Overweight, Obesity, and Mental Illnesses: Weight Loss Treatment

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OVERWEIGHT, OBESITY, AND MENTAL ILLNESSES: WEIGHT-LOSS TREATMENT

By Michelle Huang
Submitted in Partial Fulfillment of the Requirements of the Degree of Doctor of Psychology
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PHILADELPHIA COLLEGE OF OSTEOPATHIC MEDICINE
DEPARTMENT OF PSYCHOLOGY

Dissertation Approval

This is to certify that the thesis presented to us by Michelle Ann Huang on the 5th day of June, 2012, in partial fulfillment of the requirements for the degree of Doctor of Psychology, has been examined and is acceptable in both scholarship and literary quality.

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Abstract

For the past 30 years, overweight and obesity has increased at alarming rates in the general population. This public health crisis has affected persons with mental illnesses as it has those in the general population. Little is known about how individuals with psychiatric problems respond to weight-loss treatment compared to the general population. The current study examines the efficacy of a cognitive-behavioral group weight-loss intervention with such individuals. The study also examines self-esteem, motivation, and the involvement of a support person in treatment as predictor variables. The treatment was shown to be effective regardless of depression severity. However, while all participants with a support person completed the intervention, those without support were more likely to drop out. Participants also reported improvements in self-esteem after treatment completion.

Keywords: overweight, obesity, weight-loss, mental illness, depression, self-esteem
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**Introduction**

Overweight and mental illnesses often co-occur. Overweight among individuals with psychiatric diagnoses is a serious health problem that negatively affects quality of life. However, little is known about the effectiveness of weight-loss treatments among such individuals. Therefore, more research is needed.

The present study addresses the question of whether or not a weight-loss intervention will be effective for a population of individuals having mental health diagnoses. The individuals in the present study live in rural Pennsylvania and are consumers at Adams/Hanover Counseling Services, LLC, a local community mental health agency.

**Statement of the Problem**

During the past 20 years there has been a significant increase in overweight and obesity (the acronym “OaO” will be used for the purposes of the present study) worldwide and in the United States, particularly (Ogden & Carroll, 2010; World Health Organization, WHO, 2011). In the United States, 34.2 percent of adults are overweight; an additional 33.8 percent are obese, and another 5.7 percent of adults are extremely obese (Ogden & Carroll, 2010). These numbers are particularly concerning given the negative impact of OaO both on society and on the individual. The national weight problem places a financial burden on society as a whole; however, individuals often experience social stigma and psychological suffering related to OaO.

Nationally, healthcare costs have increased dramatically due to weight-associated morbidity (CDC, 2010). Because of the health problems associated with heavier weight, OaO impacts the healthcare system economically (CDC, 2010). According to a study of
national medical expenditures in 2000, $117 billion were associated with the treatment of comorbidities linked to obesity alone (CDC, 2010). Most of this cost was due to the treatment of heart disease, high blood pressure, and diabetes; these figures have increased yearly as the numbers of OaO continue to climb (CDC, 2010; CDC, 2011).

The rates of OaO among individuals with mental illnesses (the acronym “IMI” will be used for the purposes of the present study) are also increasing (Coodin, 2001; McGinty & Daumit, 2011). Similarly, the prevalence of increased, unhealthy weight among IMI is associated with numerous physical, psychological and social problems (Coodin, 2001; McGinty & Daumit, 2011). However, the impact of OaO on psychological well-being among IMI is unclear (McGinty & Daumit, 2011; Tse et al., 2011).

Despite this significant national health problem, there are not many studies regarding weight-loss interventions for IMI. Furthermore, it is unknown if weight-loss treatments are as effective for this population. For instance, prior research has examined cognitive-behavioral interventions for weight loss in the general population but there is limited research addressing whether or not such interventions are comparably effective among IMI (Tse et al., 2011). This study attempts to answer the following questions: What is the impact of cognitive-behavioral weight-loss treatment in a population of IMI? That is, does weight-loss treatment help IMI lose weight? Do other factors (e.g. levels of self-esteem, severity of depressive symptoms, levels of motivation, having a support person) alter weight loss in this population?
**Purpose of the Study**

People with mental illnesses are often overweight or obese. The reasons for this problem are complex and poorly understood. The purpose of the present study is to learn if a cognitive-behavioral weight-loss intervention is effective for persons diagnosed with mental illnesses. The present study will further examine whether or not other factors such as low self-esteem, social support, and motivation to change will predict outcomes of weight-loss treatment with persons diagnosed with mental health disorders.

Research regarding mental illnesses and weight loss efficacy is in its beginning stages. Specifically, few studies address whether or not cognitive-behavioral therapy for weight loss is helpful for people diagnosed with mental illnesses. Overweight and obesity are associated with decreased self-esteem, higher instances of chronic diseases, increased mortality, and negative social stigma. A diagnosis of a mental illness increases the risk of poverty, numerous health problems, and stigmatization. In particular, effectiveness of weight-loss treatment in such individuals is unknown and warrants further study.

The purpose of the study is to examine if treatment for weight loss is effective among persons with mental health diagnoses. Measures of weight, depression, self-esteem, social support, and motivation levels will be taken before and after treatment. Such measures will provide information about the associations between these factors and weight-loss. Demographic variables, physical health status, and mental health diagnoses will provide further information about weight-loss treatments for this group of individuals. Therefore, the current study examines not only associations between depression, self-esteem, support, and motivation, but also how such factors relate to
weight-loss treatment effectiveness among a group of individuals having mental health diagnoses.
OVERWEIGHT OBESITY AND MENTAL ILLNESSES

**Literature Review**

The definition of overweight is excess adipose accumulation that may engender significant health consequences (Albrecht & Pories, 1999; Valdez, Gregg, & Williamson, 2002; Valdez & Williamson, 2002; WHO, 1998). The U. S. Department of Health and Human Services, National Institutes of Health, National Heart, Lung, and Blood Institute Obesity Educational Initiative Expert Panel (NHLBI, 1998) report body mass index (BMI) is most widely used to classify overweight and obesity in populations and individuals because it is the same for both sexes and for all ages of adults.

The terms “overweight” and “obese” reflect a continuum on which weight/BMI increases parallel increased health risks (NHLBI, 1998; Valdez et al., 2002). The definition of BMI is the weight in kilograms divided by the square of the height in meters (Aronne, 2002; NHLBI, 1998). When measures of weight are in pounds and height in inches, multiply the quotient by 703 to convert BMI into kilograms per meter squared (Aronne, 2002; NHLBI, 1998). BMI significantly correlates with body fat percentage (Keys, Fidanza, Karvonen, Kimura, & Taylor, 1972) and is the measure commonly used for research purposes (Valdez & Williamson, 2002). However, because weight is a variable in the calculation of the BMI ratio, it is both necessary and helpful to measure weight change when assessing treatment outcomes (Valdez et al., 2002).

The determinants of unhealthy in terms of such measures has been a topic of much debate; however, the U. S. Department of Health and Human Services, National Heart, Lung, and Blood Institute recommends a BMI of greater than or equal to 25 be considered “overweight” and a BMI of greater than or equal to 30 be considered “obese” (NHLBI, 2000). The council also recommends that waist circumference be determined in
order to ascertain an estimate of body fat distribution (NHLBI, 2000). Women with a waist circumference of greater than or equal to 35 inches have upper body obesity and men with a waist circumference of greater than or equal to 40 inches have upper body obesity (Aronne, 2002; Björntorp, 2002; NHLBI, 2000). However, these figures are only estimates, because individuals with varied backgrounds or from different cultures have variable degrees of adiposity (Arrone, 2002; Kumanyika, 2002). For example, BMI may overestimate health risks for muscular individuals, yet underestimate health risks for people over the age of 70 years (Andres, 2002; Aronne, 2002). For the purposes of the present study, BMI will be calculated (NHLBI, 2000) to determine sample characteristics. However, weight in pounds will be the dependent variable used to measure the effect of treatment.

**Obesity Epidemic**

Over the past 20 years there has been a staggering increase in the prevalence of obesity (Aronne, 2002; WHO, 2011). In 2008, 1.5 billion adults aged 20 years and older were overweight, with 200 million men and 300 million women meeting the criteria for obesity worldwide (WHO, 2011). More than 65 percent of adults in the United States are overweight or obese with prevalence rates between women and men being 1.5 to 1 (Hedley et al., 2004). The World Health Organization (WHO, 2011), state that “worldwide obesity has more than doubled since 1980”. These alarming numbers, increased morbidity (Allison, Fontaine, Manson, Stevens, & VanItallie, 1999; Hogue et al., 2009), emotional suffering (Fontaine, Bartlett, & Barofsky, 2000), and financial burdens on healthcare systems (Hogue et al., 2009) lead experts to classify obesity as one
of ten major health concerns in the United States at the beginning of the 21st century (Healthy People 2010, 2000).

Statistics reflecting the scope of the problem are particularly concerning. In 2005, the World Health Organization reported that approximately 1.6 billion people over the age of 15 years were overweight and at least 400 million people were obese (Deurenberg & Yap, 1999; Devlin, 2007). The World Health Organization further projected that by the year 2015, approximately 2.3 billion adults will be overweight and another 700 million will be obese.

Obesity has been on the rise among children and adolescents in most developed countries for the past two decades (Hedley et al., 2004; Viner & Cole, 2005). Globally, at least 43 million children age five years and younger are overweight (WHO, 2011). Such worldwide numbers suggest that obesity is a problem encompassing multiple generations. Because weight issues earlier in life increase susceptibility to psychosocial problems and biological illnesses in adulthood, it is imperative to address such problems early in the lifespan (Davison & Birch, 2001; Hasnain et al., 2008). Otherwise, an intergenerational cycle of preventable disease will be perpetuated.

Because of such concerns, “the obesity epidemic” has become ubiquitous as a term (Bjornthorp, 1999; Brownell & Stunkard, 2002; Finkelstein, Ruhm, & Kosa, 2005; James, 2002; Stanton, 2006). However, one author refers to the current state of affairs as the “obesity pandemic” because of the worldwide nature of this problem (Bjornthorp, 1999). The obesity problem has become so severe that some (Magnusson, 2007) suggest that the World Health Organization adopt legal standards for unhealthy foods similar to those regulating tobacco. Accordingly, the World Health Organization has named
obesity as one of the top five risk factors related to mortality in the world (Pelleymounter, 2004; WHO, 2011).

**Prevalence of Overweight and Obesity**

In the United States, the National Health and Nutrition Examination Survey (NHANES), since 1960, has been identifying trends in OaO by collecting measures of weight and height (Ogden & Carroll, 2010). Between the years of 1988 and 1994, obesity in adults had increased 8 percent since the period between the years of 1976 and 1980 (Ogden & Carroll, 2010). These figures were after a period of relative consistency regarding OaO numbers between the years of 1960 and 1980 (Ogden & Carroll, 2010). Measures between the years of 1999 and 2000 suggest another increase in obesity rates with all age groups and both sexes equally affected (Flegal, Carroll, Ogden, & Curtain, 2010; Ogden & Carroll, 2010). Comparisons between the years 2003 to 2004 and 2005 to 2006 showed no significant changes in the population’s weight (Flegal et al., 2010; National Institute of Health Obesity Research Task Force, 2004; Onyike, Crum, Lee, Lyketsos, & Eaton, 2003). However, these figures were limited because there were fewer Caucasian participants and an overrepresentation of Mexican-American participants reflected in the data set (Flegal et al., 2010). Thus, comparisons between these figures and previous data sets are difficult to make due to the inherent statistical challenges presented by sampling error.

The U. S. Department of Health and Human Services, Healthy People 2010 initiative postulated that each state would decrease population rates of obesity to 15 percent (CDC, 2000). According to the Centers for Disease Control and Prevention and data from the Behavioral Risk Factor Surveillance System (BRFSS), no state in the
United States reached this goal (CDC, 2010). Unfortunately, 30 states reported figures of more than 25 percent of the population as being obese (CDC, 2010). This is the second such attempt at reducing the nation’s obesity rate since the Healthy People 2000 initiative, which also failed (CDC, 2010; CDC, 2011).

The CDC (2010) reported prevalence by state ranging from 18.7 percent to 32.0 percent with higher rates reported in the Midwest (26.5%) and Southern states (27.3%). Although rates were lower in the West (23.1%) and Northeastern states (24.4%), these figures are still much higher than the 15 percent goal set by the Healthy People 2010 initiative (CDC, 2010; CDC 2011). In fact, current data indicate that the situation is worsening rather than improving (CDC, 2010; CDC, 2011). Likewise, the current president of the American Psychological Association has recently made the obesity problem a presidential initiative, stressing the need for psychology to address the “most serious health challenge facing our nation” (Johnson, 2012).

The national weight problem is evident in the Greater Hanover area (CDC, 2011; Professional Research Consultants, Inc., PRC, 2001). This population consists of Adams County and York County in Pennsylvania and Carroll County in Maryland (PRC, 2001). In 2000, Adams/Hanover Counseling Services, LLC (AHCS), contracted with a firm to conduct a community health assessment of the Greater Hanover area. AHCS is a community mental health agency that provides a continuum of mental health services and offers preventive health services, as well. The community health assessment found that the prevalence of local adults who were overweight (including those with obesity) was an average of 62.2 percent, ranging from 58.6 percent in York County to 65.8 percent in Adams County (PRC, 2001.). These rates are comparable with those found across the
U.S. (Ogden & Carroll, 2010; PRC, 2001). However, the rates of OaO in Adams and York counties were higher than the statewide rate of 58 percent in Pennsylvania (PRC, 2001). The 58 percent rate if OaO found in Carroll County was equivalent to the Maryland statewide average (PRC, 2001). These findings resulted in a decision by the agency to offer weight-loss group interventions to the local population over the course of several years. The present study analyzes data gathered from a weight-loss intervention with individuals diagnosed with mental illnesses. However, the prevalence of overweight has continued to climb in rural Pennsylvania during the past decade.

More recently, the statewide rate of OaO in Pennsylvania and Maryland has climbed to 64.7 percent and 64.1 percent, respectively (CDC, 2011). The United States prevalence of OaO has increased to 68.5 percent of adults, nationally (CDC, 2011). With the trend showing yearly increases in the prevalence rates of OaO, the gravity of this public health crisis is evident (Finkelstein et al., 2005; Foster & Wadden, 2002; Friedman & Brownell, 2002; Pelleymounter, 2004; Wolf, 2002). Although the reasons for this trend are unclear, the problem remains, and the population continues to get heavier and sicker each year.

**Obesogenic Culture**

At one time, obesity was a problem only in high-income countries (Finkelstein et al., 2005). However, the numbers of people overweight and obese are rising in second and third world countries, as well (Deurenberg & Yap, 1999; Wadden, Brownell, & Foster, 2002; WHO, 2011). It has been suggested that this is due to an increased availability of unhealthy foods and a decrease in activity levels, which in turn, decrease

Some attribute the “obesogenic culture” to capitalism and the associated prosperity created by such an economy (Brownell & Stunkard, 2002; CDC, 2010; Finkelstein et al., 2005; James, 2002; Stanton, 2006). The term reflects a society in which calorie-dense foods are readily available and in which a sedentary lifestyle is reinforced (Brownell & Stunkard, 2002; Finkelstein et al., 2005; James, 2002; Stanton, 2006). Unhealthy food being widely available at a decreased cost and healthy food options being more expensive and less readily available are often characteristic of such a culture (Brownell & Stunkard, 2002; Finkelstein et al., 2005; James, 2002; Stanton, 2006).

One argument for capitalism being the culprit for the current state of affairs is that OaO are more prevalent in countries moving from a low degree of industrialization to a high degree of industrialization rather than vice versa (Campfield & Smith, 1999). However, the reason for this increased prevalence remains unclear. Some have linked OaO to increased sugar intake and the introduction of cheaper, sweeter, high fructose corn syrup into the food supply (Lustig, 2012). Others attribute the link between industrialization and OaO to behavioral shaping and a decrease in fixed meal schedules (Campfield & Smith, 1999). For example, people are less likely to maintain a regular meal schedule if calorie-dense, unhealthy foods are constantly available. Thus, an “obesogenic society” rewards unhealthy diet choices. Furthermore, losing excess weight and maintaining weight loss is extremely difficult in such a culture (Brownell & Stunkard, 2002; Finkelstein et al., 2005; James, 2002; Stanton, 2006).
Although the present study targets a rural population, evidence suggests that people living in urban environments are at risk for developing obesity, as well (Hellerstein, 2006; Hellerstein et al., 2007; WHO, 2011). Researchers suggest that this may be due to crime and safety concerns (Bleich, Cutler, Murray, & Adams, 2008; Hellerstein et al., 2007). Because urban neighborhoods have more crime, residents have fewer opportunities for outdoor activity. Therefore, limited exercise creates an imbalance between caloric intake and energy expenditure. Subsequently, urban community members have a higher risk of becoming obese than their suburban counterparts (Bleich et al., 2008).

Crime rates and safety concerns are interesting to consider; however, factors related to poverty appear to be more salient to the weight problem. For instance, six-month old infants with medical assistance have higher obesity rates than infants without medical assistance (Kim, 2006). This finding suggests that poverty is a risk factor for obesity rather than individual laziness or lack of exercise opportunities.

Some suggest that women in the workplace play a role in the current state of affairs (Finkelstein et al., 2005). Because women have less time to prepare food, there is an increased reliance on unhealthy, quicker meal options (Finkelstein et al., 2005). Subsequently, the family meal is on the decline (Bacon, Stern, Van Loan & Keim, 2005). Although women having less time to cook nutritious meals may be contributing to the obesity problem, working females are not the cause of the obesity epidemic (Bacon et al., 2005). Such beliefs have helped to disenfranchise women throughout history and attributing the population’s weight gain to women working outside of the home may be another way of expressing a negative gender bias.
Weight problems are byproducts of physiological, environmental, and cultural factors (Finkelstein et al. 2005; Wang & Brownell, 2005). Rather than placing blame on certain segments of society or on specific individuals, viewing the obesity epidemic as a societal problem involving multiple components including biological, psychological, social, and economic factors is necessary when considering effective treatments (Finkelstein et al., 2005, Wang & Brownell, 2005).

**Health Consequences of Overweight/Obesity**

Obesity often has serious consequences regarding physical health (Brownell & Stunkard, 2002; Brownell & Wadden, 1992; Hach et al., 2007; Hach, Ruhl, Klotsche, Klose, & Jacobi, 2006; Manson et al., 1995; Pi-Sunyer, 1993). People with excess weight often complain of general physical problems including hyper-hydrosis, daytime fatigue, problems initiating and maintaining sleep, shortness of breath, and diffuse pain symptoms (Brownell & Stunkard, 2002; Brownell & Wadden, 1992; Hach et al., 2007; Hach, Ruhl, Klotsche, Klose, & Jacobi, 2006; Pi-Sunyer, 2002).

Some studies suggest that a BMI of 30 or more increases the risk of mortality by 30 percent (Hogue et al., 2009, Manson et al., 1995). This increased risk directly relates to obesity’s association with many chronic health problems (Doll, Petersen, & Stewart-Brown, 2000; Pi-Sunyer, 1993). For example, obesity are responsible for increased risks of diseases such as hypertension, high cholesterol, type 2 diabetes, coronary heart disease, stroke, gallbladder disease, osteoarthritis, chronic obstructive sleep apnea and other respiratory problems (CDC, 2010; Hach et al., 2006; McGinty & Daumit, 2011; Perese & Perese, 2003). Obesity also increases the risk for some cancers such as endometrial, breast, and colon cancer (CDC, 2010; Glade, 2007).
Because of the health risks associated with excess weight, people who are overweight or obese often place an increased burden on the economy and on the healthcare system (CDC, 2010). According to one study of national medical expenditures, $92.6 billion were associated with the treatment of co-morbidities linked to overweight or obesity in the United States (CDC, 2010).

**Gender, Ethnicity and Overweight/Obesity**

Women, more frequently than men, are likely to suffer from the health problems associated with overweight or obesity (Hedley et al., 2004). A summary of studies regarding diet and calorie-restriction found that 39 percent of women reported dieting in the past twelve months and 55 percent admit to calorie-restriction as a means of losing weight at some point during their lifetimes (Gallagher, Jakicic, Napolitano, & Marcus, 2006). However, research suggests that acceptance of one’s size and healthy behaviors at every weight level improved the health of overweight or obese women but dieting alone did not (Bacon et al., 2005). Among females, persistent obesity is also correlated with lower relationship satisfaction and less stable employment histories (Viner & Cole, 2005). Women with increased body weight suffer from higher mortality rates, as well (Bulik, Sullivan, & Kendler, 2002; Manson et al., 1995). Why women experience such disproportionate, negative consequences is unclear. Possible reasons include social stressors, economic disparities, and physiological variables.

There are disparities between ethnic groups of females and adult obesity prevalence in the United States (Ogden & Carroll, 2010). Results from the National Health and Nutrition Examination Survey (NHANES) show a significant difference between Caucasian, African-American, and Mexican-American women and the
likelihood of obesity but no such difference is found for men (Ogden & Carroll, 2010). Although 33.0 percent of white women met criteria for obesity, 45.1 percent of Mexican-American women and 49.6 percent of African-American women met criteria for obesity between 2007 and 2008 (Ogden & Carroll, 2010). The report also indicates that rates of overweight in men and women have remained stable over the past decade although there are still significant differences between and among ethnic groups.

Because of such complexities, the use of ethnicity in health research is a hotly debated topic. The fact that ethnic differences in health exist is recognized (BeLue et al., 2009; Hellerstein et al., 2007, Mendoza et al., 1991; Wang, Chen, Chung, Poon, Lew, & Tam, 2007). However, such ethnic differences blamed for causing poor health outcomes appear to be a valid concern. One review of health outcomes among Caucasian, African/Caribbean, and Indian/Pakistani adults in Great Britain found that ethnic groups report higher rates of obesity (Kelahar et al., 2003). However, it is important not to use such outcomes to blame ethnicity for increased rates of obesity in certain minority populations (Wang et al., 2007). This issue is especially salient for people living in the United States, considering the detrimental effects of obesity, negative weight-related attributional bias, and historical factors related to social justice and race relations in the country. However, ethnic and racial disparities regarding health status and healthcare remain and continue to be problematic worldwide (CDC, 2010; WHO, 1998).

**Weight-loss Treatments**

Treatments for weight problems vary. These include surgery (Albrecht & Pories, 1999; Bray, 1999b; Kalarchian, et al., 2007), medication (Bray, 1999a; Kotwal, Guerdjikova, McElroy & Keck, 2006; Wadden et al., 2005), behavior modification
(Foreyt & Goodrick, 1993; Loro, Levenkron & Fisher, 1979; Palmeira et al., 2007; Stotland & Zuroff, 1991; Wadden, Sarwer, & Berkowitz, 1999), diet (Astrup, 1999; Wadden, Foster & Letizia, 1994), and comprehensive lifestyle interventions (Bacon et al., 2005; Keranen et al., 2009; Orleans, 2000; Smedley & Syme, 2000) to name a few. Medical interventions (such as surgery and medication therapy) target satiety and the regulation of leptin and other hormones related to hunger (Glade 2007, Gowers & Bryant-Waugh, 2004). However, such medical interventions have been “tarnished by a number of disasters” (Bray, 1999b). Researchers argue that drug interventions are helpful even if weight-regain occurs when the drugs are stopped (Bray, 1999a). The rationale seems to be that any weight loss, even if the loss is temporary, is healthier than maintaining a stable overweight or obese weight status over time.

**Surgical interventions.** Surgery is the only “durable” treatment available for people with severe obesity (Albrecht & Pories, 1999). Severe obesity is a BMI of 40 or when weight “poses major health risk” to the individual (Albrecht & Pories, 1999; Bray, 1999b; Kalarchian et al., 2007). Researchers advocate a thorough evaluation of the patient and suggest that personality or addiction disorders, “depression (or) inadequate intelligence” may mitigate positive outcomes associated with surgery (Albrecht & Pories, 1999; Bray, 1999b). However, it remains unclear how mental illnesses or intellectual deficits might alter surgery outcomes. Therefore, more research regarding surgery with persons suffering from mental illnesses or intellectual disabilities is needed (Bhaumik et al., 2008).

**Dietary restriction.** Astrup (1999) discusses the value of dieting in weight loss. However, diets are not the same regarding the range of calorie allowance. Starvation
diets of fewer than 200 kilocalories are associated with negative health consequences (Wadden & Berkowitz, 2002; Wadden et al., 1994). Low-calorie (LCD) and Very-low-calorie diets (VLCD) set the daily caloric limit to be between 800-1000 and 600-800 calories, respectively (Wadden & Berkowitz, 2002; Wadden et al., 1994; Wadden, Stunkard, Brownell, & Day, 1984). Unfortunately, such restrictive diets are not sustainable. Because the idea of nutritional balance and other skills necessary for achieving optimal health are overlooked, weight-regain is typical after the diet is discontinued (Astrup, 1999; Heber, 2002; Wadden & Berkowitz, 2002; Wadden et al., 1994; Wadden et al., 1984).

Health providers seldom recommend such restrictive diets (Astrup, 1999). There are risks related to nutritional deficiencies (Wadden & Berkowitz, 2002). There are often negative psychological consequences, such as depression and anxiety associated with severe dietary restrictions (Astrup, 1999; Wadden & Berkowitz, 2002; Wadden et al., 1994; Wadden et al., 1984). However, most experts agree that limiting caloric intake is important to initiate and maintain weight loss (Brownell, 1999; Carels, Young et al., 2008; Dwyer & Melanson, 2002; Elfhag & Rossner, 2005; NHLBI, 2000; Stanton, 2006).

The goal of healthy dieting for weight loss is to achieve a calculated energy deficit (Dwyer & Melanson, 2002; Stotland & Zuroff, 1991; Wadden et al., 1984). In other words, daily caloric intake should be less than the number of calories expended each day. A balanced, moderate diet plan for males is 1800 kcal/day (Wadden & Berkowitz, 2002). Females generally require and expend less energy than males. Therefore, most women require between 1000-1200 kcal/day to achieve weight loss (Wadden & Berkowitz, 2002). Evidence suggests that most individuals underestimate
the number of calories consumed daily and eat about 400 calories more when instructed to limit their intake to 1200 calories per day (Wadden & Berkowitz, 2002). Portion control seems to be the reason why many commercially available diet plans work because they provide an easy way for individuals to estimate caloric intake accurately (Heber, 2002; Womble & Wadden, 2002).

**Lifestyle interventions and cognitive-behavioral therapy.** One study suggests that simply giving advice regarding the need to lose weight and discussing the positive health effects associated with weight loss made people three times more likely to try to lose weight (Galuska, Will, Serdula & Ford, 1999). Although discussing weight may be difficult for some health care providers, it is necessary for comprehensive healthcare (Devlin, Yanovski & Wilson, 2000) and often very minimal interventions regarding nutrition and exercise education are effective (Black & Threefall, 1986).

Self-help approaches have been found to be helpful in some populations (Butryn, Phelan, & Wing, 2002; Carels, Konrad, et al., 2008; Carels et al., 2009; Carels, Young, et al., 2009; Womble & Wadden, 2002). Other authors discuss diet and exercise as a part of an encompassing lifestyle change (Astrup, 1999; Brownell, 1999; Keranen et al., 2009; Loro et al., 1979; NHLBI, 2000; Orleans, 2000). There appears to be a paradigm shift. The focus on weight-loss has decreased and increasing health behaviors as part of comprehensive lifestyle change is encouraged and recommended (Bacon et al., 2005; Orleans, 2000). The rationale is that engaging in healthy behaviors results in improved health, overall, with weight stabilization or weight loss being a natural consequence of healthier living.
Health behaviors are associated with multiple areas of one’s life. Lifestyle habits that may be of particular interest include hours of television watched per week, alcohol use, sleep duration, and cigarette smoking (Mozaffarian, Hao, Rimm, Willett, & Hu, 2011). Other areas that often require attention include nutrition, exercise, self-monitoring, one’s motivation to change, and problem-solving abilities. Positive and lasting change is possible when environmental and personal influences on such behaviors are identified (Blair & Holder, 2002; Palmeira et al., 2009; Wilson & Brownell, 2002).

Most people need help and support when changing such habits and health behaviors. Therefore, lifestyle interventions combining cognitive and behavior components are the most effective in addressing the needs of people with OaO (Bjorntorp, 1999; Butryn et al., 2002; Carels, Konrad, et al., 2008; Carels et al., 2009; Carels, Young, et al., 2009; Womble & Wadden, 2002). In fact, interventions using a bio-psycho-social approach have been shown to be successful by many researchers (Butryn et al., 2002; Carels, Konrad, et al., 2008; Carels et al., 2009; Carels, Young, et al., 2009; Womble & Wadden, 2002). However, there is still debate among researchers who criticize the use of psychotherapy as the primary treatment for obesity (Devlin et al., 2000).

**Maintenance of weight loss.** Although the efficacy of specific weight-loss treatments or combinations of treatments is vigorously debated among researchers, there is widespread agreement that weight maintenance after effective treatment is another troubling aspect of the problem (Astrup, 1999; Elder et al., 2007, Foreyt & Goodrick, 1993; Leibrand & Fichter, 2002). In fact, one recent treatment manual devotes much of the text to maintenance issues (Cooper, Fairburn, & Hawker, 2003). Regardless of which
treatment facilitates weight-loss, keeping the excess weight off and maintaining treatment goals appear to be challenges for most people faced with this pervasive health problem.

**Mental Health and Overweight/Obesity**

Erroneous assumptions about causation exist regarding OA and mental health problems. However, suggestions of causal associations between these problems are misleading because correlation does not denote causation (Jaffe, 2006). Obesity is associated with a low socioeconomic status and physical health problems (Colton & Mandersheid, 2006; Hach et al., 2007; Jones, et al., 2004; Kivimachi, Batty et al., 2009; Kivimachi, Lawler et al., 2009) but it does not cause serious mental health problems (Coodin, 2001).

That OA persons have more problems in professional and private aspects of life than average weight persons is another widely held, erroneous assumption (Frankenburg & Zarnini, 2006; Hebl & Xu, 2001; Kristeller & Hoerr, 1997). It is more likely that anti-fat bias, prejudicial attitudes, and stigmatization negatively affect the mental health and social functioning of persons struggling with OA. There is no evidence to suggest that overweight or obesity, per se, causes mental health disorders (Hach et al., 2006; Hach et al., 2007; Jaffe, 2006; Scott et al., 2008; Scott, McGee, Wells, & Oakley-Brown, 2008; Ulrich, Meyer, Rumpf, & Hapke, 2005).

**Stigma and Negative Attitudes**

OA people often experience negative judgment from others (Hebl & Xu, 2001; Kristeller & Hoerr, 1997). Research suggests that the professionals who provide treatment to OA individuals often hold pervasive negative attitudes and biases against
them (Hebl & Xu, 2001; Kristeller & Hoerr, 1997). As a result, individuals needing treatment may not access care.

People with obesity are less likely to marry and are more likely to suffer from poverty, as well as from negative social biases (Frankenburg & Zarnini, 2006). Psychosocial problems and negative treatment outcomes are associated with stigmatization, discrimination, and misplaced blame on the individual (Kristeller & Hoerr, 1997). OaO individuals are often perceived as lacking “important and valuable interpersonal qualities” (Wang & Brownell, 2005). Such beliefs support harmful stereotypes about OaO individuals. Wang and Brownell (2005) discuss how obesity is, in general, blamed on the individual and various societal aspects of the problem (i.e. an increasingly obesogenic culture) are ignored. Therefore, treatments focusing on diet alone are missing important environmental influences on treatment outcomes. Because societal, environmental, and biological factors are aspects of the weight problem, a bi-psycho-social conceptualization is necessary for optimal weight-loss treatment.

Negative attitudes and beliefs toward obese individuals reported among professionals involved in weight-loss treatment are especially problematic (Teachman & Brownell, 2001). Such professionals’ biases were implicit and held to a lesser degree than the explicit negative attitudes found in the general population. Nevertheless, views associating obesity with laziness and other negative stigmas were reported by weight-loss treatment professionals (Teachman & Brownell, 2001). These findings beg the question of how such pervasive negative attitudes, both in the general population and among health care providers, influence the mental health and well-being of individuals struggling with increased weight.
Mental Illnesses and Overweight/Obesity

Overweight or obesity and mental illnesses in the United States correlate (Allison et al., 2009; Carpenter, Hasin, Allison & Faith, 2000; Compton, Daumit & Druss, 2006; Desai, Rosenheck, Druss & Perlin, 2002; Dickerson, Brown, Daumit et al., 2006; Dickerson, Brown, Kreyenbuhl et al., 2006), but the nature and direction of the relationship is not well understood. For example, the association between obesity and mental health disorders strengthens as people age (Kivimachi et al., 2009). Possible reasons for this finding include chronic physical pain and decreased mobility because both tend to increase with age.

Obesity and mental illnesses correlated positively among a group of women in Germany. However, this finding was independent of socioeconomic status (Baumeister & Härter, 2007). This contrasts with findings in other countries where obesity and serious mental illnesses and socioeconomic status are linked (Allison et al., 2009; Atlantis et al., 2009). Perhaps these associations relate to the nature of health care in the United States. Do the high rates of OaO and instances of co-morbid mental illnesses in the United States reflect a culture where health care is not universal, preventative care is lacking, and where limited social programs are overburdened?

In a program in London, England, where healthcare coverage is universal, persons diagnosed with mental illnesses were able to maintain medication adherence and improve physical health problems such as OaO (Ohlsen, Peacock, & Smith, 2005). The program encouraged positive lifestyle choices and was a great success. As a result, the authors recommend a multi-factored approach to treating co-morbid OaO and mental illnesses
(Ohlsen et al., 2005). However, it is unclear whether or not this approach would be practical in countries with different types of healthcare service systems.

**Mental Illnesses, Overweight/Obesity, and Health Behaviors**

“Severe mental illness” includes some personality disorders, unipolar and bipolar depression, schizoaffective disorder, and schizophrenia (Perese & Perese, 2003). However, referring to mental health problems are “severe” by virtue of the diagnostic label may contribute to stigmatization, increased disparities in care, and decreased adherence to treatment. IMI suffer disproportionately when compared with the general population. For example, research suggests that IMI have a life expectancy of 10 to 15 years less than individuals in the general population (Atlantis et al., 2009; Coodin, 2001; Perese & Perese, 2003). IMI are at a five times greater risk of premature death than other individuals who have no such diagnoses (Harris & Barraclough, 1998). This suggests that persons living with psychiatric diagnoses require more intensive interventions aimed at increasing health behaviors regardless of the specific diagnostic label. There is value in differentiating between mental health disorders in research and considerable focus is on specific psychiatric diagnoses and associated problems; however, increasing health behaviors among IMI in general, and finding effective treatments for health problems commonly found among such individuals (i.e. overweight and obesity) should also be a priority (LeFevre, 2001).

**Psychotic disorders, weight, and health status.** The rate of mortality in people with schizophrenia is almost twice that of the general population (Coodin, 2001; Harris & Barraclough, 1998). People with schizophrenia are also more likely to smoke, drink alcohol, use street drugs, suffer from other illnesses that go untreated (Connelly & Kelly,
overweight obesity and mental illnesses

2005; Coodin, 2001), and belong to a low socio-economic class (Atlantis et al., 2009). However, it may be that socio-economic class precludes people with mental illnesses such as schizophrenia from engaging in health behaviors, such as preventive care, and from accessing treatment once they become ill (Connelly & Kelly, 2005; Miller, Paschell & Svendsen, 2006).

Decreases in quality of life and weight gain are associated with individuals diagnosed with schizophrenia (Allison, Mackell, & McDonnell, 2003). Weight gain among individuals treated with antipsychotic medications is a risk factor for discontinuing medication protocols (Weiden, Mackell, & McDonnell, 2004). For these reasons, weight gain among people with psychotic disorders is problematic. The literature clearly demonstrates that persons diagnosed with schizophrenia or other psychotic disorders suffer from more general health problems and have a shorter lifespan than those in the general population having no such diagnoses (Saha, Chant, & McGrath, 2007).

Mood disorders, weight, and health status. Many people diagnosed with bipolar disorders suffer from obesity (Kotwal et al., 2006). In a national study of individuals receiving care at the Veterans Administration, persons diagnosed with Bipolar Disorder were found to be less likely to engage in exercise and reported eating fewer than two daily meals (Kilbourne et al., 2007). The individuals included in the study were also more likely to report a weight gain of greater than 10 pounds in the previous six months and were less likely to discuss nutritional and weight concerns with health care providers than were other patients receiving care at the Veterans Administration (Kilbourne et al., 2007).
Obesity and depression often appear in women and are associated when the population is categorized into mild, moderate, and severe cases of obesity (Onyike et al., 2003). The association between obesity and depression is most robust among individuals belonging to the severely obese category (Onyike et al., 2003). Research suggests that almost half of women diagnosed with such mental illnesses are overweight and a third present with substance abuse problems, as well (Perese & Perese, 2003). Women with psychiatric disorders, such as bipolar and unipolar depression, are also more likely to have anemia, skin problems, dental problems, and visual impairments (Perese & Perese, 2003). Therefore, being female and having an increased, unhealthy weight status, having a psychiatric diagnosis, and having other health problems are related (Onyike et al., 2003; Perese & Perese, 2003).

However, the direction of such relationships and the degree of effect between variables are unknown. One problem is that different studies use a variety of operational definitions when defining mental illnesses such as depression (Onyike et al., 2003). For example, some studies identify depression as having symptoms in the previous month but others identify depression as having symptoms within the previous year (McEvoy et al., 2005). This makes comparisons between studies difficult. The Third National Health and Nutrition Examination Survey employed the more restrictive operational definition and found that depression is associated with weight-control and other health-related problems (McEvoy et al., 2005, Onyike et al., 2003). However, further questions about the relationship between physical health, mental health, general well-being, and quality of life among IMI remain unanswered.
A bi-directional relationship between increased weight and mental illnesses has been hypothesized (Atlantis et al., 2009; Mackin & Young, 2005; Mather, Cox, Enns, & Sareen, 2009). It is important to identify mediators and moderators of weight gain, such as social support and motivation, among those diagnosed with mental illnesses like schizophrenia and mood disorders (Kotwal et al., 2006). Because the interaction between weight and mental health is multifaceted and complicated and because of the gravity of the overweight/obesity epidemic, there is a general call for more research (Kotwal et al., 2006; McIntyre & Konarski, 2005). The statistics associated with mortality and morbidity rates among IMI warrants further research related to weight-loss interventions specifically.

The Metabolic Syndrome

The Metabolic Syndrome is an epidemic in the general population (Allison, Fontaine et al., 1999). However, some reports state that people with mental illnesses are two to three times more likely to suffer from the disease (Allison et al., 2009, Duffin, 2005). Studies are consistent in their findings that mental health problems and the Metabolic Syndrome are associated in clinical populations (Allison, Mentor et al., 1999; Goodwin et al., 2009). Perhaps treatment for psychiatric symptoms contributes to this problem.

Weight gain is a common side effect of medications prescribed for psychiatric illnesses (Allison, Mentore et al., 1999; Allison et al., 2009; Citrome, Blonde, & Damatarca, 2005; Coodin, 2001; Desai et al., 2002; Dickerson, Brown, Daumit et al., 2006; Dickerson, Brown, Kreyenbuhl et al., 2006). Therefore, the cluster of symptoms composing the metabolic syndrome has been measured, monitored, and debated for the past 20 years (Meyer et al., 2008).
Most recently, the International Diabetes Federation set forth a definition of the metabolic syndrome meant to standardize the diagnosis worldwide (Alberti, Zimmet, & Shaw, 2006). The goal of an operationalized definition of the metabolic syndrome is to decrease confusion in the research literature and to increase clinical utility (Alberti et al., 2008). However, it remains unclear if the new definition yields greater predictive power regarding the development of certain diseases such as cardiovascular disease and Diabetes Mellitus (Meyer et al., 2008).

There continues to be debate about the diagnostic utility of such a definition because the metabolic syndrome criteria lack one common, unifying, and underlying pathophysiological mechanism (Meyer et al., 2008). Nevertheless, abdominal obesity is a necessary criterion (along with two of four other conditions) for the metabolic syndrome diagnosis (Alberti et al., 2008; Meyer et al., 2008). The other four conditions are elevated fasting triglycerides, elevated fasting glucose levels, elevated blood pressure, and decreased high-density lipoprotein levels (Alberti et al., 2008; Meyer et al., 2008).

The formulation of the metabolic syndrome definition and the increased emphasis on abdominal adiposity is due in part to the published results of the Clinical Antipsychotic Trials of Intervention Effectiveness (CATIE) Schizophrenia Trial (McEvoy et al., 2005; Meyer et al., 2008). The CATIE Schizophrenia Trial found that certain antipsychotics prescribed to treat schizophrenia symptoms significantly increase metabolic risks for the individuals involved (McEvoy et al., 2005).

It has been suggested that mental illnesses, overweight and obesity and other physical diseases share a biological mechanism known as the hypothalamic–pituitary–adrenocortical (HPA) axis (Dickerson, Brown, Daumit et al., 2006; Dickerson, Brown,
Kreyenbuhl et al., 2006; Hach, et al., 2007; Smedley & Syme, 2000). However, some argue that these findings are due to selection bias because many of the research samples do not accurately reflect characteristics of those persons diagnosed with mental illnesses in the general population (Hach et al., 2007). In contrast, the sample used in the CATIE Schizophrenia Trial is an accurate reflection of such a population (i.e. people diagnosed with schizophrenia living in the United States) and treatment with antipsychotic medication was associated with serious metabolic risk and weight gain (McEvoy et al., 2005).

Evidence that some psychiatric medications are associated with potentially serious health consequences is mounting (Allison, Fontaine et al., 1999; Allison et al., 2009; Citrome et al., 2005; Coodin, 2001; Desai et al., 2002; Dickerson, Brown, Daumit et al., 2006; Dickerson, Brown, Kreyenbuhl et al., 2006; Usher, Foster, & Park, 2006; Verma, Liew, Subramaniam, & Lye, 2009).

Obesity appears to be associated with low socioeconomic status, some other health problems, and a reported decrease in quality of life (Fontaine, Cheskin, & Barofsky, 1996), but there is little evidence in support of a link between OaO and social or mental problems, per se (Grilo, White, & Masheb, 2009; Hach et al., 2007). It is more likely that people with mental illnesses often struggle with OaO due to medications commonly prescribed to treat psychiatric symptoms, poor lifestyle choices, poverty, institutional living conditions, and barriers to health resources in the community (Connelly & Kelly, 2005; Coodin, 2001). Because of the complicated relationship between physical health and the treatment of mental illnesses, such individuals require comprehensive health care services. Education about medication effects and healthier
lifestyle choices, assessment of barriers to engaging in health behaviors, monitoring of overall health status, identification of health risk factors, and appropriate treatment options for common health concerns such as OA is necessary (Connelly & Kelly, 2005; Ohlsen et al., 2005). Therefore, further studies regarding effective weight-loss treatments among such individuals are relevant and necessary.

**Mental Illnesses and Weight-loss Treatments**

One review of studies found no evidence to support pharmacological management of weight gain in patients receiving treatment with atypical antipsychotics (Werneke, Taylor, & Sanders, 2002). Other studies report similar findings (Faulkner, Soundy, & Lloyd, 2003). However, treatments involving behavioral and lifestyle interventions have been found to be effective in populations of persons diagnosed with mental illnesses (Faulkner et al., 2003). Similar to the general population, diet and exercise education along with behavioral modification appear to be the best options for weight loss and sustained weight control among individuals having OA and comorbid mental health problems (Faulkner et al., 2003). Therefore, it is important to address behavioral, environmental, and psychological factors when establishing a successful weight-loss treatment for such individuals.

**Mental Illnesses and Factors Related to Weight-loss**

Society and culture are environmental factors that clearly relate to weight-loss treatment (Dubbert, 2002; Finkelstein et al., 2005; Jean-Baptiste et al., 2007; Jerome et al., 2009; Tremblay, 1999). Environmental factors also relate to the effective treatment and management of mental illnesses (Kivimachi et al., 2009; Kotwal et al., 2006). People diagnosed with mental illnesses and presenting with problems related to increased weight
may benefit from treatments that consider and target such issues. Nutrition, exercise, and effects of medication therapy are other important factors to include in an effective weight-loss treatment protocol (Dubbert, 2002; Glade, 2007; Jerome et al., 2009; Tremblay, 1999). Medication adherence, self-esteem, social support, and motivation to make the changes necessary to achieve and maintain a healthy weight are individual variables that require consideration when implementing an effective weight-loss treatment for individuals diagnosed with mental illnesses (Citrome et al., 2005; Coodin, 2001; Desai et al., 2002; Galuska et al., 1999; Gorin et al., 2005).

**Nutrition.** Nutrition is widely recognized as a primary component of weight-loss treatment (Glade, 2007). Nutritional factors may be especially salient for persons with mental illnesses because healthier fresh food options tend to be less available, costlier and take more time to prepare than processed, unhealthy food options. As in the general population, nutritional education programs that supply food for individuals with psychiatric disorders are often successful (Jean-Baptiste et al., 2007). Therefore, education regarding nutrition and making healthy choices would be a beneficial component of a weight-loss program for such individuals. Also, addressing the availability of healthier food options and making fresh food more accessible, or at least providing education regarding the necessity and value of minimizing processed foods is another important component of successful weight-loss treatment for this group.

**Physical activity.** The importance of physical activity in weight management is evident (Dubbert, 2002; Jerome et al., 2009; Tremblay, 1999). Persons diagnosed with mental illnesses often report decreased motivation and may engage in less physical activity as a result (Kilbourne et al., 2007). Behavioral activation is the quickest way to
elevate mood (Foreyt & Goodrick, 1993). However, as cultures become more industrialized, the overweight and obesity rates in those cultures increase because individuals require less energy to survive (Finkelstein et al., 2005). Therefore, it makes sense to incorporate a physical activity component into a weight-loss program for individuals with psychiatric disorders. At the very minimum, education regarding the benefits of exercise and an individualized exercise plan must be part of a weight-loss intervention protocol for such persons (Brownell, 1995; Brownell, 2004; Wadden et al., 1999).

**Medications.** It is clear that certain medications prescribed to treat psychiatric disorders precipitate weight gain and the associated metabolic syndrome (Alvarez-Jimenez, Hetrick, Gonzalez-Blanch, Gleeson, & McGorry, 2008; Citrome et al., 2005; Desai et al., 2002; Jones & Carney, 2006; Keck & McElroy, 2004). Education regarding side effects associated with such medications is necessary in general, and would be another appropriate component of a weight-loss intervention for persons diagnosed with mental illnesses (Ball, Coons, & Buchanan, 2001; Vreeland et al., 2003).

**Self-esteem.** Although the presence or development of overweight or obesity with a co-morbid mental illness is a difficult problem to discuss, health care providers must address it. Treatment should target weight as well as the associated effects on self-esteem in cultures in which attitudes toward heavier individuals are often negative (Caldwell, Brownell, & Wilfly, 1997).

Discrimination against overweight and obese persons who also have serious and persistent mental illnesses often affects various aspects of life and can result in rejection and social isolation (Coodin, 2001). Negative stereotypes may have long-term
consequences such as decreases in self-esteem or self-worth (Teachman & Brownell, 2001). Therefore, effective weight-loss treatment for persons diagnosed with persistent mental illnesses would benefit participants by increasing self-esteem if perceptions of self-efficacy improve through successful weight-loss. Including measures to assess self-esteem is important in weight-loss treatment protocols, as well.

**Support.** Perceived social support is an important factor for success in the treatment of weight problems (Galuska et al., 1999; Gorin et al., 2005; Strine, Chapman, Balluz, & Mokdad, 2008) and in the treatment of mental illnesses (Hellerstein et al., 2007). However, a population with co-morbid weight problems and mental illnesses may have less support (Coodin, 2001) unless they have case-management or independent living resources. Because support is associated with adherence, monitoring this factor during weight-loss treatment for persons with mental illnesses is important (Brownell, 1995; Brownell, 1999, Brownell & Wadden, 1992; Wing & Jeffrey, 1999).

**Motivation to change.** Treatment achieves better outcomes when people have high motivation to change problem behaviors (Prochaska et al., 1994; Wadden, Butryn, & Byrne, 2004). Many treatments incorporate a readiness scale into the protocol to track participants’ degrees of readiness to change the behaviors associated with achieving healthy and successful outcomes (Acton, Prochaska, Kaplan, Small, & Hall, 2001). This degree of readiness to change is based upon the Processes of Change, a theory that has been studied extensively (Acton et al., 2001; Prochaska & DiClemente, 1983; Prochaska et al., 1994). The Processes of Change Inventory is a validated measure based upon the Processes of Change theory, which assesses the stage into which a person fits regarding his or her readiness and willingness to change (Prochaska et al., 1994). Unfortunately, no
validated weight-loss readiness scales based upon the Processes of Change model are in use currently (Fontaine, Cheskin, & Allison, 1997). Nevertheless, measurement of this variable is important because effective treatment and associated outcomes correlate with motivational factors and readiness for change (Acton et al., 2001; Prochaska & DiClemente, 1983; Prochaska et al., 1994). Therefore including such a measure in an effective weight-loss treatment protocol for IMI is important (Rogers et al., 2001).

The LEARN program for weight management. The LEARN program is a weight management program that teaches individuals essential skills that are necessary to maintain a healthy body weight (Brownell, 2004). The LEARN acronym is derived from the first letters of Lifestyle, Exercise, Attitudes, Relationships, and Nutrition (Brownell, 2004). Through LEARN, participants learn when, how, and why their habits occur and how to incorporate healthier habits into their lifestyles (Brownell, 2004). The program identifies, teaches, and monitors nutrition, physical activity, and readiness to lose weight (Brownell, 2004).

Self-help approaches to weight loss are successful in general (Black & Threfall, 1986; Butryn et al., 2007; Carels, Konrad et al., 2008; Carels et al., 2009; Carels, Young et al., 2008; Wadden et al., 2002). Group weight-loss interventions are effective in populations diagnosed with mental illnesses (Weber & Wyne, 2006; Wilfly et al., 1994). The LEARN program has been found to be an effective treatment for overweight and obesity (Black & Threfall, 1986; Butryn et al., 2007; Carels, Young et al., 2008; Carels et al., 2009; Gardner et al., 2007; Palmeira et al., 2009; Wadden et al., 2002). However, the program’s success has been primarily with Caucasian females and it has not been statistically validated (Brownell & Stunkard, 2002). Studies have not been done with
minority populations, so it is unclear if the LEARN program would be as effective with populations made up of individuals belonging to ethnic or cultural minority groups.

Although the LEARN program has not been studied in populations with psychotic disorders, it been used effectively with individuals having depression (Faulconbridge et al., 2009). Participants in this study were assigned to one of the following conditions: taking sibutramine alone, lifestyle modification alone, combined sibutramine and lifestyle modification, or sibutramine plus brief therapy. Participants taking medication alone lost the least weight and those participants in combined therapy lost the most weight (Faulconbridge et al., 2009). These results suggest that individuals having depression can successfully lose weight. However, further research regarding weight-loss interventions for such individuals is clearly needed (Faulconbridge et al., 2009).

**Summary and Contribution**

Research suggests that weight gain is a common problem in today’s culture. Reasons for this health crisis are unclear but the need for effective treatment is evident. Weight loss and increasing health behaviors among those in the general population is widely studied; however, less is known about how well other populations respond to available weight-loss interventions. The present study attempts to address this question.

The major aim of this study is to measure the effectiveness of a cognitive-behavioral weight-loss intervention among a group of individuals with psychiatric disorders. Individual levels of depression, self-esteem, and motivation will be measured to determine if these factors are predictive of treatment outcomes. Whether or not having support during the intervention is associated with participants’ experiencing increased weight-loss will be also be measured. Therefore, the present study will consider several
predictor variables in determining the efficacy of a weight-loss intervention among a population of persons with psychiatric diagnoses.
**Hypotheses**

This study is guided by the following question: Is weight-loss treatment effective for persons with mental illnesses? Participants were given measures before and after weight-loss treatment. When starting treatment, individuals with high self-esteem, minimal depression, and high motivation to lose weight are predicted to lose more weight, compared with individuals who have low self-esteem, high depression, and low motivation to lose weight. Individuals who have support during the weight-loss intervention are predicted to lose more weight than individuals without such support. After weight-loss treatment, it is hypothesized that individuals’ self-esteem will increase and depression will decrease.

**Hypothesis 1**

The first hypothesis examines the main effect of treatment on weight. Specifically, it is hypothesized that weight-loss treatment will be effective for overweight individuals with mental illnesses. Rationale: Previous research has established that weight-loss treatment is effective.

**Hypothesis 2**

The second hypothesis states that overweight individuals with support will lose more weight in the intervention, compared with overweight individuals without support. Rationale: Previous research has shown that support helps individuals to make changes in health behaviors (i.e. weight reduction).

**Hypothesis 3a**

It is hypothesized that overweight individuals’ self-esteem will improve during weight-loss treatment but self-esteem will remain stable among overweight individuals.
not in treatment. Rationale: Previous research has shown that heavier individuals suffer from social stigma that negatively affects self-esteem.

**Hypothesis 3b**

Furthermore, it is hypothesized that self-esteem will predict weight loss among individuals receiving weight-loss treatment. Rationale: Previous research shows self-esteem is associated with adherence.

**Hypothesis 3c**

It is also predicted that self-esteem improvements will be maintained after weight-loss treatment completion. Rationale: Previous research has shown that heavier individuals suffer from social stigma that negatively affects self-esteem.

**Hypothesis 4a**

It is hypothesized that overweight individuals’ depression will improve during weight-loss treatment but will remain stable among overweight individuals not in treatment. Rationale: Previous research suggests that behavioral activation mitigates depression.

**Hypothesis 4b**

Furthermore, it is hypothesized that depression will predict weight loss among individuals receiving weight-loss treatment. Rationale: Previous research has established depression as a poor predictor of adherence.

**Hypothesis 4c**

It is also hypothesized that improvements in depression after weight-loss treatment completion will be maintained. Rationale: Previous research has shown that depression responds to behavioral activation.
Hypothesis 5

It is predicted that overweight individuals with high motivation to lose weight will lose more weight during the weight-loss treatment intervention, compared with overweight individuals who have low motivation. Rationale: Previous research has shown motivation levels to be associated with success in changing health behaviors (i.e. weight reduction).
Method

Overview

The effectiveness of a weight-loss intervention with individuals diagnosed with psychiatric disorders is studied. Individuals who were assigned randomly either to the treatment or to the control condition completed self-esteem, motivation, and depression measures before and after treatment. Participants were invited to ask a support person to attend the didactic, healthy snack, and break portion of the intervention. Whether or not having support in treatment predicts weight-loss is an issue that will be studied. Measures of self-esteem, motivation, and depression are hypothesized to be predictors of weight loss. The effectiveness of the intervention is studied by measuring weight before and after treatment.

Design and Design Justification

The design of the present study is a secondary data analysis. The original data were collected during a randomized, wait-list control study with equivalent treatment offered to the wait-list group after six months. The wait-list control received treatment as usual during the six-month waiting period.

Participants of Parent Study

Seventy-one prospective participants were referred for inclusion in the parent study. Seventy of these referrals reported at least one mental health diagnosis as well as being overweight or obese. Fifteen of these referrals either did not respond to contacts from the investigator or declined participating in the study. All referrals were members of a rural community in Pennsylvania who spoke English. Of the 55 participants entering the parent study, most identified race as Caucasian with the exception of two who
identified as African-American. Participants’ ages ranged from 21 years to 67 years. Forty-five females and 10 males were included in the parent study. BMI measures indicated that 12 participants’ were overweight and 43 were obese with weights ranging from 166 to 377 pounds. Approximately half of the parent study participants reported taking antipsychotic medication. Fifty-five participants provided measures at the beginning of the parent study and 29 participants provided measures upon treatment completion. For the proposed study, archival data will be used from the parent study for the 29 participants completing this study as described here.

**Inclusion Criteria for the Parent Study**

Participants included in the parent study reported having a mental health diagnosis and being stable on psychiatric medications. Contact with each participant’s primary care physician verified this information. People diagnosed as having Major Depressive Disorder, Bipolar Disorder, Schizoaffective Disorder, or Schizophrenia and having a Body Mass Index (BMI) greater than or equal to 25 were eligible for inclusion in the parent study. Participants from Adams or York counties in Pennsylvania were eligible for inclusion. Participants included in the parent study agreed to engage in group therapy. All existing data generated from the parent study and supplied by Adams-Hanover Counseling Services will be included for the present study.

**Exclusion Criteria for the Parent Study**

In the parent study, individuals experiencing psychotic symptoms were excluded. People who chose to decline group treatment were excluded from the study, as well. Persons choosing not to participate or meeting criteria for exclusion from the parent study were provided with appropriate community referrals. In the present study, no exclusion
criteria are necessary, given that the proposed study will use all data from an archival data set collected during the parent study.

**Recruitment for the Parent Study**

One month prior to the start date of the intervention, investigators advertised the program in York and Adams counties in Pennsylvania by using flyers, local radio stations, the newspaper, and by word of mouth. Interested parties responded to these announcements. Intake calls were made by a licensed Psychologist to ensure that interested parties qualified for participation. Those parties who were qualified for inclusion were educated about the basic expectations and requirements for participating in the study. Participants were made aware that the study would require them to make lifestyle changes and that the intervention was offered free of charge.

For the present study, recruitment was not required because all data from an archival data set from the parent study will be used. All data were de-identified before analysis and could not be linked to the participant providing the data. Adams-Hanover Counseling Services, LLC supplied the de-identified data collected during the parent study for the present study.

**Informed Consent Process of the Parent Study**

For the parent study, informed consent procedures were used. First, the goal of the study was explained to participants. The parent study participants stated that they understood the goal and that the treatment outcomes of a cognitive-behavioral weight management program would be measured and analyzed. The parent study participants were also given forms, which stated that they had no obligation to complete the study and could quit the study at any time without explanation. The limits of confidentiality as
related to group treatment were discussed at length with the participants. Contact information for the Institutional Review Board and for the primary researcher was provided to participants and all were encouraged to make contact should they have any concerns. In addition, the parent study participants were made aware that their personal data would be de-identified and were assigned a case number. This was done to protect confidentiality. For the present study, no informed consent is needed because an archival data set from the parent study will be used.

**Measures**

**Weight Loss Readiness Test II.** The Weight Loss Readiness Test II is included in the LEARN Program. It has six categories assessing behaviors and attitudes associated with weight loss success. The categories include motivation to lose weight, expectations, confidence, hunger and eating cues, binge eating and purging, and emotional eating. It has not been statistically validated (personal communication, Brownell, 2011; Brownell & Stunkard, 2002). However, readiness to change and motivation, specifically, are related to successful treatment outcomes (Brownell & Stunkard, 2002; Prochaska & DiClemente, 1983; Prochaska et al., 1994). Therefore, the Motivation Scale of the Weight Loss Readiness Test II will be used in the present study.

**Beck Depression Inventory (BDI).** The Beck Depression Inventory (BDI) is a self-administered scale consisting of 21 items measuring the intensity, severity, and depth of depression in patients with a psychiatric diagnosis (Beck & Steer, 1993). The BDI has 21 items which offer four options for each item, ranging from zero-not present to three-severe (Beck & Steer, 1993). The ranges of depression severity and scores for interpretation have moderate specificity and good sensitivity (Beck & Steer, 1993). The
BDI takes five to ten minutes to complete and is self-administered (Beck & Steer, 1993). The BDI was developed in 1961 by Aaron T. Beck and is one of the most widely used instruments for measuring the severity of depression (Beck, Ward, Mendelson, Mock, & Erbaugh, 1961).

The BDI has been extensively tested for reliability. Coefficient alpha estimates of reliability for the BDI in outpatient and nonclinical samples are .92 and .93, respectively (Beck & Steer, 1993). Test-retest reliability for a one-week time period is reported to be .93 (Beck & Steer, 1993). The BDI has strong concurrent validity with thirty-five other measures of depression (Beck, Steer, & Carbin, 1988). The BDI has comparable levels of internal consistency and test-retest reliability, regardless of the population studied (Beck et al., 1988). Therefore, the BDI is valid and reliable, with results corresponding to clinician ratings of depression in more than 90 percent of all cases (Beck et al., 1988).

**Rosenberg Self-Esteem Scale.** The Rosenberg Self-Esteem Scale is among the most popular and well-utilized measures of global self-esteem (Rogers et al., 2001). Rosenberg defined self-esteem as an unfavorable or favorable attitude toward oneself (Rosenberg, 1965). Rosenberg’s scale was developed to measure adolescents’ feelings of self-worth or self-acceptance, and is generally considered the standard against which other measures of self-esteem are compared (Blascovich & Tomaka, 1991; Rogers et al., 2001; Rosenberg, 1965). The items represent a continuum of statements ranging from low self-esteem to high self-esteem and provide four options, which range from “strongly agree” to “strongly disagree” (Blascovich & Tomaka, 1991; Rogers et al., 2001; Rosenberg, 1965). There are five positively worded questions and five negatively worded questions (Blascovich & Tomaka, 1991; Rogers et al., 2001; Rosenberg, 1965).
The Rosenberg Self-Esteem Scale is scored by summing scale ratings in the negatively worded questions where “strongly agree” is counted as one point, “agree” counts as two points, “disagree” counts as three points and “strongly disagree” counts as four points (Blascovich & Tomaka, 1991). The positively-worded questions are scored in reverse with “strongly disagree” counting as four points, “disagree” counting as three points, “agree” counting as two points and “strongly agree” counting as one point (Blascovich & Tomaka, 1991). A total of 30 points is possible, with scores of 26 to 30 considered high; between 15 and 25 considered within the normal range, and scores of 14 and below indicating low self-esteem (Blascovich & Tomaka, 1991).

Extensive and acceptable reliability and validity information exists for the Rosenberg Self-Esteem Scale (Blascovich & Tomaka, 1991; Rogers et al., 2001; Rosenberg, 1965). Reliability assessments found satisfactory internal reliability with a 92 percent Guttmann scale coefficient of reproducibility and a 72 percent coefficient of scalability (Rogers et al., 2001). Internal consistency is considered satisfactory, with a reported Cronbach alpha of between .77 and .88 (Blascovich & Tomaka, 1991). Test-retest reliability over a two-week time period has been reported to be between .85 and .88 (Rogers et al., 2001). A one-week interval test-retest correlation of .82 has been reported (Blascovich & Tomaka, 1991). These statistics indicate excellent stability of the instrument.

The scale is “strikingly face valid” (Blascovich & Tomaka, 1991). The Rosenberg Self-Esteem Scale has good convergent validity and correlates at a .65 level with confidence, a .39 level with popularity and a .38 level with one’s feelings of academic competence (Blascovich & Tomaka, 1991). Concurrent, predictive and
construct validity has been demonstrated by the author of the scale, as well (Rosenberg, 1965).

**Demographics questionnaire.** A demographics questionnaire was developed solely for use in this research (see appendix). Information was gathered for each participant regarding age, weight, gender, ethnicity, employment history, and past health status. There were also questions concerning the use of alcohol and nicotine, current health status and mental health diagnosis, and history.

**Procedures**

Data were collected at Hanover Hospital and at Adams-Hanover Counseling Services, Inc. The 70 participant volunteers were randomly assigned either to the first (index treatment group) or second (wait-list control group). The treatment group members participated in group therapy with a cognitive-behavioral approach to weight management. The control group members were assigned to treatment as usual.

An unlicensed Medical Doctor, two licensed Psychologists, and a Registered Nurse took baseline measurements. Both index and control groups provided baseline measures. Surveys comprised data on socio-demographics, nutritional intakes, levels of physical activity, motivation to change, self-esteem, and depression were completed. Mental health diagnoses were based on self-report. The participants gave consent to contact their primary care physicians and verification of self-reported health status and mental health diagnoses was obtained.

A licensed, doctoral-level Psychologist with training in group therapy and mind-body techniques facilitated the groups. Groups met weekly for 90 minutes, and the intervention lasted 24 weeks. There were three groups total and the size of each group
was approximately ten participants. After completion of the 24 weeks of treatment, the index and control groups completed the same scales and measures taken at baseline. The control group participants were offered the weight-loss treatment provided to the index group participants after 24 weeks (six months).

During the first week of the study, all participants read and signed the consent form, completed a demographic survey, completed the Weight Loss Readiness Test II, completed the Beck Depression Inventory (BDI), completed the Rosenberg Self-Esteem Scale, and had weight and height measured. Body Mass Index (BMI) was calculated. For those individuals in the treatment condition, weeks two through 24 consisted of 25 minutes of didactic education that utilized the LEARN Program; 15 minutes of break time that included a healthy snack, and 50 minutes of group therapy which utilized components of the LEARN program. Participants were given complimentary copies of the LEARN manual and pedometers to use with the LEARN program. The individuals in the treatment condition were encouraged to invite support partners to attend the didactic and healthy snack components of the intervention with them. These support partners received monthly newsletters that discussed issues related to what was taught in the LEARN program. The participants who attended 80 percent of the assigned sessions received a small prize/incentive (valued at approximately $10). The wait-list control group participants were offered the same weight-loss intervention as that provided to the index group participants.

For the proposed study, an archival, de-identified, data set from the parent study was used. Adams/Hanover Counseling Services, LLC permitted the used of this data.

**Analysis of Risk/Benefit Ratio of Parent Study**
In the parent study, the Psychologist discussed risks associated with group treatment, such as possible confidentiality breaches. Discussion of failure to attain personal program goals was another example of potential risk to the participants. After a full review by the Institutional Review Board, such risks were judged to be minimal and the parent study was approved. Therefore, the potential benefits to participants in the parent study outweighed the potential risks. The analysis of the risk/benefit ratio is irrelevant to the proposed study since the existing data set from the parent study is used.

**Potential benefit to others.** Weight gain is a difficult problem to treat. However, weight loss can decrease a person’s chance of developing numerous diseases. Findings regarding a promising weight-loss treatment would be of value to many. A diagnosis of mental illness may or may not alter weight-loss treatment outcomes. The proposed study will address the need for further research regarding weight-loss treatment with persons diagnosed with mental illnesses.

**Procedure for Maintaining Confidentiality**

In the parent study, the participants were advised of the possible risks related to confidentiality and group treatment. The participants were also explained their rights and given a form with information about how to contact the IRB members or the study researchers should they have any concerns or questions related to their rights as a study participant. All information and data were de-identified during the parent study. In the proposed study, the archival data will be analyzed.

**Results**

**Participant Enrollment**
Seventy-one people having at least one mental health diagnosis were referred for inclusion into the parent study (see Figure 1). One individual had no mental health diagnosis and was excluded from the parent study. Of those remaining, 70 participants were randomly assigned either to the treatment (index) group or to treatment as usual (control) group. Accordingly, thirty-five participants were randomized to the index group and 35 participants to the control group. Of the 70 participants, baseline measures were obtained for 57 participants. Of the 35 participants assigned to the control group, only 22 participants completed, because 13 participants dropped out of the study upon learning of their assignment. Accordingly, 22 participants completed baseline measures. Over the course of six months, 16 participants in the index group and 10 participants in the control group were lost to attrition.

At treatment completion, 19 participants in the index group and 12 participants in the control group remained. However, two participants in the index group violated the treatment protocol by admitting that they had attempted to gain weight over the course of the study. Although these two participants completed the study, the data associated with them were excluded from analyses. At the completion of the study, post-treatment measures were obtained for 17 participants in the index group and 12 participants in the control group (see Figure 1).
Figure 1.

Referral, Enrollment, Randomization and Follow-Up of Study Participants

- **71 Referrals**
  - 1 Excluded
  - No Mental Health Diagnosis

- **70 Enrollment**

- **Randomization**

- **Allocation**
  - 35 Allocated
    - Index Group
  - 35 Allocated
    - Control Group

- **Baseline Measures**
  - 33 Index Group
    - 2 Excluded
      - Due to Protocol Violation
  - 22 Control Group
    - 13 Dropouts
      - Due to Assignment to Control Group

- **16 Lost to Attrition**
  - Index Group: 17 Completed

- **10 Lost to Attrition**
  - Control Group: 12 Completed
Demographic and Clinical Characteristics of Parent Study Participants

Fifty-five participants with mental illnesses were enrolled in the study, with similar demographic characteristics reported among the index and control group participants at baseline (see Table 1). In the index group, 79 percent (n=26) were female, 94 percent (n=31) were white, and the average age was 49 years. In the control group, 86 percent (n=19) were female, 100 percent (n=22) were white, and the average age was 46 years. At baseline, 54 percent of participants in the index group and 55 percent of participants in the control group were employed. At baseline, unemployment rates among participants in the index and control groups were 46 percent and 45 percent, respectively. In the index group, 18 percent had less than a high school education and 30 percent had a high school diploma or GED. In comparison, in the control group, 5 percent had less than a high school education and 36 percent had a high school diploma or GED (see Table 1).

Table 1.

<table>
<thead>
<tr>
<th>Baseline Characteristics in Parent Study</th>
<th>Index (n=33)</th>
<th>Control (n=22)</th>
<th>P-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Characteristic</td>
<td>n</td>
<td>%</td>
<td>n</td>
</tr>
<tr>
<td>Age, mean ± SD</td>
<td>48.8 ± 10.0</td>
<td></td>
<td>45.9 ± 13.8</td>
</tr>
<tr>
<td>Gender as observed</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>7</td>
<td>21</td>
<td>3</td>
</tr>
<tr>
<td>Female</td>
<td>26</td>
<td>79</td>
<td>19</td>
</tr>
<tr>
<td>Race</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Caucasian</td>
<td>31</td>
<td>94</td>
<td>22</td>
</tr>
<tr>
<td>African American</td>
<td>2</td>
<td>6</td>
<td>0</td>
</tr>
</tbody>
</table>
Health-related characteristics of the sample were documented during enrollment (see Table 2). Participants’ psychiatric diagnoses were documented, as well. Twenty-one percent of participants in the index group and 45 percent of participants in the control group had a Bipolar Disorder spectrum diagnosis; 33 percent of participants in the index group and 23 percent in the control group had a Schizophrenia spectrum diagnosis, and

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Education</strong></td>
<td></td>
<td>0.536</td>
</tr>
<tr>
<td>Less than High School</td>
<td>6</td>
<td>18</td>
</tr>
<tr>
<td>High School</td>
<td>10</td>
<td>30</td>
</tr>
<tr>
<td>Some College</td>
<td>14</td>
<td>42</td>
</tr>
<tr>
<td>College Degree</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>Some Graduate Study</td>
<td>2</td>
<td>6</td>
</tr>
</tbody>
</table>

| **Marital Status**       |          | 0.446    |
| Married                  | 13       | 39       | 7        | 32       |
| Single                   | 10       | 30       | 9        | 41       |
| Separated                | 4        | 12       | 1        | 5        |
| Divorced                 | 4        | 12       | 5        | 23       |
| Widowed                  | 2        | 6        | 0        | 0        |

| **Current Living Situation** |          | 0.486 |
| Alone                      | 11       | 33     | 8       | 36       |
| With Family                | 15       | 46     | 12      | 55       |
| With Roommates             | 7        | 21     | 2       | 9        |

| **Employed**              |          | 0.988  |
| Full-Time                 | 7        | 21     | 5       | 23       |
| Part-Time                 | 11       | 33     | 7       | 32       |
| Unemployed                | 15       | 46     | 10      | 45       |

| **Income**                |          | 0.959  |
| < $20,000                 | 19       | 58     | 12      | 55       |
| $20-50,000                | 7        | 21     | 4       | 18       |
| $50-80,000                | 5        | 15     | 4       | 18       |
| >$80,000                  | 2        | 6      | 2       | 9        |

Note: All comparisons were made using either two-sample t-tests or chi-squared tests.
18 percent in each group were diagnosed with Schizoaffective Disorder. Nearly half of the index participants were taking antipsychotic medication, compared with about 40 percent in the control group.

In the index condition, 24 percent of participants reported using alcohol and 27 percent of participants in the control condition reported alcohol consumption on a weekly basis. Among index participants, 36 percent smoked cigarettes and 18 percent smoked cigarettes in the control group. Three percent of participants in the index group and 5 percent of participants in the control group were diagnosed with Type 1 Diabetes. In the index group, 24 percent of participants were diagnosed with Type II Diabetes, compared with 9 percent in the control group. Other physical health problems reported by the index and control group participants included chronic obstructive pulmonary disease, fibromyalgia, arthritis, asthma and back problems (see Table 2).

Table 2.

<table>
<thead>
<tr>
<th>Baseline Health-Related Characteristics in Parent Study</th>
</tr>
</thead>
<tbody>
<tr>
<td>Characteristic</td>
</tr>
<tr>
<td>-------------------------------------</td>
</tr>
<tr>
<td>Any Alcohol Use (at least one drink per week)</td>
</tr>
<tr>
<td>Any Cigarette Use</td>
</tr>
<tr>
<td>Diagnosis</td>
</tr>
<tr>
<td>Bipolar</td>
</tr>
<tr>
<td>Schizophrenia</td>
</tr>
<tr>
<td>Schizoaffective</td>
</tr>
</tbody>
</table>
Major Depressive Disorder | 28 | 85 | 19 | 86 | 0.876
Antipsychotic (Medication) | 16 | 49 | 9  | 41 | 0.580
Diabetes Type 1 | 1  | 3  | 1  | 5  | 0.769
Diabetes Type 2 | 8  | 24 | 2  | 9  | 0.154

Other Physical Condition

| Condition                      | Index Group | Control Group | \( \chi^2 \text{-test results} \)
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Chronic Obstructive Pulmonary Disease (COPD)</td>
<td>2</td>
<td>6</td>
<td>1</td>
</tr>
<tr>
<td>Fibromyalgia</td>
<td>3</td>
<td>9</td>
<td>2</td>
</tr>
<tr>
<td>Arthritis</td>
<td>4</td>
<td>12</td>
<td>4</td>
</tr>
<tr>
<td>Asthma</td>
<td>5</td>
<td>15</td>
<td>2</td>
</tr>
<tr>
<td>Back Pain/Problems</td>
<td>4</td>
<td>12</td>
<td>3</td>
</tr>
</tbody>
</table>

Health Insurance

| Insurance          | Index Group | Control Group | \( \chi^2 \text{-test results} \)
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Medicare</td>
<td>18</td>
<td>55</td>
<td>14</td>
</tr>
<tr>
<td>Medical Assistance</td>
<td>14</td>
<td>42</td>
<td>8</td>
</tr>
<tr>
<td>Other Insurance</td>
<td>1</td>
<td>3</td>
<td>0</td>
</tr>
</tbody>
</table>

Note: All comparisons were made using either two-sample t-tests or chi-squared tests.

Thirty-three participants in the index group and 22 participants in the control group completed baseline measures. Among the index group participants, 13 had a support person in attendance during the didactic and healthy snack portion of the weight-loss intervention. This support person attended 40 minutes of a 90-minute group session each week. In comparison, there were 20 index group participants having no designated support person. Baseline measures of weight, self-esteem, depression, and motivation
were calculated for the parent study participants at the beginning of treatment (see Table 3).

Table 3.

**Summary of Baseline Measures in Parent Study**

<table>
<thead>
<tr>
<th>Measure</th>
<th>Index (n=33)</th>
<th>Control (n=22)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(Range)</td>
<td>(Range)</td>
</tr>
<tr>
<td></td>
<td>Mean (SD)</td>
<td>Mean (SD)</td>
</tr>
<tr>
<td></td>
<td>Median</td>
<td>Median</td>
</tr>
<tr>
<td>Weight (Pounds)</td>
<td>(168, 318)</td>
<td>(166, 377)</td>
</tr>
<tr>
<td></td>
<td>240 (37)</td>
<td>241 (55)</td>
</tr>
<tr>
<td></td>
<td>237</td>
<td>240</td>
</tr>
<tr>
<td>Rosenberg Self-Esteem Scale (0-30)</td>
<td>(8, 29)</td>
<td>(3, 23)</td>
</tr>
<tr>
<td></td>
<td>18.0 (5.7)</td>
<td>13.6 (6.2)</td>
</tr>
<tr>
<td></td>
<td>17</td>
<td>14</td>
</tr>
<tr>
<td>Beck Depression Inventory (0-63)</td>
<td>(1, 40)</td>
<td>(7, 54)</td>
</tr>
<tr>
<td></td>
<td>19.0 (10.1)</td>
<td>26.4 (13.3)</td>
</tr>
<tr>
<td></td>
<td>21</td>
<td>26</td>
</tr>
<tr>
<td>Weight Loss Readiness Test II: Motivation</td>
<td>(9, 20)</td>
<td>(10, 20)</td>
</tr>
<tr>
<td>(0-20)</td>
<td>15.2 (3.4)</td>
<td>15.4 (3.2)</td>
</tr>
<tr>
<td></td>
<td>15</td>
<td>15</td>
</tr>
</tbody>
</table>

**Demographic and Clinical Characteristics of Present Study Participants**

Twenty-nine participants completed the study and demographic characteristics among the index and control group participants were documented at baseline for the present study (see Table 3). In the index group, 71 percent (n=12) were female, 94 percent (n=16) were Caucasian, and the average age was 48 years. In the control group, 83 percent (n=10) were female, 100 percent (n=12) were Caucasian, and the average age
was 46 years. At baseline, 70 percent of participants in the index group and 75 percent of participants in the control group were employed. At baseline, unemployment rates among participants in the index and control groups were 30 percent and 25 percent, respectively. In the index group, 24 percent had less than a high school education and 18 percent had a high school diploma or GED. In comparison, 8 percent had less than a high school education and 33 percent had a high school diploma or GED in the control group. Forty-seven percent of index group participants reported living alone compared with 50 percent of control group participants. Fifty-three percent of index group participants lived either with family or with roommates, compared with 50 percent of control group participants (see Table 4).

Table 4.

Baseline Characteristics in Present Study

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Index (n=17)</th>
<th>Control (n=12)</th>
<th>P-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>%</td>
<td>n</td>
</tr>
<tr>
<td>Age, mean ± SD</td>
<td>48.2 ± 10.6</td>
<td>45.8 ± 10.3</td>
<td>0.557</td>
</tr>
<tr>
<td>Gender as observed</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>5</td>
<td>29</td>
<td>2</td>
</tr>
<tr>
<td>Female</td>
<td>12</td>
<td>71</td>
<td>10</td>
</tr>
<tr>
<td>Race</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Caucasian</td>
<td>16</td>
<td>94</td>
<td>12</td>
</tr>
<tr>
<td>African American</td>
<td>1</td>
<td>6</td>
<td>0</td>
</tr>
<tr>
<td>Education</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Less than High School</td>
<td>4</td>
<td>24</td>
<td>1</td>
</tr>
<tr>
<td>High School</td>
<td>3</td>
<td>18</td>
<td>4</td>
</tr>
<tr>
<td>Some College</td>
<td>8</td>
<td>47</td>
<td>4</td>
</tr>
<tr>
<td>College Degree</td>
<td>0</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>Some Graduate Study</td>
<td>2</td>
<td>12</td>
<td>1</td>
</tr>
</tbody>
</table>
### Marital Status

<table>
<thead>
<tr>
<th>Status</th>
<th>Observed</th>
<th>Expected</th>
</tr>
</thead>
<tbody>
<tr>
<td>Married</td>
<td>4</td>
<td>24</td>
</tr>
<tr>
<td>Single</td>
<td>5</td>
<td>29</td>
</tr>
<tr>
<td>Separated</td>
<td>3</td>
<td>18</td>
</tr>
<tr>
<td>Divorced</td>
<td>4</td>
<td>24</td>
</tr>
<tr>
<td>Widowed</td>
<td>1</td>
<td>6</td>
</tr>
</tbody>
</table>

\[ p = 0.461 \]

### Current Living Situation

<table>
<thead>
<tr>
<th>Situation</th>
<th>Observed</th>
<th>Expected</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alone</td>
<td>8</td>
<td>47</td>
</tr>
<tr>
<td>With Family</td>
<td>6</td>
<td>35</td>
</tr>
<tr>
<td>With Roommates</td>
<td>3</td>
<td>18</td>
</tr>
</tbody>
</table>

\[ p = 0.767 \]

### Employed

<table>
<thead>
<tr>
<th>Employment</th>
<th>Observed</th>
<th>Expected</th>
</tr>
</thead>
<tbody>
<tr>
<td>Full-Time</td>
<td>5</td>
<td>29</td>
</tr>
<tr>
<td>Part-Time</td>
<td>7</td>
<td>41</td>
</tr>
<tr>
<td>Unemployed</td>
<td>5</td>
<td>29</td>
</tr>
</tbody>
</table>

\[ p = 0.958 \]

### Income

<table>
<thead>
<tr>
<th>Income</th>
<th>Observed</th>
<th>Expected</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; $20,000</td>
<td>11</td>
<td>65</td>
</tr>
<tr>
<td>$20-50,000</td>
<td>3</td>
<td>18</td>
</tr>
<tr>
<td>$50-80,000</td>
<td>2</td>
<td>12</td>
</tr>
<tr>
<td>&gt;$80,000</td>
<td>1</td>
<td>6</td>
</tr>
</tbody>
</table>

\[ p = 0.369 \]

Note: All comparisons were made using either two-sample t-tests or chi-squared tests.

The remaining participants completing treatment reported health characteristics and psychiatric diagnoses at baseline. Eighteen percent of participants in the index group and 58 percent of participants in the control group had a Bipolar Disorder spectrum diagnosis. Thirty-five percent of participants in the index group and 25 percent in the control group had a Schizophrenia spectrum diagnosis. Twelve percent of participants in the index group and 25 percent of participants in the control group were diagnosed with Schizoaffective Disorder. Medication management of psychiatric diagnoses was similar in both groups, with forty-seven percent of the index participants taking antipsychotic medication, compared with 42 percent in the control group.
Among those completing treatment in the index condition, 29 percent of participants reported using alcohol and 8 percent of participants in the control condition reported weekly alcohol consumption. Among those index participants who completed treatment, 35 percent smoked cigarettes and eight percent smoked cigarettes in the control group. Six percent of participants completing treatment in the index group and eight percent of participants completing treatment in the control group were diagnosed with Type 1 Diabetes. Among those completing treatment, 29 percent of the index group were diagnosed with Type II Diabetes, compared with 17 percent of the control group. Other physical health problems reported by the index and control group participants who completed treatment included chronic obstructive pulmonary disease, fibromyalgia, arthritis, asthma and back pain/problems (see Table 5).

Table 5.

Baseline Health-Related Characteristics in Present Study

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Index (n=17)</th>
<th>Control (n=12)</th>
<th>P-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>%</td>
<td>n</td>
</tr>
<tr>
<td>Any Alcohol Use</td>
<td>5</td>
<td>29</td>
<td>1</td>
</tr>
<tr>
<td>(at least one drink per week)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Any Cigarette Use</td>
<td>6</td>
<td>35</td>
<td>1</td>
</tr>
<tr>
<td>Diagnosis</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bipolar</td>
<td>3</td>
<td>18</td>
<td>7</td>
</tr>
<tr>
<td>Schizophrenia</td>
<td>6</td>
<td>35</td>
<td>3</td>
</tr>
<tr>
<td>Schizoaffective</td>
<td>2</td>
<td>12</td>
<td>3</td>
</tr>
<tr>
<td>Major Depressive Disorder</td>
<td>13</td>
<td>76</td>
<td>10</td>
</tr>
</tbody>
</table>
Seventeen participants in the index group and 12 participants in the control group completed baseline measures. Among the index group participants, 13 had a support person in attendance during the didactic and healthy snack portions of the weight-loss intervention. This support person attended 40 minutes of a 90-minute group session each week. In comparison, there were four index group participants with no designated support person. Have a support person in attendance during the intervention was relevant only among index group participants engaging in weight-loss treatment. Therefore, support among control group participants was irrelevant because control participants

<table>
<thead>
<tr>
<th>Other Physical Condition</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Chronic Obstructive Pulmonary Disease (COPD)</td>
<td>2</td>
<td>6</td>
<td>1 5</td>
</tr>
<tr>
<td>Fibromyalgia</td>
<td>3</td>
<td>9</td>
<td>2 9</td>
</tr>
<tr>
<td>Arthritis</td>
<td>4</td>
<td>12</td>
<td>4 18</td>
</tr>
<tr>
<td>Asthma</td>
<td>5</td>
<td>15</td>
<td>2 9</td>
</tr>
<tr>
<td>Back Pain/Problems</td>
<td>4</td>
<td>12</td>
<td>3 14</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Health Insurance</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Medicare</td>
<td>9</td>
<td>53</td>
<td>7 58</td>
</tr>
<tr>
<td>Medical Assistance</td>
<td>7</td>
<td>41</td>
<td>5 42</td>
</tr>
<tr>
<td>Other Insurance</td>
<td>1</td>
<td>6</td>
<td>0 0</td>
</tr>
</tbody>
</table>

Note: All comparisons were made using either two-sample t-tests or chi-squared tests.
were not involved in the intervention. Measures of weight, self-esteem, depression, and motivation were calculated for the index and control group participants in the present study at the beginning of treatment, upon treatment completion at six months, and at 12 months. Unfortunately, only 11 participants in the control group completed measures at 12 months (see Table 6).

Table 6.

*Measures at Baseline, 6 Months, and 12 Months in Present Study*

<table>
<thead>
<tr>
<th>Measure</th>
<th>Index (n=17)</th>
<th>Control (n=12)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(Range)</td>
<td>(Range)</td>
</tr>
<tr>
<td></td>
<td>Mean (SD)</td>
<td>Mean (SD)</td>
</tr>
<tr>
<td></td>
<td>Median</td>
<td>Median</td>
</tr>
<tr>
<td>Weight (Pounds)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Baseline</td>
<td>(183.5-318)</td>
<td>(166-353)</td>
</tr>
<tr>
<td></td>
<td>248 (40)</td>
<td>238 (54)</td>
</tr>
<tr>
<td>6 Months</td>
<td>(191-306)</td>
<td>(164-360)</td>
</tr>
<tr>
<td></td>
<td>238 (36)</td>
<td>242 (57)</td>
</tr>
<tr>
<td></td>
<td>228</td>
<td>243</td>
</tr>
<tr>
<td>Rosenberg Self-Esteem Scale</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Baseline</td>
<td>(13-29)</td>
<td>(3-23)</td>
</tr>
<tr>
<td></td>
<td>19.9 (5.3)</td>
<td>14.1 (6.3)</td>
</tr>
<tr>
<td>6 Months</td>
<td>(10-26)</td>
<td>(3-29)</td>
</tr>
<tr>
<td></td>
<td>20.8 (4.6)</td>
<td>14.7 (7.8)</td>
</tr>
<tr>
<td>12 Months*</td>
<td>(10-27)</td>
<td>(3-29)</td>
</tr>
<tr>
<td></td>
<td>20.5 (5.3)</td>
<td>15.2 (7.5)</td>
</tr>
<tr>
<td></td>
<td>22</td>
<td>12</td>
</tr>
<tr>
<td>Beck Depression Inventory</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Baseline</td>
<td>(1-33)</td>
<td>(7-43)</td>
</tr>
<tr>
<td></td>
<td>16.9 (9.1)</td>
<td>22.0 (11.3)</td>
</tr>
<tr>
<td>6 Months</td>
<td>(0-25)</td>
<td>(8-45)</td>
</tr>
<tr>
<td></td>
<td>11.7 (9.1)</td>
<td>23.7 (13.0)</td>
</tr>
<tr>
<td>12 Months*</td>
<td>(0-22)</td>
<td>(5-45)</td>
</tr>
<tr>
<td></td>
<td>8.7 (7.4)</td>
<td>19.6 (14.2)</td>
</tr>
<tr>
<td></td>
<td>6</td>
<td>15</td>
</tr>
</tbody>
</table>
### Weight Loss Readiness Test II: Motivation (0-20)

<table>
<thead>
<tr>
<th></th>
<th>Baseline (10-20)</th>
<th>6 Months (10-20)</th>
<th>15.8 (3.2)</th>
<th>14.7 (2.9)</th>
<th>15.8 (3.3)</th>
<th>13.2 (4.1)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>16</td>
<td>15</td>
<td>16</td>
<td>14</td>
</tr>
</tbody>
</table>

*At 12 months, data on 17 Index and 11 Control participants were obtained.

### Statistical Analysis

In all subsequent analyses, adjustments for multiple analyses were not made because of the low sample size. This was a deliberate decision to analyze without a correction for multiple tests in an attempt to minimize the probability of a Type II error because analyzing a small sample size has the increased risk of overlooking treatment effects. Furthermore, because this was a randomized trial and baseline demographic characteristics were not significantly different between the control and index groups, a decision was made to analyze the data without adjusting for demographic factors in the analyses. This rationale prioritized the identification of treatment effects and optimized the chance of finding significant differences between conditions and among variables.

First, comparisons of the baseline demographic and health-related characteristics of the index and control arms were made. Tests that were used for differences between the two groups included t-tests for normally distributed continuous variables, Wilcoxon ranked-sum tests for abnormally distributed variables; and chi-square tests for categorical variables.

Hypotheses 1, 3a, and 4a involved comparisons between the index and control groups. To address these hypotheses, two paired t-tests were used separately (i.e. one
paired t-test for the control group and one paired t-test for the index group) in order to examine the difference in the outcome measures (weight, self-esteem, depression) from baseline to the 6 months, when the treatment intervention was completed. The outcome measures used in these analyses included weight measured in pounds, the Rosenberg Self-Esteem Scale scores, and the Beck Depression Inventory scores. In order to compare the changes between the control and index groups from baseline to 6 months, a two-sample t-test was performed. The two-sample t-test compared group differences between the control group, from baseline to 6 months, and the index group over the same time period. This t-test provides a comparison that can be viewed as the effectiveness of the intervention, because its calculation determines if the treatment group differs significantly from the control group.

A statistical approach similar to that described previously was taken to address hypotheses 2, 3b, 4b, and 5, except that these analyses used a particular subset of participants randomized to the index group. Therefore, in the analyses for these hypotheses, the paired t-tests involved subgroup comparisons within the index group rather than treatment and index group comparisons. For example, when comparing weight loss between the high motivation participants and the not-high motivation participants, a binary variable was created to identify those index group participants with high motivation. Then, a paired t-test was used to examine the difference between the high motivation and not-high motivation subgroups’ weight loss within the index group. This statistical approach was also used to examine differences in weight loss between subgroups identified as having either support or no support, low self-esteem or moderate
to high self-esteem, and minimal depression or mild to severe depression within the index group participants.

Finally, for hypotheses 3c and 4c, a fixed effects difference model was used to examine the effect of weight change on post-treatment changes in psychological measures (Beck Depression Inventory and Rosenberg Self-Esteem Scale scores). In these difference models, the outcome variable was the point change in the measure score from 6 months to 12 months, and the main effect of interest was a 10-pound change in weight from baseline to 6 months. Time invariant covariates that have differential effects at different time points were included as controls (Allison, 2005). All statistical analyses were conducted using SAS V9.2 (SAS Institute Inc., 2009).

Hypothesis 1

It was hypothesized that index group participants would lose more weight than those in the control group. Two paired t-tests were conducted, one each for the index and control groups, to determine if there were significant differences in weight-loss from baseline to 6 months. Then, a two-sample t-test was conducted to determine if the treatment group had significantly more weight loss than the control group. The average weight loss for the index group was 10 pounds from baseline to 6 months (P<0.01), as compared with a gain of three pounds for the control group (P=0.133), yielding a difference of 13 pounds (95% CI = [7.5, 19.1], P<0.01). These results show that the index group, which received the 6-month treatment, had a statistically significant greater weight loss than the control group, who gained rather than lost weight (see Table 7).
Table 7.

**Hypothesis 1**

<table>
<thead>
<tr>
<th></th>
<th>Index (n=17)</th>
<th>Control (n=12)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean 95% CI</td>
<td>P-Value</td>
</tr>
<tr>
<td>Paired t-test</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Weight (Pounds)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Baseline</td>
<td>247.8 (224, 271)</td>
<td>238.5 (211, 266)</td>
</tr>
<tr>
<td>6 Months</td>
<td>237.8 (214, 262)</td>
<td>241.8 (214, 269)</td>
</tr>
<tr>
<td>Baseline-6M</td>
<td>-10.0 (6.1, 13.7)</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td></td>
<td>3.3 (7.8, 1.1)</td>
<td>0.133</td>
</tr>
</tbody>
</table>

Two-sample t-test of differences

|                  |                |
| Index vs. Control| 13.3 (7.5, 19.1) | <0.01 |

**Hypothesis 2**

It was hypothesized, that within the index group, participants with a support person attending part of the intervention will lose more weight than those participants without such support. Two paired t-tests were conducted, one each for the support subgroup and the no support subgroup, to determine if there were significant differences in weight loss from baseline to 6 months. Then, a two-sample t-test was conducted to determine if participants in the support subgroup had significantly more weight loss than participants in the no support subgroup.
Of the 17 index group participants, 13 participants had support and four participants had no support. Analysis revealed that index participants with a support person lost a significant amount of weight ($\Delta=10.4$, 95% CI = [5.2, 15.8], P<0.01), but index participants without a support person did not experience a significant weight loss over the 6-month period (P=0.150). A comparison between the amount of weight lost in the support subgroup and the amount of weight lost in the no support subgroup was not statistically different (P=0.652). Index group participants without a support person also lost weight. Because there were only four people in the subgroup with no support, it is impossible to make a meaningful statement about this hypothesis. Therefore, due to sample size, these analyses are unreliable because there was not enough power to detect statistically significant differences between the support and no support subgroups if such differences do, indeed, exist (see Table 8).
Table 8.

Hypothesis 2

<table>
<thead>
<tr>
<th></th>
<th>Support (n=13)</th>
<th>No Support (n=4)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>95% CI</td>
</tr>
<tr>
<td>Paired t-test</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Weight (Pounds)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Baseline</td>
<td>242.1</td>
<td>(220, 264)</td>
</tr>
<tr>
<td>6 Months</td>
<td>231.7</td>
<td>(210, 254)</td>
</tr>
<tr>
<td>Baseline-6M</td>
<td>-10.4</td>
<td>(5.2, 15.8)</td>
</tr>
<tr>
<td>Two-sample t-test of differences</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Support vs. No-Support</td>
<td>2.6</td>
<td>(-14.8, 9.6)</td>
</tr>
</tbody>
</table>

Hypothesis 3a

It was hypothesized that index group participants receiving the weight-loss intervention would experience an increase in Rosenberg Self-Esteem Scale scores, but the control group would not. Two separate paired t-tests were performed, one in the index group and one in the control group, to determine if there were significant differences in Rosenberg Self-Esteem Scale scores from baseline to 6 months within each group. Then, a two-sample t-test was conducted to determine if the index group had significantly higher Rosenberg Self-Esteem Scale scores than the control group. This hypothesis was
not supported because there were no statistically significant changes in Rosenberg Self-Esteem scores for either group (see Table 9).

Table 9.

**Hypothesis 3a**

<table>
<thead>
<tr>
<th></th>
<th>Index (n=17)</th>
<th>Control (n=12)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean 95% CI</td>
<td>P-Value</td>
</tr>
<tr>
<td>Paired t-test</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rosenberg Self-Esteem Scale (0-30)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Baseline</td>
<td>20.2 (17.4, 23.0)</td>
<td>13.8 (10.6, 17.0)</td>
</tr>
<tr>
<td>6 Months</td>
<td>20.3 (17.5, 23.1)</td>
<td>14.9 (11.6, 23.1)</td>
</tr>
<tr>
<td>Baseline-6M</td>
<td>-0.1 (-1.8, 1.6)</td>
<td>0.949</td>
</tr>
</tbody>
</table>

Two-sample t-test of differences

<table>
<thead>
<tr>
<th></th>
<th>Index vs. Control</th>
<th>P-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0.99 (-1.6, 3.6)</td>
<td>0.438</td>
</tr>
</tbody>
</table>

**Hypothesis 3b**

It was hypothesized that, within the index group, participants with normal to high self-esteem would lose more weight than participants with low self-esteem. Subgroups of normal to high self-esteem and low self-esteem were identified, using the recommended Rosenberg Self-Esteem Scale clinical cut scores. Participants with baseline scores of greater than 14 on the Rosenberg Self-Esteem Scale were included in
the normal to high self-esteem subgroup. Participants with baseline scores equal to or less than 14 on the Rosenberg Self-Esteem Scale were included in the low self-esteem subgroup.

Two separate paired t-tests were conducted, one for the normal to high self-esteem subgroup and one for the low self-esteem subgroup, to determine if participants in each subgroup lost a significant amount of weight from baseline to 6 months. Then, a two-sample t-test was conducted to determine if the normal to high self-esteem subgroup had significantly more weight loss than the low self-esteem subgroup. The normal to high self-esteem subgroup experienced significant weight loss from baseline to 6 months (P<0.01), but the low self-esteem subgroup did not (P = 0.111). A comparison between the amount of weight that the normal to high self-esteem subgroup lost and the amount of weight that the low self-esteem subgroup lost was not different (P=0.699). The low self-esteem subgroup also lost weight, but because there were only three participants in this subgroup, it was impossible to make a meaningful statement about this hypothesis. Therefore, due to sample size, these analyses are unreliable because there was not enough power to detect statistically significant differences between the low self-esteem and normal to high self-esteem subgroups if such differences do, indeed, exist (see Table 10).
Table 10.

**Hypothesis 3b**

<table>
<thead>
<tr>
<th></th>
<th>Normal to High Self-Esteem (n=14)</th>
<th>Low Self-Esteem (n=3)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>95% CI</td>
</tr>
<tr>
<td>Paired t-test</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Weight (Pounds)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Baseline</td>
<td>246.8</td>
<td>(227, 267)</td>
</tr>
<tr>
<td>6 Months</td>
<td>237.2</td>
<td>(217, 257)</td>
</tr>
<tr>
<td>Baseline-6M</td>
<td>9.6</td>
<td>(4.2, 15.0)</td>
</tr>
<tr>
<td>Two-sample t-test</td>
<td></td>
<td></td>
</tr>
<tr>
<td>of differences</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Normal to High vs. Low Self-Esteem</td>
<td>-3.2</td>
<td>(-14.4, 20.8)</td>
</tr>
</tbody>
</table>

**Hypothesis 3c**

It was hypothesized that changes in weight during the 6-month treatment period would result in changes in self-esteem after treatment completion among index group participants. The estimate from the regression model refers to the linear regression coefficient estimate for a one-point increase in the Rosenberg Self-Esteem Scale from 6 months to 12 months associated with a 10-pound weight change from baseline to 6 months.
Difference model results show that for each 10 pound weight loss, there was an associated two point increase on the Rosenberg Self-Esteem Scale ($\beta=1.88$, $P=0.071$). Although such changes among index group participants identified a trend that approached significance, the results were not statistically significant at the 0.05 level (see Table 11).

Table 11.

<table>
<thead>
<tr>
<th>Hypothesis 3c</th>
<th>Index Group (n=17)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Predictor</td>
<td>Estimate (change in SES per 10 pound weight loss)</td>
</tr>
<tr>
<td>Change in Self-Esteem (6M to 12M)</td>
<td>1.88</td>
</tr>
<tr>
<td>Change in Weight per 10 pound loss (Baseline to 6M)</td>
<td></td>
</tr>
</tbody>
</table>

Hypothesis 4a

It was hypothesized that index group participants would have significant decreases in Beck Depression Inventory scores, but the control group would not. Two separate paired $t$-tests were conducted, one for the index group and one for the control group, to determine if there were significant differences in Beck Depression Inventory scores from baseline to 6 months in each group. Then, a two-sample $t$-test was conducted to determine if the index group had significantly lower Beck Depression Inventory scores than the control group. This hypothesis was not supported because there were no significant changes in Beck Depression Inventory scores from baseline to 6 months in either group. A comparison between depression scores in the index and control groups
was not different. However, there was a non-significant trend for depression scores to decrease within the index group (see Table 12).

Table 12.

**Hypothesis 4a**

<table>
<thead>
<tr>
<th></th>
<th>Index (n=17)</th>
<th>Control (n=12)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean 95% CI</td>
<td>P-Value</td>
</tr>
<tr>
<td>Paired t-test</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Beck Depression</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Inventory (0-63)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Baseline</td>
<td>16.5 (11.3, 21.7)</td>
<td>22.3 (16.3, 28.3)</td>
</tr>
<tr>
<td>6 Months</td>
<td>12.2 (6.9, 17.6)</td>
<td>23.4 (17.3, 29.6)</td>
</tr>
<tr>
<td>Baseline-6M</td>
<td>4.3 (-0.9, 9.5)</td>
<td>0.105</td>
</tr>
<tr>
<td>Two-sample t-test</td>
<td></td>
<td></td>
</tr>
<tr>
<td>of differences</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Index vs. Control</td>
<td>5.4 (-2.6, 13.4)</td>
<td>0.179</td>
</tr>
</tbody>
</table>

**Hypothesis 4b**

It was hypothesized that within the index group, participants with minimal depression would lose more weight than participants with mild to severe depression. Subgroups of minimal depression and mild to severe depression were identified, using the recommended Beck Depression Inventory clinical cut scores. Participants with baseline scores of less than 14 on the Beck Depression Inventory were included in the
minimal depression subgroup. Participants with baseline scores of equal to or greater than 14 on the Beck Depression Inventory were included in the mild to severe depression subgroup. Two separate paired t-tests were conducted, one for the minimal depression subgroup and one for the mild to severe depression subgroup, to determine if participants in each subgroup lost a significant amount of weight from baseline to 6 months. Then a two-sample t-test was conducted to determine if the minimal depression subgroup had significantly more weight loss than the mild to severe depression subgroup.

Index group participants with minimal depression lost an average of 14 pounds (P<0.01). In comparison, the remaining 12 index group participants with mild to severe depression lost an average of 10 pounds (P=0.01). However, the difference between weight losses in the two subgroups was not statistically significant (see Table 13).
Table 13.

**Hypothesis 4b**

<table>
<thead>
<tr>
<th></th>
<th>Minimal Depression (n=5)</th>
<th>Mild to Severe Depression (n=12)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>95% CI</td>
</tr>
<tr>
<td>Paired t-test</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Weight (Pounds)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Baseline</td>
<td>254.3</td>
<td>(232, 277)</td>
</tr>
<tr>
<td>6 Months</td>
<td>240.0</td>
<td>(219, 261)</td>
</tr>
<tr>
<td>Baseline-6M</td>
<td>14.2</td>
<td>(6.3, 22.2)</td>
</tr>
</tbody>
</table>

Two-sample t-test of differences

<table>
<thead>
<tr>
<th></th>
<th>Mean</th>
<th>95% CI</th>
<th>P-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minimal vs. Mild-Severe Depression</td>
<td>4.4</td>
<td>(-14.8, 6.0)</td>
<td>0.381</td>
</tr>
</tbody>
</table>

**Hypothesis 4c**

It was hypothesized that changes in weight during the 6-month treatment period would result in changes in depression after treatment completion among index group participants. A two-period difference model was used and the regression estimate refers to the linear regression coefficient estimate for a one-point change in the Beck Depression Inventory score from 6 months to 12 months associated with a 10-pound weight change from baseline to 6 months. There was no association between changes in
weight and changes in depression scores among the index group participants (see Table 14).

Table 14

**Hypothesis 4c**

<table>
<thead>
<tr>
<th>Outcome Predictor</th>
<th>Index Group (n=17)</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>Estimate</strong></td>
<td><strong>Standard Error</strong></td>
<td><strong>P-Value</strong></td>
</tr>
<tr>
<td></td>
<td>(point change in BDI per 10 pound weight loss)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Change in BDI (6M to 12M)</td>
<td>0.69</td>
<td>0.26</td>
<td>0.799</td>
</tr>
<tr>
<td>Change in BDI per 10 pound loss (Baseline to 6M)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Hypothesis 5**

It was hypothesized that within the index group, participants with high baseline motivation scores on the Weight Loss Readiness Test II would lose significantly more weight than other participants within the index group. Participants having high motivation had Weight Loss Readiness Test II Motivation baseline scores in the highest quartile among index group participants. Two separate paired t-tests were performed, one for the high motivation subgroup and one for the not-high motivation subgroup, to determine if there was a significant difference in weight loss from baseline to 6 months in each subgroup. Then, a two-sample t-test was conducted to determine if the high motivation subgroup had significantly more weight loss than the not-high motivation subgroup. High motivation subgroup participants lost a significant amount of weight
with an average of 18 pounds (P<0.01), as compared with eight pounds for the not high motivation subgroup participants (P=0.018). A comparison of the amount of weight lost between each subgroup showed no significant difference (see Table 15).

Table 15.

<table>
<thead>
<tr>
<th>Hypothesis 5</th>
<th>Index Group</th>
<th>Index Group</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>High Motivation (n=7)</td>
<td>Not-High Motivation (n=10)</td>
</tr>
<tr>
<td>Mean</td>
<td>95% CI</td>
<td>P-Value</td>
</tr>
<tr>
<td>Paired t-test</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Weight (Pounds)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Baseline</td>
<td>248.7</td>
<td>(227, 270)</td>
</tr>
<tr>
<td>6 Months</td>
<td>230.3</td>
<td>(207, 254)</td>
</tr>
<tr>
<td>Baseline - 6M</td>
<td>18.4</td>
<td>(8.0, 28.8)</td>
</tr>
<tr>
<td>Two-sample t-test of differences</td>
<td></td>
<td></td>
</tr>
<tr>
<td>High vs. Not-High Motivation</td>
<td>10.4</td>
<td>(-1.8, 22.6)</td>
</tr>
</tbody>
</table>

Post Hoc Analyses

Post hoc analyses were conducted to examine patterns and characteristics of participants who completed the study (see Table 16). The post hoc analyses also aimed to reveal any differences between the study completers and the dropouts. Fifty-two percent of the index group participants completed the study and 45 percent of the control
group participants completed the study. A chi-squared test did not find the difference in attrition between the index and control groups to be statistically significant (P=0.856).

Table 16.

<table>
<thead>
<tr>
<th></th>
<th>Index Group</th>
<th>Control Group</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Completers (At 6 Months)</td>
<td>17</td>
<td>12</td>
<td>29</td>
</tr>
<tr>
<td>Drop-Outs (Baseline – 6 Months)</td>
<td>16</td>
<td>10</td>
<td>26</td>
</tr>
<tr>
<td>Total Participants (At Baseline)</td>
<td>33</td>
<td>22</td>
<td>55</td>
</tr>
</tbody>
</table>

The second post hoc analysis examined a trend in the index group. Namely, all the participants who had a support person in the index group completed the study (n=13). In comparison, index group participants without a support person only had a 20% completion rate (4 of 20). This analysis revealed a chi-squared test statistic of 22.7 (P<0.01) that is highly significant (see Table 17).

Table 17.

<table>
<thead>
<tr>
<th></th>
<th>Support</th>
<th>No Support</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Index Completers (At 6 Months)</td>
<td>13</td>
<td>4</td>
<td>17</td>
</tr>
<tr>
<td>Index Drop-Outs (Baseline – 6 Months)</td>
<td>0</td>
<td>16</td>
<td>16</td>
</tr>
<tr>
<td>Index Group Total Participants</td>
<td>13</td>
<td>20</td>
<td>33</td>
</tr>
</tbody>
</table>

Another post hoc analysis examines the baseline outcome measures for the participants who dropped-out of the study and those who completed the study. Although there were no statistically significant differences in weight, self-esteem, or motivation
between the participants who dropped-out of treatment and those who completed treatment, there was an observable difference in depression (P=0.037). Specifically, participants who dropped-out of the study had higher depression scores at baseline than those who completed the study (see Table 18).

Table 18.

*Differences in Baseline Measures between Dropouts and Completers*

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Drop-Outs (n=26)</th>
<th>Completers (n=29)</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean (SD)</td>
<td>(Range)</td>
<td>Mean (SD)</td>
</tr>
<tr>
<td>Weight</td>
<td>236.2 (44.2)</td>
<td>(168, 377)</td>
<td>244.4 (44.9)</td>
</tr>
<tr>
<td>Rosenberg Self-Esteem Scale</td>
<td>14.8 (6.0)</td>
<td>(3, 27)</td>
<td>17.5 (6.2)</td>
</tr>
<tr>
<td>Beck Depression Inventory</td>
<td>25.5 (13.0)</td>
<td>(4, 54)</td>
<td>18.8 (10.1)</td>
</tr>
<tr>
<td>Motivation</td>
<td>14.7 (3.3)</td>
<td>(9, 20)</td>
<td>15.8 (3.3)</td>
</tr>
</tbody>
</table>
Discussion

Summary of Findings

In comparing weight loss of participants who received the intervention with those who did not, it was determined that participants receiving weight-loss treatment experienced significantly more weight loss. In comparing participants’ self-esteem at treatment completion, there was no difference between the participants who engaged in the intervention and their counterparts in the control condition.

Trends that approached statistical significance were also identified. Decreased depression among index group participants was noted upon treatment completion. However, comparisons between the index and control groups show that the difference in depression upon treatment completion was negligible. Another trend found that among index group participants, successful weight loss was associated with high self-esteem. Interestingly, index group participants with lower motivation lost weight just as those participants with high motivation. However, comparisons between the groups indicated a trend in which index participants with high motivation lost more weight.

Limited power and low sample size made it difficult to make meaningful statements about several predictions. For example, having support was predicted to improve treatment outcomes. However, the difference in weight loss between participants with support and those without support was not measureable due to low sample size in the no support condition. Other hypotheses regarding comparisons of self-esteem and depression among index group participants were analyzed but results were unreliable due to such limitations (i.e. inadequate power and too few participants in the conditions of interest).
Finally, specific recommendations are made to AHCS. The community mental health agency provided the weight-loss intervention and the results can help to guide good clinical care in the future.

**Significance of the Findings**

**Hypothesis 1.** This hypothesis states that participants engaging in the weight-loss intervention (the index group) will lose more weight, compared with participants not engaging in the weight-loss intervention (the control group). Analyses show that the index group lost a significant amount of weight during the intervention but the control group did not. A comparison of the difference between weight loss in the index group and control group was significant. The index group lost an average of 10 pounds in contrast to an average gain of three pounds in the control group. Among index group participants, weight loss ranged from 7.5 pounds to 19.1 pounds.

These findings show that individuals having a mental health disorder can be successful at weight loss. Participants engaged in the intervention lost significantly more weight than those not participating in the intervention. The participants in this study also reported having multiple physical health problems and almost half were taking antipsychotic medications to control psychiatric symptoms. These factors might lead one to assume that such individuals are not likely to benefit from weight-loss treatment. However, despite many challenges, the individuals in this sample did benefit from treatment and experienced significant weight loss over the course of the intervention.

**Hypothesis 2.** This hypothesis predicts that those participants in the index group who have a support person attending the intervention will lose more weight than those not having a support person in attendance. Index group participants with a support
person lost a significant amount of weight from baseline to treatment completion (over 10 pounds, on average). Within group comparisons between index group participants having a support person and those with no such support did not show a significant difference in weight loss. However, this finding is not reliable. Index group participants without a support person also lost weight but because there were only four people without support, it is impossible to test this hypothesis reliably. Therefore, due to low sample size, there was inadequate power to detect statistically significant differences between the support and no support subgroups, if such differences do, indeed, exist.

**Hypothesis 3a.** This hypothesis predicts that scores on the Rosenberg Self-Esteem Scale will significantly increase for participants in the index group but scores on the Rosenberg Self-Esteem Scale will not change significantly for participants in the control group. However, analyses did not support this hypothesis. There were no statistically significant changes in Rosenberg Self-Esteem Scale scores for either group.

Another finding that was non-significant but of interest nevertheless, was that control group participants reported lower self-esteem at baseline and at the end of six months. One hypothesis is that such participants’ self-esteem was negatively influenced by learning of their assignment in the study. Having control group participants complete baseline measures before notification of assignment within the study may help to mitigate this effect.

It is interesting to note that individuals in the index group reported a mean of 20 on the Rosenberg Self-Esteem Scale with scores ranging from 17 to 23. Such scores are moderately high and are suggestive of a ceiling effect. In other words, because there was not specified exclusion criteria for maximum self-esteem scores at the start of treatment,
individuals’ scores may have been sufficiently high, therefore limiting the measureable treatment effect and thereby rendering this hypothesis inapplicable within this particular sample.

**Hypothesis 3b.** This hypothesis states that within the index group, comparisons of baseline and post-treatment weight will show that participants with normal to high self-esteem will lose significantly more weight upon treatment completion than those with low self-esteem scores. Although analyses show that the normal to high self-esteem subgroup of index participants experienced significant weight loss from baseline to treatment completion, the low self-esteem subgroup did not. A comparison between the two subgroups found no difference in weight loss. However, there were only three participants in the low self-esteem subgroup. These participants also lost weight; however, the low sample size made it impossible to detect significant differences between the low self-esteem and normal to high self-esteem subgroups. Therefore, these analyses are unreliable because of inadequate power and an increased chance of Type II error. Again, this hypothesis may be further evidence that this particular sample entered the study with sufficiently high self-esteem scores to make reliable testing of related hypotheses impossible.

**Hypothesis 3c.** This hypothesis states that scores on the Rosenberg Self-Esteem Scale will significantly increase for index group participants after treatment completion. Analyses show that a 10-pound weight loss was associated with a two-point increase in Rosenberg Self-Esteem Scale scores. However, although these changes identified a trend, the effect was not strong enough to reach statistical significance. Nevertheless, that weight loss was associated with increased self-esteem was interesting because small,
positive changes in self-regard may help facilitate future successes in terms of further weight reduction or maintenance of weight loss. Such changes in self-efficacy may lead to increases in other health behaviors, as well.

**Hypothesis 4a.** This hypothesis predicts that scores on the Beck Depression Inventory will significantly decrease post-treatment for participants in the index group but post-treatment scores on the Beck Depression Inventory will not change significantly for participants in the control group. Comparisons between the index and control groups will show a significant difference in Beck Depression Inventory scores upon treatment completion. The analyses did not support this prediction. However, a non-significant trend for a decrease in depression scores was identified within the index group. This finding may have been the result of a floor effect. In other words, because the study had no inclusion or exclusion criteria regarding Beck Depression Inventory scores, individuals entered the study with sufficiently low depression scores as to preclude reliable analysis of changes in depression over the course of treatment. As a result, whether or not weight loss is associated with significant decreases in depression upon treatment completion remains unclear.

It is interesting to consider how elevations in mood might influence other areas of life. For example, if physical activity implemented during weight-loss treatment is helpful in decreasing depression, will individuals be more apt to adhere to other treatments for different problems? Because the individuals engaged in this study identified as having mental health diagnoses, it is plausible to hypothesize that mild improvements in depression would increase adherence to mental health treatments. It would be interesting to see how such mood elevations might influence other health
behaviors in general. Perhaps this trend is associated with self-efficacy or factors not measured in the present study. However, it has been documented that increased activity elevates mood. If weight-loss treatment mitigates depression, individuals may be more likely to continue behaviors that they have found to be of benefit (i.e. increased physical activity). Therefore, this trend is important in terms of maintaining treatment gains and may have other implications, as well.

**Hypothesis 4b.** This hypothesis states that within the index group, comparisons of baseline and post-treatment weights will show that participants with minimal scores on the Beck Depression Inventory will lose a significant amount of weight upon treatment completion but that participants with mild to severe scores on the Beck Depression Inventory will not. The findings show that depression level did not predict weight loss. Both groups lost significant weight during the intervention. There were no differences in weight loss between participants with minimal depression and participants with mild to severe depression.

These findings were interesting because the idea that depression does not influence weight loss seems somewhat counterintuitive. Participants with moderate to severe depression lost significant amounts of weight during the intervention, just as those reporting minimal levels of depression. Depression is associated with negative thought patterns that can lead individuals to believe they are unable to achieve goals. However, these encouraging results provide evidence to the contrary. Perhaps this study will help others to identify and challenge the negative thinking often associated with depression and low self-efficacy.
**Hypothesis 4c.** This hypothesis predicts that scores on the Beck Depression Inventory will significantly decrease for those participants within the index group after treatment completion. This hypothesis was not supported. There was no association found between weight loss and depression among index group participants. However, this result may be further evidence supporting the previously mentioned floor effect. That is, index group participants entered the study with sufficiently low depression scores that precluded reliable testing of related hypotheses.

**Hypothesis 5.** This hypothesis states that within the index group, comparisons of baseline and post-treatment weight will show that participants with high Weight Loss Readiness Test II Motivation scores will lose a significant amount of weight upon treatment completion but participants with not-high Weight Loss Readiness Test II Motivation scores will not. However, participants with high motivation lost a significant amount of weight during the intervention, as did those participants in the lower motivation subgroup. However, the not-high motivation subgroup reached statistical significance at the 0.05 probability level, rather than the 0.01 level met by the high motivation subgroup. Although there was a trend suggesting a difference in weight loss between the high and the not-high motivation subgroups, the difference was not statistically significant.

**Post Hoc Analyses.** Analyses were conducted to compare characteristics of participants who completed the study with those who did not. The analyses show that participants were similar on all characteristics at baseline, with the exception of depression scores. Those who did not finish the study were significantly more depressed. Findings show higher attrition rates among participants with elevated Beck Depression
Inventory scores at baseline but participants scoring lower on the Beck Depression Inventory at baseline completed the study. One plausible hypothesis regarding this finding is that depression interfered with functioning. Therefore, such participants were less likely to complete the study if depression symptoms made activities of daily living difficult or impossible. An alternative of this hypothesis could apply, as well. For example, individuals with less depression were possibly functioning better and more likely to complete the study successfully.

Another interesting finding shows that all of the index group participants with support completed treatment but only one in five of those without support did so. This finding provides one reason for having support during weight-loss treatment. Although having support was not associated with greater weight loss, having no support was associated with higher attrition rates. Of the participants in the treatment group who had support persons attend part of the intervention with them, 100 percent completed the intervention. However, participants having no such support had only a 20 percent chance of completing the intervention.

Obviously, individuals must sustain regular attendance to benefit from treatment. However, there may be intangible factors or other positive qualities related to support that were not addressed over the course of this particular study. In this instance, having a support person increased the chances of an individual completing the intervention and thus, was associated with successful weight reduction. Therefore, those persons seeking help to lose weight (i.e. starting a weight-loss intervention or program) should be strongly encouraged to recruit a support person.
Relation of the Present Study to Previous Research

Recently, the National Association of State Mental Health Program Directors published a report on the problem of morbidity and mortality among individuals with serious mental illnesses (2006). The report states that increased rates of disease and death among such persons are preventable and are due in part, to disparities in access to healthcare. The report recommends the integration of mental and physical healthcare that emphasizes person-centered wellness, hope, and recovery (2006). The present intervention used a coordinated care approach by involving caseworkers, primary care physicians, and other supports while remaining focused on individual abilities and freedom of choice. Therefore, the present study provides a good example of how the high prevalence of morbidity and mortality among individuals having psychiatric problems can be mitigated within a recovery and wellness model.

It is clear that health promotion is an important factor related to psychiatric rehabilitation among persons with mental illnesses. The integrated model of psychiatric rehabilitation discusses two types of life challenges that persons with mental illnesses often face: the specific disabilities produced by psychiatric disease and the loss of opportunities resulting from discrimination and stigma associated with having a mental health diagnosis (Corrigan, 2003). The present study is relevant to psychiatric rehabilitation because it offers a community-based intervention addressing the common problem of weight gain among a group of individuals diagnosed with mental illnesses. During the intervention, participants were empowered to make healthier choices about nutrition and physical activity and were encouraged to recruit support partners. As a result, individuals experienced significant weight loss. Furthermore, because weight gain
impacts medication adherence, it is logical to assume that individuals participating in such weight-loss programs would achieve more stability in other areas of life (Weiden et al., 2003).

The participants in the present study reported numerous health problems. There were nine cases of diabetes reported in the sample, with 35 percent of the index group and 25 percent of the control group reporting a diagnosis of either Diabetes Type I or Diabetes Type II. Similar to findings among persons with psychiatric disorders, physical health problems are often associated with overweight in the general population. For example, people who are overweight or obese are at a higher risk for developing certain types of cancer (i.e., endometrial, breast, colon) and are at a greater risk for type II diabetes, coronary heart disease and stroke (CDC, 2010; McGinty & Daumit, 2011). Heavier individuals also have a higher risk than do their normal weight counterparts of developing hypertension, high cholesterol/elevated triglycerides, gallbladder disease, osteoarthritis, and sleep apnea (CDC, 2010; McGinty & Daumit, 2011). Likewise, participants in the present study reported having numerous physical health problems. If individuals lose weight, other health risks decrease. The successful outcomes of the present study suggest that overall health improvements among individuals with mental illnesses are possible.

Research suggests that heavier weight correlates with depression and other mental health problems (Hach et al., 2006; Hach et al., 2007; Scott, Bruffaerts et al., 2008). Although participants in the present study reported having a psychiatric diagnosis, many reported having depression, as well. In the index group, 76 percent of participants reported having Major Depressive Disorder and in the control group, 83 percent of
participants reported a Major Depressive Disorder diagnosis. Almost half of participants reported taking antipsychotic medications. It is well documented that antipsychotic medications often cause excessive weight gain and are associated with the development of the metabolic syndrome (Alvarez-Jimenez et al., 2008; Citrome et al., 2005; Desai et al., 2002; Keck & McElroy, 2004; Jones & Carney, 2006). However, having psychiatric diagnoses and taking medication to manage symptoms did not hinder the treatment participants in the present study. Individuals who remained in the intervention were successful in achieving weight loss.

A similar program in London, England, saw comparable, positive results among individuals diagnosed with psychiatric disorders (Ohlsen et al., 2005). The program encouraged positive lifestyle choices and health behaviors. As a result, participants not only lost weight, but also improved in measures of overall physical health and quality of life. The authors state that participants reported improved adherence to mental health treatments, too (Ohlsen et al., 2005). In the present study, participants in the index condition did report minimally decreased depression upon treatment completion. However, the reason for participants’ mood elevation is unclear; psychiatric treatment adherence was not considered a variable of interest and as a result, was not measured. Therefore, it is unknown if participants were more faithfully adherent to taking medication regularly during the course of the study or not.

Another interesting finding of the study was the non-significant association between weight loss and depression. The association found that for every 10-pound weight loss, Beck Depression Scores increased 0.69 points. Statistically, this finding was insignificant and essentially considered to be unimportant. It is also important to note
that this finding could be explained by chance alone. However, the fact that depression ratings increased after weight loss was concerning, given the findings of another weight-loss study (Faulconbridge et al., 2009). Although the majority of the participants in the earlier study reported fewer symptoms of depression, 13.9 percent of the participants reported an increase in symptoms of depression (Faulconbridge et al., 2009). In addition, seven new cases of suicidal ideation were identified above the baseline of 3.6 percent reported across treatment groups (Faulconbridge et al., 2009).

Although none of the participants in the current study reported suicidal ideation or plans, the finding of an increase in Beck Depression Inventory scores is interesting even if it is non-significant. However, cautious interpretation of this particular result must be stressed. Given the fact that this study did not adjust for multiple analyses, this non-significant result could simply be an artifact related to this statistical decision. Even if this were not the case, it would appear that the health benefits of losing 10 pounds would far outweigh an increase in depression equivalent to less than a point on the Beck Depression Inventory.

**Relation of the Present Study to Future Research**

The present study attempts to address an identified need for empirically supported, weight-loss treatments for individuals with mental health diagnoses (Kotwal et al., 2006; McIntyre & Konarski, 2005). Researchers have been vocal regarding the necessity of understanding mediators and moderators (i.e. motivation, social support) associated with weight gain among individuals diagnosed with mental illnesses (LeFevre, 2001; McEvoy et al., 2005; Onyike et al., 2003). Because individuals with psychiatric disorders have shorter life expectancies and often suffer from more general health
problems than those in the general population, there has been a general call for more research on the topic (Atlantis et al., 2009; Coodin, 2001; Kotwal et al., 2006; Miller et al., 2006; Saha et al., 2007). The emphasis on person-centered wellness, hope, and recovery among persons with psychiatric diagnoses must be based upon empirical evidence (Corrigan, 2003). For instance, if the ultimate goal is increased personal empowerment and health, more research about treatments that work is necessary. The present study clearly shows a weight-loss intervention to be successful. Unfortunately, the disparities that exist in healthcare access are other barriers that have not yet been adequately addressed in this population. Further work is also needed in this area, if the goals of the wellness and recovery movement are to be met.

The findings of the present study generate other interesting questions and specific directions for future study. For instance, the relationship between support and attendance is clearly important to weight loss success. Weight loss and attrition or attendance rates are variables of interest impacted by whether or not participants have support. In future studies, having the support person complete standardized measures would be of benefit in terms of understanding this relationship better. For example, it would be interesting to learn if the support person lost weight during the intervention. Furthermore, it would be helpful to quantify, what exactly, support entails within the context of weight-loss treatment.

Another future direction may include multiple studies with participants from populations with homogeneous characteristics. For instance, inclusion criteria related to BMI and psychiatric diagnosis could be useful. Establishing such criteria would help provide important information regarding the effectiveness of weight-loss interventions
with specific populations. Perhaps such trials could be implemented at multiple sites where different populations access services.

It would be interesting to conduct dismantling studies to learn what element of the intervention in the current study was most effective. Similarly, future studies might include a general support group instead of a wait-list control. This would provide information regarding group socialization and isolate the effect of the weight-loss intervention.

In general, the present study supports future research because weight-loss treatment was found to be effective for those participants who completed the intervention. Future studies aimed at helping individuals diagnosed with mental health disorders achieve a better quality of life by addressing weight gain are clearly needed. The results of the current study show that such individuals can be successful at achieving weight loss if given support and the opportunity to access effective, affordable treatments. Perhaps the present study will inspire others to address the needs of such individuals, generate further studies, and thereby, fill the associated gaps in the current literature base.

**Limitations of the Current Study**

The current study has several limitations. The main problems were high attrition rates and low sample size. As a result, several hypotheses were untestable due to limited power. These limitations increased the probability of Type II error. In other words, if there were significant differences among variables, it was more difficult to identify them. Therefore, any subtle treatment effects remained undetected due to small samples, high
attrition rates, and inadequate power. Unfortunately, several research questions were left unanswered because of such limitations.

In many respects, the study involved a homogenous sample. Participants in this study were not diverse in terms of race, ethnicity characteristics, geographic location, and other demographic variables. Most participants were female and almost all participants within the sample identified as Caucasian. As a result, the present study is unable to address diversity issues and provides no new information regarding these matters. This also limits the generalizability of the results because the sample in the present study is not representative of the diversity among individuals having mental health disorders within the general population.

Alternatively, many different mental health diagnoses were represented among participants in the present study. Therefore, the heterogeneity of the sample is another limitation to consider. Because participants did not share a common psychiatric diagnosis, or have related diagnoses from within a given category, the findings of this study are difficult to generalize. Another related limitation is that participants were treated together as one group whether they were obese or they were overweight. It is unknown if a more homogenous group (i.e. a group composed of only overweight individuals) would respond similarly to the intervention.

**Recommendations**

Considering the successful outcomes experienced by participants completing the intervention of interest in the present study, it would be prudent to expand the availability of such weight-loss groups. Specifically, community mental health agencies might offer such programs on an ongoing basis. Psychiatric evaluations might include referrals to
such groups, especially when atypical antipsychotics are used. The treating psychiatrist could recommend this group intervention and discuss it in the context of risks and benefits associated with the medication prescribed.

In the population of the present study, several participants were receiving supportive housing services. For such individuals, caseworkers often participated in treatment as the designated support. However, it may be feasible to train such caseworkers to provide the LEARN program. Incorporating the intervention into the structure of the supportive housing environment would require minimal training and therefore, would be cost effective.

The present study shows that weight-loss interventions can be effective among individuals diagnosed with psychiatric disorders. The current emphasis on recovery and wellness within community mental health agencies highlights a need for these types of programs. Therefore, community mental health agencies should consider adopting organizational policies which encourage systematic referrals, broad provision of services, and quality assurance measures of interventions like the LEARN program.

**Summary and Conclusions**

In summary, the present research study found some very encouraging results. Overweight and obese individuals with current psychiatric diagnoses successfully lost a significant amount of weight during the studied weight-loss intervention. This occurred independently of the individuals’ reported levels of depression and was related to small increases in self-esteem, as well. Another important finding shows that having support is associated with decreased attrition rates, treatment completion, and subsequently, better adherence and treatment outcomes for the individuals involved.
Such evidence may serve to inspire treatment providers and engender hope among those who need it the most: individuals with mental and physical health concerns. Such individuals often lack the motivation required to make difficult behavior changes and others fear risking failure. Persons with psychiatric diagnoses often feel unable to change due to a lack of confidence or a pervasive sense of hopelessness. Yet this population of individuals was able to overcome such obstacles. Participants were successful in accomplishing the challenging task of achieving a healthier weight despite serious physical and mental health problems and while taking medications that cause significant weight gain. Perhaps these results will provide community mental health agencies with the impetus to offer programs similar to the one presently studied and encourage individuals diagnosed with psychiatric disorders to address weight problems earlier by accessing such programs after they become more widely available. In this regard, the present study may empower individuals with mental health problems to take an active role in recovering their health by providing evidence that optimal wellness is achievable.
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Appendix

Group Member Information

First Name:       Last Name:
Address:
Phone Number:    (Home):    (Cell):
Date of Birth:   Gender:
Marital Status:  Married:    Single:    Separated:    Divorced:    Widowed:
Ethnicity:   Caucasian:   African-American:   Latin-American:
            Asian:       Native-American:   Other:
Employment Status:  Employed Full-Time:   Employed Part-Time:
            Not Presently Employed:
Current Living Situation:  Living Alone:    Living with Family (# in Household):
            Living with Unrelated Individuals (# in Household):
Highest Level of Education:  Less than High School:
            High School Graduate or Equivalent:
            Some College:
            College Graduate:
            Graduate School:
Approximate Household Income per Year:  Under $20,000:
            $20,000-$50,000:
            $50,000-$80,000:
            More than $80,000:
Do you smoke cigarettes?  If yes, how much do you smoke per day?
Do you drink alcohol?    If yes, how much do you drink per week?
How did you hear about this program?  Doctor’s Office:   Radio:
            Newspaper:   Your Therapist:
            Other:
Do you have
Medical Assistance?
Medicare?
Any Other Insurance?
Physical Health Condition:

Primary Care Physician:

Do you have high blood pressure?  If yes, what medication are you taking for high blood pressure:

Do you have Type I Diabetes? Type II Diabetes?  If yes, what medication are you taking for diabetes?

Do you have other physical health problems?  If yes, what are these physical health problems?

Your current blood pressure, if known, is:  
Your current glucose level, if known, is:  
Your current cholesterol level, if known, is:

How often do you get physical examinations?  Less than once a year:  
                                          Once a year:  
                                          More than two times a year:

Mental Health Condition:

Have you ever been diagnosed with Major Depressive Disorder?
Have you ever been diagnosed with Bipolar Disorder?
Have you ever been diagnosed with Schizophrenia?
Have you ever been diagnosed with Schizoaffective Disorder?
Have you ever been diagnosed with other mental health problems?  If yes, what are these mental health problems?

Are you taking any medication for your mental health problems?  Yes:  No:  
If yes, what are you taking?

Psychiatrist:
How often do you see your psychiatrist?  Once a week:  
                                             Once every other week:  
                                             Once a month:  
                                             Less than once a month:

Mental Health Counselor/Therapist:
How often do you see your counselor/therapist?  Two times a week:  
                                             Once a week:  
                                             Once every other week:  
                                             Once a month:  
                                             Less frequent than once a month: