change in depression which in turn affects mental quality of life at program completion. The rest of the difference, the difference of -0.10 units, is due to the effect of perceived stigmatization at baseline on mental quality of life at program completion independent of change in depression and is not significant. Thus, the data provide evidence that change in depression acts as a mechanism for the relationship of baseline stigma with change in MCS.

Bariatric status was examined as a moderator of the relationship of baseline stigma with change in depression controlling for MCS and depression at baseline. The effect of baseline stigma on change in depression was not dependent on bariatric status (see Table 15). As a result, the hypothesized moderated mediation model also was unsupported.

The second simple mediation model shown in Table 14 examined change in depression as a mediator of the relationship of baseline stigma with PCS at program

completion after controlling for PCS at baseline, depression at baseline, and age. The confidence interval for the indirect effect did not contain zero (point estimate = -.06, 95% bias-corrected CI = -.18 to -.01), indicating that change in depression mediated the relationship of baseline stigma with PCS at program completion. In this model, the confidence interval for the total effect (see Table 11; point estimate = -.09, 95% bias-corrected CI = -.27 to .08) contained zero as did the confidence interval for the direct effect (point estimate = -.03 95% bias-corrected CI = -.21 to .15). There was no overall relationship between baseline stigma and PCS at program completion and no relationship of baseline stigma with PCS at program completion independent of change in depression. Thus, two individuals differing by one unit on baseline stigma are estimated to differ by -.09 units on PCS at program completion. They differ by -.06 units on physical quality of life at program completion on average as a result of the effect of perceived stigmatization at baseline on change in depression. Change in depression in turn affects physical quality of life at program completion. The remaining non-significant difference of -.03 units, is due to the effect of perceived stigmatization at baseline on physical quality of life at program completion independent of change in depression. Thus, the data provide evidence that change in depression acts as a mechanism in the relationship of baseline stigma to change in PCS.

As shown in Table 15, bariatric status was examined as a moderator of the relationship of baseline stigma with change in depression after controlling for PCS at baseline, depression at baseline, and age. Since the effect of baseline stigma on change in depression was not dependent on bariatric status, the hypothesized moderated mediation model also was unsupported.

The third simple mediation model examined change in depression as a mediator of the relationship of baseline stigma with IWQOL at program completion controlling for IWQOL at baseline, depression at baseline, and gender. As shown in Table 14, the confidence interval for the indirect effect contained zero (point estimate = .06, 95% bias-corrected CI = -.11 to .28), indicating that change in depression did not mediate the relationship of baseline stigma with IWQOL at program completion. In this model, the confidence intervals for the total effect (see Table 11; point estimate = .19, 95% bias-corrected CI = -.24 to .62) and the direct effect (point estimate = .13 95% bias-corrected CI = -.25 to .50) also contained zero, indicating no overall relationship between baseline stigma and PCS at program completion and no relationship independent of change in depression.

Bariatric status was examined as a moderator of the relationship of baseline stigma with change in depression controlling for IWQOL at baseline, depression at baseline, and gender. The effect of baseline stigma on change in depression was not dependent on bariatric status (see Table 15) and the hypothesized moderated mediation model was unsupported.

The fourth simple mediation model examined the indirect effect of baseline stigma on MCS at program completion through change in anxiety controlling for MCS and anxiety at baseline. Change in anxiety mediated the relationship of baseline stigma with MCS at program completion controlling for MCS at baseline as the confidence interval did not contain zero (point estimate = -.16, 95% bias-corrected CI = -.42 to -.04). In this model, the confidence interval for the direct effect (point estimate = .02, 95% bias-corrected CI = -.17 to .21) and the total effect (point estimate = -.14, 95% bias-corrected

CI = -.35 to .07) contained zero. Thus, two cases that differ by one unit on perceived stigmatization at baseline are estimated to differ by -.14 units on mental quality of life at program completion. They differ by -.16 units on mental quality of life at program completion on average as a result of the effect of perceived stigmatization at baseline on change in anxiety which in turn affects mental quality of life at program completion. The remaining difference of .02 units is due to the effect of perceived stigmatization at baseline on mental quality of life at program completion independent of change in anxiety. These results provide evidence that change in anxiety acts as a mechanism for the relationship of baseline stigma with change in MCS.

As seen in Table 15, the relationship between baseline stigma and change in anxiety controlling for MCS at baseline was not conditional on bariatric status and the hypothesized moderated mediation model was unsupported.

The fifth simple mediation model examining the indirect effect of baseline stigma on PCS at program completion through change in anxiety controlling for PCS at baseline, anxiety at baseline, and age was not significantly different from zero (point estimate = .05; 95% bias-corrected CI = -.08 to .20; see Table 14). The confidence interval for the direct effect (point estimate = -.33; 95% bias-corrected CI = -.42 to -.03) was significantly different from zero, indicating that baseline stigma predicted PCS at program completion independent of the indirect effect through change in anxiety. Additionally, the relationship of baseline stigma with change in anxiety controlling for PCS at baseline, anxiety at baseline, and age was not conditional on bariatric status as shown in Table 15. As a result, the hypothesized moderated mediation model was unsupported.

The sixth mediation model predicting an indirect effect of baseline stigma on IWQOL at program completion through change in anxiety also was unsupported as the confidence interval for the indirect effect (point estimate = .08; 95% bias-corrected CI = -.07 to .34) contained zero. The confidence interval for the direct effect (point estimate = .24; 95% bias-corrected CI = -.21 to .68) also contained zero, indicating that baseline stigma did not predict IWQOL independent of the indirect effect through change in anxiety. Bariatric surgery did not moderate the relationship of baseline stigma with change in anxiety, indicating that the hypothesized moderated mediation model was unsupported.

Hypothesis 7 proposed that improvements in coping over the course of weight management would mediate the relationship of baseline stigma with BMI at program completion after controlling for BMI at baseline, coping at baseline, and age. It was further hypothesized that the relationship of baseline stigma with improvements in coping would be moderated by bariatric status. The following six aspects of coping were examined in separate moderated mediation analyses: reduction in emotional eating, increase in eating self-efficacy, increase in approach coping, decrease in avoidance coping, increase in use of emotional support, and increase in use of instrumental support.

The first mediation model for hypothesis 7 examined change in emotional eating as a mediator of the relationship of baseline stigma with BMI at program completion after controlling for BMI at baseline, emotional eating at baseline, and age. The confidence interval for the indirect effect of baseline stigma on BMI at program completion through change in emotional eating contained zero (point estimate = -.01; 95% bias-corrected CI = -.03 to .00), indicating that change in emotional eating did not mediate the relationship

of baseline stigma with BMI at program completion after controlling for BMI at baseline, emotional eating at baseline, and age. As shown in Table 16, the direct effect of baseline stigma on BMI at program completion (point estimate = .02; 95% bias-corrected CI = -.04 to .07) also was not significantly different from zero.

As shown in Table 17, bariatric status was examined as a moderator of the relationship of baseline stigma with change in emotional eating controlling for BMI at baseline, emotional eating at baseline, and age. Since the effect of baseline stigma on change in emotional eating was not dependent on bariatric status, the hypothesized moderated mediation model was unsupported.

The second mediation model for hypothesis 7 examined the mediating effect of change in eating self-efficacy on the relationship of baseline stigma with BMI at program completion after controlling for BMI at baseline, eating self-efficacy at baseline, and age, as shown in Table 16. Eating self-efficacy did not mediate the relationship of baseline stigma with BMI at program completion as the confidence interval for the indirect effect of baseline stigma on BMI at program completion through change in eating self-efficacy contained zero (point estimate = .01; 95% bias-corrected CI = -.00 to .03). The direct effect of baseline stigma on BMI at program completion (point estimate = .00; 95% bias-corrected CI = -.05 to .05) also was not significantly different from zero. In addition, bariatric status did not moderate the relationship of baseline stigma with change in eating self-efficacy controlling for BMI at baseline, eating self-efficacy at baseline, and age. The effect of baseline stigma on change in eating self-efficacy was not dependent on bariatric status, and thus the hypothesized moderated mediation model was unsupported.

The third mediation model for hypothesis 7 examined the mediating effect of change in approach coping on the relationship of baseline stigma with BMI at program completion after controlling for BMI at baseline, approach coping at baseline, and age. Approach coping did not mediate the relationship of baseline stigma with BMI at program completion as the confidence interval for the indirect effect contained zero (point estimate = -.00; 95% bias-corrected CI = -.01 to .01). The direct effect of baseline stigma on BMI at program completion also was not significantly different from zero (point estimate = .01; 95% bias-corrected CI = -.04 to .05). Additionally, bariatric status did not moderate the relationship of baseline stigma with change in approach coping controlling for BMI at baseline, approach coping at baseline, and age (see Table 17). Since the effect of baseline stigma on change in approach coping was not dependent on bariatric status, the hypothesized moderated mediation model was unsupported.

Similarly, the fourth mediation model for hypothesis 7 examining change in avoidance coping as a mediator of the relationship of baseline stigma with BMI at program completion after controlling for BMI at baseline, avoidance coping at baseline, and age was not supported. As shown in Table 16, the confidence interval for the indirect effect of baseline stigma on BMI at program completion through change in avoidance coping contained zero (point estimate = .00; 95% bias-corrected CI = -.00 to .02). The direct effect of baseline stigma on BMI at program completion also was not significantly different from zero (point estimate = .21; 95% bias-corrected CI = -.04 to .05). As bariatric status did not moderate the relationship of baseline stigma with change in avoidance coping controlling for BMI at baseline, avoidance coping at baseline, and age, the hypothesized moderated mediation model was unsupported.

The fifth mediation model for hypothesis 7 examined change in use of emotional support as a mediator of the relationship of baseline stigma with BMI at program completion after controlling for BMI at baseline, use of emotional support at baseline, and age, as shown in Table 16. The confidence interval for the indirect effect of baseline stigma on BMI at program completion through change in use of emotional support contained zero (point estimate = -.00; 95% bias-corrected CI = -.02 to .00). The direct effect of baseline stigma on BMI at program completion also was not significantly different from zero (point estimate = .01; 95% bias-corrected CI = -.03 to .05). Because bariatric status did not moderate the relationship of baseline stigma with change in use of emotional support controlling for BMI at baseline and age, it was unnecessary to run the hypothesized moderated mediation model as it would also be unsupported.

The sixth and final mediation model for hypothesis 7 examined change in use of instrumental support as a mediator of the relationship of baseline stigma and BMI at program completion after controlling for BMI at baseline, use of instrumental support at baseline, and age. The confidence interval for the indirect effect of baseline stigma on BMI at program completion through change in use of instrumental support contained zero (point estimate = .00, 95% bias-corrected CI = -.01 to .02) and thus the mediation model was not supported. The direct effect of baseline stigma on BMI at program completion also was not significantly different from zero (point estimate = .01; 95% bias-corrected CI = -.03 to .05). Bariatric status did not moderate the relationship of baseline stigma with change in use of instrumental support after controlling for BMI at baseline, use of instrumental support at baseline, and age, so the hypothesized moderated mediation model was unsupported.

Hypothesis 8 predicted that improvements in coping would mediate the relationship of baseline stigma with improvement in quality of life after controlling for demographic predictors of quality of life and coping at baseline. It was further hypothesized that the relationships of baseline quality of life with changes in coping would be moderated by bariatric status. Separate analyses were conducted for each measure of coping in the study (e.g. reduction in emotional eating, increase in eating self-efficacy, increase in approach coping, decrease in avoidance coping, increase in use of emotional support, and increase in use of instrumental support) with each of the three quality of life outcomes (MCS, PCS, and IWQOL), yielding 18 different models in these analyses.

The first three simple mediation models examined change in emotional eating as a mediator of the relationship between baseline stigma and each of the three quality of life outcomes. As the confidence intervals contained zero for the indirect effects of baseline stigma on MCS through change in emotional eating (point estimate = -.02; 95% bias-corrected CI = -.01 to .01), for baseline stigma on PCS through change in emotional eating (point estimate = -.01; 95% bias-corrected CI = -.08 to .05), and for baseline stigma on IWQOL through change in emotional eating (point estimate = .00; 95% bias-corrected CI = -.06 to .13), change in emotional eating did not act as a mediator in any of the three simple mediation models (see Table 18). The direct effect of baseline stigma on quality of life was not significant for the model predicting MCS (point estimate = -.04; 95% bias-corrected CI = -.28 to .21), the model predicting PCS (point estimate = -.16; 95% bias-corrected CI = -.35 to .02), or the model predicting IWQOL (point estimate = .25; 95% bias-corrected CI = -.25 to .74). In all three of these models, bariatric status did

not moderate the relationship of baseline stigma with change in emotional eating while controlling for baseline quality of life, baseline emotional eating, and other relevant covariates (see Table 19), indicating that the predicted moderated mediation models were not supported by the data.

The second three simple mediation models in Table 18 examined whether change in eating self-efficacy mediated the relationship of baseline stigma with each of the three quality of life outcomes. The confidence intervals contained zero for the indirect effects of baseline stigma on MCS through change in eating self-efficacy (point estimate = -.01; 95% bias-corrected CI = -.10 to .03), for baseline stigma on PCS through change in eating self-efficacy (point estimate = -.01; 95% bias-corrected CI = -.07 to .01), and for baseline stigma on IWQOL through change in eating self-efficacy (point estimate = .04; 95% bias-corrected CI = -.08 to .20). The direct effect of baseline stigma on quality of life was not significant for the model predicting MCS (point estimate = -.20; 95% bias-corrected CI = -.42 to .01), the model predicting PCS (point estimate = -.10; 95% bias-corrected CI = -.26 to .08), or the model predicting IWQOL (point estimate = .18; 95% bias-corrected CI = -.21 to .57). As shown in Table 19, bariatric status did not moderate the relationship of baseline stigma with change in eating self-efficacy while controlling for baseline quality of life, baseline eating self-efficacy, and other relevant covariates, indicating that the predicted moderated mediation models were not supported by the data.

The third set of simple mediation models for hypothesis 8 examined whether change in approach coping over the course of weight management mediated the relationship of baseline stigma with each of the three quality of life outcomes. The results are shown in Table 18. The confidence intervals contained zero for the indirect effects of

baseline stigma through change in approach coping on MCS (point estimate = .01; 95% bias-corrected CI = -.01 to .07), on PCS (point estimate = .01; 95% bias-corrected CI = -.01 to .05), and on IWQOL (point estimate = -.05; 95% bias-corrected CI = -.20 to .01), indicating no indirect effect of baseline stigma on any aspect of quality of life through percent change in approach coping. The direct effect of baseline stigma on quality of life was significant for the model predicting MCS (point estimate = -.24; 95% bias-corrected CI = -.43 to -.04) but not for the model predicting PCS (point estimate = -.11; 95% bias-corrected CI = -.25 to .04) or the model predicting IWQOL (point estimate = .26; 95% bias-corrected CI = -.15 to .67). These results suggest that baseline stigma predicted MCS at program completion not through change in approach coping. In all three of these models, bariatric status did not moderate the relationship of baseline stigma with change in approach coping while controlling for baseline quality of life, baseline approach coping, and other relevant covariates, and the predicted moderated mediation models were not supported by the data.

The fourth set of simple mediation models examined change in avoidance coping as a mediator of the relationship of baseline stigma with each of the three quality of life outcomes, as shown in Table 18. The confidence intervals contained zero for the indirect effects of baseline stigma through change in avoidance coping on MCS (point estimate = -.03; 95% bias-corrected CI = -.12 to .01), on PCS (point estimate = -.02; 95% bias-corrected CI = -.10 to .01), and on IWQOL (point estimate = -.02; 95% bias-corrected CI = -.14 to .05), indicating that change in avoidance coping did not mediate the relationship of baseline stigma with any aspect of quality of life. The direct effect of baseline stigma on quality of life was not significant for the model predicting MCS (point estimate = -.11;

95% bias-corrected CI = -.30 to .08), the model predicting PCS (point estimate = -.12; 95% bias-corrected CI = -.28 to .05), or the model predicting IWQOL (point estimate = .20; 95% bias-corrected CI = -.22 to .62). In all three of these models, bariatric status did not moderate the relationship of baseline stigma with change in avoidance coping while controlling for baseline quality of life, baseline avoidance coping, and other relevant covariates such that the predicted moderated mediation models were not supported by the data.

The fifth set of simple mediation models shown in Table 18 examined change in use of emotional support as a mediator of the relationship of baseline stigma with MCS, PCS, and IWQOL. Change in use of emotional support did not mediate the effect of baseline stigma on quality of life as the confidence intervals contained zero for the indirect effects of baseline stigma through change in use of emotional support on MCS (point estimate = .00; 95% bias-corrected CI = -.05 to .06), on PCS (point estimate = .00; 95% bias-corrected CI = -.04 to .06), and on IWQOL (point estimate = .01; 95% bias-corrected CI = -.03 to .14). The direct effect of baseline stigma on quality of life was significant for the model predicting MCS (point estimate = -.22; 95% bias-corrected CI = -.42 to -.02) but not for the model predicting PCS (point estimate = -.11; 95% bias-corrected CI = -.25 to .03) or the model predicting IWQOL (point estimate = .21; 95% bias-corrected CI = -.20 to .62). Baseline stigma predicted MCS at program completion not through change in use of emotional support. In all three of these models, bariatric status did not moderate the relationship between baseline stigma and change in use of emotional support while controlling for baseline quality of life, baseline use of emotional

support, and other relevant covariates, and the predicted moderated mediation models are not supported by the data.

The sixth and final set of simple mediation models for hypothesis 8 predicted that change in use of instrumental support would mediate the relationship of baseline stigma with each of the three quality of life outcomes. As shown in Table 18, the confidence intervals contained zero for the indirect effects on MCS (point estimate = .03; 95% bias-corrected CI = -.03 to .13), on PCS (point estimate = .00; 95% bias-corrected CI = -.05 to .04), and on IWQOL (point estimate = -.01; 95% bias-corrected CI = -.04 to .13). The direct effect of baseline stigma on quality of life was significant for the model predicting MCS (point estimate = -.24; 95% bias-corrected CI = -.44 to -.03) but not for the model predicting PCS (point estimate = -.10; 95% bias-corrected CI = -.24 to .05) or the model predicting IWQOL (point estimate = .19; 95% bias-corrected CI = -.22 to .59). These results suggest that baseline stigma predicted MCS at program completion not through change in use of instrumental support. In all three of these models, bariatric status did not moderate the relationship of baseline stigma with change in use of instrumental support while controlling for baseline quality of life, baseline instrumental support, and other relevant covariates such that the predicted moderated mediation models were unsupported by the data.

Hypothesis 9 predicted that adherence to treatment (e.g. percent attendance, dietary log completion, and physical activity log completion) would mediate the relationship of baseline stigma with BMI at program completion after controlling for baseline demographic predictors of weight loss. It was further hypothesized that these relationships would be moderated by bariatric status. Separate analyses were conducted

for each of the three aspects of adherence: percent attendance, percent dietary log completion, and percent physical activity log completion.

The first mediation model for hypothesis 9 examined attendance as a mediator of the relationship between baseline stigma and BMI at program completion after controlling for BMI at baseline and age. For analyses involving attendance, the number of sessions attended was divided by the total number of sessions possible for the individual (25 for those completing the 6-month program and 14 for those completing the 3-month program) to create a percentage of sessions attended. Results of the simple mediation analysis are summarized in Table 20. The confidence interval contained zero for the indirect effect of baseline stigma on BMI at program completion through percent attendance (point estimate = -.00; 95% bias-corrected CI = -.02 to .01), thus percentage of sessions attended did not mediate the relationship of baseline stigma with BMI at program completion after controlling for BMI at baseline and age. Furthermore, the direct effect of baseline stigma on BMI at program completion (point estimate = .03; 95% bias-corrected CI = -.01 to .06) also was not significantly different from zero. Bariatric status did not moderate the relationship between baseline stigma and attendance controlling for BMI at baseline and age (see Table 21). As a result, the hypothesized moderated mediation model was unsupported.

In the second mediation model for hypothesis 9, the mediating effect of dietary log completion on the relationship of baseline stigma with BMI at program completion after controlling for BMI at baseline and age was examined. The raw number of logs completed was divided by the total number of sessions possible for the individual (25 for those completing the 6-month program and 14 for those completing the 3-month program

which was then multiplied by seven) to create a percentage of dietary logs completed. Dietary log completion did not mediate the relationship of baseline stigma with BMI at program completion as the confidence interval for the indirect effect contained zero (point estimate = -.00; 95% bias-corrected CI = -.02 to .01). The direct effect of baseline stigma on BMI at program completion also was not significantly different from zero (point estimate = .03; 95% bias-corrected CI = -.00 to .06). Bariatric status did not moderate the relationship of baseline stigma with dietary log completion controlling for BMI at baseline and age (see Table 21). Since the effect of baseline stigma on dietary log completion was not dependent on bariatric status, the hypothesized moderated mediation model was unsupported.

The third and final mediation model for hypothesis 9 examined the mediating effect of physical activity log completion on the relationship of baseline stigma with BMI at program completion after controlling for BMI at baseline and age. As was done with dietary log completion, total number of physical activity logs was divided by the possible number of logs (i.e., number of weekly sessions multiplied by seven). Percent physical activity log completion did not mediate the relationship of baseline stigma with BMI at program completion as the confidence interval for the indirect effect contained zero (point estimate = -.00, 95% bias-corrected CI = -.02 to .01). As shown in Table 20, the direct effect of baseline stigma on BMI at program completion also was not significantly different from zero (point estimate = .03; 95% bias-corrected CI = -.00 to .07). Bariatric status did not moderate the relationship of baseline stigma with percent physical activity log completion controlling for BMI at baseline and age and thus the hypothesized moderated mediation model also was unsupported.

Hypothesis 10 predicted that adherence to treatment (e.g. percent attendance, percent dietary log completion, and percent physical activity log completion) would mediate the relationship of baseline stigma with quality of life at program completion after controlling for quality of life at baseline and demographic predictors of quality of life. It was further hypothesized that the relationship of baseline quality of life and adherence would be moderated by bariatric status. Separate analyses were conducted for each aspect of adherence to treatment (e.g. percent attendance, percent dietary log completion, and percent physical activity log completion) with each of the three quality of life outcomes (MCS, PCS, and IWQOL), yielding 9 different models in these analyses. As was done in hypothesis 9, percentage scores were created for each aspect of adherence.

The first three simple mediation models examined percentage of sessions attended as a mediator of the relationship of baseline stigma with each of the three quality of life outcomes. The confidence intervals contained zero for the indirect effects of baseline stigma on MCS through percentage of sessions attended (point estimate = .04; 95% bias-corrected CI = -.03 to .18), for baseline stigma on PCS through percentage of sessions attended (point estimate = -.00; 95% bias-corrected CI = -.04 to .03), and for baseline stigma on IWQOL through percentage of sessions attended (point estimate = -.01; 95% bias-corrected CI = -.12 to .03), indicating that percentage of sessions attended did not act as a mediator in any of the three simple mediation models (see Table 22). The direct effect of baseline stigma on quality of life was significant for the model predicting PCS (point estimate = -.15, bias-corrected CI = -.29 to -.01) but not for the model predicting MCS (point estimate = -.18, bias-corrected CI = -.38 to .01) or the model predicting

IWQOL (point estimate = .27, bias-corrected CI = -.13 to .67). Thus, baseline stigma predicted PCS at program completion not through percentage of sessions attended. Additionally, in all three models, bariatric status did not moderate the relationship of baseline stigma with percentage of sessions attended while controlling for baseline quality of life and other relevant covariates, indicating that the predicted moderated mediation models were not supported by the data.

The second three simple mediation models examined whether percentage of dietary logs completed mediated the relationship of baseline stigma with each of the three quality of life outcomes, as shown in Table 22. The confidence intervals contained zero for the indirect effects of baseline stigma on MCS through percentage dietary log completion (point estimate = -.01; 95% bias-corrected CI = -.07 to .02), for baseline stigma on PCS through percentage dietary log completion (point estimate = -.01; 95% bias-corrected CI = -.08 to .03), and baseline stigma on IWQOL through percentage dietary log completion (point estimate = .01; 95% bias-corrected CI = -.13 to .15). The direct effect of baseline stigma on quality of life was significant for the model predicting PCS (point estimate = -.14, bias-corrected CI = -.27 to -.01) but not for the model predicting MCS (point estimate = -.13, bias-corrected CI = -.34 to .07) or the model predicting IWQOL (point estimate = .26, bias-corrected CI = -.14 to .65). These results suggest that baseline stigma predicted PCS at program completion not through percent dietary log completion. In all three of these models, bariatric status did not moderate the relationship of baseline stigma with dietary log completion while controlling for baseline quality of life and other relevant covariates, indicating that the predicted moderated mediation models are not supported by the data.

The third and final set of simple mediation models for hypothesis 10 examined percentage of physical activity logs completed over the course of weight management as a mediator of the relationship of baseline stigma with each of the three quality of life outcomes after controlling for baseline quality of life and relevant covariates. The results are shown in Table 22. The confidence intervals contained zero for the indirect effects of baseline stigma on quality of life through percentage physical activity log completion for the models predicting MCS (point estimate = -.00; 95% bias-corrected CI = -.06 to .03), PCS (point estimate = .01; 95% bias-corrected CI = -.02 to .08), and IWQOL (point estimate = -.09, bias-corrected CI = -.26 to .01), thus the simple mediation models were not supported. The direct effect of baseline stigma on quality of life was significant for the model predicting PCS (point estimate = -.16, bias-corrected CI = -.30 to -.03) but not for the model predicting MCS (point estimate = -.14, bias-corrected CI = -.35 to .07) or the model predicting IWQOL (point estimate = .35, bias-corrected CI = -.05 to .74). These results suggest that baseline stigma predicted PCS at program completion not through percentage physical activity log completion. Bariatric status did not moderate the relationship of baseline stigma with percent physical activity log completion in any of the three models while controlling for baseline quality of life and other relevant covariates, indicating that the predicted moderated mediation models are not supported by the data (Table 23).

Chapter 4: Discussion

Participants lost an average of 1.8 BMI points over the course of behavioral weight management, improved an average of 2.7 points on the measure of physical quality of life, and reported lower impact of weight on quality of life by 8.8 points. While these were all statistically significant effects, the effect size for BMI was small and the effect sizes for physical quality of life and impact of weight on quality of life were small-to-moderate, indicating limited improvements in body weight and quality of life over the course of weight management. These limited changes in BMI and aspects of quality of life likely reflect the limited effectiveness of behavioral weight loss treatment (Franz et al., 2007; Wing & Phelan, 2005; Kraschnewski et al., 2010). Furthermore, participants only improved an average of 2.0 points on a measure of mental quality of life, and this effect was not statistically significant. Although previous studies have found that mental quality of life improves over the course of weight management (e.g. Blissmer et al., 2006), the effects of weight loss treatment on mental quality of life tend to be weaker than the effects reported for physical quality of life (Kolotkin et al., 2001). Because the average participant in this study began weight management with a relatively modest decrement in mental quality of life, it is possible that the lack of improvement reflects a ceiling effect among individuals with extreme obesity (e.g. mental quality of life was already relatively high for this sample despite their body weight). It also is possible that

participants did not lose enough weight in behavioral weight management to produce statistically significant effects in mental quality of life.

Consistent with previous studies documenting improvements in some areas of quality of life associated with weight loss (Maciejewski, Patrick, &Williamson, 2005; Kushner & Foster, 2000; Williamson et al., 2009; Thieszen et al., 2011; Fontaine et al., 2004; Palmeira et al., 2009), reduced BMI was associated with improved physical quality of life and reduced impact of weight on quality of life in this sample. Additionally, reduced impact of weight on quality of life was associated with improved physical quality of life and mental quality of life, which is consistent with the fact that impact of weight on quality of life includes both mental and physical aspects of quality of life.

Contrary to expectations, reduced BMI was not associated with improved mental quality of life in this sample, and improved physical quality of life was associated with worsening of mental quality of life over the course of weight management. The lack of relationship between change in BMI and change in mental quality of life may reflect the relatively greater relationship of BMI with physical components of health-related quality of life relative to mental aspects of health-related quality of life (Kolotkin et al., 2001). Alternatively, these relationships also may be reflective of relatively good mental quality of life among participants at baseline and the lack of statistically significant improvement in mental quality of life during weight management. It also is possible that the magnitude of change in BMI over the course of weight management was not sufficient to lead to statistically significant improvement in mental quality of life. The relationship of improved physical quality of life with worsening mental quality of life may reflect

participants' awareness of improvements in physical abilities and functioning with weight loss coupled with their relative lack of similar improvements in social well-being.

The observational nature of this study does not allow for causal claims, but the pattern of significant correlations in this study suggests that further research clarifying the nature of the relationship between improvements in BMI and improvements in quality of life is warranted. Specifically, research is needed to clarify the extent to which decreases in BMI that may occur outside of a weight loss program lead to improvements in physical quality of life and impact of weight on quality of life versus the extent to which participation in behavioral weight management is an essential component in the relationship of weight loss with improvements in physical quality of life and impact of weight on quality of life.

As shown in previous studies (e.g. Fabricatore et al., 2009; Svetkey et al., 2012), there was some suggestion in the data that ethnicity predicted change in BMI such that Caucasian ethnicity was associated with greater change in BMI over the course of weight management. Contrary to hypotheses, initial BMI and gender did not predict change in BMI. The lack of a statistically significant relationship between initial BMI and change in BMI in this sample may reflect the nonlinear relationship between baseline weight and weight loss. Most previous studies have found that higher initial BMI predicts greater weight loss (e.g. Stubbs et al., 2011; Teixeira et al., 2005), but Lloyd and Khan (2011) found that lower levels of obesity were associated with greater weight loss. It is also possible that the relationship between higher initial BMI and weight loss did not apply in this sample because of the individualization of dietary plans utilized in this study. Past literature examining the relationship of initial BMI with weight loss has suggested that

heavier people may lose more weight in behavioral interventions. These individuals tend to have a higher resting metabolic rate and thus greater energy deficit when placed on a reduced calorie diet. These heavier individuals also may receive more intensive weight loss plans than individuals with lower levels of obesity, further increasing their energy deficit (Stubbs et al., 2011). In the current study, initial BMI and resting metabolic rate were utilized to create individualized dietary plans, thus reducing the variability of prescribed energy deficits across individuals in the study. As a result, most individuals in the current study were given dietary plans designed to create an energy deficit of approximately 500 calories per day, thus reducing the likelihood that study participants with the highest initial BMIs would have greater energy deficits.

The lack of relationship of male gender with change in BMI in this study may be reflective of differences in the measurement of adiposity across studies. For example, Presnell and colleagues (2008) found that men lost more weight than women over the course of their residential obesity treatment program, however, weight loss was measured in kilograms rather than BMI and men in the study were taller, which likely contributed to the sex difference observed in their study. In fact, most behavioral weight management studies utilize change in kilograms or percent change in weight as the body weight outcome measure. This study used change in BMI as the outcome which is a more conservative measure because it accounts for differences in body size. Additionally, there were only 25 males in the current study, resulting in relatively low power to detect a relationship of gender with change in BMI. Future studies with a more balanced male to female ratio may be better powered to detect a relationship of gender with change in BMI.

Demographic variables predicted some aspects of quality of life at program completion in analyses controlling for quality of life at baseline. Unlike studies finding that higher BMI at baseline was associated with greater weight loss (e.g. Stubbs et al., 2011; Teixeira et al., 2005), higher BMI at baseline in this study was associated with greater impairment in physical quality of life and greater impact of weight on quality of life at program completion. Posthoc correlational analyses were conducted examining the relationship of initial BMI with physical quality of life and weight-related quality of life. Initial BMI was significantly correlated in expected directions with physical quality of life at baseline ($r = -.52$, $p < .001$), impact of weight on quality of life at baseline ($r = .53$, $p < .001$), physical quality of life at program completion ($r = -.41$, $p < .001$), and impact of weight on quality of life at program completion ($r = .50$, $p < .001$), but initial BMI was not associated with change in physical quality of life or change in impact of weight on quality of life. Taken together, these results suggest that the relationships of initial BMI with poorer physical and weight-related quality of life are due to the cross-sectional relationships of initial BMI with physical and weight-related quality of life at baseline.

Although Caucasian ethnicity predicted greater weight loss in this sample, non-Caucasian ethnicity was associated with greater improvement in physical quality of life. Posthoc correlational analyses revealed that ethnicity was not associated with physical quality of life at baseline or at program completion. However, ethnicity was associated with change in physical quality of life at the level of a trend such that non-Caucasian ethnicity was associated with greater improvement in physical quality of life ($r = .24$, $p = .074$). Caucasian ethnicity has been associated with poorer quality of life at relatively lower levels of obesity in previous literature (White et al., 2004). Additionally, although

posthoc analyses indicated that stigma did not differ by ethnicity in this sample ($F(1, 89) = .08$, $p = .781$), prior research has suggested that obesity may be more salient among white women and that white women may be more likely to ascribe to the thin ideal than women of color (Hebl & Heatherton, 1998). As a result, the relatively greater improvement in physical quality of life among non-Caucasian participants, despite reduced weight loss, may be a reflection of cultural differences in views of obesity. Indeed, greater changes in BMI may be necessary to produce significant improvement in physical quality of life among Caucasian participants. None of the demographic predictors were associated with mental quality of life at program completion, possibly reflecting the lack of change in mental quality of life over the course of weight management or the relatively intact mental quality of life of participants.

As shown in previous studies (Teixeira et al., 2005; Wadden et al., 1992), baseline depression and anxiety were not predictive of weight loss or improvement in quality of life. However, higher baseline anxiety was unexpectedly associated with poorer mental quality of life at program completion. It is likely that this finding reflects the cross-sectional relationship of anxiety with poorer mental quality of life in combination with a lack of significant change in mental quality of life.

Contrary to prior research examining the effect of stigma on weight loss (e.g. Wott & Carels, 2010; Latner et al., 2009), there was no total effect of perceived stigma on change in BMI. This difference in findings across studies may be accounted for by differences in average BMI at baseline across studies. In this sample, the average participant had a BMI of 47.9 at baseline, while participants in the Wott and Carels (2010) study had an average BMI of 37.2 at baseline, and participants in the Latner and

colleagues (2009) study had an average initial BMI of 33.2. It is possible that stigma could serve as the impetus for change among individuals with lower levels of obesity but undermine change or differentially affect people at higher levels of obesity. Stigma could be particularly harmful for individuals with extreme obesity because these individuals would need to achieve a relatively greater level of absolute weight loss to reach socially acceptable levels of body fat. It also is possible that differences in measurement of stigma in the current sample may account for the lack of relationship. Latner and colleagues (2009) and Wott and Carels (2010) utilized The Stigmatizing Situations Inventory (SSI; Myers & Rosen, 1999), an obesity-specific measure of stigmatizing situations over the course of the lifespan, while the current study utilized the Social Impact Scale (SIS; Fife & Wright, 2000), which was designed to assess stigma among individuals with chronic medical conditions.

Similarly, there was no overall effect of perceived stigma at baseline on change in physical quality of life or weight-related quality of life. It appears that perceived stigma at baseline serves as the impetus for change in quality of life among some participants but limits change among other participants, thus washing out any effect across participants. However, stigma was associated with lower mental quality of life. There was a total effect of baseline stigma on mental quality of life at program completion after controlling for mental quality of life at baseline. Individuals who reported greater perceived stigma at baseline reported lower mental quality of life at program completion. It is important to note that this effect was significant despite the lack of correlation between perceived stigma at baseline and change in mental quality of life and the lack of significant change in mental quality of life over the course of weight management. The total effect of

perceived stigma on mental quality of life at program completion thus may be reflective of the cross-sectional relationship of perceived stigma with mental quality of life. However, it also is possible that the effect of stigma is strongest for mental quality of life and that entering behavioral weight loss treatment with high levels of perceived stigma prevents some individuals from experiencing improvements in mental quality of life over the course of treatment. In fact, research in several patient populations has shown that the effortful process of coping with stigma utilizes psychological resources, making it more difficult for individuals to engage in adaptive emotion regulation and thereby leading to poorer mental health (Hatzenbuehler, Phelan, & Link, 2013).

Increases in depression and anxiety mediated the relationship of perceived stigma with reduced mental quality of life. Similarly, increases in depression mediated the relationship of perceived stigma with reduced physical quality of life. Individuals with higher perceptions of stigma at baseline reported reduced mental and physical quality of life at program completion through stigma increasing depression. Similarly, individuals with higher perceptions of stigma at baseline reported reduced mental quality of life at program completion through stigma increasing anxiety. Post hoc analysis of change in depression and change in anxiety in a multiple mediation model indicated that change in depression mediated the relationship of stigma to mental quality of life at program completion, but change in anxiety did not act as a mediator. As shown in Table 24, the specific indirect effect of stigma on mental quality of life at program completion through change in depression was different from zero (point estimate = -.08; 95% bias-corrected CI = -.19 to -.01), but the specific indirect effect through change in anxiety straddled zero (point estimate = -.13; 95% bias-corrected CI = -.37 to .00). In this model, the total

indirect effect, which is the sum of the specific indirect effects, also was significantly different from zero (point estimate = -.20; 95% bias-corrected CI = -.47 to -.06) while the direct effect (point estimate = .06; 95% bias-corrected CI = -.14 to .25) and the total effect (point estimate = -.14; 95% bias-corrected CI = -.37 to .09) were not significantly different from zero. Taken together, these results suggest that explicitly targeting symptoms of depression over the course of weight management among individuals who enter weight management with higher levels of perceived stigma may be a strategy to reduce negative changes in mental and physical quality of life.

No other hypothesized mediators accounted for the relationship of perceived stigma at baseline with changes in any of the four outcomes (BMI, MCS, PCS, and IWQOL). Given the paucity of research examining potential mediators of the relationship of perceived stigma with weight loss treatment outcomes, it is possible that none of the other proposed mediators account for the relationship of perceived stigma at baseline with changes in BMI and quality of life. There may be other potential mediators that were not examined in this study that would better account for these relationships, however, alternative types of mediators have not been identified in the current literature.

It is possible that bariatric status is relevant for some aspects of behavioral weight management, but bariatric status did not moderate the relationship of perceived stigma with change in any of the potential mediators. It seems that bariatric status is unrelated to perceived stigma, distress, eating behavior, coping, or adherence in behavioral weight management. Thus, future plans regarding surgical treatment following behavioral weight management were not predictive of willingness to engage in a behavioral treatment program. Furthermore, there were no significant differences in outcomes across the two

groups (non-surgical patients reported greater improvement in impact of weight on quality of life at the level of a trend). Taken together, these results suggest that individuals pursuing behavioral treatment as a precursor to surgical intervention are as likely as individuals pursuing behavioral treatment alone to be successful in making changes during behavioral treatment.

The magnitude of the relationships in the mediation models evaluated in this study may have been too small to be clinically significant, or it is possible the hypothesized mediators are not relevant. For example, there was relatively little change in most mediators over time and several of the regression coefficients for the mediation models were very close to zero, suggesting that an extremely large sample would be necessary to achieve statistical significance. Thus, even if these relationships were found, it is unlikely that they would have clinical relevance. It also is possible that the overall lack of significant effects may be the result of methodological problems including lower than expected power, participant drop-out, the timing of assessments, and problems inherent in self-report data, as discussed below.

Prior research examining statistical power in mediation analyses suggested that 71 participants were needed to obtain power of 0.80 when alpha was set at 0.05 and effect sizes were medium for all paths (Fritz & MacKinnon, 2007). Sample sizes for mediation analyses in the current study ranged from as high as 87 to as low as 50. Future studies with a larger sample size or studies that intentionally select individuals reporting extreme levels of potential mediators at baseline may provide additional insight into the relationship of perceived stigma with weight loss treatment outcomes.

Participant drop-out also is of concern in this study. Of the 104 participants who consented to participate, 98 completed questionnaires at baseline and 75 participants completed questionnaires at both time points. Although participants' most recent BMI in behavioral weight management treatment was utilized as a 'post-program' outcome for participants who prematurely dropped out of weight management, it was not possible to obtain post-program self-report data from many of these participants. There were no significant differences between completers and non-completers at baseline, however, it is possible that there are differences that were not considered in this study (e.g. people with weight loss below their expectations may have been more likely to drop out). In addition, participant drop-out negatively impacted the power of the current study.

The observational nature of this study and inability to establish temporal precedence due to the lack of a third time point preclude making causal claims. In addition, the predominant use of self-report measures increases the potential for social desirability and response bias to influence results. Although participants were told that their participation was optional and that responses would remain anonymous and confidential, participants may have been motivated to respond in ways that differed from their true beliefs and behaviors. Future studies may consider the use of objective or third-party measures of stigma, distress, eating behavior, coping, and quality of life to help control effects of social desirability and response bias. Future studies also may consider a randomized study with a control group of adults not participating in behavioral weight management to facilitate conclusions about causality.

The unique nature of the patient population in this study may limit the generalizability of results. Given the exploratory nature of the study and desire to

maximize power for the statistical analyses, no outliers were omitted from the analyses. It is possible that outliers may have skewed the results. Furthermore, the relatively higher starting BMI, lack of racial and ethnic diversity, high percentage of females in the study, and higher level of education among participants may account for the lack of replication of previous findings and may limit generalizability to less heavy, more diverse, and less educated samples. Replication through a larger, multi-site study with a more representative sample may improve the generalizability of these findings.

Conversely, the sample of participants used in this study could be viewed as a strength. By utilizing a sample of participants with extreme obesity, the current study addresses a subgroup of obese individuals that has been largely understudied in the current literature. Most studies of behavioral interventions include participants with an average BMI in the 30s rather than in the 40s. Furthermore, the higher proportion of women in this sample is reflective of the patient population that tends to enter behavioral weight loss treatment. In fact, by not screening participants to create a more even distribution across demographic variables, this sample more closely matches the population of individuals typically participating in behavioral weight loss treatment and thus improves the potential for translation of this research to clinical sites.

Two of the variables used in this study also presented limitations. Cronbach's alphas for the total score, approach subscale, and avoidance subscale of the Brief Approach/Avoidance Coping Questionnaire were lower than expected in the current study, indicating poor to questionable internal consistency, and limiting interpretation of findings. Additionally, the use of BMI change for all analyses examining weight loss accounted for differences in height across participants, but it limited the ability to

compare results from the current study with other studies utilizing absolute weight loss or percentage of weight loss. Future studies may consider defining weight loss using multiple measures to enable comparisons across behavioral weight loss interventions.

The large number of analyses conducted to examine the ten hypotheses in this study increased risk of committing type I error and incorrectly rejecting null hypotheses. Given the exploratory nature of the study, limited sample size, and lower-than-expected statistical power, no statistical correction for multiple comparisons was utilized. Thus it is possible that the relatively few significant findings in this study may be the result of type I error. Replication of results with a larger, more representative sample would lend to the validity of the findings.

This study provided partial support for the relationships among weight loss treatment outcomes. Results addressed the role of demographic variables, stigma, distress, coping, and adherence in predicting weight loss and improvement in quality of life among participants in behavioral weight management. The use of two time points allowed for the examination of changes in BMI and quality of life over the course of weight management. The follow up assessment also facilitated exploration of the role that perceived stigma plays in predicting weight management outcomes. The large number of nonsignificant findings may indicate a need to consider alternative measures of stigma or to look at alternative mediators of the relationship of perceived stigma on weight loss treatment outcomes. Additionally, though bariatric status is an important factor for many individuals participating in behavioral weight management, it may not be a relevant moderator of the effect of stigma on weight loss treatment outcomes.

Despite the limited findings of this study, results provided evidence that perceived stigma may negatively influence mental and physical quality of life at the conclusion of behavioral weight management through increases in depression. Although prior investigators have had difficulty identifying mechanisms explaining the limited improvements seen in behavioral weight loss interventions (e.g. Brownell, 2010), these results highlight a mechanism that is potentially modifiable in behavioral weight loss programs. Because obesity is a heterogeneous medical condition, future studies with large, representative samples, standardized definitions of constructs (for predictors and outcomes), frequent longitudinal measurement of both predictors and outcomes, and recognition of the large intra-individual variability in pathways to weight loss are necessary to minimize the weaknesses of the current research literature (Stubbs et al., 2011).

This study suggests that heightened awareness of perceptions of weight-related stigma and assessment of these perceptions at the outset of behavioral weight loss treatment may be warranted among extremely obese samples. Future research should replicate these findings in a larger, more representative sample with the goal of identifying additional mediators in the relationship of stigma to weight loss treatment outcomes. Additionally, in light of the relationship of stigma to poorer mental and physical quality of life at program completion, future studies could examine the utility of interventions aimed at reducing perceived stigma among individuals entering behavioral weight management. In fact, several investigators have called for research examining ways to reduce the negative impact of weight-related stigma (e.g. Vartanian & Porter, 2016; O'Brien et al., 2016; Mensinger, et al., 2016; Lillis et al., 2009). In addition,

assessing distress levels among weight management participants reporting stigmatizing experiences may help identify individuals at risk for poorer mental and physical quality of life at the conclusion of behavioral weight loss treatment.

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Appendix A: Tables

Table 1. Baseline demographics for the sample.

Variable	*M (SD)*	Range
BMI	47.9 (12.1)	28.2 - 98.5
Waist Circumference (inches)	52.8 (7.8)	34.8 - 75.3
Age	45.4 (11.8)	19 - 73
Variable	N	% of sample
Sex		
Male	25	24
Female	79	76
Race		
Caucasian	79	76
Non-Caucasian	19	18
Unknown	7	7
Education		
Some High School	1	1
High School Graduate	12	12
Trade or Vocational School	2	2
Some College	26	26
College Degree	26	26
Some Graduate School	13	13
Graduate Degree	21	21
Surgical Status		
Nonsurgical	53	51
Presurgical	48	46
Unknown	3	2
Program Length		
Three-month	37	36
Six-month	67	64

Note: BMI=body mass index.

Table 2. Comparison of participants and non-participants.

Variable	Participants (n=104) *M (SD)*	Non-participants (n=151) *M (SD)*
BMI	47.9 (12.1)	48.0 (12.7)
Age	45.4 (11.8)	45.2 (11.9)
Variable	N (%)	N (%)
Sex		
Male	25 (24.0)	25 (24.5)
Female	79 (76.0)	77 (75.5)
Race		
Caucasian	79 (80.6)	77 (80.2)
Non-Caucasian	19 (19.4)	19 (19.8)

Note: BMI=body mass index; Due to changes in electronic medical records for the Living Well program during the time of data collection, demographic information was not available for all non-participants. All available data were included in the analyses.

Table 3. Comparison of descriptive statistics for BMI and psychological variables at baseline and program completion among completers.

	Baseline		Program Completion			
Variable	M (*SD*)	Range	M (*SD*)	Range	T-value	p-value
BMI	47.5 (10.8)	28.2 - 76.1	45.8 (11.0)	26.5 - 76.9	6.46	<.001
MCS	45.8 (12.2)	17.0 - 64.8	47.3 (12.5)	13.4 - 65.5	1.34	.185
PCS	38.7 (10.2)	16.9 - 63.9	41.7 (11.3)	16.6 - 61.9	2.54	.014
IWQOL	90.5 (28.4)	37 - 142	85.7 (30.1)	37 - 155	4.82	<.001
Stigma	51.7 (15.7)	24 - 86	-	-	-	-
Depression	6.4 (3.7)	1 - 17	5.6 (4.2)	0 - 20	2.98	.004
Anxiety	7.7 (4.1)	1 - 20	7.6 (4.6)	0 - 21	.91	.366
Emotional Eating	38.6 (23.5)	0 - 100	34.2 (18.7)	1 - 84	1.87	.066
Eating Self-Efficacy	107.5 (30.3)	35 - 174	99.9 (29.7)	32 - 175	2.88	.005
BACQ Total	38.1 (4.8)	27 - 51	38.3 (5.5)	22 - 56	.17	.863
BACQ Approach	21.8 (3.4)	15 - 30	22.5 (4.0)	11 - 30	1.43	.157
BACQ Avoidance	16.3 (4.2)	7 - 26	15.8 (4.6)	6 - 30	1.17	.246
COPE Total	65.3 (9.4)	45 - 88	64.6 (11.8)	32 - 98	-.64	.523
Emotional Support	5.6 (1.8)	2 - 8	5.7 (1.8)	2 - 8	.45	.651
Instrumental Support	5.6 (1.7)	2 - 8	5.4 (1.8)	2 - 8	-1.18	.242

Note: All t-tests were run such that a positive score reflects improvement over the course of weight management. BMI=body mass index; MCS=mental component summary; PCS=physical component summary; IWQOL= impact of weight on quality of life; BACQ=brief approach avoidance coping questionnaire; COPE=brief coping inventory.

Table 4. Correlations among psychological variables at baseline.

	x1	x2	x3	x4	x5	x6	x7	x8	x9	x10	x11
1 Stigma	-										
2 Anxiety	.58***	-									
3 Depression	.68***	.64***	-								
4 Emotional Eating	.52***	.44***	.42***	-							
5 Eating Self-Efficacy	.49***	.46***	.43***	.83***	-						
6 BACQ Total	.22*	.23*	.27**	.11	.07	-					
7 Avoidance Coping	.44***	.47***	.52***	.21*	.25*	.70***	-				
8 Approach Coping	-.19	-.20*	-.22*	-.08	-.18	.59***	-.17	-			
9 COPE Total	.37***	.26*	.28**	.22*	.19	.28**	.19	.17	-		
10 Emotional Support	-.06	-.05	-.13	.08	.08	.12	-.04	.22*	.53***	-	
11 Instrumental Support	.16	.01	.06	.11	.02	.11	-.09	.26*	.58***	.51***	-

Note: 1 = stigma; 2 = anxiety; 3 = depression; 4 = emotional eating; 5 = eating self-efficacy; 6 = brief approach avoidance coping questionnaire total; 7 = avoidance coping; 8 = approach coping; 9 = brief coping inventory total; 10 = emotional support; 11 = instrumental support; *p<.05, **p<.01,***p<.001

Table 5. Correlations between psychological variables at baseline and outcomes at baseline.

	BMI	MCS	PCS	IWQOL
Stigma	.36***	-.52***	-.38***	.81***
Anxiety	.16	-.68***	-.08	.55***
Depression	.30**	-.60***	-.43***	.69***
Emotional Eating	.06	-.36**	-.20	.51***
Eating Self-Efficacy	.06	-.35***	-.24*	.54***
BACQ Total	.13	-.22*	-.04	.13
BACQ Avoidance	.17	-.41***	-.15	.38***
BACQ Approach	-.02	.15	.10	-.23*
COPE Total	.18	-.18	-.30**	.37***
COPE Emotional Support	.14	.04	-.15	.04
COPE Instrumental Support	.21*	-.01	-.21	.19

Note: BMI=body mass index; MCS=mental component summary; PCS=physical component summary; IWQOL= impact of weight on quality of life; BACQ=brief approach avoidance coping questionnaire; COPE=brief coping inventory, *p<.05, **p<.01, ***p<.001

Table 6. Comparison of Completers and Non-Completers at baseline.

Variable	Completers (n=76) M (*SD*)	Non-Completers (n=28) M (*SD*)	F-value	p-value
Age	46.6 (11.5)	42.0 (12.2)	3.28	.073
Baseline BMI	47.5 (10.8)	49.0 (15.6)	.28	.600
Baseline MCS	45.8 (12.2)	43.4 (10.7)	.66	.419
Baseline PCS	38.7 (10.2)	39.4 (10.1)	.08	.780
Baseline IWQOL	90.5 (28.4)	82.6 (27.7)	1.17	.283
Stigma	51.7 (15.8)	51.2 (15.2)	.02	.901
Depression	6.4 (3.7)	7.5 (3.4)	1.56	.214
Anxiety	7.7 (4.1)	8.0 (3.9)	.07	.786
Emotional Eating	38.6 (23.5)	36.5 (18.4)	.14	.712
Eating Self-Efficacy	107.5 (30.3)	105.3 (23.7)	.10	.753
BACQ Total	38.1 (4.8)	37.0 (6.1)	.74	.393
Approach	21.8 (3.4)	21.7 (4.7)	.01	.936
Avoidance	16.3 (4.2)	15.3 (4.1)	.96	.331
COPE Total	65.3 (9.4)	64.0 (8.5)	.33	.568
Active Coping	6.6 (1.5)	6.4 (1.1)	.37	.546
Emotional Support	5.6 (1.8)	5.0 (1.9)	1.42	.237
Instrumental Support	5.6 (1.7)	5.5 (1.7)	.17	.679

Continued

Table 6 continued

Variable	Completers N (%)	Non-Completers N (%)	$\chi 2$[1, N]	p-value
Gender			.02 [1, 104]	.889
Male	18 (24)	7 (25)		
Female	58 (76)	21 (75)		
Race			2.93 [1, 98]	.087
Caucasian	61 (85)	18 (69)		
Non-Caucasian	11 (15)	8 (31)		
Education			11.02 [1, 101]	.088
Some high school	0 (0)	1 (4)		
High school graduate	6 (8)	6 (23)		
Trade or vocational school	2 (3)	0 (0)		
Some college	18 (24)	8 (31)		
College degree	23 (31)	3 (12)		
Some graduate school	9 (12)	4 (15)		
Graduate degree	17 (23)	4 (15)		
Surgery			.38 [1, 101]	.537
Non-Surgical	11 (23)	15 (28)		
Presurgical	37 (77)	38 (72)		
Program Length			.820 [1, 104]	.365
3-month	29 (38)	8 (29)		
6-month	47 (62)	20 (71)		

Note: BMI=body mass index; MCS=mental component summary; PCS=physical component summary; IWQOL= impact of weight on quality of life; BACQ=brief approach avoidance coping questionnaire; COPE=brief coping inventory.

Table 7. Correlations between weight loss and improvements in aspects of quality of life.

	x1	x2	x3	x4
1 BMI Change	-			
2 MCS Change	-.027	-		
3 PCS Change	.344**	-.464***	-	
4 IWQOL Change	.457***	.300*	.398**	-

Note: All change scores reflect improvement in the variable. 1 = change in body mass index; 2 = change in mental component summary; 3 = change in physical component summary; 4 = change in impact of weight on quality of life; *$p < 0.05$, **$p < 0.01$, ***$p < 0.001$

Table 8. Initial BMI, male gender, and Caucasian ethnicity predicting change in BMI.

	Dependent Variable: Change in BMI				
Predictors	Coefficient	SE	B	p-value	Adjusted R^2
Intercept	1.76	1.16	0	.134	
Baseline BMI	.03	.02	.14	.169	
Gender	.11	.59	.02	.852	
Race	-1.12	.62	-.19	.073	
					.017

Note: BMI= body mass index

Table 9. Initial BMI, gender, and ethnicity predicting quality of life at program completion after controlling for quality of life at baseline and relevant covariates.

	Dependent Variable: Mental component summary at Program Completion					
Predictors	Coefficient	SE	B	p-value	Adjusted R^2	ΔR^2
Intercept	22.07	5.30	0	<.001		
Baseline MCS	.56	.11	.55	<.001		
					.294	
Baseline BMI	-.04	.17	-.03	.790		
Gender	.12	3.64	.00	.974		
Race	1.46	4.21	.04	.730		
					.255	.002
	Dependent Variable: Physical component summary at Program Completion					
Predictors	Coefficient	SE	B	p-value	Adjusted R^2	ΔR^2
Intercept	12.43	4.40	0	.007		
Baseline PCS	.75	.11	.68	<.001		
					.447	
Baseline BMI	-.23	.13	-.03	.081		
Gender	4.05	2.58	.15	.122		
Race	5.92	3.05	.20	.058		
					.491	.071
	Dependent Variable: Impact of Weight on Quality of Life at Program Completion					
Predictors	Coefficient	SE	B	p-value	Adjusted R^2	ΔR^2
Intercept	5.27	6.13	0	.394		
Baseline IWQOL	.84	.06	.86	<.001		
					.744	
Baseline BMI	.48	.21	.18	.024		
Gender	-3.38	4.24	-.05	.429		
Race	-6.65	4.80	-.09	.171		
					.757	.025

Note: BMI= body mass index; MCS= mental component summary; PCS= physical component summary; IWQOL= impact of weight on quality of life.

Table 10. Baseline anxiety and depression predicting changes in BMI and quality of life.

	Dependent Variable: BMI at Program Completion					
Predictors	Coefficient	SE	β	p-value	Adjusted R^2	Δ R^2
Intercept	-.40	1.02	0	.697		
Baseline BMI	.97	.02	.98	<.001		
					.959	
Anxiety	-.05	.06	-.02	.394		
Age	-.03	.02	-.03	.213		
					.959	.000
	Dependent Variable: BMI at Program Completion					
Predictors	Coefficient	SE	β	p-value	Adjusted R^2	Δ R^2
Intercept	-.40	1.02	0	.697		
Baseline BMI	.97	.02	.98	<.001		
					.959	
Depression	.08	.07	.03	.256		
Age	-.03	.02	-.02	.250		
					.960	.001
	Dependent Variable: MCS at Program Completion					
Predictors	Coefficient	SE	β	p-value	Adjusted R^2	Δ R^2
Intercept	22.15	5.32	0	<.001		
Baseline MCS	.56	.11	.54	<.001		
					.280	
Anxiety	-1.19	.42	-.40	.006		
					.359	.088
	Dependent Variable: MCS at Program Completion					
Predictors	Coefficient	SE	β	p-value	Adjusted R^2	Δ R^2
Intercept	22.15	5.32	0	<.001		
Baseline MCS	.56	.11	.54	<.001		
					.280	
Depression	-.70	.50	-.19	.165		
					.292	.024
	Dependent Variable: PCS at Program Completion					
Predictors	Coefficient	SE	β	p-value	Adjusted R^2	Δ R^2
Intercept	11.67	4.39	0	.010		
Baseline PCS	.77	.11	.68	<.001		
					.446	
Anxiety	.06	.25	.02	.809		
Age	-.24	.10	-.24	.019		
					.483	.002

Continued

Table 10 continued

	Dependent Variable: PCS at Program Completion					
Predictors	Coefficient	SE	β	p-value	Adjusted R^2	Δ R^2
Intercept	11.67	4.39	0	.010		
Baseline PCS	.77	.11	.68	<.001		
					.446	
Depression	-.29	.35	-.09	.407		
Age	-.25	.10	-.25	.014		
					.489	.003
	Dependent Variable: IWQOL at Program Completion					
Predictors	Coefficient	SE	β	p-value	Adjusted R^2	Δ R^2
Intercept	5.55	5.80	0	.342		
Baseline IWQOL	.84	.06	.87	<.001		
					.753	
Anxiety	-.74	.57	-.10	.204		
Gender	.24	3.98	.00	.952		
					.752	.006
	Dependent Variable: IWQOL at Program Completion					
Predictors	Coefficient	SE	β	p-value	Adjusted R^2	Δ R^2
Intercept	5.55	5.80	0	.342		
Baseline IWQOL	.84	.06	.87	<.001		
					.753	
Depression	.06	.71	.01	.935		
Gender	-.04	3.07	-.00	.993		
					.745	.000

Note: BMI= body mass index; MCS= mental component summary; PCS= physical component summary; IWQOL= impact of weight on quality of life.

Table 11. Total effects of the relationship of stigma with BMI and quality of life.

Outcome	BMI	
Predictor	Coefficient (SE)	p-value
Intercept	-1.42 (2.20)	.522
Baseline Stigma	-.02 (.03)	.532
Baseline BMI	.99 (.03)	< .001
Baseline Depression	.18 (.11)	.102
Age	-.00 (.03)	.870
Model R^2	.953	< .001
Outcome	MCS	
Predictor	Coefficient (SE)	p-value
Intercept	43.49 (10.65)	< .001
Baseline Stigma	-.20 (.11)	.082
Baseline MCS	.36 (.15)	.017
Baseline Depression	-.28 (.59)	.640
Model R^2	.596	< .001
Outcome	PCS	
Predictor	Coefficient (SE)	p-value
Intercept	35.99 (10.07)	< .001
Baseline Stigma	-.09 (.09)	.303
Baseline PCS`	.60 (.13)	< .001
Baseline Depression	-.10 (.43)	.820
Age	-.26 (.10)	.013
Model R^2	.524	< .001
Outcome	IWQOL	
Predictor	Coefficient (SE)	p-value
Intercept	2.44 (7.63)	.750
Baseline Stigma	.19 (.21)	.384
Baseline IWQOL	.78 (.12)	< .001
Baseline Depression	-.16 (.77)	.836
Gender	.70 (4.26)	.870
Model R^2	.755	< .001

Note: BMI= body mass index; MCS= mental component summary; PCS= physical component summary; IWQOL= impact of weight on quality of life.

Table 12. Changes in depression and anxiety as mediators of the relationship of baseline stigma with BMI at program completion.

	Model 1		Model 2	
Outcome	Change in Depression		BMI at Program Completion	
Predictor	Coefficient (SE)	p-value	Coefficient (SE)	p-value
Intercept	3.87 (2.70)	.157	-.99 (2.23)	.659
Baseline Stigma	-.06 (.03)	.047	-.02 (.03)	.383
Baseline BMI	-.03 (.04)	.386	.98 (.03)	< .001
Baseline Depression	.41 (.14)	.003	.23 (.12)	.057
Age	-.01 (.03)	.760	-.01 (.03)	.838
Change in Depression			-.11 (.10)	.274
Model R^2	.363	.050	.976	< .001
	Model 1		Model 2	
Outcome	Change in Anxiety		BMI at Program Completion	
Predictor	Coefficient (SE)	p-value	Coefficient (SE)	p-value
Intercept	-.42 (2.64)	.873	-1.89 (2.17)	.386
Baseline Stigma	-.08 (.03)	.016	.03 (.03)	.209
Baseline BMI	.03 (.04)	.478	.99 (.03)	< .001
Baseline Anxiety	.32 (.11)	.005	-.14 (.10)	.141
Age	.02(.03)	.578	-.00 (.03)	.949
Change in Anxiety			-.00 (.10)	.987
Model R^2	.350	.064	.976	< .001

Note: BMI= body mass index.

Table 13. Bariatric status as a moderator of the relationship of baseline stigma with change in depression and change in anxiety.

	Outcome: Change in Depression		
Predictor	Coefficient (SE)	Interaction Δ R^2	Model R^2
Intercept	3.75 (2.81)		
Age	-.02 (.04)		
Baseline BMI	-.04 (.04)		
Baseline Depression	.44 (.14)**		
Surgery Status	1.58 (2.79)		
Baseline Stigma	-.05 (.04)		
Interaction	-.04 (.05)	.008	
			.379
	Outcome: Change in Anxiety		
Predictor	Coefficient (SE)	Interaction Δ R^2	Model R^2
Intercept	-.12 (2.77)		
Age	.02 (.04)		
Baseline BMI	.03 (.04)		
Baseline Anxiety	.33 (.12)**		
Surgery Status	-1.14 (2.72)		
Baseline Stigma	-.08 (.04)		
Interaction	.01 (.05)	.001	
			.131

Note: BMI= body mass index; *p< 0.05, **p < 0.01, ***p< 0.001.

Table 14. Changes in depression and anxiety as mediators of the relationship of baseline stigma with quality of life at program completion.

	Model 1		Model 2	
Outcome	Change in Depression		MCS at Program Completion	
Predictor	Coefficient (SE)	p-value	Coefficient (SE)	p-value
Intercept	-1.24 (3.04)	.684	45.49 (9.58)	<.001
Baseline Stigma	-.07 (.03)	.049	-.10 (.11)	.364
Baseline MCS	.06 (.04)	.150	.26 (.13)	.055
Baseline Depression	.44 (.17)	.011	-.98 (.56)	.086
Change in Depression			1.60 (.42)	<.001
Model R^2	.364	.049	.489	<.001
	Model 1		Model 2	
Outcome	Change in Depression		PCS at Program Completion	
Predictor	Coefficient (SE)	p-value	Coefficient (SE)	p-value
Intercept	4.73 (3.85)	.224	32.27 (9.83)	.002
Baseline Stigma	-.08 (.03)	.023	-.03 (.09)	.741
Baseline PCS	-.03 (.05)	.589	.62 (.13)	< .001
Baseline Depression	.30 (.16)	.073	-.34 (.43)	.438
Age	-.01 (.04)	.755	-.25 (.10)	.013
Change in Depression			.79 (.34)	.026
Model R^2	.104	.198	.567	<.001
	Model 1		Model 2	
Outcome	Change in Depression		IWQOL at Program Completion	
Predictor	Coefficient (SE)	p-value	Coefficient (SE)	p-value
Intercept	2.01 (1.41)	.160	7.82 (.81)	.255
Baseline Stigma	-.02 (.04)	.559	.13 (.19)	.507
Baseline IWQOL	-.03 (.02)	.164	.70 (.11)	< .001
Baseline Depression	.50 (.14)	< .001	1.17 (.74)	.121
Gender	.58 (.79)	.467	2.25 (3.75)	.552
Change in Depression			-2.68 (.62)	< .001
Model R^2	.193	.013	.815	< .001

Continued

Table 14 continued

	Model 1		Model 2	
Outcome	Change in Anxiety		MCS at Program Completion	
Predictor	Coefficient (SE)	p-value	Coefficient (SE)	p-value
Intercept	1.78 (3.18)	.578	48.03 (8.90)	<.001
Baseline Stigma	-.09 (.03)	.008	.02 (.09)	.822
Baseline MCS	.00 (.04)	.964	.24 (.12)	.058
Baseline Anxiety	.37 (.14)	.010	-1.63 (.40)	<.001
Change in Anxiety			1.87 (.37)	<.001
Model R^2	.163	.018	.589	<.001
	Model 1		Model 2	
Outcome	Change in Anxiety		PCS at Program Completion	
Predictor	Coefficient (SE)	p-value	Coefficient (SE)	p-value
Intercept	6.73 (3.62)	.069	39.39 (9.95)	< .001
Baseline Stigma	-.11 (.03)	.001	-.22 (.10)	.027
Baseline PCS	-.09 (.05)	.061	.55 (.13)	<.001
Baseline Anxiety	.39 (.11)	.001	.58 (.10)	.089
Age	-.00 (.04)	.905	-.27 (.10)	.009
Change in Anxiety			-.41 (.36)	.259
Model R^2	.219	.008	.552	<.001
	Model 1		Model 2	
Outcome	Change in Anxiety		IWQOL at Program Completion	
Predictor	Coefficient (SE)	p-value	Coefficient (SE)	p-value
Intercept	1.18 (1.50)	.436	1.51 (7.15)	.833
Baseline Stigma	-.11 (.04)	.022	.24 (.22)	.288
Baseline IWQOL	.02 (.02)	.272	.82 (.11)	< .001
Baseline Anxiety	.31 (.13)	.019	-.84 (64)	.194
Gender	-.04 (.86)	.959	1.43 (4.06)	.353
Change in Anxiety			-.80 (62)	.200
Model R^2	.130	.080	.775	<.001

Note: MCS= mental component summary; PCS= physical component summary; IWQOL= impact of weight on quality of life.

Table 15. Bariatric status as a moderator of the relationship of baseline stigma with change in depression and change in anxiety.

	Outcome: Change in Depression		
Predictor	Coefficient (SE)	Interaction Δ R^2	Model R^2
Intercept	-2.93 (3.12)		
Baseline MCS	.08 (.04)		
Baseline Depression	.57 (.25)***		
Surgery Status	.05 (2.69)		
Baseline Stigma	-.06 (.04)		
Interaction	-.02 (.05)	.001	
			.447
	Outcome: Change in Depression		
Predictor	Coefficient (SE)	Interaction Δ R^2	Model R^2
Intercept	4.35 (4.17)		
Age	-.03 (.04)		
Baseline PCS	-.02 (.05)		
Baseline Depression	.45 (.16)**		
Surgery Status	.48 (2.93)		
Baseline Stigma	-.07 (.04)		
Interaction	-.02 (.05)	.003	
			.158
	Outcome: Change in Depression		
Predictor	Coefficient (SE)	Interaction Δ R^2	Model R^2
Intercept	2.03 (1.70)		
Gender	-.78 (.80)		
Baseline IWQOL	-.03 (.02)		
Baseline Depression	.48 (.14)**		
Surgery Status	-.87 (2.48)		
Baseline Stigma	-.01 (.04)		
Interaction	.00 (.05)	.000	
			.201

Continued

Table 15 continued

	Outcome: Change in Anxiety		
Predictor	Coefficient (SE)	Interaction Δ R^2	Model R^2
Intercept	.83 (3.29)		
Baseline MCS	.01 (.04)		
Baseline Anxiety	.41 (.14)**		
Surgery Status	.15 (2.73)		
Baseline Stigma	-.08 (.04)		
Interaction	-.01 (.05)	.001	
			.163
	Outcome: Change in Anxiety		
Predictor	Coefficient (SE)	Interaction Δ R^2	Model R^2
Intercept	8.31 (3.89)*		
Age	-.01 (.03)		
Baseline PCS	-.10 (.05)*		
Baseline Anxiety	.43 (.12)***		
Surgery Status	-1.29 (2.71)		
Baseline Stigma	-.12 (.04)**		
Interaction	.01 (.05)	.001	
			.227*
	Outcome: Change in Anxiety		
Predictor	Coefficient (SE)	Interaction Δ R^2	Model R^2
Intercept	1.22 (1.86)		
Gender	.08 (.87)		
Baseline IWQOL	.02 (.02)		
Baseline Anxiety	.29 (.12)*		
Surgery Status	-1.34 (2.69)		
Baseline Stigma	-.09 (.05)		
Interaction	.01 (.05)	.001	
			.130

Note: MCS= mental component summary; PCS= physical component summary; IWQOL= impact of weight on quality of life; *p< 0.05, **p < 0.01, ***p< 0.001.

Table 16. Changes in coping as mediators of the effect of baseline stigma on BMI at program completion.

	Model 1		Model 2	
Outcome	Change in Emotional Eating		BMI at Program Completion	
Predictor	Coefficient (SE)	p-value	Coefficient (SE)	p-value
Intercept	8.28 (11.23)	.464	-2.42 (2.39)	.315
Baseline Stigma	-.22 (.13)	.106	.02 (.03)	.552
Baseline BMI	-.12 (.17)	.489	1.00 (.04)	< .001
Baseline Emotional Eating	.43 (.09)	.086	-.01 (.02)	.601
Age	-.09 (.14)	.529	.00 (.03)	.982
Change in Emotional Eating			.03 (.03)	.988
Model R^2	.349	<.001	.950	< .001
	Model 1		Model 2	
Outcome	Change in Eating Self-Efficacy		BMI at Program Completion	
Predictor	Coefficient (SE)	p-value	Coefficient (SE)	p-value
Intercept	-29.28 (21.19)	.172	-2.90 (2.35)	.221
Baseline Stigma	-.36 (.23)	.114	.00 (.03)	.951
Baseline BMI	.24 (.30)	.418	1.00 (.03)	< .001
Baseline Eating Self-Efficacy	.42 (11)	<.001	.01 (.01)	.510
Age	-.01 (.24)	.527	.00 (.03)	.874
Change in Eating Self-Efficacy			-1.34 (1.28)	.298
Model R^2	.175	.009	.953	< .001

Continued

Table 16 continued

	Model 1		Model 2	
Outcome	Change in Approach Coping		BMI at Program Completion	
Predictor	Coefficient (SE)	p-value	Coefficient (SE)	p-value
Intercept	16.02 (4.21)	<.001	-.53 (3.25)	.872
Baseline Stigma	.06 (.03)	.070	.01 (.02)	.723
Baseline BMI	-.11 (.05)	.020	.99 (.03)	< .001
Baseline Approach Coping	-.45 (.13)	<.001	-.07 (.10)	.458
Age	-.07 (.04)	.078	.00 (.03)	.900
Change in Approach Coping			-.02 (.08)	.817
Model R^2	.260	<.001	.953	< .001
	Model 1		Model 2	
Outcome	Change in Avoidance Coping		BMI at Program Completion	
Predictor	Coefficient (SE)	p-value	Coefficient (SE)	p-value
Intercept	-1.28 (3.57)	.722	-2.73 (2.35)	.248
Baseline Stigma	-.05 (.03)	.156	.00 (.02)	.889
Baseline BMI	-.01 (.05)	.900	1.00 (.03)	< .001
Baseline Avoidance Coping	.46 (.12)	<.001	.06 (.09)	.508
Age	-.06 (.04)	.155	.00 (.03)	.957
Change in Avoidance Coping			-.05 (.08)	.514
Model R^2	.197	.004	.953	< .001

Continued

Table 16 continued

	Model 1		Model 2	
Outcome	Change in Use of Emotional Support		BMI at Program Completion	
Predictor	Coefficient (SE)	p-value	Coefficient (SE)	p-value
Intercept	6.92 (1.67)	<.001	-1.50 (2.56)	.559
Baseline Stigma	.01 (.01)	.348	.01 (.02)	.536
Baseline BMI	-.04 (.02)	.083	.99 (.03)	< .001
Baseline Emotional Support	-.80 (.12)	<.001	-.06 (.21)	.779
Age	-.02 (.02)	.221	.00 (.03)	.978
Change in Use of Emotional Support			-.16 (.17)	.335
Model R^2	.428	<.001	.953	< .001
	Model 1		Model 2	
Outcome	Change in Use of Instrumental Support		BMI at Program Completion	
Predictor	Coefficient (SE)	p-value	Coefficient (SE)	p-value
Intercept	3.09 (1.58)	.055	-1.78 (2.31)	.442
Baseline Stigma	.03 (.01)	.021	.01 (.02)	.653
Baseline BMI	-.01 (.02)	.67	1.00 (.03)	< .001
Baseline Instrumental Support	-.70 (.13)	<.001	-.16 (22)	.460
Age	-.01 (.02)	.463	.01 (.03)	.803
Change in Use of Instrumental Support			.04 (.17)	.839
Model R^2	.338	<.001	.952	< .001

Note: Note: BMI= body mass index.

Table 17. Bariatric status as a moderator the relationship of baseline stigma with changes in coping.

	Outcome: Change in Emotional Eating		
Predictor	Coefficient (SE)	Interaction Δ R^2	Model R^2
Intercept	2.28 (11.56)		
Age	-.15 (.15)		
Baseline BMI	-.22 (.18)		
Baseline Emotional Eating	.47 (.09)***		
Surgery Status	21.98 (11.58)		
Baseline Stigma	-.01 (.17)		
Interaction	-.39 (.21)	.037	
			.392***
	Outcome: Change in Eating Self-Efficacy		
Predictor	Coefficient (SE)	Interaction Δ R^2	Model R^2
Intercept	-33.61 (22.42)		
Age	-.02 (.25)		
Baseline BMI	.19 (.31)		
Baseline Eating Self Efficacy	.42 (.12)***		
Surgery Status	8.34 (19.96)		
Baseline Stigma	-.28 (.30)		
Interaction	-.10 (.37)	.001	
			.185*
	Outcome: Change in Approach Coping		
Predictor	Coefficient (SE)	Interaction Δ R^2	Model R^2
Intercept	15.88 (4.21)***		
Age	-.06 (.04)		
Baseline BMI	-.11 (.05)*		
Baseline Approach Coping	-.46 (.13)***		
Surgery Status	.49 (2.96)		
Baseline Stigma	.03 (.04)		
Interaction	.03 (.05)	.003	
			.315***

Continued

Table 17 continued

	Outcome: Change in Avoidance Coping		
Predictor	Coefficient (SE)	Interaction Δ R^2	Model R^2
Intercept	-2.49 (3.61)		
Age	-.06 (.04)		
Baseline BMI	-.03 (.05)		
Baseline Avoidance Coping	.44 (.12)***		
Surgery Status	3.23 (3.18)		
Baseline Stigma	-.00 (.05)		
Interaction	-.05 (.06)	.010	
			.212*
	Outcome: Change in Use of Emotional Support		
Predictor	Coefficient (SE)	Interaction Δ R^2	Model R^2
Intercept	6.67 (1.69)***		
Age	-.03 (.02)		
Baseline BMI	-.04 (.02)		
Baseline Emotional Support	-.77 (.12)***		
Surgery Status	1.41 (1.53)		
Baseline Stigma	.02 (.02)		
Interaction	-.02 (.03)	.005	
			.437***
	Outcome: Change in Use of Instrumental Support		
Predictor	Coefficient (SE)	Interaction Δ R^2	Model R^2
Intercept	3.02 (1.63)		
Age	-.01 (.02)		
Baseline BMI	-.01 (.02)		
Baseline Instrumental Support	-.68 (.14)***		
Surgery Status	.25 (1.55)		
Baseline Stigma	.03 (.02)		
Interaction	.00 (.03)	.000	
			.324***

Note: BMI= body mass index; *p< 0.05, **p < 0.01, ***p< 0.001.

Table 18. Changes in coping as mediators of the effect of baseline stigma on quality of life at program completion.

	Model 1		Model 2	
Outcome	Change in Emotional Eating		MCS at Program Completion	
Predictor	Coefficient (SE)	p-value	Coefficient (SE)	p-value
Intercept	-3.19 (12.92)	.806	30.44 (10.70)	.007
Baseline Stigma	-.22 (.14)	.125	-.04 (.12)	.756
Baseline MCS	.04 (.17)	.815	.48 (.14)	.002
Baseline Emotional Eating	.44 (.09)	<.001	-.08 (.09)	.401
Change in Emotional Eating			.11 (.12)	.369
Model R^2	.335	<.001	.351	< .001
	Model 1		Model 2	
Outcome	Change in Emotional Eating		PCS at Program Completion	
Predictor	Coefficient (SE)	p-value	Coefficient (SE)	p-value
Intercept	29.88 (15.19)	.055	31.59 (10.02)	.003
Baseline Stigma	-.34 (.14)	.018	-.16 (.09)	.080
Baseline PCS	-.37 (.19)	.058	.64 (.12)	<.001
Baseline Emotional Eating	.44 (.09)	<.001	.02 (.07)	.773
Age	-.25 (.17)	.146	-.16 (.11)	.159
Change in Emotional Eating			.02 (.09)	.859
Model R^2	.395	<.001	.606	< .001
	Model 1		Model 2	
Outcome	Change in Emotional Eating		IWQOL at Program Completion	
Predictor	Coefficient (SE)	p-value	Coefficient (SE)	p-value
Intercept	-2.51 (6.34)	.694	3.24 (7.52)	.669
Baseline Stigma	-.05 (.21)	.793	.25 (.24)	.320
Baseline IWQOL	-.09 (.11)	.442	.79 (.13)	<.001
Baseline Emotional Eating	.45 (.09)	<.001	-.15 (4.30)	.971
Gender	-1.46 (3.63)	.690	-.15 (4.30)	.971
Change in Emotional Eating			-.06 (.17)	.738
Model R^2	.368	<.001	.760	< .001

Continued

Table 18 continued

	Model 1		Model 2	
Outcome	Change in Eating Self-Efficacy		MCS at Program Completion	
Predictor	Coefficient (SE)	p-value	Coefficient (SE)	p-value
Intercept	-25.26 (22.88)	.274	42.40 (10.32)	<.001
Baseline Stigma	-.11 (.24)	.639	-.20 (.11)	.057
Baseline MCS	.08 (.28)	.773	.41 (.13)	.002
Baseline Eating Self-Efficacy	.34 (.12)	.007	-.04 (.06)	.511
Change in Eating Self-Efficacy			.13 (.06)	.036
Model R^2	.142	.032	.402	< .001
	Model 1		Model 2	
Outcome	Change in Eating Self-Efficacy		PCS at Program Completion	
Predictor	Coefficient (SE)	p-value	Coefficient (SE)	p-value
Intercept	7.32 (27.21)	.789	34.43 (9.56)	<.001
Baseline Stigma	-.23 (.24)	.346	-.09 (.08)	.287
Baseline PCS	-.30 (.33)	.381	.63 (.12)	<.001
Baseline Eating Self-Efficacy	.340 (.12)	.010	-.02 (.04)	.736
Age	-.25 (.28)	.379	-.25 (.10)	.014
Change in Eating Self Efficacy			.05 (.05)	.300
Model R^2	.159	.042	.545	< .001

Continued

Table 18 continued

	Model 1		Model 2	
Outcome	Change in Eating Self-Efficacy		IWQOL at Program Completion	
Predictor	Coefficient (SE)	p-value	Coefficient (SE)	p-value
Intercept	-25.77 (12.56)	.045	2.83 (8.31)	.734
Baseline Stigma	-.19 (.30)	.544	.18 (.20)	.354
Baseline IWQOL	.00 (.16)	.991	.80 (.10)	<.001
Baseline Eating Self-Efficacy	.42 (.12)	.001	-.00 (.08)	.952
Gender	-.33 (6.18)	.958	-.47 (3.95)	.906
Change in Eating Self-Efficacy			-.20 (.08)	.018
Model R^2	.221	.004	.787	< .001
	Model 1		Model 2	
Outcome	Change in Approach Coping		MCS at Program Completion	
Predictor	Coefficient (SE)	p-value	Coefficient (SE)	p-value
Intercept	9.93 (4.88)	.047	40.15 (13.63)	.005
Baseline Stigma	.03 (.04)	.391	-.24 (.10)	.019
Baseline MCS	.01 (.05)	.864	.42 (.13)	.002
Baseline Approach Coping	-.51 (.15)	.001	.01 (.44)	.979
Change in Approach Coping			.44 (.36)	.223
Model R^2	.204	.004	.373	< .001
	Model 1		Model 2	
Outcome	Change in Approach Coping		PCS at Program Completion	
Predictor	Coefficient (SE)	p-value	Coefficient (SE)	p-value
Intercept	14.03 (5.60)	.015	31.16 (12.36)	.015
Baseline Stigma	.02 (.03)	.500	-.11 (.07)	.155
Baseline PCS	-.02 (.06)	.479	.62 (.12)	<.001
Baseline Approach Coping	-.50 (.15)	.001	.13 (.34)	.694
Age	-.06 (.05)	.181	-.25 (.10)	.017
Change in Approach Coping			.24 (.28)	.390
Model R^2	.229	.005	.542	< .001

Continued

Table 18 continued

	Model 1		Model 2	
Outcome	Change in Approach Coping		IWQOL at Program Completion	
Predictor	Coefficient (SE)	p-value	Coefficient (SE)	p-value
Intercept	12.27 (3.88)	.002	5.46 (16.29)	.739
Baseline Stigma	.07 (.05)	.183	.26 (.21)	.212
Baseline IWQOL	-.04 (.03)	.141	.74 (.11)	<.001
Baseline Approach Coping	.51 (.13)	<.001	-.13 (.58)	.828
Gender	-1.69 (1.04)	.108	-.62 (4.12)	.881
Change in Approach Coping			-.77 (.50)	.129
Model R^2	.260	.001	.771	< .001
	Model 1		Model 2	
Outcome	Change in Avoidance Coping		MCS at Program Completion	
Predictor	Coefficient (SE)	p-value	Coefficient (SE)	p-value
Intercept	-4.44 (4.02)	.274	58.52 (10.58)	<.001
Baseline Stigma	-.05 (.04)	.133	-.11 (.10)	.254
Baseline MCS	.04 (.05)	.441	.297 (.12)	.019
Baseline Avoidance Coping	.38 (.13)	.006	-1.19 (.36)	.002
Change in Avoidance Coping			.54 (.35)	.127
Model R^2	.136	.039	.456	< .001

Continued

Table 18 continued

	Model 1		Model 2	
Outcome	Change in Avoidance Coping		PCS at Program Completion	
Predictor	Coefficient (SE)	p-value	Coefficient (SE)	p-value
Intercept	-.94 (4.37)	.830	34.49 (9.24)	<.001
Baseline Stigma	-.06 (.04)	.113	-.12 (.08)	.155
Baseline PCS	.02 (.06)	.674	.59 (.12)	<.001
Baseline Avoidance Coping	.37 (.13)	.007	.16 (.29)	.596
Age	-.05 (.05)	.304	-.26 (.10)	.010
Change in Avoidance Coping			.39 (.28)	.167
Model R^2	.152	.052	.561	< .001
	Model 1		Model 2	
Outcome	Change in Avoidance Coping		IWQOL at Program Completion	
Predictor	Coefficient (SE)	p-value	Coefficient (SE)	p-value
Intercept	-4.65 (2.19)	.038	-2.21 (8.96)	.806
Baseline Stigma	.03 (.05)	.597	.20 (.21)	.340
Baseline IWQOL	-.05 (.03)	.088	.73 (.11)	<.001
Baseline Avoidance Coping	.50 (.12)	<.001	.52 (.55)	.349
Gender	-.63 (1.02)	.538	-.02 (4.04)	.997
Change in Avoidance Coping			-.82 (.51)	.112
Model R^2	.250	.002	.771	< .001

Continued

Table 18 continued

	Model 1		Model 2	
Outcome	Change in Use of Emotional Support		MCS at Program Completion	
Predictor	Coefficient (SE)	p-value	Coefficient (SE)	p-value
Intercept	.36 (1.87)	.848	42.28 (111.17)	<.001
Baseline Stigma	.03 (.02)	.087	-.22 (.10)	.033
Baseline MCS	.04 (.02)	.047	.41 (.13)	.003
Baseline Emotional Support	-.69 (.12)	<.001	-.35 (.97)	.717
Change in Use of Emotional Support			.02 (.79)	.983
Model R^2	.379	<.001	.355	< .001
	Model 1		Model 2	
Outcome	Change in Use of Emotional Support		PCS at Program Completion	
Predictor	Coefficient (SE)	p-value	Coefficient (SE)	p-value
Intercept	5.53 (2.37)	.023	32.37 (10.41)	.003
Baseline Stigma	.00 (.02)	.832	-.11 (.07)	.109
Baseline PCS	-.03 (.03)	.304	.64 (.11)	<.001
Baseline Emotional Support	-.73 (.14)	<.001	.30 (.71)	.674
Age	-.01 (.02)	.602	-.25 (.09)	.012
Change in Use of Emotional Support			1.21 (.56)	.035
Model R^2	.347	<.001	.580	< .001

Continued

Table 18 continued

	Model 1		Model 2	
Outcome	Change in Use of Emotional Support		IWQOL at Program Completion	
Predictor	Coefficient (SE)	p-value	Coefficient (SE)	p-value
Intercept	4.47 (1.27)	<.001	-8.03 (10.51)	.448
Baseline Stigma	.03 (.03)	.357	.21 (.20)	.300
Baseline IWQOL	-.01 (.01)	.409	.76 (.11)	<.001
Baseline Emotional Support	-.802 (.13)	<.001	1.71 (1.27)	.184
Gender	-.23 (.54)	.673	1.60 (1.27)	.854
Change in Use of Emotional Support			.40 (.97)	.680
Model R^2	.396	<.001	.769	< .001
	Model 1		Model 2	
Outcome	Change in Use of Instrumental Support		MCS at Program Completion	
Predictor	Coefficient (SE)	p-value	Coefficient (SE)	p-value
Intercept	1.28 (1.80)	.481	41.37 (10.34)	<.001
Baseline Stigma	.04 (.02)	.039	-.24 (.10)	.022
Baseline MCS	.01 (.02)	.714	.41 (.13)	.002
Baseline Instrumental Support	-.66 (.14)	<.001	-.02 (.95)	.987
Change in Use of Instrumental Support			.78 (.76)	.311
Model R^2	.306	<.001	.370	< .001

Continued

Table 18 continued

	Model 1		Model 2	
Outcome	Change in Use of Instrumental Support		PCS at Program Completion	
Predictor	Coefficient (SE)	p-value	Coefficient (SE)	p-value
Intercept	2.85 (2.35)	.231	38.61 (10.37)	<.001
Baseline Stigma	.03 (.02)	.084	-.10 (.07)	.194
Baseline PCS	-.01 (.03)	.622	.61 (.12)	<.001
Baseline Instrumental Support	-.67 (.14)	<.001	-.57 (.74)	.439
Age	-.01 (.02)	.794	-.27 (.10)	.009
Change in Use of Instrumental Support			.01 (.58)	.989
Model R^2	.308	<.001	.543	< .001
	Model 1		Model 2	
Outcome	Change in Use of Instrumental Support		IWQOL at Program Completion	
Predictor	Coefficient (SE)	p-value	Coefficient (SE)	p-value
Intercept	2.52 (1.14)	.031	-2.92 (9.54)	.761
Baseline Stigma	.01 (.03)	.657	.19 (.20)	.368
Baseline IWQOL	.01 (.01)	.449	.74 (.11)	<.001
Baseline Instrumental Support	-.75 (.14)	<.001	1.45 (1.38)	.299
Gender	-.14 (.51)	.784	.27 (4.12)	.949
Change in Use of Instrumental Support			.45 (1.05)	.666
Model R^2	.336	<.001	.761	< .001

Note: MCS= mental component summary; PCS= physical component summary; IWQOL= impact of weight on quality of life.

Table 19. Bariatric status as a moderator of the relationship of baseline stigma with changes in coping.

	Outcome: Change in Emotional Eating		
Predictor	Coefficient (SE)	Interaction Δ R^2	Model R^2
Intercept	-5.33 (13.68)		
Baseline MCS	-.06 (.17)		
Baseline Emotional Eating	.48 (.09)***		
Surgery Status	16.02 (12.27)		
Baseline Stigma	-.14 (.16)		
Interaction	-.30 (.23)	.022	
			.386***
	Outcome: Change in Emotional Eating		
Predictor	Coefficient (SE)	Interaction Δ R^2	Model R^2
Intercept	16.08 (17.07)		
Baseline PCS	-.31 (.20)		
Baseline Emotional Eating	.50 (.09)***		
Age	-.17 (.16)		
Surgery Status	11.46 (12.72)		
Baseline Stigma	-.25 (.17)		
Interaction	-.23 (.23)	.011	
			.419***
	Outcome: Change in Emotional Eating		
Predictor	Coefficient (SE)	Interaction Δ R^2	Model R^2
Intercept	-6.26 (8.10)		
Baseline IWQOL	-.08 (.11)		
Baseline Emotional Eating	.49 (.09)***		
Gender	-2.40 (3.64)		
Surgery Status	11.25 (12.07)		
Baseline Stigma	-.03 (.22)		
Interaction	-.19 (.23)	.009	
			.379***

Continued

Table 19 continued

	Outcome: Change in Eating Self-Efficacy		
Predictor	Coefficient (SE)	Interaction Δ R^2	Model R^2
Intercept	-23.41 (24.22)		
Baseline MCS	-.05 (.27)		
Baseline Eating Self-Efficacy	.37 (.12)**		
Surgery Status	4.90 (20.14)		
Baseline Stigma	-.12 (.27)		
Interaction	-.07 (.37)	.000	
			.170*
	Outcome: Change in Eating Self-Efficacy		
Predictor	Coefficient (SE)	Interaction Δ R^2	Model R^2
Intercept	-12.38 (29.86)		
Baseline PCS	-.21 (.34)		
Baseline Eating Self-Efficacy	.37 (12)**		
Age	-.03 (.26)		
Surgery Status	.83 (21.13)		
Baseline Stigma	-.20 (.30)		
Interaction	.00 (.39)	.000	
			.175
	Outcome: Change in Eating Self-Efficacy		
Predictor	Coefficient (SE)	Interaction Δ R^2	Model R^2
Intercept	-30.96 (16.95)		
Baseline IWQOL	.03 (.17)		
Baseline Eating Self-Efficacy	.45 (.13)**		
Gender	-.36 (6.55)		
Surgery Status	5.39 (21.05)		
Baseline Stigma	-.03 (.36)		
Interaction	-.00 (.39)	.000	
			.225*

Continued

Table 19 continued

	Outcome: Change in Approach Coping		
Predictor	Coefficient (SE)	Interaction Δ R^2	Model R^2
Intercept	12.03 (4.88)		
Baseline MCS	.01 (.04)		
Baseline Approach Coping	-.53 (.14)***		
Surgery Status	-2.39 (3.29)		
Baseline Stigma	-.03 (.04)		
Interaction	.08 (.06)	.022	
			.260**
	Outcome: Change in Approach Coping		
Predictor	Coefficient (SE)	Interaction Δ R^2	Model R^2
Intercept	13.30 (5.95)*		
Baseline PCS	.02 (.06)		
Baseline Approach Coping	-.53 (.14)***		
Age	-.04 (.04)		
Surgery Status	-1.63 (3.39)		
Baseline Stigma	-.02 (.05)		
Interaction	.07 (.06)	.014	
			.271**
	Outcome: Change in Approach Coping		
Predictor	Coefficient (SE)	Interaction Δ R^2	Model R^2
Intercept	12.46 (3.85)**		
Baseline IWQOL	-.04 (.03)		
Baseline Approach Coping	-.50 (.13)***		
Gender	-1.31 (1.01)		
Surgery Status	-1.33 (3.12)		
Baseline Stigma	.04 (.06)		
Interaction	.06 (.06)	.012	
			.297**

Continued

Table 19 continued

	Outcome: Change in Avoidance Coping		
Predictor	Coefficient (SE)	Interaction Δ R^2	Model R^2
Intercept	-5.82 (4.04)		
Baseline MCS	.02 (.05)		
Baseline Avoidance Coping	.40 (.13)**		
Surgery Status	2.26 (3.25)		
Baseline Stigma	-.02 (.04)		
Interaction	-.04 (.06)	.005	
			.143
	Outcome: Change in Avoidance Coping		
Predictor	Coefficient (SE)	Interaction Δ R^2	Model R^2
Intercept	-3.85 (4.80)		
Baseline PCS	.01 (.06)		
Baseline Avoidance Coping	.36 (.13)**		
Age	-.03 (.04)		
Surgery Status	3.04 (3.38)		
Baseline Stigma	-.02 (.05)		
Interaction	-.05 (.06)	.010	
			.150
	Outcome: Change in Avoidance Coping		
Predictor	Coefficient (SE)	Interaction Δ R^2	Model R^2
Intercept	-5.92 (2.59)*		
Baseline IWQOL	-.04 (.03)		
Baseline Avoidance Coping	.50 (.12)***		
Gender	-.91 (1.03)		
Surgery Status	1.27 (3.21)		
Baseline Stigma	.04 (.06)		
Interaction	-.02 (.06)	.001	
			.252**

Continued

Table 19 continued

	Outcome: Change in Use of Emotional Support		
Predictor	Coefficient (SE)	Interaction Δ R^2	Model R^2
Intercept	.73 (1.84)		
Baseline MCS	.05 (.02)*		
Baseline Emotional Support	-.66 (.12)***		
Surgery Status	-.84 (1.51)		
Baseline Stigma	.01 (.02)		
Interaction	.01 (.03)	.003	
			.391***
	Outcome: Change in Use of Emotional Support		
Predictor	Coefficient (SE)	Interaction Δ R^2	Model R^2
Intercept	6.70 (2.50)**		
Baseline PCS	-.02 (.03)		
Baseline Emotional Support	-.70 (.13)***		
Age	-.02 (.02)		
Surgery Status	-.47 (1.63)		
Baseline Stigma	-.01 (.02)		
Interaction	.01 (.03)	.001	
			.347***
	Outcome: Change in Use of Emotional Support		
Predictor	Coefficient (SE)	Interaction Δ R^2	Model R^2
Intercept	4.64 (1.37)**		
Baseline IWQOL	-.01 (.01)		
Baseline Emotional Support	-.77 (.13)***		
Gender	.04 (.52)		
Surgery Status	-.40 (1.60)		
Baseline Stigma	.02 (.03)		
Interaction	.01 (.03)	.002	
			.406***

Continued

Table 19 continued

	Outcome: Change in Use of Instrumental Support		
Predictor	Coefficient (SE)	Interaction Δ R^2	Model R^2
Intercept	1.34 (1.83)		
Baseline MCS	.01 (.02)		
Baseline Instrumental Support	-.68 (.15)***		
Surgery Status	.21 (1.65)		
Baseline Stigma	.03 (.02)		
Interaction	.00 (.03)	.000	
			.284**
	Outcome: Change in Use of Instrumental Support		
Predictor	Coefficient (SE)	Interaction Δ R^2	Model R^2
Intercept	3.43 (2.51)		
Baseline PCS	-.01 (.03)		
Baseline Instrumental Support	-.70 (.15)***		
Age	-.02 (.02)		
Surgery Status	.38 (1.70)		
Baseline Stigma	.02 (.02)		
Interaction	-.00 (.03)	.000	
			.288**
	Outcome: Change in Use of Instrumental Support		
Predictor	Coefficient (SE)	Interaction Δ R^2	Model R^2
Intercept	2.31 (1.24)		
Baseline IWQOL	.01 (.01)		
Baseline Instrumental Support	-.71 (.15)***		
Gender	-.09 (.52)		
Surgery Status	.46 (1.68)		
Baseline Stigma	.01 (.03)		
Interaction	.00 (.03)	.000	
			.310**

Note: MCS= mental component summary; PCS= physical component summary; IWQOL= impact of weight on quality of life; *p< 0.05, **p < 0.01, ***p< 0.001.

Table 20. Adherence as a mediator the effect of baseline stigma on BMI at program completion.

	Model 1		Model 2	
Outcome	Percent Attendance		BMI at Program Completion	
Predictor	Coefficient (SE)	p-value	Coefficient (SE)	p-value
Intercept	.74 (.13)	.000	-2.19 (1.96)	.266
Baseline Stigma	.00 (.00)	.713	.03 (.02)	.129
Baseline BMI	.00 (.00)	.712	.95 (.02)	<.001
Age	.00 (.00)	.706	-.02 (.02)	.291
Percent Attendance			-2.36 (1.38)	.091
Model R^2	.006	.917	.965	<.001
	Model 1		Model 2	
Outcome	Percent Dietary Log Completion		BMI at Program Completion	
Predictor	Coefficient (SE)	p-value	Coefficient (SE)	p-value
Intercept	.42 (.24)	.084	1.59 (1.61)	.327
Baseline Stigma	.00 (.00)	.526	.03 (.02)	.074
Baseline BMI	-.00 (.00)	.202	.94 (.02)	<.001
Age	.00 (.00)	.440	-.02 (.02)	.383
Percent Dietary Log Completion			-2.75 (.74)	<.001
Model R^2	.032	.446	.969	<.001
	Model 1		Model 2	
Outcome	Percent Physical Activity Log Completion		BMI at Program Completion	
Predictor	Coefficient (SE)	p-value	Coefficient (SE)	p-value
Intercept	.13 (.15)	.389	.94 (1.63)	.566
Baseline Stigma	.00 (.00)	.417	.03 (.02)	.076
Baseline BMI	-.00 (.00)	.544	.95 (.02)	<.001
Age	.00 (.00)	.519	-.02 (.02)	.346
Percent Physical Activity Log Completion			-3.77 (1.20)	.002
Model R^2	.016	.731	.967	<.001

Note: BMI= body mass index.

Table 21. Bariatric status as a moderator the relationship of baseline stigma with adherence.

	Outcome: Percent Change in Attendance		
Predictor	Coefficient (SE)	Interaction Δ R^2	Model R^2
Intercept	.74 (.15)***		
Age	.00 (.01)		
Baseline BMI	.00 (.00)		
Surgery Status	-.03 (.15)		
Baseline Stigma	.00 (.00)		
Interaction	.00 (.00)	.001	
			.010
	Outcome: Percent Change in Dietary Log Completion		
Predictor	Coefficient (SE)	Interaction Δ R^2	Model R^2
Intercept	.44 (.26)		
Age	.00 (.00)		
Baseline BMI	-.00 (.00)		
Surgery Status	-.16 (.26)		
Baseline Stigma	.00 (.00)		
Interaction	.00 (.00)	.006	
			.045
	Outcome: Percent Change in Physical Activity Log Completion		
Predictor	Coefficient (SE)	Interaction Δ R^2	Model R^2
Intercept	.13 (.17)		
Age	.00 (.00)		
Baseline BMI	-.00 (.00)		
Surgery Status	-.04 (.17)		
Baseline Stigma	.00 (.00)		
Interaction	.00 (.00)	.001	
Model R^2			.019

Note: BMI= body mass index; *p< 0.05, **p < 0.01, ***p< 0.001.

Table 22. Adherence as a mediator of the effect of baseline stigma on quality of life at program completion.

	Model 1		Model 2	
Outcome	Percent Attendance		MCS at Program Completion	
Predictor	Coefficient (SE)	p-value	Coefficient (SE)	p-value
Intercept	.59 (.17)	<.001	21.13 (10.36)	.046
Baseline Stigma	.00 (.00)	.278	-.18 (.10)	.069
Baseline MCS	.00 (.00)	.085	.39 (.13)	.004
Percent Attendance			21.12 (7.55)	.007
Model R^2	.054	.220	.420	<.001
	Model 1		Model 2	
Outcome	Percent Attendance		PCS at Program Completion	
Predictor	Coefficient (SE)	p-value	Coefficient (SE)	p-value
Intercept	1.03 (.21)	<.001	32.16 (10.39)	.003
Baseline Stigma	-.00 (.00)	.922	-.15 (.07)	.030
Baseline PCS	-.00 (.00)	.486	.63 (.11)	<.001
Age	-.00 (.00)	.407	-.22 (.09)	.022
Percent Attendance			2.98 (5.59)	.597
Model R^2	.017	.812	.601	<.001
	Model 1		Model 2	
Outcome	Percent Attendance		IWQOL at Program Completion	
Predictor	Coefficient (SE)	p-value	Coefficient (SE)	p-value
Intercept	.83 (.07)	<.001	11.40 (13.20)	.392
Baseline Stigma	.00 (.00)	.624	.27 (.20)	.180
Baseline IWQOL	.00 (.00)	.941	.74 (.10)	<.001
Gender	-.05 (.04)	.171	-.89 (4.04)	.827
Percent Attendance			-11.93 (13.42)	.378
Model R^2	.057	.332	.771	<.001

Continued

Table 22 continued

	Model 1		Model 2	
Outcome	Percent Dietary Log Completion		MCS at Program Completion	
Predictor	Coefficient (SE)	p-value	Coefficient (SE)	p-value
Intercept	.44 (.34)	.201	31.17 (10.18)	.003
Baseline Stigma	-.00 (.00)	.698	-.13 (.10)	.201
Baseline MCS	.00 (.00)	.598	.46 (.13)	.001
Percent Dietary Log Completion			5.27 (4.01)	.195
Model R^2	.017	.633	.356	<.001
	Model 1		Model 2	
Outcome	Percent Dietary Log Completion		PCS at Program Completion	
Predictor	Coefficient (SE)	p-value	Coefficient (SE)	p-value
Intercept	.45 (.42)	.293	32.44 (8.48)	<.001
Baseline Stigma	-.00 (.00)	.578	-.14 (.07)	.038
Baseline PCS	.00 (.01)	.691	.62 (.11)	<.001
Age	.00 (.00)	.827	-.23 (.09)	.014
Percent Dietary Log Completion			6.01 (2.75)	.034
Model R^2	.015	.849	.632	<.001
	Model 1		Model 2	
Outcome	Percent Dietary Log Completion		IWQOL at Program Completion	
Predictor	Coefficient (SE)	p-value	Coefficient (SE)	p-value
Intercept	.52 (.17)	.004	7.43 (7.39)	.319
Baseline Stigma	-.00 (.00)	.930	.26 (.20)	.196
Baseline IWQOL	-.00 (.00)	.972	.74 (.10)	<.001
Gender	-.02 (.10)	.868	-.40 (3.89)	.918
Percent Dietary Log Completion			-11.65 (5.33)	.033
Model R^2	.001	.997	.787	<.001

Continued

Table 22 continued

	Model 1		Model 2	
Outcome	Percent Physical Activity Log Completion		MCS at Program Completion	
Predictor	Coefficient (SE)	p-value	Coefficient (SE)	p-value
Intercept	.26 (.22)	.244	31.67 (10.19)	.003
Baseline Stigma	-.00 (.00)	.925	-.14 (.10)	.184
Baseline MCS	-.00 (.00)	.902	.48 (.13)	.001
Percent Physical Activity Log Completion			7.11 (6.30)	.264
Model R^2	.000	.992	.351	<.001
	Model 1		Model 2	
Outcome	Percent Physical Activity Log Completion		PCS at Program Completion	
Predictor	Coefficient (SE)	p-value	Coefficient (SE)	p-value
Intercept	-.07 (.26)	.792	35.76 (8.43)	<.001
Baseline Stigma	.00 (.00)	.511	-.16 (.07)	.016
Baseline PCS	.01 (.00)	.108	.58 (.11)	<.001
Age	.00 (.00)	.883	-.22 (.09)	.015
Percent Physical Activity Log Completion			9.23 (4.44)	.042
Model R^2	.503	.430	.629	<.001
	Model 1		Model 2	
Outcome	Percent Physical Activity Log Completion		IWQOL at Program Completion	
Predictor	Coefficient (SE)	p-value	Coefficient (SE)	p-value
Intercept	.14 (.11)	.220	4.06 (6.91)	.559
Baseline Stigma	.00 (.00)	.149	.35 (.20)	.083
Baseline IWQOL	-.00 (.00)	.289	.70 (.10)	<.001
Gender	.03 (.06)	.644	.35 (3.87)	.929
Percent Physical Activity Log Completion			-19.07 (8.08)	.022
Model R^2	.038	.529	.789	<.001

Note: MCS= mental component summary; PCS= physical component summary; IWQOL= impact of weight on quality of life.

Table 23. Bariatric status as a moderator of the relationship of baseline stigma with adherence.

	Outcome: Percent Attendance		
Predictor	Coefficient (SE)	Interaction Δ R^2	Model R^2
Intercept	.49 (.17)**		
Baseline MCS	.00 (.00)*		
Surgery Status	-.07 (.16)		
Baseline Stigma	.00 (.00)		
Interaction	.00 (.00)	.002	
			.066
	Outcome: Percent Attendance		
Predictor	Coefficient (SE)	Interaction Δ R^2	Model R^2
Intercept	.90 (.23)***		
Baseline PCS	-.00 (.00)		
Age	-.00 (.00)		
Surgery Status	-.03 (.17)		
Baseline Stigma	.00 (.00)		
Interaction	.00 (.00)	.000	
			.009
	Outcome: Percent Attendance		
Predictor	Coefficient (SE)	Interaction Δ R^2	Model R^2
Intercept	.76 (.10)***		
Baseline IWQOL	.00 (.00)		
Gender	-.01 (.05)		
Surgery Status	-.13 (.15)		
Baseline Stigma	-.00 (.00)		
Interaction	.00 (.00)	.013	
			.050
	Outcome: Percent Dietary Log Completion		
Predictor	Coefficient (SE)	Interaction Δ R^2	Model R^2
Intercept	.358 (.30)		
Baseline MCS	.00 (.00)		
Surgery Status	-.14 (.29)		
Baseline Stigma	-.00 (.00)		
Interaction	.00 (.01)	.003	
			.008

Continued

Table 23 continued

	Outcome: Percent Dietary Log Completion		
Predictor	Coefficient (SE)	Interaction Δ R^2	Model R^2
Intercept	.09 (.39)		
Baseline PCS	.00 (.00)		
Age	.00 (.00)		
Surgery Status	-.05 (.29)		
Baseline Stigma	-.00 (.00)		
Interaction	.00 (.01)	.001	
			.026
	Outcome: Percent Dietary Log Completion		
Predictor	Coefficient (SE)	Interaction Δ R^2	Model R^2
Intercept	.41 (.19)*		
Baseline IWQOL	-.00 (.00)		
Gender	.01 (.09)		
Surgery Status	-.15 (.28)		
Baseline Stigma	.00 (.00)		
Interaction	.00 (.01)	.004	
			.009
	Outcome: Percent Physical Activity Log Completion		
Predictor	Coefficient (SE)	Interaction Δ R^2	Model R^2
Intercept	.19 (.19)		
Baseline MCS	-.00 (.00)		
Surgery Status	.00 (.18)		
Baseline Stigma	.00 (.00)		
Interaction	-.00 (.00)	.000	
			.001
	Outcome: Percent Physical Activity Log Completion		
Predictor	Coefficient (SE)	Interaction Δ R^2	Model R^2
Intercept	-.15 (.55)		
Baseline PCS	.00 (.00)		
Age	.00 (.00)		
Surgery Status	.07 (.18)		
Baseline Stigma	.00 (.00)		
Interaction	-.00 (.00)	.002	
			.035

Continued

Table 23 continued

	Outcome: Percent Physical Activity Log Completion		
Predictor	Coefficient (SE)	Interaction Δ R^2	Model R^2
Intercept	.15 (.12)		
Baseline IWQOL	-.00 (.06)		
Gender	.01 (.00)		
Surgery Status	-.02 (.18)		
Baseline Stigma	.00 (.00)		
Interaction	.00 (.00)	.000	
			.019

Note: MCS= mental component summary; PCS= physical component summary; IWQOL= impact of weight on quality of life; *p< 0.05, **p < 0.01, ***p< 0.001.

Table 24. Change in depression and change in anxiety as mediators of the effect of baseline stigma on mental quality of life at program completion.

	Model 1		Model 2		Model 3	
Outcome	Change in Depression		Change in Anxiety		MCS at Program Completion	
Predictor	Coefficient (SE)	p-value	Coefficient (SE)	p-value	Coefficient (SE)	p-value
Intercept	-2.11 (3.34)	.529	1.69 (3.40)	.621	53.50 (9.02)	<.001
Baseline Stigma	-.07 (.03)	.278	-.91 (.03)	.011	.06 (.10)	.547
Baseline MCS	.07 (.05)	.085	.00 (.05)	.927	.13 (.13)	.328
Baseline Depression	.40 (.18)	.027	.08 (.18)	.676	-.41 (.50)	.417
Baseline Anxiety	.10 (.15)	.523	.34 (.15)	.031	-1.68 (.42)	<.001
Change in Depression					1.06 (.41)	.012
Change in Anxiety					1.39 (.40)	.001
Model R^2	.139	.084	.159	.050	.642	<.001