EARLY ONSET OF OBESITY AND TREATMENT OUTCOME IN A BEHAVIORAL WEIGHT LOSS PROGRAM

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ABSTRACT

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The present study examines whether self-efficacy, binge/emotional eating, body image, self-esteem, self-reported difficulties and outcome expectancies mediate the relationship between onset of obesity and percent of body weight lost/change. Forty-four sedentary, obese adults participated in a six-month behavioral weight loss program (BLWP) and six-month maintenance phase. At baseline, early onset of obesity was associated with increased BMI levels. However, early onset was not associated with percent weight lost/change during the treatment or maintenance phases and was not consistently associated with any other psychological or physiological outcome. Findings and methodological limitations are discussed.
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INTRODUCTION

The increasing prevalence of obesity in the United States is a well-documented threat to national health. It is has been shown to be a contributor to five of the ten leading causes of death in the United States and is approaching smoking as the number one cause of preventable death (Peeters, Barendregt, Willekends, Mackenbach, Al Mamun, & Bonneux, 2003). “Obesity” refers to excess body fat. It is commonly expressed in a ratio of weight (in kilograms) to height (in meters) squared called body mass index (BMI). One in three Americans is currently obese (BMI >30 kg/m²) and almost two-thirds are overweight (BMI 25 - 29.9 kg/m²). According to the 1999 to 2000 National Health and Nutrition Examinations Survey (NHANES), in the year 2000, an estimated 64% of Americans over 20 years of age were overweight and 30% were obese. According to NHANES, the overweight category increased from 47% to 64% between the years 1976 to 2000 while the obese category increased from 15% to 31%, thus more than doubling. Individuals are thus becoming obese in America at a faster rate than individuals who are becoming overweight (Devlin, Yanovski, & Wilson, 2000; NHANES; Perri & Fuller, 1995).

Similarly, the proportions of overweight children and adolescents have been increasing dramatically, with one in five children currently being identified as such (Dietz, 1998a). For children and adolescents, “overweight” refers to the risk of developing obesity and is estimated by the age and sex-specific 95th percentile of BMI of the population. Children between the 85th and 95th percentile are considered at “risk for overweight” while those above the 95th percentile are considered “overweight” (NHANES). Between 1963 and 1970, the National Health Examination Surveys (NHES) II and III found that 5% of children and adolescents age 6 through 19 were overweight. In contrast, results from NHANES in 2000 found the current prevalence to
be 15%, thus tripling in the last couple of decades (Berkowitz & Stunkard, 2002; Sothern & Gordon, 2003).
CHAPTER I LITERATURE REVIEW

*Obesity as a Health Risk*

The increasing incidence of obesity in the population is a large public health concern due to its association with chronic disease and adverse health outcomes (Gable & Lutz, 2000; Guo & Chumlea, 1999; Manson, Skerrett, & Willett, 2002; Poirier & Eckel, 2002; Serdula et al., 1993). Approximately 280,000 adult deaths in the United States each year are related to obesity due to its association with several serious medical conditions. For example, about one-third of obese individuals are hypertensive. It has also been found that the longer one remains obese, the more likely they are to develop hypertension. Those who are 20% or more overweight are twice as likely to have hypertension as those of normal weight, especially for individuals whose distribution of body fat is centralized or concentrated in the abdominal region (Bjorntorp, 1988; Hall et al., 2003; Pi-Sunyer, 2002) The increased prevalence of hypertension in obese individuals increases their risk for strokes (Pi-Sunyer, 2002). Obesity is also associated with dyslipidemia (increases in low-density lipoprotein (LDL) cholesterol and triglyceride levels, and decreases in high-density lipoprotein (HDL) cholesterol levels), which may ultimately lead to greater coronary heart disease risk (Manson, 2002; Pi-Sunyer, 2002). Cardiovascular disease (CVD), which includes angina pectoris, nonfatal myocardial infarction, and sudden death, is more likely to occur in obese individuals as well. The likelihood of CVD is doubled for those with a BMI of 25.0 to 28.9 and 3.6 times for those with a BMI greater than 29 compared to those with a BMI below 21 (Pi-Sunyer, 2002).

The length of time obesity is maintained in an individual as well as the severity of the obesity is highly associated with increased risk for developing type 2 (non-insulin-dependent)
diabetes mellitus. Thus, as BMI increases, insulin resistance is more likely to occur which contributes to the pathogenesis of diabetes. The risk for diabetes has been observed to be two times as high in mildly obese, five times in moderately obese, and 10 times in severely obese individuals (Pi-Sunyer, 2002). There is also an association between obesity and a greater prevalence of gallbladder disease as obese individuals are three to four times more likely to have gallstones than non-obese individuals (Fraquelli, Pagliarulo, Colucci, Paggi, & Conte, 2003; Pi-Sunyer, 2002).

According to a prospectively studied cohort of more than 900,000 U.S. adults (participants in the Cancer Prevention Study II), increased body weight is also associated with increased death rates due to cancer (Calle, Rodriquez, Walker-Thurmond, & Thun, 2003). The participants (free of cancer at enrollment) were followed for 16 years. Potential confounds such as age, race, and smoking status were controlled for. During the study, 57,145 deaths from cancer occurred. Participants with a BMI of at least 40 had death rates from all cancers combined that were 52% higher for men and 62% higher for women than the rates in those of normal weight. Based on these results, Calle et al. (2003) estimated that overweight and obesity in the U.S. could account for 14% of all deaths from cancer in men and 20% of those in women. Obesity and overweight are also associated with increased risk for osteoarthritis, sleep apnea, female reproductive problems, renal disease, liver disease, and gout (Dechaud et al., 1998; Felson et al., 1988; Fogel et al., 2003; Hall, 2002; Hall, 2003; Korner, 2001; Lake et al. 1997; Pi-Sunyer, 2002). Overall, mortality is moderately increased for overweight individuals and highly increased for obese individuals.

With weight losses as little as 5% to 10%, medical benefits are observed such as reduced blood pressure, reduced serum triglycerides, increased HDL cholesterol, reduced total
cholesterol, reduced LDL cholesterol, and reduced blood glucose in patients with type 2 diabetes (Devlin, Yanovski, & Wilson, 2000). In addition, weight loss for obese individuals can decrease the likelihood of developing serious illnesses in the future.

Childhood obesity is associated with increased rates of mortality and morbidity. Being overweight in childhood is also associated with the development of hyperlipidemia, sleep apnea, orthopedic complications, glucose intolerance, hepatic steatosis, and choledhiasis (Dietz 1998a; Hill & Trowbridge, 1998; Magarey, Daniels, Boulton, & Cockington, 2003; Serdula et al., 1993; Wisemandle, Maynard, Guo, & Siervogel, 2000).

**Psychosocial Consequences of Obesity**

In addition to health problems related to obesity, there are many psychological and psychosocial difficulties that accompany the condition. For both children and adults alike, prejudice against the overweight and obese has become progressively institutionalized (Puhl & Brownell, 2002; Wadden, Womble, Stunkard, & Anderson, 2002). Such prejudice has been observed in populations from children to health care professionals. In a longitudinal study following 10,039 non-overweight and overweight adolescents, Gortmaker, Must, Perrin, Sobol and Dietz (1993) found a number of significant differences between the two groups. After following the children for seven years, the overweight females had completed significantly less school, had significantly lower household incomes, and were significantly less likely to be married than their non-overweight peers despite similar intellectual levels of the two groups. The overweight males were also less likely to be married than were the non-overweight individuals. Numerous additional studies have addressed discrimination in employment, medical and health care, and educational settings (Puhl & Brownell, 2002).
According to Seidell and Tijhuis (2002), obese individuals also have a significantly reduced “health-related quality of life,” referring to increased suffering and limitations in work and social functioning associated with illness. Using data from 109,076 respondents in the 1996 Behavioral Risk Factor Surveillance System, Ford, Moriarty, Zack, and Mokdad (2001) examined the relationship between self-reported BMI in the general adult population of the United States and five health-related quality of life measures developed by the Center for Disease Control. They found that those with a BMI greater than 30 kg/m² and those with a BMI less than 18.5 kg/m² reported significantly more impaired quality of life compared to those with a self-reported BMI between 18.5 kg/m² and 25 kg/m².

Despite research demonstrating discrimination, lower socioeconomic status and diminished health-related quality of life, previous studies have not consistently found that obesity is associated with higher rates of psychopathology. Thus, it is possible that the effects of obesity in regards to psychological suffering vary across individuals, with some experiencing no difficulty and others experiencing some impairment. Within the obese population itself, certain factors have been found to predict a higher prevalence of psychopathology, including individuals who engage in binge eating and/or weight cycling. Certain demographic risk factors, such as being female, adolescent, and severely overweight differentiate individuals within the obese population who may suffer from psychological impairment (Friedman & Brownell, 2002; Wadden et al., 2002).

For those with chronic obesity dating back to childhood, there may be many psychosocial difficulties related to their weight (Dietz, 1998b). Previous research has indicated that the negative impact of obesity during the formative years on psychosocial adjustment is considerable (Mellin, Neumark-Sztainer, Stor, Ireland, & Resnick, 2002). In a study by Mills and
Andrianopoulos (1993) the Symptom Checklist (SCL-90-R; Derogatis, Yevzeroff, & Wittelsberger, 1975) was administered to 37 obese adults in an outpatient weight loss treatment. The findings indicated that patients with early onset obesity reported a significantly greater frequency and significantly higher level of emotional distress and psychopathology than late onset patients. According to Dietz (1998b), obese children are often targets for discrimination due to their size. One example study by Richardson, Goodman, Hastorf, and Dornbusch (1961) found that 10-11 year old children prefer other children with many other types of handicaps to children who are overweight. Children also equate obesity with negative characteristics such as laziness and sloppiness from the early ages of 6 to 10 years old. Thus, obese children often develop negative self-images that may persist well into adulthood (Dietz, 1998b).

**Difficulties in Weight Maintenance**

In addition to increased health risks, research suggests that maintenance of weight loss among obese adults is difficult, making obesity resistant to treatment. Those who complete behavioral weight loss programs lose approximately 9% of their total body weight but regain about half of that lost weight within one year and almost all of that within five years (Perri, 2002; Wing & Klem, 2002). Once obesity has developed in adulthood, the probability of achieving an ideal body weight through voluntary weight loss is low and the probability of maintaining that weight loss is even lower (Serdula et al., 1993). Research on individuals who are successful at long term weight maintenance indicates that they are characterized by continued consumption of a low calorie, low fat diet, high levels of physical activity, and careful monitoring of their weight (Wing, 2002). The complex etiology of obesity has most likely contributed to the limited success that researchers have had in treating adult obesity long term. For example, variables such as reduced metabolic rate due to decreased body mass and exposure
to an environment full of highly caloric foods are plausible deterrents to long-term weight loss (Devlin, Yanovski, & Wilson, 2000; Wing, 2002). Thus, strategies have developed that focus on preventing the development of obesity in childhood (Gable & Lutz, 2000).

The Relationship between Childhood and Adulthood Obesity

While onset of obesity can occur at any age, many obese adults have been obese since childhood. The risk of adult obesity is at least twice as high for obese children as for non-obese children (Dietz, 1998a; Magarey et al., 1993; Serdula et al., 1993). A retrospective study of 73,532 women who were all members of the TOPS club (Take Off Pounds Sensibly) found that of 40-to-49 year old women who were more than 100% overweight, 65% of them were obese as children as compared to 31% of women less than 20% above their ideal weight (Hartz & Rimm, 1980; Rimm & Rimm, 1976). A review of current literature conducted by Serdula et al. (1993) revealed that 26% to 41% of obese preschool children were obese as adults, and 42% to 63% of obese school-age children were obese as adults. These findings indicate that the risk of adult obesity was 2.0 times as high for obese preschool children and 2.6 times as high for obese school-age children than that of non-obese children, respectively. Similarly, a study of 555 children and adolescents also found a significant association between BMI in childhood and adulthood. The probability of becoming overweight at age 35 was much higher for 18 year olds with BMI’s above the 60th percentile than those below this cutoff (Guo & Chumlea, 1999). Thus, body weight and composition in childhood may be important determinants of overweight and obesity in adulthood with obese children being more likely to mature into obese adults. The risk of adult obesity was also found to be greater among children who were at more extreme levels of obesity and who had obese parents (Magarey, et al., 2003; Serdula et al., 1993).
**Heterogeneity of Obesity**

Recently, there has been an increased interest in the heterogeneity of obesity and subsequently in developing meaningful classifications to facilitate new approaches to research and treatment of the condition. According to Allison and Heshka (1993), nosologies allow for the better understanding of disorders, the prediction of their course, and their response to treatment. More specifically, identifying factors at baseline that differentiate the successful from the unsuccessful in weight loss attempts and maintenance could aid in predicting which individuals may need specialized treatment in future interventions. In spite of the recognition that patient-treatment matching approaches may be important for treatment success, many current programs present few options to participants and generally cannot be adapted to their individual characteristics to reduce poor treatment outcome (Teixeira et al., 2002). While several attempts have been made to isolate predictors of treatment and follow-up success for weight control programs, results have been largely mixed and inconclusive (Dennis & Goldberg, 1996; Stotland & Zuroff, 1991; Wadden & Letizia, 1992). A few recent studies have examined the issue of age of onset of obesity as a baseline predictor of poor treatment outcome. While findings are still inconclusive, some results indicate that individuals with early onset (beginning before age 18) obesity may have different treatment needs from those with a late onset (beginning at or after age 18; Bonato & Boland, 1987; McCrone, Dennis, Tomoyasu, & Carroll, 2000).
CHAPTER II THE PRESENT STUDY

*Early Onset versus Late Onset Obesity*

Previous studies have focused mainly on the issue of onset of childhood obesity and its association with adult obesity. However, little research has been conducted examining the effects of early onset obesity and treatment outcome. One previous study (McCrone et al., 2000) with postmenopausal women compared early versus late onset obesity on various psychological, physiological, and behavioral factors. Early onset women were found to be higher in BMI, waist circumference, amount of attempted diets (during which they had lost more weight in any single attempt than the late onset group), and rates of depression and anxiety (McCrone et al., 2000; Mills & Andrianopoulos, 1993; Stunkard & Rush, 1974). In addition, the lifetime maximum weights were higher for the early onset group and were achieved earlier in life while their lifetime lowest adult weights were higher and occurred at an older age than the late onset group. The early onset group was also more likely to binge eat and use eating as a coping mechanism. Finally, the early onset group was more certain about their ability to lose weight but not about their ability to maintain weight loss.

Additionally, Bonato and Boland (1987) conducted a 10-week weight loss intervention with 83 obese women. No pretreatment variables predicted 1-year follow-up status. However, work status, age of onset of obesity, and ratio of overcome urges to total urges to overeat were predictive of weight loss from the end of treatment to the follow-up. To assess ratio of overcome urges to total urges to overeat, participants were asked to report daily frequency of urges to overeat and daily frequency of urges to overeat that were overcome.
In a review of predictor variables, Weiss (1977) found that age of onset predicted participants’ success in a weight control program (early onset predicted poorer treatment outcome). McReynolds and Lutz (1976) correlated age of onset and the proportion of life overweight with weight loss among 54 women, and found that both were significantly correlated with weight loss ($r = +0.44$ and $r = -0.047$ respectively, $p < 0.01$ in each case). Mullins (1958) reported that 62% of the early onset participants responded poorly to treatment (defined as less than 30% of excess weight lost), compared to 39% of the adult-onset group. Of those with a “good” result (weight loss to within 10-20% of ideal weight), 14% were adult onset and none were early onset. There were equal amounts (25%) of early and adult-onset participants who performed moderately (loss of more than 30% of excess weight but did not reduce their weight to within 20% of ideal weight). Finally, 13% of the early onset group and 22% of the adult-onset group had unknown outcomes at the completion of the study.

These results indicate that participants with an early onset of obesity may have poorer long-term treatment outcome (i.e., they were not able to maintain posttreatment weight loss). Thus, previous studies suggest that individuals with early onset obesity may have more difficulty with, and may be ultimately less successful in, weight loss programs and subsequent weight maintenance periods when compared to those who are late onset.

Previous findings suggest that individuals with early onset obesity may possess specific treatment needs in order to address physiological and psychological differences that distinguish them from their late onset peers (Allison & Heshka, 1991; Bonato & Boland, 1987; McCrone et al., 2000; Mills & Andrianopoulos, 1993; Stunkard & Burt, 1967; Stunkard & Rush, 1974). Previous studies examining the performance of early onset groups have primarily relied on retrospective, self-report measures of weight history and weight loss (Ashwell, 1975; McCrone
et al., 2002). Retrospective measures in the area of weight history may lead to bias in that the participant may skew information in a more positive or negative light regarding past weight loss failures and successes. Thus, it would be valuable to determine how early versus late onset obesity is associated with treatment outcome during a current weight loss attempt rather than in self-reported, past weight-loss attempts.

In order to better determine the association between onset of obesity and treatment outcome, this study examined the performance of both participants with either early and late onset obesity in a behavioral weight loss program (BWLP) during which treatment outcome was directly and systematically evaluated. Previous research suggests that persons with early onset versus late onset obesity differ significantly in behavioral and psychological factors such as self-efficacy, binge eating/emotional eating, body image, and self-esteem.

**Self-Efficacy**

Self-efficacy theory is an integrative cognitive-social learning framework that has shown to be useful in various treatment contexts. According to Bandura (1997), the term self-efficacy refers to confidence in one’s ability to perform a behavior required to produce a desired outcome. Self-efficacy judgments have been shown to predict outcomes in a variety of addictive behaviors such as problem drinking (Burling, Reilly, Moltzen, & Ziff, 1989) and smoking (Stuart, Borland, & McMurray, 1994). The concept of self-efficacy has also been applied to weight loss. Previous research suggests that participants who report greater confidence in their ability to follow treatment guidelines lose more weight than those who are less confident, with correlation coefficients generally in the range of .25 to .35 (Bagozzi & Edwards, 2000; Leon & Rosenthal, 1984; Stotland & Zuroff, 1991; Wadden & Letizia, 1992). In a study by Stotland and Zuroff (1991) with 41 female participants in a BWLP, dieting self-efficacy was operationalized with
reference to the goals of controlling eating in individual eating episodes, performing various
dieting behaviors, or reaching dieting goals. Goal-based dieting self-efficacy was a significant
predictor in success of losing weight in a 10-week BWLP. Likewise, a study by Dennis and
Goldberg (1996) assessed perceived difficulty in controlling overeating during negative affect
and in social contexts and found that those who reported the strongest self-efficacy beliefs
regarding their ability to lose weight at baseline lost significantly more weight than those with
low self-efficacy.

According to McCrone et al. (2000), early onset individuals have struggled with obesity
for a longer period of time and thus have likely engaged in more weight loss attempts than
persons with late onset obesity. While self-efficacy regarding the ability to initially lose weight
did not appear to be affected by early versus late onset obesity, McCrone et al. (2000) found
decreased self-efficacy in the ability to maintain weight losses. This finding suggests that while
early onset of obesity groups may feel confident in their initial ability to lose weight, they may
have reduced self-efficacy in their ability to maintain weight losses. This pattern of losing weight
but failing to maintain such losses has the potential effect of reducing self-efficacy for long-term
weight maintenance (Clark, Ruggiero, Pera, Goldstein, & Abrams, 1993; Cutter et al., 1996;
Foreyt et al., 1995). Conversely, Clark and King (2000) found no change in self-efficacy among
41 obese participants in their study who experienced weight loss and subsequent weight gain.
However, participants in this study consisted of weight regainers who voluntarily returned (18%
of total estimated weight regainers in the study) for additional treatment. It is possible that these
participants differed from those who did not return for additional treatment in ways that might
have affected self-efficacy scores. Thus, the study by Clark and King (2000) may not be
representative of most weight regainers and their subsequent self-efficacy levels.
Motivations for Overeating

It is widely accepted that human eating behavior is influenced by emotional state (i.e. anxiety, joy, depression, sadness and other emotions; Canetti, Bachar, & Berry, 2002; Geliebter & Aversa, 2003). Although the relationship between eating and emotion differs according to the particular characteristics of individuals and their specific emotional states, emotions have been identified as reliable antecedents to eating behavior. According to Patel and Schlundt (2001), both negative and positive emotions increase food intake compared to a neutral emotional state. Thus, emotional eating may be defined as eating behavior that occurs simultaneously with strong emotion, which is either positive or negative in nature.

Dennis and Goldberg (1996) found that, compared to non-obese women, obese women tend to eat more in response to emotional arousal and to have more negative self-images. Emotional eating is found to occur more frequently in the obese population such that overweight individuals report engaging in more emotional eating than normal-weight and underweight individuals (Canetti, Bachar, & Berry, 2002; Geliebter & Aversa, 2003). Emotional eating patterns may contribute to weight gain in the overweight and obese populations.

Emotional eating has also been found to affect weight loss success in BWLPs. A year long study with 187 adults compared changes in reported frequency of emotional eating and weight loss (Blair, Lewis, & Booth, 1990). Among individuals exhibiting high levels of emotional eating, those who were able to reduce their emotional eating the most also lost more weight. Conversely, among individuals exhibiting low baseline levels of emotional eating, those who reported an increase in emotional eating were less successful at approaching their target weight. A study by Leon and Rosenthal (1984) attempted to identify a number of behavioral, personality, and attitudinal factors among 47 adults predictive of weight loss outcome at the end...
of a BWLP and at an 8-month follow-up. Posttreatment and follow-up outcome was significantly related to eating in response to emotional arousal. Thus, it appears as though emotional eating may contribute to poor weight control over periods of at least one year.

According to McCrone et al. (2000), women with an early onset of obesity reported significantly greater negative affect eating (the use of eating as a coping mechanism for feelings of depression, anger, and anxiety) and eating in response to emotional arousal rather than hunger. Thus, research suggests that those with an early onset of obesity may be more likely to overeat when experiencing both negative and positive emotions than late onset individuals.

**Binge Eating**

Binge eating is defined by the fourth edition of the *Diagnostic and Statistical Manual of Mental Disorders* as eating, in a discrete period of time, an amount that is larger than most others would consume in similar circumstances, and is accompanied by a sense of loss of control over what or how much one is eating. Approximately one-third of participants in weight loss programs regularly engage in binge eating behavior for which they do not compensate by purging (Wadden, et al., 2000; Yanovski, 2002). Although some studies report similar decreases in body weight in response to weight loss treatment for binge eaters and non-binge-eaters, several studies suggest that greater binge eating is strongly related to obesity, maladaptive diet behavior, psychological distress, high rates of attrition from weight loss programs, and poor weight loss maintenance (Marcus, Wing, & Hopkins, 1988; Yanovski, 2002). According to Yanovski (2002), binge eating is associated with more severe obesity. Indeed, binge eating correlates positively with body weight among obese persons (Telch, Agras, & Rossiter, 1988).

A study by Safer, Lively, Telch, and Agras (2002) examined factors related to relapse in participants with binge eating disorder following the completion of 20 weeks of dialectical
behavior therapy. Thirty-two women who had originally achieved abstinence from binge eating were assessed at a 6-month follow up. Results from this study indicated that one of the largest effect sizes for predicting relapse of binge eating during the follow-up period was early onset of binge eating. Specifically, this study found that early binge-eating onset was associated with a 53.8% relapse rate at 6-month follow up compared to an 11.7% relapse rate for the late onset group. Thus, for those who began binge eating at earlier ages, treatment was less successful at preventing relapse long term.

These findings may be relevant given that previous research indicates that those who binge-eat are more likely to report childhood obesity (Stunkard, 2002). A multisite study using 1,785 participants from 18 different weight control programs found that participants diagnosed with binge eating disorder (BED) had an earlier onset of being overweight (Spitzer et al., 1992). The average age of onset of overweight for the subjects with BED (N = 502) was 15.9 as compared to 19.5 for those without BED (N = 1,151). Similarly, in a longitudinal study of adolescent girls, binge eating predicted earlier onset of obesity (Stice, Presnell, & Spangler, 2002). According to Stice et al. (2002), elevated body mass at an early age may increase the likelihood of dieting behavior in children and adolescents due to body dissatisfaction, appearance overvaluation, and perceived pressure to be thin. Ultimately, this dieting behavior may lead to binge eating, which is likely to persist into adulthood. Thus, early onset of obesity may be associated with increased binge eating behavior. Indeed, McCrone et al. (2000) found that the characteristics of eating behaviors were significantly different between persons with early versus late onset of obesity. One-half the early onset group in this study scored over 18 on the BES (suggestive of difficulty with binge eating) compared to one-third of the late onset group. This suggests that those who have an early onset of obesity may engage in binge eating more often
than those who are late onset obesity, making weight loss efforts less successful and less likely to be sustained.

*Body Image*

According to Rosen (2002), obese persons are more prone to distort their body size, more dissatisfied and preoccupied with their physical appearance, and more avoidant of social situations than non-obese individuals. For example, obese individuals are more likely to report concerns with areas of their bodies unrelated to overall weight such as facial features, facial or head hair, skin blemishes, teeth, and breast size and shape (Rosen, 2002). In a study of 68 obese females, Collins et al. (1983) reported that obese patients perceived themselves as bigger than they actually were. When median weight was used to dichotomize the group, the less obese patients perceived themselves as 19% larger than they actually were, and the more obese patients perceived themselves as 24% larger than they actually were. Another study examined differences in judgments of body shape between participants of normal weight (control), participants with anorexia, participants with bulimia, and obese participants (Collins et al., 1987). Significant differences were found between the mean judgments of body shape in the control participants and each of the clinical groups. More specifically, significant differences were found between the means of the control participants and the obese participants in that obese participants were more likely to overestimate their actual body size. Cash (2002) explains this disparagement as stemming from experiences of weight stigmatization during childhood, adolescence, and adulthood.

Although little research is available on the development of negative body image in obesity, maladaptive coping responses to stigmatization predict more negative body image (Rosen, 2002). Myers and Rosen (1999) surveyed 146 obese participants about the frequency
with which they encountered stigmatization and employed different forms of coping. Results indicated that more frequent exposure to stigmatization was associated with greater psychological distress, more attempts to cope, and more severe obesity. In addition, maladaptive coping strategies were associated with greater distress.

Several studies have assessed changes in body image in obese persons during weight loss treatment and reported significant improvements in those who lost an average of at least 22 kg (about 50 lbs.; Sarwer & Thompson, 2002). Although little research has been conducted regarding the reciprocal effects of weight loss and body image, it appears that higher body dissatisfaction at baseline predicts poorer treatment outcome during weight control treatment and reduced weight maintenance (Carels et al., 2003; Kiernan, King, Kraemer, Stefanick, & Killen, 1998; Rosen, 2002; Teixeira et al., 2002). In 112 overweight and obese middle-aged women who participated in a four-month BWLP, higher body dissatisfaction was one of the strongest significant baseline predictors of poor treatment outcome (Teixeira et al., 2002).

According to Rosen (2002), being obese by early adolescence sets the stage for negative body image and predicts body dissatisfaction in adulthood. Presumably, obese adolescents become more self-conscious than normal weight adolescents about their physical appearance because of the negative stereotypes about obesity and the high number of thin body images that our media endorses. Appearance-related teasing and criticism in youth can have lasting effects on body image which can guide assumptions or schemas about the psychosocial importance of looks (Cash, 2002; Stice, 2002). Previous research reveals that individuals with early-onset obesity report greater body image disturbance than individuals with late-onset obesity (Brownell & Stunkard, 1980; Bruch, 1981; Stunkard & Burt, 1967; Stunkard & Mendelson, 1967). For example, Stunkard and Mendelson (1967) found that those who experienced prepubescent onset
of obesity were more frequent sufferers of body image dissatisfaction. Although Faubel (1989) noted that previous studies regarding early onset and body image were based upon methodologically flawed designs, more recent research has continued to support a discrepancy between body image ratings in late versus early onset obesity groups (Adami et al., 1998; Grilo, Wilfley, Brownell, & Rodin, 1994). Thus, negative body image appears to be more pervasive and common among those with early onset obesity, further decreasing their chances of being successful at initial weight loss and subsequent maintenance in a BWLP.

Self-Esteem

Current treatments aimed at increasing levels of self-esteem in obese persons before focusing on weight reduction reflect mental health professionals’ recognition that positive self-esteem may be an important precursor to effective weight management (Cash, 1997; Ciliska, 1998). Recognizing that weight loss is not the only way to achieve more positive self-esteem, professionals are intervening to ameliorate low self-esteem that may interfere with the practice of adequate self-care. A study by Nir and Neumann (1991) with 116 women in a 10-week weight reduction program found that participants with low self-esteem lost significantly less weight than participants with medium and high self-esteem scores. Likewise, during a 15- to 47-month follow-up of 66 out of the original 116 participants, Nir and Neumann (1995) found that participants low in self-esteem regained significantly more weight than participants who were medium and high in self-esteem scores.

Similarly, a 9-month weight loss intervention conducted by Dennis and Goldberg (1996) assessed self-efficacy and self-esteem and their association to treatment outcome. Two major self-efficacy categories emerged through factor analysis of Q sorts: “assureds” and “disbelievers.” Participants who were goal directed, independent, persistent, and confident in
their weight control abilities were labeled as “assureds.” Participants who had wavering faith in their ability to control their body weight were labeled “disbelievers.” The assureds reported significantly greater self-esteem at baseline in comparison to the disbelievers. The assured group also lost significantly more weight by the end of treatment than the disbelievers. While self-esteem was not directly linked to treatment outcome in this study, its results reveal the presence of higher self-esteem in those who ultimately lost more weight. Although a relatively small amount of research has been conducted in the area of self-esteem and its implications for treatment outcome, there is some evidence that it may be an important predictor for weight loss success.

A study by Grilo et al. (1994) revealed that the frequency of being teased about weight and size while growing up was negatively correlated with evaluation of one’s appearance and positively correlated with body dissatisfaction during adulthood. They found that self-esteem covaried significantly with body image measures. Thus, the experience of being obese as a child or adolescent may lead to decreased self-esteem in adulthood in addition to negative body image. Because lowered self-esteem appears to have negative implications for weight loss success, early onset individuals may more likely to have difficulties in losing and maintaining weight.

*Early onset, nutrition, physical activity, difficulties, and outcome expectancies*

No studies have been conducted on the actual energy expenditure or energy intake of early onset versus late onset individuals during weight loss attempts. Current research on the topic has relied on weight loss as an outcome measure rather than assessing participants’ objective and subjective performance in the areas important for weight loss success (such as amounts of daily physical activity and caloric intake; Bonato & Boland, 1987; McCrone et al., 2000). Previous research has indicated that early onset individuals are more likely to have poor
treatment outcome in comparison to late onset individuals, thus knowledge of why this occurs is an important step for future studies. It would be valuable to assess whether performance in the areas of eating and/or exercise were of particular difficulty for an early onset group during a BWLP. It is possible that those with an early onset of obesity are less likely to decrease their caloric consumption adequately during a weight loss attempt than those of a late onset of obesity. It also may be that those with an early onset of obesity have a lower level of physical activity throughout a weight loss attempt than those with a late onset of obesity. These differences could help to explain poor treatment outcome in the early onset group.

In addition, a measure of early onset individuals’ beliefs regarding their own performance could indicate any subjective feelings of difficulty or low self-confidence in decreasing energy intake and/or increasing energy expenditure in the early onset group. It is possible that those with an early onset of obesity would report more difficulties and lower self-confidence in the areas of eating and exercise and low than those in the late onset group.

Summary

The prevalence of obesity in the United States is currently recognized as a serious threat to national health. Prejudice and discrimination against the obese is pervasive in our society as well, creating many negative social implications for obese children and adults. There is an increased risk that obese children will develop into obese adults. In addition, obese children and adults are at increased risk for numerous medical problems and health-related quality of life is seriously reduced for those who suffer from obesity. Unfortunately, success in the maintenance of weight loss has been largely disappointing, leading professionals to explore new options for treatments that may improve outcomes. Specifically, attempts to identify baseline characteristics among weight loss program participants that predict difficulty and/or success have been made in
order to better individualize treatments. One such factor is the age of onset of obesity. Limited research suggests that those who have struggled with obesity from a young age may differ on psychological, physiological, and behavioral factors that interfere with successful weight loss and maintenance compared to those who developed obesity later in life.

The present study examined the differences between early and late onset groups’ weight changes during the 6-month treatment and 6-month maintenance phases of a BWLP. It also examined how the two groups differed in regards to self-efficacy, binge/emotional eating, body image, self-esteem and self-reported difficulties and self-confidence in the areas of eating and exercise. Finally, it examined how early and late onset individuals differed in terms of energy intake and expenditure during participation in a BWLP. Previous research has consistently shown that these factors are associated with treatment outcome in BWLPs. Therefore, the purpose of this investigation was to conduct a mediational analysis in order to determine whether a relationship between individuals’ onset of obesity and percent of body weight lost was mediated by self-efficacy, binge/emotional eating, body image, self-esteem, self-reported difficulties and outcome expectancies in the areas of eating and exercise, and energy intake/expenditure during the treatment phase of a BWLP. This study’s purpose was also to conduct a mediational analysis in order to determine whether a relationship between individuals’ onset of obesity and percent body weight change was mediated by self-efficacy, binge/emotional eating, body image, self-esteem, self-reported difficulties and outcome expectancies in the areas of eating and exercise, and energy/intake during the maintenance phase of a BWLP.

**Hypotheses**

1. Early onset and beginning weight
Numerous studies have observed that those who have been obese since childhood enter weight loss programs with significantly higher baseline BMI values than individuals who developed obesity later in life (Allison & Heshka, 1993; Bonato & Boland, 1987; Faubel, 1989; Genender et al., 1982; McCrone et al., 2002; Mills & Andrianopoulos, 1993). Thus, I hypothesized that the early onset group would have significantly higher BMI values than the late onset group.

2. Early onset and percentage of body weight lost

There is some evidence to suggest that those with an early onset of obesity lose significantly less weight than those with a late onset of obesity during weight loss attempts (McReynolds & Lutz, 1976; Mullins, 1958; Weiss, 1977). I hypothesized that the early onset group would lose a significantly lower percentage of their total body weight than the late onset group upon completion of a 6-month BWLP.

3. Psychological factors and weight loss during treatment

A number of studies suggest that individuals with an early onset of obesity are psychologically, physiologically and behaviorally different than individuals with a late onset of obesity in ways that ultimately affect their performance in weight loss attempts (Allison & Heshka, 1991; Bonato & Boland, 1987; McCrone et al., 2000; Mills & Andrianopoulos, 1993; O’Neil et al., 1981). Thus, I hypothesized that the following variables would mediate the relationship between onset of obesity and percent of body weight lost in the treatment phase of a BWLP.
a. High levels of self-esteem are significantly related to better treatment outcome in weight loss interventions as well as long-term maintenance (Dennis & Goldberg, 1996; Nir & Neumman, 1991, 1995). Self-esteem has also been found to covary with body image (Grilo et al., 1994). Thus, I hypothesized that the early onset group in this study would have lower baseline self-esteem than the late onset group. I also hypothesized that lower baseline self-esteem would mediate the relationship between onset of obesity and percent of body weight lost during the treatment phase. Mediation is defined as occurring if: 1) the independent variable (i.e., onset of obesity) is associated with the dependent variable (i.e., percent body weight lost), 2) the independent variable is associated with the potential mediator (i.e., self-esteem), 3) the potential mediator (i.e., self-esteem) is associated with the dependent variable (i.e., percent body weight lost), and 4) the onset of obesity and percent total body weight lost relationship becomes greatly attenuated or nonsignificant when the influence of the mediator is partialled out of the relationship.

b. Binge eating is also associated with negative treatment outcomes. Previous research has found this behavior to predict difficulty losing and maintaining weight losses in BWLPs (Marcus, Wing, Hopkins, 1988). In addition, those who have an early onset of obesity are more likely to engage in binge eating and emotional eating than those of a late onset (Stice, 2002). Therefore, I hypothesized that the early onset group in this study would report more binge eating at baseline than the late onset group. I also hypothesized that higher baseline binge eating would mediate the relationship between onset of obesity and percent of body weight lost during the treatment phase.

c. Emotional eating is associated with poor treatment outcome according to previous research (Blair, Lewis, & Booth, 1990; Leon & Rosenthal, 1984). Those who have an early onset
of obesity are more likely to engage in emotional eating (McCrone et al., 2000). Therefore, I hypothesized that the early onset group in this study would report more emotional eating at baseline than the late onset group. I also hypothesized that higher baseline emotional eating would mediate the relationship between onset of obesity and percent of weight lost during the treatment phase.

d. Previous research suggests that individuals who possess a negative body image at baseline during weight control treatment will have poorer treatment outcome and reduced weight maintenance (Kiernan et al., 1998; Rosen, 2002; Teixeira et al., 2002). Previous research has also shown that there are greater levels of body dissatisfaction among those with an early onset of obesity than those with a late onset (Teixeira, 2002). Thus, in this study, I hypothesized that those in the early onset group would have more negative baseline body image than those in the late onset group. I also hypothesize that more negative baseline body image will mediate the relationship between onset of obesity and percent of body weight lost during the treatment phase.

e. On measures of difficulties and outcome expectancies in the areas of eating behavior and physical activity, I hypothesized that early onset of obesity would report greater perceived difficulty and lower self-confidence than the late onset of obesity group throughout the treatment phase. I also hypothesized that greater difficulty and lower self-confidence would mediate the relationship between onset of obesity and percent of body weight lost during the treatment phase.

f. Self-efficacy has predicted weight loss success in several studies (Bagozzi & Edwards, 2000; Leon & Rosenthal, 1984; Stotland & Zuroff, 1991; Wadden & Letizia, 1992). However, there has not been research to support that those with an early onset of obesity have lower self-efficacy regarding their weight loss attempts. Rather, it is during the maintenance phase that self-
efficacy is reportedly affected (McCrone, et al., 2000). Therefore, I hypothesized that the early onset of obesity group would not have significantly lower baseline self-efficacy than the late onset of obesity group during the treatment phase of a BWLP.

4. Early onset and maintenance of weight loss

It has also been suggested that for those with an early onset of obesity, maintenance of weight losses following the treatment phase is poor compared to those with a late onset of obesity (Bonato & Boland, 1987; McCrone et al., 2000). I therefore hypothesized that those with an early onset of obesity would be less likely to maintain weight losses during the 6-month maintenance phase than those with a late onset of obesity.

5. Psychological factors and weight maintenance

Previous research suggests that individuals with an early onset of obesity are psychologically and behaviorally different than individuals with a late onset of obesity in ways that ultimately affect their ability to maintain weight losses (Bonato & Boland, 1987; McCrone et al., 2000). Thus, I hypothesized that the following areas would mediate the relationship between onset of obesity and percent body weight change during the 6-month maintenance phase of a BWLP.

a. Results from previous studies indicate that those who have an early onset of obesity will have lower self-efficacy during the maintenance phase of a BWLP (McCrone et al., 2000). I therefore hypothesized that the early onset group would have significantly lower posttreatment self-efficacy than the late onset group. I also hypothesized that lower posttreatment self-efficacy
would mediate the relationship between onset of obesity and percent of body weight change during the maintenance phase.

b. I hypothesized that the early onset group would have higher posttreatment binge eating, and lower posttreatment self-esteem when compared to the late onset group. I also hypothesized that higher posttreatment binge eating, more negative posttreatment body image, and lower posttreatment self-esteem would mediate the relationship between onset of obesity and percent of body weight change during the maintenance phase.

c. Emotional eating and body image were assessed only at baseline. However, I hypothesized that higher amounts of baseline emotional eating and more negative baseline body image would both mediate the relationship between onset of obesity and percent of body weight change during the maintenance phase.

d. I hypothesized that the early onset group would have higher amounts of self-reported difficulties and lower self-confidence in the areas of eating and exercise throughout the BWLP. I also hypothesized that higher difficulties and lower self-confidence during treatment would mediate the relationship between onset of obesity and percent of body weight change during the maintenance phase.

6. Early onset, nutrition, and physical activity

There have been no studies investigating whether early onset of obesity individuals’ energy intake and energy expenditure differs from those with a late onset of obesity within treatment. An additional purpose of this study was to compare energy intake (calories consumed as recorded in nutrition diaries) and energy expenditure (calories expended as recorded using
Caltrac accelerometers and physical activity logs) in early and late onset individuals who participated in a behavioral weight loss program.

a. I hypothesized that early onset individuals would report a smaller absolute change in calories consumed from baseline to posttreatment than the late onset group. Additionally, I hypothesized that this small change in caloric consumption would mediate the relationship between onset of obesity and percent of body weight lost both during treatment phase and percent of body weight change during the maintenance phase.

b. I hypothesized that early onset individuals would report a lower level of weekly energy expenditure than late onset individuals over the course of the treatment phase. Additionally, I hypothesized that the lower level of energy expenditure would mediate the relationship between onset of obesity and percent of body weight lost during the treatment phase and percent of body weight change during the maintenance phase.
CHAPTER III METHOD

Participants

Forty-four obese, sedentary adults were randomly assigned to a 6-month BWLP or BWLP + stepped care (see Study Design below). The total final sample in this investigation was 38 participants as four failed to complete the 6-month intervention and two additional participants failed to complete posttreatment questionnaires. Participants were recruited through local advertisements (e.g. newspapers) and campus email at a Midwestern university. Individuals were included in the investigation if they were: a) obese (BMI ≥ 30 kg/m²); b) sedentary (i.e., not participating in a program of physical conditioning two or more times per week for at least 20 minutes per session); c) willing to accept random assignment; d) non-smokers; e) able to provide informed consent; and f) approved for participation by their primary physician. Participants were excluded from participation if they had: a) past or current cardiovascular disease (e.g. myocardial infarction, stroke) determined from medical history; b) musculoskeletal problems that would prevent participation in moderate levels of physical activity (e.g., self-reported osteoarthritis) c) a history of insulin dependent diabetes (self-reported); d) resting blood pressure greater than or equal to 160/100 mgHg (assessed during screening); and e) a life-limiting or complicated illness including cancer, renal dysfunction, hepatic dysfunction, or dementia. The project was approved by the human subjects review board and the procedures were followed without deviation.

Study Design

The data collection in this study was part of a larger investigation on weight loss and physical activity in which half of the participants were randomly assigned to a BWLP or BWLP + stepped care (Carels et al., 2004a). In the stepped care condition, performance-based criteria
dependent on the participants’ progress toward pre-established weight loss goals were used to
determine stepped-up treatment for participants in the BWLP + stepped care groups. Eligibility
for stepped care was assessed during four pre-established weight loss assessments throughout
treatment. A minimum weight loss goal of 8% of total body weight by the end of treatment was
established for each participant.

Prior to beginning the BWLP (program description below), participants completed
assessments of height, body weight and fat, physical activity, and nutrition. All assessments were
again obtained at the conclusion of the six-month intervention. During the intervention,
participants made daily recordings of the calories they expended from activity (see Caltrac
accelerometers) and the duration of planned physical activity in a physical activity diary. Also,
participants carried temptation and lapse diaries for one week prior to the beginning of the
BWLP. Participants completed a variety of questionnaires at the beginning of the intervention
including the Rosenberg Self-Esteem Scale (Rosenberg, 1965), the Multi-dimensional Body
Self-Relations Questionnaire (Cash, 1994), the Binge Eating Scale (Gormally, Black, Daston, &
Rardin, 1982), the Exercise Self-Efficacy Questionnaire (Bandura, 1997), and the Eating Self-
Efficacy Scale (Glynn & Ruderman, 1986). At the end of the intervention, the participants again
completed the questionnaires, including a weight history questionnaire.

**Intervention**

Participants completed a 20-session weight loss and physical activity intervention (24
weeks including holidays and scheduling conflicts), modified from the LEARN program
(Brownell, 2000). The LEARN program is an empirically supported approach to weight
management and physical activity with five components: Lifestyle, Exercise, Attitudes,
Relationships, and Nutrition (Wadden, Foster, & Letizia, 1994). The goals of the intervention are
to achieve weight loss by gradually increasing energy expenditure through physical activity while progressively decreasing energy intake through permanent lifestyle changes. The program emphasizes: (a) self-monitoring of eating behavior, (b) controlling stimuli associated with eating, (c) physical activity, (d) nutrition education, (e) modifying self-defeating thoughts and negative emotions associated with dieting and body image, (f) setting realistic goals, (g) relationships, and (h) relapse prevention and weight maintenance. Additional information on the LEARN program can be found at the website: [www.thelifestylecompany.com](http://www.thelifestylecompany.com). A clinical health psychologist and one or two graduate students in clinical psychology administered the weekly sessions in small groups (i.e., 7-12 participants). Participants met weekly for 75-minute sessions and were weighed at the end of each session. Participants eligible for additional counseling received problem solving therapy that was based on D’Zurilla’s et al. five stage problem solving method (D'Zurilla, 1999; D'Zurilla, Nezu, & Maydeu-Olivares, 2002). To assess participants’ maintenance of weight loss, weight assessments were conducted at 4 weeks, 8 weeks, 16 weeks, and 24 weeks posttreatment. Detailed descriptions of the treatment interventions and the physiological measures collected in the investigation or can be provided upon request (Carels et al., 2004a).

**Measures**

*Assessment of Body Weight and Body Composition.* Body weight to the closest 0.1 lb. was assessed on a weekly basis at the end of each session using a digital scale (BF-350e; Tanita, Arlington Heights, IL) and height to the closest 0.5 inch was measured in inches using a standard balance beam scale height rod at baseline. Height and weight were later converted to kilograms and meters to calculate BMI (kg/m²). Although change in body weight is commonly used to measure weight loss success (Jeffery et al., 2000), weight loss expressed as a percentage of initial
body weight reduces the likelihood that heavier participants will be categorized as more successful while losing a smaller percentage of their total body weight than lighter participants. In this investigation, percent change in body weight was defined as the percent change in body weight from pretreatment baseline to post-treatment (i.e. baseline weight minus weight at the end of treatment divided by baseline weight).

Onset of Obesity. Previous studies examining onset of obesity have relied on self-report instruments of weight history to assess the age at which participants became obese (Bonato & Boland, 1987; Faubel, 1989; Genender et al., 1982; McCrone et al., 2000; Stunkard & Burt, 1967). These studies defined early onset of obesity as occurring before age 18 (McCrone et al., 2000), 18 and younger (Genender et al., 1982; Stunkard & Burt, 1967) or as under 17 (Faubel, 1989). Wing, Nowalk, Epstein, Scott, and Ewing (1985) examined methodological issues in assessing age for onset of obesity. Results indicated that twice as many participants were classified as early onset obese when the division was based on the question, “Were you overweight as a child or teenager?” than when the division was based on self-reported weight at age 21. However, it was not possible to determine which method was more reliable or valid as self-report was not compared to objective indices by Wing et al. (1985) or any other previous research.

For the purposes of this study, a weight history questionnaire using both of the methods described by Wing et al. (1985) as well as two additional methods was designed in order to determine participants’ age at onset of obesity (see Appendix A). First, onset of obesity was assessed dichotomously using the first method described by Wing et al. (1985) by asking participants, “Overall, would you consider yourself as having been overweight any time before
age 18.” Conversely, participants who did not endorse being overweight before age 18 were coded as late onset.

The questionnaire uses the second method described by Wing et al. (1985) by asking participants to approximate their height, weight, and age at their “first time being overweight.” Participants were then dichotomized into responses of 18 years of age and younger (early onset of obesity) and responses of 19 years or older (late onset of obesity). Although similar to the second method described by Wing et al. (1985), this study used age 18 rather than age 21 as an early onset of obesity cutoff point. In order to determine onset of obesity during childhood, a measurement called BMI-for age was used. BMI-for-age is a gender and age specific measure that has been found to be a valid measure of pediatric overweight that is independent of age for both sexes (Pietrobelli et al., 1998). According to the Center for Disease Control and Prevention (CDC), standardized percentile curves of BMI-for-age are used to identify underweight and overweight in children. The 95th percentile corresponds to a BMI of 30, which is the marker for obesity in adults. For the purposes of this study, a score that fell above the 95th percentile was considered obese for those 18 years of age and younger.

Third, participants’ age of onset of obesity was assessed using three questions: “At what childhood age do you first remember being overweight,” “At what teenage age do you first remember being overweight,” and “At what age would you say you began having a weight problem.” The responses to these three questions were combined into a continuous variable expressing participants’ self-reported age of onset.

Finally, the fourth method assessing of onset of obesity was to group participants into one of three categories based on their self-reported age at the first time being overweight. The first
category ranged from ages 0-12 years (childhood onset), 13-18 years (adolescent onset), and 19 years and above (adult onset).

**Assessment of Self-Efficacy.** The Exercise Self-Efficacy Scale (EES) and the Eating Self-Efficacy Scale (ESES) were used to assess self-efficacy. The EES is a unipolar 18-item scale developed by Bandura (1997; see Appendix B). Using a 100-point scale, participants rate the strength of their efficacy beliefs. The scale ranges from 0 (cannot do) to 100 (certainly can do) in intervals of 10 (Bandura, 1997). Participants rate how confident they are that they can perform exercise under various circumstances that may interfere with intentions to exercise such as “during a vacation” or “when I am feeling depressed” (Bandura, 1997). Psychometric evaluation of this questionnaire was conducted in a study with 249 Korean adults with chronic illnesses (Shin, Jang, & Pender, 2001). The instrument was translated into Korean by researchers and reviewed by an expert Korean panel who were asked to review each item and assess the appropriateness of the translation for comprehension. The scale had good internal consistency ($\alpha = .94$). Test-retest reliability was calculated on 14 participants within a two-week interval ($r = .77$). Construct validity of the scale was confirmed through a factor analysis without rotation, which revealed one factor. For the purpose of this investigation, baseline and posttreatment data from the total scale score of the EES were used.

The ESES is a 25-item scale that measures difficulty in overeating in various psychological states and social situations (Glynn & Ruderman, 1986; see Appendix C). Using a 7-point scale, participants rate the likelihood that they would have difficulty controlling their overeating in various situations. The scale ranges from 1 (no difficulty controlling eating) to 7 (most difficulty controlling eating). Glynn and Ruderman (1986) conducted five studies in order to develop items for the ESES and to examine its psychometric properties and predictive
validity. The internal consistency, test-retest reliability, and construct validity of the ESES were assessed in a study of 484 female undergraduates. A principle components factor analysis revealed three factors. Two reflected eating as a function of (1) socially acceptable circumstances (SAC), and (2) negative affect (NA). The third factor consisted of 3 items accounting for 7% of the variance. Internal consistency was good with an alpha of .92 for the entire ESES scale, .94 for the negative affect subscale, and .85 for the socially acceptable circumstances subscale. The test-retest reliability of the ESES over a 7-week period was also acceptable (r = .70). The convergent validity of these scales was supported by a positive correlation to Restraint Scale scores (a similar construct; r = .47). Changes in self-efficacy scores were positively correlated with weight change in 32 participants in a weight control program (r = .35) confirming the predictive validity of the ESES. For the purpose of this investigation, baseline and posttreatment data from the ESES were used.

Assessment of Emotional Eating. Temptation/lapse diaries were used to assess individuals’ overeating during times of negative or positive mood (see description below). Thus, emotional eating was defined as any time a participant reported a positive or negative mood during a dietary temptation or lapse in dieting. Participants’ responses in the temptation/lapse diaries were coded into two categories: positive/negative mood, or no mood reported/neutral mood. Out of a participant’s total number of dietary temptations/lapses, the percentage of those events during which a participant reported experiencing a negative or positive mood were calculated. Therefore, emotional eating was reflected by the percentage of total temptations/lapses that the participants engage in while simultaneously reporting negative/positive affect.
An electronic diary was used to examine temptations and lapses in dieting for seven days prior to the BWLP (Carels, et al., 2004a). Palm Visor handheld computers (Palm Inc, Milpitas, CA) outfitted with Pendragon Forms Software (Pendragon Software Inc., Libertyville, IL) were used in this investigation. Participants were required to initiate electronic dietary recordings in response to dietary temptations or lapses. Temptations were defined as, “A sudden urge to break your diet (e.g. overeat, eat a forbidden food, ect.). Lapses were defined as, “An incident where you felt that you broke your diet (e.g., overate, ate a forbidden food, ect.).” Each diary entry contained a space for recording date and time of entry.

Mood preceding the temptation or lapse was also assessed with the question, “describe your mood preceding the temptation” (e.g., frustrated, nervous, bored, content, restless, in control, sad, happy, stressed, tired, relaxed, and other). Additionally, the possibility of a second mood was assessed with the question, “were you experiencing another mood prior to the temptation?” Participants also completed sections regarding activities, location, and coping in response to the temptation or lapse. The temptation and lapse diaries were used at baseline only.

Emotional eating was determined by coding the existence of both positive and negative emotions during a dietary lapse or temptation. Additionally, different components of emotional eating were examined by coding only those instances in which both positive and negative emotions occurred only during temptations, both positive and negative emotions only during lapses, negative emotions during a temptation or lapse, negative emotions only during temptations, and negative emotions only during lapses. Finally, emotionally eating was examined using the negative affect subscale of the ESES (Glynn & Ruderman, 1986). This subscale reflects eating as a function of negative affect.
Assessment of Binge Eating. The Binge Eating Scale was used to assess binge eating (Gormally, Black, Daston, & Rardin, 1982; see Appendix D). It is a 16-item self-report questionnaire assesses various dimensions of binge eating, including behavioral, emotional, and cognitive areas. Participants choose from 3 or 4 statements per question the one that best describes them. Statements indicating more severe binge eating receive higher scores on the BES. According to Gormally et al. (1982), the BES has adequate validity. The BES was significantly correlated with the Cognitive Factor Scale, which was developed by the authors to assess two cognitive phenomena thought to be associated with binge eating: the tendency to set unrealistic standards for a diet and low efficacy expectations for sustaining a diet \((p< .001)\). The BES also has adequate internal consistency \((\alpha= .89)\). In a study by Timmerman (1999), 56 binge eaters completed the BES and 28-day food records. BES scores were found to be reliably associated with self-reported subjective and objective binge eating severity, with correlations ranging from .39 to .40 \((p< .05)\). For the purpose of this investigation, baseline and posttreatment data from the BES were used.

Assessment of Body Image. Body Image was assessed using the Multidimensional Body Self-Regulations Questionnaire-Appearance Scales (MBSRQ-AS; Cash, 1994; see Appendix E). The MBSRQ-AS is a well-validated, attitudinal assessment of body image. The MBSRQ-AS (34 items) is a shortened version of the original 69-item scale. The MBSRQ uses a response format ranging from 1 \((\text{definitely agree})\) to 5 \((\text{definitely disagree})\). The scales measure participants’ attitudes toward their physical appearance, fitness, and health. The MBSRQ was developed and standardized from the national body image survey based on 996 males and 1070 females (Cash, Winstead, & Janda; 1985, 1986). The scale has adequate internal consistency with alphas ranging from .70 to .91 for men and from .73 to .90 for women. Test-retest reliability was conducted over
a one-month interval with alphas ranging from .71 to .89 for men and from .74 to .91 for women. Numerous studies have confirmed the convergent, discriminant, and construct validities of the MBSRQ (Cash, 1994). The questionnaire consists of seven factor subscales and three special multi-item subscales: (a) The Body Area Satisfaction Scale, (b) the Overweight Preoccupation Scale, and (c) the Self-Classified Weight Scale. A cross-validated principal-components analysis was conducted with 2,052 individuals who participated in a national survey on body image. This analysis supported the conceptual components of the MBSRQ, revealing the following seven factor subscales: (a) Appearance Evaluation, (b) Appearance Orientation, (c) Fitness Evaluation, (d) Fitness Orientation, (e) Health Evaluation, (f) Health Orientation, and (g) Illness Orientation (Brown, Cash, & Mikulka, 1990). The MBSRQ-AS version, which was used for this study, includes 5 of the original 7 scales: Appearance Evaluation, Appearance Orientation, Overweight Preoccupation, Self-classified Weight, and the Body Areas Satisfaction Scale. For the purpose of this investigation, baseline data from the MBSRQ-AS were used.

Assessment of Self-Esteem. Self-esteem was assessed using the Rosenberg’s Self-Esteem Scale (RSE; Rosenberg, 1965; see Appendix F). The scale consists of ten items on a 4-point scale that address self-evaluation of characteristics, abilities, self-satisfaction, self-respect, and dignity. While items are scored as either agreement or disagreement, the scale ranges from strongly agree to strongly disagree. The final self-esteem score is the average of the ten items. The RSE has received more psychometric analysis and empirical validation than any other self-esteem measure (Gray-Little et al., 1997) and has been shown to be a reliable and valid measure of global self-worth. When McCarthy and Hoge (1982) examined 2,000 students in grades 7-12, internal consistency coefficients ranged from an alpha of .74 to .77. The RSE demonstrated adequate validity when compared to the Coopersmith Self-Esteem Inventory (Coopersmith,
1967), with correlations between the two scales ranging from .46 to .68 (Francis & Wilcox, 1995; Watson, Hood, Morris, & Hall, 1985). In a study conducted with 28 adolescents test-retest reliability was found to be .85 over a two-week period (Silber & Tippett, 1965). For the purpose of this investigation, baseline and posttreatment data from the RSE were used.

Assessment of Outcome Expectancies and Difficulties. Outcome expectancies and difficulties with eating and exercise were assessed weekly throughout the intervention. Each week, participants completed a 13-item questionnaire designed to assess outcome expectancies and difficulties in achieving eating and physical activity goals (Carels et al., 2004b). Eleven items were assessed on a 9-point scale (1 = strongly disagree to 9 = strongly agree). Three items assessing self-confidence asked participants to respond to the statement, “I feel confident that I can”: 1) achieve my weight loss goals, 2) achieve my eating goals, and 3) achieve my exercise goals. Two items assessing self-control asked participants to respond to the statement, “I have self-control over”: 1) my eating habits, and 2) my physical activity habits. Four items asked participants to respond to the statement, “I have difficulty”: 1) modifying my eating habits, 2) following my physical activity plan, 3) keeping track of my eating habits, 4) keeping track of my physical habits. Two items asked participants to respond to the statement, “I was unable to”: 1) eat in a manner that I would have liked, 2) be physically active in a manner that I would have liked. These were rated on a 6-point scale (no problems; 1-2 times; 3-4 times; 5-6 times; 7-8 times; >8 times) participants were asked: “I was unable to”: 1) eat in a manner I would have liked; and 2) be physically active in a manner that I would have liked.

The scale was scored by computing a total value for the 13 items. This method of scoring produced good internal consistency (α = .94). For the purpose of this investigation, averages of
participants’ responses on the difficulties and outcome expectancies questionnaire were computed across the 20-week treatment phase.

*Caltrac Accelerometer and Physical Activity Logs.* An assessment of weekly exercise participation was determined for all participants. Caltrac accelerometers were used to measure kilocalories expended from daily physical activity. The Caltrac assesses vertical acceleration and converts the measurement into caloric expenditure (Fehling, Smith, Warner, & Dalsky, 1999). Each participant was taught how to wear and operate the device. Participants recorded total calories from activity from readings of the Caltrac accelerometers in a daily activity diary. Participants also recorded the type and duration of daily planned physical activity in a daily activity diary. Weekly estimates of the total time spent in planned physical activity were derived. One participant failed to complete a physical activity diary. For the purpose of this investigation, averages of participants’ physical activity expenditure were computed across the 20-week treatment phase.

*Assessment of Caloric Intake.* To obtain an independent assessment of caloric intake, participants recorded all food intake over 4 days (2 weekdays, 2 weekend days) at baseline and post-treatment. Research suggests that 4-day food diaries can provide reliable group estimates of habitual caloric intake (Gay, 2000; Schlundt, 1988). Verbal and written instructions on food measurement estimation were provided to participants prior to recording. Estimates for total calories were derived using Nutribase 2001 Professional Nutrition software (Phoenix, Arizona). Nutribase 2001 contains the complete contents of the USDA Nutrient Database for Standard Reference, Release 13. Eight participants failed to complete dietary assessments. For the purpose of this investigation, differences between baseline caloric intake and posttreatment caloric intake were computed for each participant.
Data Analyses

Four methods (including those used in Wing et al., 1985) for determining onset of obesity status were used in this investigation. This includes assessing onset of obesity: 1) dichotomously by their answer to the question, “Overall, would you consider yourself as having been overweight any time before age 18?” 2) continuously by self-reported age of onset, 3) in three groups based on whether they reported themselves overweight for the first time between ages 0-12 years (childhood), ages 13-18 years (adolescence), and ages 19 and above (adulthood), and 4) dichotomously based on BMI for age calculated by self-reported age, weight, and height.

t-tests, Chi square analyses, analyses of variance, and correlations were used to examine the association between demographic characteristics (i.e. age, gender, race, income, and education) and onset of obesity.

Separate regression analyses and analyses of variance were also used to examine the relationship between onset of obesity and baseline BMI values. Additionally, paired sample t-tests were used to examine the main effects of treatment on psychological and physiological factors.

Although mediational analyses were proposed in the current investigation, they were not conducted due to a non-significant relationship between the independent variables and dependent variables. Mediation would have been analyzed consistent with the procedure outlined by Baron and Kenny (1986). Mediation is defined as occurring if: 1) the independent variable (i.e., onset of obesity) is associated with the dependent variable (i.e., percent body weight lost), 2) the independent variable is associated with the potential mediator (e.g. body image), 3) the potential mediator (e.g. body image) is associated with the dependent variable (i.e., percent body weight lost), and 4) the onset of obesity and percent total body weight lost relationship becomes greatly
attenuated or nonsignificant when the influence of the mediator is partialled out of the relationship.

Separate regression analyses and analyses of variance were used to determine whether early onset of obesity was associated with percent of weight lost at the completion of the treatment phase. Similar analyses were used to examine whether early onset of obesity was associated with baseline self-efficacy, emotional eating, binge eating, body image, self-esteem, self-reported difficulties and outcome expectancies in the areas of eating and exercise throughout the BLWP, caloric intake differences from baseline to posttreatment, and calorie expenditure throughout the BWLP. Finally, separate regression analyses were used to determine if the psychological and physiological variables were associated with percent of weight lost at the completion of the treatment phase.

Separate regression analyses and analyses of variance were used to determine whether early onset of obesity was associated with percent of weight change at the completion of the maintenance phase. These analyses were also used to examine whether onset of obesity was associated with posttreatment self-efficacy, binge eating, self-esteem, baseline emotional eating, baseline body image, self-reported difficulties and outcome expectancies in the areas of eating and exercise throughout the BLWP, caloric intake differences from baseline to posttreatment, and calorie expenditure throughout the BWLP. Finally, separate regression analyses were used to determine if the psychological and physiological variables were associated with percent of weight lost at the completion of the maintenance phase.
CHAPTER IV RESULTS

Demographic and Baseline Differences. There were no statistically significant differences between individuals in the BWLP and the BWLP + stepped-care groups on any demographic or baseline characteristics. Therefore, the two groups were combined for all analyses. See Table 1 for baseline and demographic characteristics.

T-tests, Chi-squares, analyses of variance, and correlations were conducted to examine the association between demographic characteristics and onset of obesity. No demographic factors were associated with age of onset (under any age of onset assessment criteria) with the exception of gender when assessing age of onset dichotomously by self-reported age, weight, and height. There were significantly more women than men in the late onset group compared to the early onset group. Gender was added as a covariate in all analyses using this method of assessment.

Main Effects of Treatment on Psychological and Physiological Factors. Paired sample t-tests were used to determine whether treatment had an effect on psychological and physiological factors. Eating self-efficacy and self-esteem increased significantly from baseline to posttreatment, \( t(33) = 5.4, p < .01 \) and \( t(34) = -3.6, p < .01 \), respectively. Binge eating, eating during times of negative affect (ESES; Glynn & Ruderman, 1986), and caloric intake decreased significantly from baseline to posttreatment, \( t(26) = 4.1, p < .01 \); \( t(33) = 4.91, p < .01 \); and \( t(29) = 6.10, p < .01 \), respectively. However, there was no significant difference from baseline to posttreatment in exercise self-efficacy.

Paired t-tests also indicated that participants’ weight in pounds decreased \( (M = 17.2 \text{ lbs.}, SD = 11.9 \text{ lbs.}) \) significantly from baseline to posttreatment, \( t(37) = 8.90, p < .01 \), but increased \( (M = -3.1 \text{ lbs.}, SD = 9.0 \text{ lbs.}) \) significantly from posttreatment to the end of the maintenance
phase, $t(34) = -2.00$, $p < .05$. When baseline was compared to the end of the maintenance phase, weight remained significantly lower ($M = 15.4$ lbs., $SD = 16.2$ lbs.) at the end of the maintenance phase, $t(34) = 5.61$, $p < .01$.

Onset of Obesity Measured Continuously and Outcome Measures. When self-reported age of onset of obesity was assessed continuously, separate linear regression analysis indicated that higher baseline BMI was significantly associated with an earlier onset of obesity, $R^2 = .29$, $F(1, 35) = 14.17$, $p < .01$. Given that baseline BMI could plausibly be associated with many psychological factors associated with eating and physical activity (e.g., eating self-efficacy), all analyses using this method to assess onset of obesity were conducted with and without baseline BMI in the regression model. Onset of obesity was not associated with percentage of weight change at the end of the treatment phase or maintenance phases, respectively. See Table 2.

Baseline binge and emotional eating, body image, exercise self-efficacy, average outcome expectancies, caloric intake differences, and average calorie expenditure were not significantly related to onset of obesity. Also, the different components of emotional eating (i.e., positive and negative mood during temptations and lapses, positive and negative mood during a temptation or lapses individually, negative mood during temptations and lapses, and negative mood during a temptation or lapse individually) were not significantly associated with onset of obesity. Decreased levels of self-esteem, $R^2 = .17$, $F(1, 32) = 6.4$, $p < .05$; decreased eating self-efficacy, $R^2 = .14$, $F(1, 31) = 4.8$, $p < .05$; and increased eating during times of negative affect (ESES; Glynn and Ruderman, 1986), $R^2 = .19$, $F(1, 32) = 7.3$, $p < .05$, were significantly associated with earlier onset of obesity. However, when baseline BMI was added to the regression, the relationship between eating self-efficacy and onset of obesity was no longer significant, $\beta = -.30$, $p = .06$. 
Posttreatment binge eating, exercise self-efficacy and self-esteem were not significantly related to onset of obesity. However, posttreatment eating during times of negative affect (ESES; Glynn & Ruderman, 1986) was significantly associated with earlier onset of obesity, $R^2 = .16$, $F(1, 34) = 6.22, p < .05$, and there was a trend towards decreased posttreatment eating self-efficacy, $p = .08$.

Post hoc bivariate correlations indicated no significant association between age of onset and changes in eating and exercise self-efficacy, binge eating, self-esteem, or eating during times of negative affect from baseline to the end of treatment.

**Onset of Obesity Measured Dichotomously Based on Self-Report and Outcomes.** Analysis of variance was performed to determine whether individuals who reported onset of obesity before age 18 had significantly higher baseline BMI values than those who reported an onset of obesity at age or older. Baseline BMI was significantly higher in the early onset group, $F(1, 36) = 5.95, p < .05$. Thus, all analyses using this method to assess onset of obesity were conducted with and without baseline BMI added as a covariate. Onset of obesity was not significantly associated with the percentage of weight change at the end of the treatment or maintenance phases, $F(1, 36) = .01, p = .92$ and $F(1, 33) = .10, p = .75$, respectively. See Table 3.

Self-esteem, eating self-efficacy, and exercise self-efficacy were not significantly different between groups. Binge eating, body image, and eating during times of negative affect (ESES; Glynn & Ruderman, 1986) were also not significantly different between groups. Similarly, there were no significant differences between groups in the different components of emotional eating. Finally, average outcome expectancies, caloric intake differences and average calorie expenditures were not significantly different between the two groups.
Posttreatment binge eating, eating/exercise self-efficacy, and self-esteem were not significantly associated with onset of obesity in this method of assessment.

Post hoc repeated measures analysis revealed that there were no significant differences between groups in their changes of eating and exercise self-efficacy, binge eating, eating during times of negative affect (ESES; Glynn & Ruderman, 1986), or in self-esteem. However, upon controlling for baseline BMI, early onset group showed a significantly larger reduction in binge eating than those in the late onset group, $F(1, 22) = 4.34, p < .05$.

Onset of Obesity Measured Dichotomously by BMI Rank and Outcomes. Given that there were significantly more women in the late onset group when assessing onset of obesity dichotomously by BMI rank (i.e., derived from BMI calculated by self-reported age, weight, and height), gender was used as a covariate in all analyses. It is worth noting that BMI rank could only be computed for participants who completed the necessary information to compute this variable ($n = 16$). Therefore, the sample size is severely limited for these analyses. An analysis of variance determined that baseline BMI was not significantly different between the two groups, $F(1, 14) = .26, p = .62$. See Table 4. Additionally, there was not a significantly different percent of weight change at the end of the treatment or maintenance phases between groups, $F(1, 14) = .76, p = .40$, and $F(1, 13) = 1.04, p = .32$, respectively.

Analyses of variance were also conducted to determine if baseline psychological variables, average outcome expectancies, caloric intake differences, and average calorie expenditure were significantly different between the onset of obesity groups. Self-esteem, eating self-efficacy, and exercise self-efficacy were not significantly different between groups. Binge eating, body image, and eating during times of negative affect (ESES; Glynn and Ruderman, 1986) were not significantly different between groups. None of the different components of
emotional eating were significantly different between groups. Similarly, average outcome expectancies, caloric intake differences and average calorie expenditures were not significantly different between groups.

Posttreatment binge eating, eating/exercise self-efficacy, and self-esteem were not significantly associated with onset of obesity in this method of assessment.

Post hoc repeated measures analyses revealed no significant differences between onset of obesity groups in their changes of eating and exercise self-efficacy, eating during times of negative affect (ESES; Glynn & Ruderman, 1986), or in self-esteem. However, the late onset group showed a significantly larger reduction in binge eating than those in the early onset group over the course of treatment, $F(1, 9) = 5.44, p < .05$.

*Early Onset of Obesity Measured in Three Groups and Outcomes.* Participants were placed into one of three categories based on whether they reported themselves overweight for the first time between ages 0-12 years (childhood), ages 13-18 years (adolescence), and ages 19 and above (adulthood) for this method of assessing onset of obesity. Analysis of variance revealed that baseline BMI was significantly different between onset of obesity groups, $F(2, 34) = 6.34, p < .01$. Thus, all analyses using this method to assess onset of obesity were conducted with and without baseline BMI added as a covariate. Post hoc analyses revealed that BMI levels were higher in the childhood group than in adulthood group and in the adolescent group than in the adulthood group, $ps < .01$. However, there was no significant difference between the childhood and adolescent groups. There was no significant differences between groups in percent of weight change at the end of the treatment phase or maintenance phases, $F(2, 34) = .63, p = .54$ and $F(2, 32) = .40, p = .67$, respectively. See Table 5.
Analyses of variance were conducted to determine if baseline psychological variables, average outcome expectancies, caloric intake differences, and average calorie expenditure were significantly different between onset of obesity groups. Neither body image nor binge eating was significantly different between groups. Additionally, exercise self-efficacy, eating self-efficacy, and average outcome expectancies were not significantly different between groups. Similarly, caloric intake differences and average calorie expenditures were not significantly different between groups. When emotional eating was examined using negative and positive mood during lapses only, it was significantly associated with onset of obesity, $F(2, 22) = 3.63, p < .05$. Post hoc analyses revealed significant differences between the childhood and adolescent onset groups and between the childhood and adulthood group, $ps < .05$; the adolescent and adult groups experienced significantly more lapses in response to emotion than the childhood group. However, the relationship became non-significant after controlling for baseline BMI, $F(2, 21) = 2.38, p = .12$. Eating during negative affect (ESES; Glynn and Ruderman, 1986) was also significantly different among the three groups $F(2, 31) = 3.48, p < .05$. Post hoc analyses revealed a significant difference between the childhood onset group and adult onset group, $p < .05$, with significantly more eating during times of negative affect in the childhood group, $p < .05$. However, after controlling for baseline BMI this relationship became non-significant, $F(2, 31) = 2.01, p = .15$. Self-esteem was significantly different between the three onset of obesity groups, $F(2, 32) = 3.14, p = .05$. Post hoc analyses revealed trends between the adolescent and adult groups, $ps = .06$; the adult group had higher self-esteem.

Posttreatment binge eating, eating/exercise self-efficacy, and self-esteem were not significantly associated with onset of obesity in this method of assessment.
Post hoc repeated measures analyses indicated no differences between groups in their changes of eating self-efficacy, exercise self-efficacy, binge eating, eating during times of negative affect (ESES; Glynn & Ruderman, 1986), or in self-esteem in response to treatment.

**Potential Mediator Variables and Treatment Outcome.** Separate linear regressions were performed to determine if baseline psychological variables (binge and emotional eating, eating and exercise self-efficacy, self-esteem, and body image) average outcome expectancies, caloric intake differences, and average calorie expenditure were related to percent of weight change at the completion of the treatment phase. Only positive outcome expectancies throughout the BWLP were significantly associated with greater percent of body weight lost at posttreatment, $\beta = .66, R^2 = .44, F(1, 34) = 27.83, p < .01$. None of the other psychological or physiological variables were significantly associated with percent of weight lost at treatment outcome.

Separate linear regressions were also performed to determine if posttreatment psychological (with the exception of baseline body image and emotional eating) variables, average outcome expectancies, caloric intake differences, and average calorie expenditure were related to percent of weight change at the completion of the maintenance phase. None of these psychological or physiological variables were significantly associated with weight maintenance outcome. Baseline body image and emotional eating were also not significantly associated with weight maintenance outcome.
CHAPTER V DISCUSSION

The goal of this study was to examine the differences between early and late onset of obesity and weight changes during the treatment and maintenance phases of a BWLP. Additionally, it was the goal of this study to examine differences between persons with early versus late onset of obesity on various psychological and physiological factors during treatment to assess whether these factors might mediate a relationship between onset of obesity and treatment outcome. First, I hypothesized that early onset of obesity would be associated with less weight loss during the treatment and maintenances phases of a BLWP. I also hypothesized that early onset individuals would report more difficulty in the areas of eating and exercise self-efficacy, self-esteem, binge and emotional eating, body image, reducing their dietary intake, increasing their physical activity levels, and maintaining positive outcome expectancies throughout the intervention. Finally, it was hypothesized that the difficulties in eating and exercise self-efficacy, self-esteem, binge and emotional eating, body image, dietary intake, physical activity, and outcome expectancies would mediate the relationship between onset of obesity and percent of weight change in both the treatment and maintenance phases. The following section discusses the results of this study, as well as implications, limitations, and future research.

*Onset of Obesity, Baseline BMI, and Weight Loss Outcomes.* This study confirms previous findings that individuals with early onset of obesity have higher baseline BMI compared to late onset individuals (Genender et al., 1982; McCrone, 2000; Wing et al., 1985). McCrone (2000) found that women with an early onset of obesity attained their highest lifetime body weight five years earlier than those with a late onset of obesity, suggesting a pattern of
increasing weight that begins earlier in life. I do not know whether early onset individuals achieved in my investigation their highest lifetime weight earlier than late onset individuals, but the early and late onset groups did not differ significantly in age. It is possible that the baseline differences in BMI might be attributed to early onset participants’ relatively longer struggle with obesity and the attendant difficulties with weight loss and subsequent weight gain. However, neither duration of obesity, nor age of attainment of highest lifetime body weight was assessed in this investigation.

While a number of studies have shown an association between onset of obesity and poor treatment outcomes (Bonato & Boland, 1987; McReynolds & Lutz, 1976; Mullins, 1958; Weiss, 1977), other studies have not shown this relationship (Ashwell, 1975; Ashwell, Durrant, & Garrow, 1978; Genender et al., 1982; Wing, Jeffery, & Stunkard, 1978; Wing, Marcus, Epstein, & Kupfer 1983), and one study by Wing and Jeffery (Wing and Jeffery, 1976 as cited in Weiss, 1977) found that participants with early onset of obesity actually lost more weight during a BWLP than those with late onset (controlling for baseline BMI). The current study found no support for the hypothesis that individuals with an early onset of obesity are more likely to have poor treatment outcome in a weight loss program during or in the first 6 months following treatment. Notably, Bonato and Boland (1987) did not detect differences in weight loss between early and late onset individuals until nearly a year following treatment. It may be that the weight maintenance differences would have emerged during an extended maintenance phase (i.e., 12 versus 6 months) in this investigation. Of course, many previous studies examining onset of obesity and weight loss have relied on retrospective recall of past weight loss success (McCrone, 2000; Ashwell, 1975). To prevent recall bias, the current investigation examined weight loss
during an actual attempt. This investigation found that early onset individuals lost weight and maintained weight loss equally well as late onset individuals in a BWLP.

*Onset of Obesity and Psychological Outcomes.* Psychological factors such as binge/emotional eating, body image, self-esteem, and eating/exercise self-efficacy have been associated with onset of obesity in prior research (Adami et al., 1998; Grilo, et al., 1994; McCrone, 2000; Stice, Presnell, & Spangler, 2002; Stunkard, 2002; Stunkard & Mendelson, 1967). In this investigation, early onset of obesity was not consistently associated with any psychological factors, including caloric intake and expenditure, but different methods of assessing onset of obesity often resulted in inconsistent findings. For example, early onset individuals made significantly less improvement in the area of binge eating when measuring onset by BMI rank. The early onset group reduced their levels of binge eating by 43% as opposed to 23% for the late onset group. However, this pattern was significantly reversed when assessing onset of obesity dichotomously by self-report, in which late onset individuals reduced their binge eating significantly more (38%) than late onset individuals (27%). Depending on which method for assessing onset of obesity is employed, researchers might come to different conclusions about the relationship between onset of obesity and sensitivity of binge eating weight loss treatment.

When assessing early onset continuously by self-reported age of onset and in three groups by self-reported age of onset (i.e., childhood, adolescence, and adulthood), early onset individuals reported that they were significantly more likely to have difficulty maintaining dietary changes during times that they were experiencing negative feelings, but only when negative feelings were assessed with retrospective self-report questionnaire (i.e., emotional eating subscale of the ESES; Glynn & Rudderman, 1986). In contrast, when I assessed onset of
obesity in three groups and emotional eating with ecological momentary assessment (EMA), adolescent and adult onset individuals reported experiencing a greater number of dietary lapses during times of both negative and positive mood. This discrepant finding may be explained by the different methods of assessing eating in response to negative affect. The negative affect scale emphasizes a perceived causal relationship between negative feelings and subsequent overeating, whereas EMA captures the presence of mood during actual lapses/temptations. For example, the ESES requires participants to rate how likely they are to resist temptation when feeling upset or tense. Therefore, this questionnaire assesses whether an individual perceives a causal relationship between negative affect and subsequent difficulty with resisting overeating. Alternatively, EMA captures negative affect that is proximally related to eating temptations and lapses, but does not assess whether individual believes that affect played a causal role in the event. For example, participants in the current study who experienced a dietary lapse or temptation were simply asked to “describe your mood preceding the temptation/lapse.” Participants were not asked to indicate whether they believed that their mood caused the temptation or lapse. Additionally, capturing behavior through EMA regarding a recent, specific overeating episode is different than assessing this behavior retrospectively where recall bias is more likely to be introduced. Due to the discrepant findings in the current investigation, the exact nature of the relationship between emotional eating and onset of obesity is not clear.

There was a significant association between early onset of obesity and lower levels of self-esteem (i.e., when assessing onset continuously and in three age categories). While both groups endorsed items indicative of moderate levels of self-esteem, relative to the adult onset participants, childhood and adolescent onset participants endorsed items more indicative of low self-esteem. It is plausible that early onset individuals’ decreased self-esteem may be an outcome
increased childhood experiences of devaluation related to society’s stigmatization of obese individuals. According to Faith, Saelens, Wilfley, and Allison (2001), obese children are subject to considerable discrimination based on their weight. A prospective study by Hesketh, Wake, and Waters (2004) found a strong association between lower self-esteem and higher body mass in 1,157 children across the elementary school years. Overweight/obesity preceded low self-esteem in many of these children, suggesting that being overweight may diminish self-esteem over time.

Peer discrimination during critical periods of social development, such as early elementary school years, may influence enduring patterns of negative self-evaluation that continue into adulthood. However, the relationship between decreased self-esteem and early onset of obesity was not detected in all methods of assessing onset of obesity, suggesting that these results should also be viewed tentatively.

There was a significant relationship between lower baseline eating self-efficacy and early onset of obesity when assessing onset continuously and there was also a statistically significant trend between lower posttreatment eating self-efficacy and early onset utilizing this method of assessment. In this investigation, I hypothesized that early onset participants would not differ from those with a late onset of obesity in baseline self-efficacy, but would report lower self-efficacy during the maintenance phase. There was only a trend towards significant posttreatment eating self-efficacy and onset of obesity (measured continuously). Therefore, contrary to the study’s hypothesis, early onset individuals reported feeling less confident regarding their ability to control overeating in difficult situations during treatment, but did not report lower self-efficacy in comparison to late onset individuals during the maintenance phase of the intervention. However, this outcome was found in only one method of assessing onset of obesity, suggesting it should be viewed cautiously.
Increased body image dissatisfaction was not associated with an early onset of obesity in the current investigation. Research has shown that most individuals become more accepting of their own body size as they grow older (Rand & Wright, 2000), thus weight status may be less likely to be associated with body image as participants age. The present study’s sample was relatively older ($M = 46.4$, $SD = 9.5$) than other studies in which age of onset was significantly associated with body image dissatisfaction (i.e., Adami et al., 1997; $M = 38$, $SD = 12$). Thus, while early onset individuals may suffer from increased body image dissatisfaction earlier in life, this dissatisfaction could decrease with age.

In several analyses examining onset of obesity and psychological outcome variables related to eating (i.e., eating self-efficacy, emotional eating, and binge eating), the relationships between onset of obesity and the psychological variables became non-significant once baseline BMI was controlled for. However, the relationships between baseline BMI and eating self-efficacy, emotional eating, and binge eating were not statistically significant, making the possibility of a partial mediation by BMI unlikely. Also, it is likely that by including baseline BMI into the regression analyses, the drop in significance levels was secondary to an inflation of the standard error.

While early and late onset individuals did not differ significantly in the amount of weight lost throughout the intervention, the early onset group may have had to put forth more effort to reduce eating and increase exercise in order to achieve the same outcomes as late onset individual. Therefore, I examined the relationship between onset of obesity and differences between baseline and posttreatment caloric intake as well as average level of caloric expenditure throughout the intervention. Compared to late onset individuals, early onset individuals did not
report significantly different patterns of caloric intake or calories expended through physical activity during treatment.

Positive outcome expectancies were the only psychological variable that was significantly associated with percent of weight lost during the treatment phase. Individuals who felt confident that they were achieving their eating and exercise goals and would continue to do so in the future lost significantly more weight than individuals with lower scores on the measure. However, this variable was not related to early onset of obesity.

**Strengths and Limitations of the Present Study.** A strength of the current investigation was that assessed weight loss during an actual weight loss attempt, reducing the likelihood of retrospective recall bias. However, despite this strength, this investigation had a number of notable limitations. First, participants were asked to recall distant information regarding their earliest onset of a weight problem. This type of recall is subject to considerable retrospective recall bias. Participants with an early onset of obesity may have reported it as occurring at an earlier or later age, or may have failed to report it at all. Unfortunately, attempts to assess this information longitudinally would be time consuming and expensive. Wing et al. (1985) suggested obtaining medical records of weight, height, and age from participants’ pediatricians would be a more objective method of assessing onset of obesity. However, accessing medical records from childhood may also be difficult and participants may not have regularly visited a pediatrician during their early years, making this option limited as well.

The findings in this study were not consistent across method of assessing onset of obesity suggesting that defining onset of obesity in different ways may yield different correlates of early onset of obesity. The different methods, while not only appearing on face value to assess qualitatively different information, also were subject to different methodological shortcomings.
For example, asking participants, “Were you overweight at any point before age 18,” requires participants to subjectively recall events from childhood that may or may not be truly related to onset of obesity. A participant may recall being made fun of as a child for a weight problem or having difficulty participating in certain forms of physical activity when trying to recall this information. Conversely, when asking participants to report their age, height, and weight at onset of obesity, this information (while potentially more objective) is likely to be difficult to recall. When recalling this kind of information, a participant may think back to stepping on a scale at a doctor’s office or having their height measured at that time. It is possible that these different methods of assessing onset may not only result in participants retrieving quite discrepant information, but this information may contain considerable although qualitatively different inaccuracies. Finally, the number of people identified as early onset by ranking individuals into two groups based on BMI rank was much lower ($n=16$) than when assessing onset of obesity dichotomously by self-reported age ($n=38$). Missing data points across three variables (i.e. self-reported weight, height, and age at onset of obesity) made computation of the BMI rank challenging. This variable may not be a representative subsample of the original early onset BWLP participants in this investigation.

Individuals who volunteer to participate in a BWLP may be unique among the obese population and additionally, unique among early onset individuals. The subset of early onset individuals who attempted to lose weight in this intervention may have been more motivated than those who choose not to participate in a formal BWLP. Therefore, sample bias may have influenced this investigation’s findings. Additionally, the present study was also conducted with a sample that was predominantly individuals who were Caucasian (84%), women (87%), earned
greater than $30,000 a year (61%) at a Midwestern university. These results may not generalize to other populations using different approaches to weight loss.

Additionally, the present investigation may have lacked sufficient power to detect significant differences between onset of obesity and treatment outcomes due to a small sample size. For example, when assessing onset of obesity by BMI rank ($n=16$), early onset individuals gained back a higher percentage of their weight at the end of the maintenance phase, producing a large ($\omega^2 = .09$) effect size, which accounted for 16% of variance in weight change. Approximately 48 participants would have been required to detect this effect. Again, however, this difference was found in only one method of assessing onset of obesity. In fact, when I assessed onset of obesity continuously, early onset individuals actually lost more weight than late onset individuals (although not a significant amount). Thus, inadequate power does not account for the lack of an association between early onset and treatment outcomes nor does it account for the discrepant results.

**Implications.** Success in the maintenance of weight loss following treatment has been largely disappointing, suggesting the need to find new, effective treatment methods for obesity (Jeffrey et al., 2000). This has led to increased interest in developing meaningful classifications among obese individuals in an attempt to isolate predictors of poor treatment outcome. One such attempt, onset of obesity has garnered considerable interest, but somewhat limited support (Allison & Heshka, 1993; Bonato & Boland, 1987; Faubel, 1989; Genender et al., 1982; McCrone et al., 2002; Mills & Andrianopoulos, 1993). While early onset of obesity was not associated with poor weight loss or maintenance in the current investigation, it was associated with greater maladjustment in some psychological outcomes. Also, early onset individuals had higher BMI values at baseline. Given these findings, early onset individuals might benefit from
interventions designed to encourage weight maintenance as well as to reduce some of the negative psychosocial correlates of early onset during childhood or adolescence. However, the inconsistent findings regarding onset of obesity and psychological outcomes suggest that these relationships should be viewed as tentative and replication is warranted.

_Future Research_. There are considerable limitations to assessing onset of obesity retrospectively. The current investigation revealed that different methods of assessing onset of obesity can result in different and sometimes contrasting correlates. In this light, I recommend that future studies assess onset of obesity prospectively or using archival data. Future research may also benefit from assessing the actual duration of time individuals remained obese during childhood and adulthood. Of course, the relationship between onset of obesity and weight loss treatment outcome may be better understood by examining individuals of different ages, genders, socioeconomic status, and races. Thus, assessing onset of obesity prospectively with larger and more diverse samples may be necessary to inevitably develop a true understanding of the potential risk of early onset obesity in weight loss treatment.
REFERENCES


APPENDIX A

1. Were you ever considered overweight before you were 12 years of age?  Yes □  No □
   (If no skip to question 7)

2. At what childhood age do you first remember being overweight? Age ______

3. Estimate how many pounds overweight you were at that time. Lbs. ______

4. Estimate your approximate weight and height at that time. Lbs._______  Hgt._______

5. Did you lose your childhood weight at any time to where you considered yourself to no longer
   have a weight problem or has it remained with you for your entire life? Yes □  No □

6. If so, at what age did you lose this weight and approximately how many pounds?
   Age_______   Lbs. _______

7. Did you feel that you were overweight between the ages of 12 and 18?  Yes □  No □
   (If no skip to question 13)

8. At what teenage age do you first remember being overweight? Age ______

9. Estimate how many pounds overweight you were at that time. Lbs. ______

10. Estimate your approximate weight and height at that time. Lbs._______  Hgt._______

11. Did you lose weight during your teenage years to the point where you would consider
    yourself to no longer have a weight problem?  Yes □  No □

12. If so, at what age and how much? Lbs. ______

13. At what age would you say you began having a weight problem? Age ______

14. Estimate the approximate weight and height that you were at that time.
    Lbs._______  Hgt._______

15. Estimate how many pounds overweight you were at that time. Lbs. ______

16. Overall, would you consider yourself as having been overweight any time before
    age 18?  Yes □  No □
APPENDIX B

Instructions: Please indicate how certain you are you can exercise under each of the following conditions.

<table>
<thead>
<tr>
<th>0</th>
<th>10</th>
<th>20</th>
<th>30</th>
<th>40</th>
<th>50</th>
<th>60</th>
<th>70</th>
<th>80</th>
<th>90</th>
<th>100</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cannot</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>certain</td>
</tr>
<tr>
<td>I can do</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>I can do</td>
</tr>
</tbody>
</table>

I can exercise……..

1. ___ When I am feeling tired
2. ___ When I am feeling under pressure for work
3. ___ During bad weather
4. ___ After recovering from an injury that caused me to stop exercising
5. ___ During or after experiencing personal problems
6. ___ When I am feeling depressed
7. ___ When I am feeling anxious
8. ___ After recovering from an illness that cause me to stop exercising
9. ___ When I feel physical discomfort when I exercise
10. ___ After a vacation
11. ___ When I have too much work to do at home
12. ___ When visitors are present
13. ___ When there are other interesting things to do
14. ___ If I don’t reach my exercise goals
15. ___ Without support from my family or friends
16. ___ During a vacation
17. ___ When I have other time commitments
18. ___ After experiencing family problems
APPENDIX C

For numbers 1-25 you should rate the likelihood that you would have difficulty controlling your overeating in each of the situations listed, using this scale:

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No difficulty controlling eating</td>
<td>Moderate difficulty controlling eating</td>
<td>Most difficulty controlling eating</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

How difficult is it to control your…….

1. ___ Overeating after work or school
2. ___ Overeating when you feel restless
3. ___ Overeating around holiday time
4. ___ Overeating when you feel upset
5. ___ Overeating when tense
6. ___ Overeating with friends
7. ___ Overeating when preparing food
8. ___ Overeating when irritable
9. ___ Overeating as part of a social occasion dealing with food-like at a restaurant or dinner party
10. ___ Overeating with family members
11. ___ Overeating when annoyed
12. ___ Overeating when angry
13. ___ Overeating when you are angry at yourself
14. ___ Overeating when depressed
15. ___ Overeating when you feel impatient
16. ___ Overeating when you want to sit back and enjoy some food
17. ___ Overeating after an argument
18. ___ Overeating when you feel frustrated
19. ___ Overeating when tempting food is in front of you
20. ___ Overeating when you want to cheer up
21. ___ Overeating when there is a lot of food available to you (refrigerator is full)
22. ___ Overeating when you feel overly sensitive
23. ___ Overeating when nervous
24. ___ Overeating when hungry
25. ___ Overeating when anxious or worried
APPENDIX D

Please make a check mark in the box next to the one sentence that you feel best describes you.

#1
- I don’t feel self-conscious about my weight or body size when I’m with others.
- I feel concerned about how I look to others, but it normally doesn’t make me feel disappointed with myself.
- I do get self-conscious about my appearance and weight which makes me feel disappointed in myself.
- I feel very self-conscious about my weight and frequently, I feel intense shame and disgust for myself. I try to avoid social contacts because of my self-consciousness.

#2
- I don’t have any difficulty eating slowly in the proper manner.
- Although I seem to “gobble down” foods, I don’t end up feeling stuffed because of eating too much.
- At times, I tend to eat quickly and then, I feel uncomfortably full afterwards.
- I have the habit of bolting down my food, without really chewing it. When this happens, I usually feel uncomfortably stuffed because I’ve eaten too much.

#3
- I feel capable of controlling my eating urges when I want to.
- I feel like I have failed to control my eating more than the average person.
- I feel utterly helpless when it comes to feeling in control of my eating urges.
- Because I feel so helpless about controlling my eating, I have become very desperate about trying to get in control.

#4
- I don’t have the habit of eating when I’m bored.
- I sometimes eat when I’m bored, but often I’m able to become busy and get my mind off food.
- I have a regular habit of eating when I’m bored, but occasionally, I can use some other activity to get my mind off eating.
- I have a strong habit of eating when I’m bored. Nothing seems to help me break the habit.

#5
- I’m usually physically hungry when I eat something.
- Occasionally, I eat something on impulse even though I really am not hungry.
- I have the regular habit of eating foods, that I might not really enjoy, to satisfy a hungry feeling even though physically, I don’t need the food.
- Even though I’m not physically hungry, I get a hungry feeling in my mouth that only seems to be satisfied when I eat a food, like a sandwich, that fills my mouth. Sometimes, when I eat the food to satisfy my mouth hunger, then I spit the food out so I won’t gain weight.

#6
- I don’t feel any guilt or self-hate after I overeat.
- After I overeat, occasionally I feel guilt or self-hate.
- Almost all the time I experience strong guilt or self-hate after I overeat.

#7
- I don’t lose total control of my eating when dieting even after periods when I overeat.
- Sometimes when I eat a “forbidden food” on a diet, I feel like “I blew it” and eat even more.
- Frequently, I have the habit of saying to myself, “I’ve blown it anyway, why not go all the way” when I overeat on a diet.
When that happens I eat even more.
I have a regular habit of starting strict diets for myself, but I break the diets by going on an eating binge.
My life seems to be either a “feast” or “famine.”

| #8 | I rarely eat so much food that I feel uncomfortably stuffed afterwards. |
|    | Usually about once a month, I eat such a quantity of food, I end up feeling very stuffed. |
|    | I have regular periods during the month when I eat large amounts of food, either at meal times or at snacks. |
|    | I eat so much food that I regularly feel quite uncomfortable after eating and sometimes a bit nauseous. |

| #9 | I usually am able to stop eating when I want to. I know when “enough is enough.” |
|    | Every so often, I experience a compulsion to eat which I can’t seem to control. |
|    | Frequently, I experience strong urges to eat which I seem unable to control, but at other times I can control my eating urges. |
|    | I feel incapable of controlling urges to eat. I have a fear of not being able to stop eating voluntarily. |

| #10 | I don’t have any problem stopping eating when I feel full. |
|     | I usually can stop eating when I feel full but occasionally overeat leaving me feeling uncomfortably stuffed. |
|     | I have a problem stopping eating once I start and I usually feel uncomfortably stuffed after I eat a meal. |
|     | Because I have a problem not being able to stop eating when I want, I sometimes have to induce vomiting to relieve my stuffed feeling. |

| #11 | I seem to eat just as much when I’m with others (family, social gatherings) as when I’m by myself. |
|     | Sometimes, when I’m with other persons, I don’t eat as much as I want to eat because I’m self-conscious about my eating. |
|     | Frequently, I eat only a small amount of food when others are present, because I’m very embarrassed about my eating. |
|     | I feel so ashamed about overeating that I pick times when I know no one will see me. I feel like “closet eating.” |

| #12 | I eat three meals a day with only an occasional between-meal snack. |
|     | I eat three meals a day but I also normally snack between meals. |
|     | When I am snacking heavily, I get in the habit of skipping regular meals. |
|     | There are regular periods when I seem to be continually eating, with no planned meals. |

| #13 | I don’t think much about trying to control unwanted eating urges. |
|     | At least some of the time, I feel my thoughts are pre-occupied with trying to control my eating urges. |
|     | I feel that frequently I spend much time thinking about how much I ate or about trying not to eat anymore. |
|     | It seems to me that most of my waking hours, I am pre-occupied with thoughts about eating or not eating. I feel like I’m constantly struggling not to eat. |

| #14 | I don’t think about food a great deal. |
|     | I have strong cravings for food but they last only for brief periods of time. |
|     | I have days when I can’t seem to think about anything else but food. |
|     | Most of my days seem to be pre-occupied with thoughts about food. I feel like I live to eat. |

| #15 | I usually know whether or not I’m physically hungry. I take the right portion of food to satisfy me. |
|     | Occasionally, I feel uncertain about knowing whether or not I’m physically hungry. At these times it’s hard to know how much food I should take to satisfy me. |
|     | Even though I might know how many calories I eat, I don’t have any idea what is a “normal” amount of food for me. |

| #16 | My level of calorie intake does not go up very high or go down very low on a regular basis. |
|     | Sometimes after I overeat, I will try to reduce my caloric intake to almost nothing to compensate for the excess |
calories I have eaten. I have a regular habit of overeating during the night. It seems that my routine is not to be hungry in the morning but overeat in the evening.

In my adult years, I have had week-long periods where I practically starve myself. This follows periods when I overeat. It seems I live a life of either “feast or famine.”
APPENDIX E

INSTRUCTIONS—PLEASE READ CAREFULLY

The following pages contain a series of statements about how people might think, feel, or behave. You are asked to indicate the extent to which each statement pertains to you personally.

Your answers to the items in the questionnaire are anonymous, so please do not write your name on any of the materials. In order to complete the questionnaire, read each statement carefully and decide how much it pertains to you personally. Using a scale like the one below, indicate your answer by entering it to the left of the number of the statement.

EXAMPLE:

I am usually in a good mood.

In the blank space, enter a 1 if you definitely disagree with the statement; enter a 2 if you mostly disagree; enter a 3 if you neither agree nor disagree; enter a 4 if you mostly agree; or enter a 5 if you definitely agree with the statement.

There are no right or wrong answers. Just give the answer that is most accurate for you. Remember, your responses are confidential, so please be completely honest and answer all items.

(Duplication and use of the MBSRQ-AS only by permission of Thomas F. Cash, Ph.D., Department of Psychology, Old Dominion University, Norfolk, VA, 23529)
|   | 1. Before going out in public, I always notice how I look. | 2. I am careful to buy clothes that will make me look my best. | 3. My body is sexually appealing. | 4. I constantly worry about being or becoming fat. | 5. I like my looks just the way they are. | 6. I check my appearance in a mirror whenever I can. | 7. Before going out, I usually spend a lot of time getting ready. | 8. I am very conscious of even small changes in my weight. | 9. Most people would consider me good-looking. | 10. It is important that I always look good. | 11. I use very few grooming products. | 12. I like the way I look without my clothes on. | 13. I am self-conscious if my grooming isn’t right. | 14. I usually wear whatever is handy without caring how it looks. | 15. I like the way my clothes fit me. | 16. I don’t care what people think about my appearance. | 17. I take special care with my hair grooming. | 18. I dislike my physique. | 19. I am physically unattractive. | 20. I never think about my appearance. |
For the remainder of the items, use the response scale given with the item, and enter your answer in the space beside the item.

_____ 21. I am always trying to improve my physical appearance.

_____ 22. I am on a weight-loss diet.

23. I have never tried to lose weight by fasting or going on crash diets.

   1. Never
   2. Rarely
   3. Sometimes
   4. Often
   5. Very Often

_____ 24. I think I am:

   1. Very Underweight
   2. Somewhat Underweight
   3. Normal Weight
   4. Somewhat Overweight
   5. Very Overweight

_____ 25. From looking at me, most other people think I am:

   1. Very Underweight
   2. Somewhat Underweight
   3. Normal Weight
   4. Somewhat Overweight
   5. Very Overweight
26-34. Use this 1 to 5 scale to indicate how dissatisfied or satisfied you are with each of the following areas or aspects of your body:

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very Dissatisfied</td>
<td>Mostly Dissatisfied</td>
<td>Neither Satisfied Nor Dissatisfied</td>
<td>Mostly Satisfied</td>
<td>Very Satisfied</td>
<td></td>
</tr>
</tbody>
</table>

- _____ 26. Face (facial features, complexion)
- _____ 27. Hair (color, thickness, texture)
- _____ 28. Lower torso (buttocks, hips, thighs, legs)
- _____ 29. Mid-torso (waist, stomach)
- _____ 30. Upper torso (chest or breasts, shoulders, arms)
- _____ 31. Muscle tone
- _____ 32. Weight
- _____ 33. Height
- _____ 34. Overall appearance
APPENDIX F

Please record the appropriate answer for each item, depending on whether you strongly agree, agree, disagree, or strongly disagree with it.

1 = strongly agree
2 = agree
3 = disagree
4 = strongly disagree

___ 1. On the whole, I am satisfied with myself.
___ 2. At times I think that I am not good at all.
___ 3. I feel that I have a number of good qualities.
___ 4. I am able to do things as well as most other people.
___ 5. I feel that I do not have much to be proud of.
___ 6. I certainly feel useless at times.
___ 7. I feel that I am a person of worth.
___ 8. I wish I could have more respect for myself.
___ 9. All in all, I am inclined to think that I am a failure.
___ 10. I take a positive attitude toward myself.
APPENDIX G

Name _______________________ ID ______   3/29 & 3/30

Process Inventory

Please indicate a number from 0-9 next to each statement which best indicates your degree of agreement with each item below based on your feelings during the past week.

0                 1            2               3          4              5      6          7          8           9
Strongly Disagree………              .Disagree……………     Agree…………….       Strongly Agree

1. _____ I feel confident that I can achieve my weight loss goals.
2. _____ I feel confident that I can achieve my eating goals.
3. _____ I feel confident that I can achieve my exercise goals.
4. _____ I have difficulty modifying my eating habits.
5. _____ I was unable to eat in a manner I would have liked.
6. _____ I have difficulty following my physical activity plan.
7. _____ I was unable to be physically active in a manner that I would have liked.
8. _____ I have difficulty keeping track of my eating habits.
9. _____ I have difficulty keeping track of my physical activity habits.
10. _____ I have self-control over my eating habits.
11. _____ I have self-control over my physical activity habits.

12. I was unable to eat in a manner I would have liked.  ____      ____    ____    ____    ____      ____

13. I was unable to be physically active in a manner that I would have liked.       ____      ____    ____    ____    ____      ____

14. Please discuss any issues you feel should be brought to our attention. For example, issues that came up this week at home or in class, things that were helpful or not helpful.
Table 1. Demographics and Baseline Characteristics of Sample (N = 38)

<table>
<thead>
<tr>
<th>Baseline Measures</th>
<th>N</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender, Women</td>
<td>33</td>
<td>(87%)</td>
</tr>
<tr>
<td>Income &gt; $30,000</td>
<td>23</td>
<td>(61%)</td>
</tr>
<tr>
<td>College Degree</td>
<td>24</td>
<td>(63%)</td>
</tr>
<tr>
<td>Race, Caucasian</td>
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<td>(84%)</td>
</tr>
<tr>
<td>Marital Status, Married</td>
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<td>(74%)</td>
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<tr>
<td>Early Onset of Obesity(^1)</td>
<td>22</td>
<td>(58%)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>M</th>
<th>(SD)</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>BMI</td>
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<td>(5.9)</td>
<td>29.3-56.6</td>
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<tr>
<td>Age</td>
<td>46.4</td>
<td>(9.5)</td>
<td>24-61</td>
</tr>
<tr>
<td>Age at Onset of Obesity(^2)</td>
<td>22.1</td>
<td>(12.2)</td>
<td>6-55</td>
</tr>
<tr>
<td>Emotional Eating(^3)</td>
<td>54</td>
<td>(.38)</td>
<td>0-1</td>
</tr>
<tr>
<td>Body Image</td>
<td>97.1</td>
<td>(11.4)</td>
<td>72-121</td>
</tr>
</tbody>
</table>

M (SD) = Mean (Standard Deviation)  
N (%) = Number (Percentage)

\(^1\) Age of onset was assessed dichotomously by asking participants to report if they would consider themselves overweight any time before age 18.  
\(^2\) Age of onset was assessed continuously by asking participants to report the earliest age at which they had a weight problem.  
\(^3\) Results for emotional eating are reported as means. Multiplying by 100 equals percent of time participants experienced positive or negative emotion during a dietary temptation or lapse.
### Pre-Post Measures

<table>
<thead>
<tr>
<th></th>
<th>Baseline</th>
<th>Post-Treatment</th>
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<tbody>
<tr>
<td></td>
<td>M (SD) Range</td>
<td>M (SD) Range</td>
</tr>
<tr>
<td>Eating Self Efficacy</td>
<td>103.1 (26.0) 25-155</td>
<td>87.7 (27.5) 25-145</td>
</tr>
<tr>
<td>Exercise Self Efficacy</td>
<td>855.8 (232.3) 430-1450</td>
<td>903.1 (401.1) 190-1620</td>
</tr>
<tr>
<td>Binge Eating</td>
<td>19.6 (7.3) 7-32</td>
<td>13.0 (7.6) 3-31</td>
</tr>
<tr>
<td>Negative Affect</td>
<td>57.7 (20.6) 15-105</td>
<td>47.1 (18.5) 15-88</td>
</tr>
<tr>
<td>Self Esteem</td>
<td>30.5 (5.1) 22-40</td>
<td>32.9 (4.9) 23-40</td>
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</tbody>
</table>

### Averages

<table>
<thead>
<tr>
<th></th>
<th>M (SD) Range</th>
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<tbody>
<tr>
<td>Outcome Expectancies</td>
<td>65.9 (14.2) 272-1148</td>
</tr>
<tr>
<td>Total Daily Calories (kcals)</td>
<td>2,151.4 (542.9) -155-1562</td>
</tr>
<tr>
<td>Physical Activity (kcals)</td>
<td>574.2 (228.9) 272-1148</td>
</tr>
<tr>
<td>Percent Weight Lost</td>
<td>.08 (.05) -.04-.28</td>
</tr>
<tr>
<td>Percent Weight Change</td>
<td>.01 (.04) -.13-.12</td>
</tr>
</tbody>
</table>

M (SD) = Mean (Standard Deviation)
N (%) = Number (Percentage)

---

4 Pre-Post: Measures taken at baseline and upon completion of the 6-month weight loss intervention.
5 Averages: Measures were computed as averages across the 6-month weight loss intervention.
6 Difference in calories consumed from baseline to posttreatment.
7 Percent of weight lost during the treatment phase of the BWLP.
8 Percent of weight change during the 6-month maintenance phase of the BWLP.
Table 2. Summary of Regression Analyses Performed Separately for Age of Onset as a Predictor Variable. N = 37

<table>
<thead>
<tr>
<th></th>
<th>Post-Treatment</th>
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<th>Post-Maintenance¹</th>
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<tbody>
<tr>
<td></td>
<td>B</td>
<td>SE</td>
<td>β</td>
<td>B</td>
</tr>
<tr>
<td>Percent of Weight Loss/Change</td>
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<td>.001</td>
<td>-.195</td>
<td>-.001</td>
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<td>Baseline Measures</td>
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<td>Post-Treatment Measures²</td>
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<tr>
<td></td>
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<td>SE</td>
<td>β</td>
<td>B</td>
</tr>
<tr>
<td>Self Esteem</td>
<td>.18</td>
<td>.06</td>
<td>.44**</td>
<td>.11</td>
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<tr>
<td>Eating Self-Efficacy</td>
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<td>.38</td>
<td>-.37*</td>
<td>-.66</td>
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<td>Negative Affect Scale</td>
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<td>.29</td>
<td>-.43**</td>
<td>-.60</td>
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<td>Exercise Self-Efficacy</td>
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<td>-.06</td>
<td>-5.9</td>
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<tr>
<td>Binge Eating</td>
<td>-.17</td>
<td>.10</td>
<td>-.29</td>
<td>-.12</td>
</tr>
</tbody>
</table>

* p < .05, ** p < .01; Early versus Late Onset of Obesity

¹ Post-Treatment/Maintenance: Percent of weight lost at the completion of the 6-month treatment phase and percent of weight changed at the completion of the 6-month maintenance phase.

² Baseline/Posttreatment: Measures taken at baseline and upon completion of the 6-month weight loss intervention.

³ Reverse scored: When baseline BMI was added to the regression, the relationship between eating self-efficacy and onset of obesity was no longer significant.

⁴ Negative Affect Subscale of Eating Self-Efficacy Scale was used as an additional measure of emotional eating.
### Baseline Measures

<table>
<thead>
<tr>
<th>Measure</th>
<th>B</th>
<th>SE B</th>
<th>$\beta$</th>
</tr>
</thead>
<tbody>
<tr>
<td>BMI</td>
<td>-.26</td>
<td>.07</td>
<td>-.54**</td>
</tr>
<tr>
<td>Body Image</td>
<td>.18</td>
<td>.15</td>
<td>.21</td>
</tr>
<tr>
<td>Emotional Eating</td>
<td>.001</td>
<td>.006</td>
<td>.03</td>
</tr>
<tr>
<td>Lapses</td>
<td>.002</td>
<td>.007</td>
<td>.07</td>
</tr>
<tr>
<td>Temptations</td>
<td>-.001</td>
<td>.006</td>
<td>-.02</td>
</tr>
</tbody>
</table>

### Averages<sup>5</sup>

<table>
<thead>
<tr>
<th>Measure</th>
<th>B</th>
<th>SE B</th>
<th>$\beta$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Outcome Expectancies</td>
<td>.06</td>
<td>.19</td>
<td>.09</td>
</tr>
<tr>
<td>Activity Calories (kcals)</td>
<td>-4.6</td>
<td>3.2</td>
<td>-2.4</td>
</tr>
<tr>
<td>Difference in Calories Consumed (kcals)</td>
<td>3.6</td>
<td>7.6</td>
<td>.1</td>
</tr>
</tbody>
</table>

*<sup>p< .05, ** p< .01; Early versus Late Onset of Obesity</sup>

<sup>5</sup> Averages: Measures were computed as averages across the 6-month weight loss intervention.
Table 3. Early Onset versus Late Onset Measured Dichotomously on Treatment Outcome Post Treatment (N= 38)

<table>
<thead>
<tr>
<th>Participant</th>
<th>Early Onset</th>
<th>Late Onset</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M (SD)</td>
<td>M (SD)</td>
</tr>
<tr>
<td>Post-Treatment/Maintenance Changes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Treatment</td>
<td>.08 (.07)</td>
<td>-.01 (.04)</td>
</tr>
<tr>
<td>Maintenance</td>
<td>.08 (.04)</td>
<td>-.02 (.05)</td>
</tr>
</tbody>
</table>

**Pre-Post Measures**

<table>
<thead>
<tr>
<th>Measure</th>
<th>Baseline</th>
<th>Post-Treatment</th>
<th>Baseline</th>
<th>Post-Treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eating Self-Efficacy</td>
<td>103.6 (28.1)</td>
<td>88.3 (28.4)</td>
<td>102.5 (24.1)</td>
<td>86.8 (27.2)</td>
</tr>
<tr>
<td>Negative Affect Scale</td>
<td>59.7 (22.3)</td>
<td>50.1 (19.5)</td>
<td>55.1 (18.5)</td>
<td>43.1 (16.8)</td>
</tr>
<tr>
<td>Exercise Self-Efficacy</td>
<td>865.0 (238.8)</td>
<td>893.8 (381.2)</td>
<td>844.37 (231.3)</td>
<td>916.9 (443.7)</td>
</tr>
<tr>
<td>Self Esteem</td>
<td>29.70 (5.1)</td>
<td>32.32 (4.7)</td>
<td>32.57 (4.68)</td>
<td>33.44 (5.2)</td>
</tr>
<tr>
<td>Binge Eating</td>
<td>21.00 (7.0)</td>
<td>13.05 (7.1)</td>
<td>17.64 (7.56)</td>
<td>12.85 (8.4)</td>
</tr>
</tbody>
</table>

p< .05, ** p< .01; Early versus Late Onset of Obesity

1 Post-Treatment/Maintenance Changes: Percent of weight lost at the completion of the 6-month treatment phase and percent of weight changed at the completion of the 6-month maintenance phase.

2 Pre-Post: Measures taken at baseline and upon completion of the 6-month weight loss intervention.

3 Reverse scored

4 Negative Affect Subscale of Eating Self-Efficacy Scale was used as an additional measure of emotional eating.
### Baseline Measures

<table>
<thead>
<tr>
<th></th>
<th>Early Onset</th>
<th>Late Onset</th>
</tr>
</thead>
<tbody>
<tr>
<td>BMI</td>
<td>38.5 (6.5)*</td>
<td>34.1 (3.9)</td>
</tr>
<tr>
<td>Body Image</td>
<td>95.8 (11.1)</td>
<td>98.8 (12.0)</td>
</tr>
<tr>
<td>Emotional Eating⁵</td>
<td>.55 (.30)</td>
<td>.53 (.40)</td>
</tr>
<tr>
<td>Lapses⁶</td>
<td>.64 (.40)</td>
<td>.66 (.44)</td>
</tr>
<tr>
<td>Temptations</td>
<td>.47 (.36)</td>
<td>.45 (.42)</td>
</tr>
</tbody>
</table>

**Averages⁷**

<table>
<thead>
<tr>
<th></th>
<th>Early Onset</th>
<th>Late Onset</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average Activity kcals</td>
<td>613.5 (268.6)</td>
<td>519.1 (149.0)</td>
</tr>
<tr>
<td>Difference in Daily Calories⁸ Consumed (kcals)</td>
<td>475.3 (378.2)</td>
<td>559.1 (530.0)</td>
</tr>
<tr>
<td>Outcome Expectancies</td>
<td>65.10 (14.7)</td>
<td>66.89 (13.9)</td>
</tr>
</tbody>
</table>

* p< .05, ** p< .01: Early versus Late Onset of Obesity

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⁵ Results for emotional eating are reported as means. Multiplying by 100 equals percent of time participants experienced positive or negative emotion during a dietary temptation or lapse.

⁶ Lapses and temptations were computed as separate components of emotional eating. Multiply means by 100 for percentage of time participants experienced positive or negative emotion during a temptation or lapse.

⁷ Averages: Measures were computed as averages across the 6-month weight loss intervention.

⁸ Caloric intake reported at posttreatment subtracted from intake reported at baseline.
Table 4. Early Onset versus Late Onset Measured by BMI Rank on Treatment Outcome (N= 16)

<table>
<thead>
<tr>
<th>Participant</th>
<th>Early Onset</th>
<th>Late Onset</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M (SD)</td>
<td>M (SD)</td>
</tr>
</tbody>
</table>

Post-Treatment/Maintenance Changes¹

<table>
<thead>
<tr>
<th></th>
<th>Treatment</th>
<th>Maintenance</th>
<th>Treatment</th>
<th>Maintenance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Percent of Weight Lost/Change</td>
<td>.06 (.06)</td>
<td>-.04 (.02)</td>
<td>.09 (.07)</td>
<td>-.01 (.03)</td>
</tr>
</tbody>
</table>

Pre-Post Measures²

<table>
<thead>
<tr>
<th></th>
<th>Baseline</th>
<th>Post-Treatment</th>
<th>Baseline</th>
<th>Post-Treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eating Self-Efficacy³</td>
<td>111.60 (17.4)</td>
<td>91.200 (24.8)</td>
<td>104.80 (19.1)</td>
<td>92.91 (25.2)</td>
</tr>
<tr>
<td>Negative Affect Scale⁴</td>
<td>64.4 (16.8)</td>
<td>44.5 (13.8)</td>
<td>58.3 (16.6)</td>
<td>52.7 (18.3)</td>
</tr>
<tr>
<td>Exercise Self-Efficacy</td>
<td>862.0 (336.6)</td>
<td>942.00 (368.3)</td>
<td>821.00 (160.6)</td>
<td>976.3 (405.1)</td>
</tr>
<tr>
<td>Self Esteem</td>
<td>30.00 (3.7)</td>
<td>30.25 (3.0)</td>
<td>29.10 (5.2)</td>
<td>33.1 (5.0)</td>
</tr>
<tr>
<td>Binge Eating</td>
<td>20.75 (6.1)</td>
<td>16.00 (7.8)</td>
<td>21.00 (7.6)</td>
<td>11.9 (6.2)</td>
</tr>
</tbody>
</table>

* p<.05, ** p<.01; Early versus Late Onset of Obesity

¹ Post-Treatment/Maintenance Changes: Percent of weight lost at the completion of the 6-month treatment phase and percent of weight changed at the completion of the 6-month maintenance phase.

² Pre-Post: Measures taken at baseline and upon completion of the 6-month weight loss intervention.

³ Reverse scored

⁴ Negative Affect Subscale of Eating Self-Efficacy Scale was used as an additional measure of emotional eating.
### Baseline Measures

<table>
<thead>
<tr>
<th></th>
<th>Early Onset</th>
<th>Late Onset</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>BMI</strong></td>
<td>37.5 (3.7)</td>
<td>37.2 (5.5)</td>
</tr>
<tr>
<td><strong>Body Image</strong></td>
<td>99.80 (15.5)</td>
<td>93.00 (10.5)</td>
</tr>
<tr>
<td><strong>Emotional Eating</strong></td>
<td>(\dot{5} (0.25))</td>
<td>(\dot{5.6} (0.25))</td>
</tr>
<tr>
<td><strong>Lapses</strong></td>
<td>(\dot{5.8} (0.38))</td>
<td>(\dot{7.9} (0.29))</td>
</tr>
<tr>
<td><strong>Temptations</strong></td>
<td>(\dot{4.7} (0.21))</td>
<td>(\dot{3.8} (0.33))</td>
</tr>
</tbody>
</table>

### Averages

<table>
<thead>
<tr>
<th></th>
<th>Early Onset</th>
<th>Late Onset</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Average Activity kcals</strong></td>
<td>648.51 (290.7)</td>
<td>635.27 (291.7)</td>
</tr>
<tr>
<td><strong>Difference in Daily Calories</strong>&lt;sup&gt;8&lt;/sup&gt;</td>
<td>422.40 (422.5)</td>
<td>506.75 (357.0)</td>
</tr>
<tr>
<td><strong>Outcome Expectancies</strong></td>
<td>63.43 (14.6)</td>
<td>66.1 (16.1)</td>
</tr>
</tbody>
</table>

* *p*<.05, ** *p*<.01; Early versus Late Onset of Obesity

---

<sup>5</sup>Results for emotional eating are reported as means. Multiplying by 100 equals percent of time participants experienced positive or negative emotion during a dietary temptation or lapse.

<sup>6</sup>Lapses and temptations were computed as separate components of emotional eating. Multiply means by 100 for percentage of time participants experienced positive or negative emotion during a temptation or lapse.

<sup>7</sup>Averages: Measures were computed as averages across the 6-month weight loss intervention.

<sup>8</sup>Caloric intake reported at posttreatment subtracted from intake reported at baseline.
Table 5. Age of Onset Measured in Three Groups on Treatment Outcome (N = 37)

<table>
<thead>
<tr>
<th>Ages 0-12 Onset</th>
<th>Ages 13-18 Onset</th>
<th>Ages 19 - Adult Onset</th>
</tr>
</thead>
<tbody>
<tr>
<td>M (SD)</td>
<td>M (SD)</td>
<td>M (SD)</td>
</tr>
</tbody>
</table>

### Post-Treatment/Maintenance Changes¹

<table>
<thead>
<tr>
<th></th>
<th>Treatment</th>
<th>Maintenance</th>
<th>Treatment</th>
<th>Maintenance</th>
<th>Treatment</th>
<th>Maintenance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Percent of Weight Lost/Change</td>
<td>.09 (.05)</td>
<td>-.002 (.05)</td>
<td>.07 (.08)</td>
<td>-.02 (.03)</td>
<td>.08 (.04)</td>
<td>-.02 (.05)</td>
</tr>
</tbody>
</table>

### Pre-Post Measures²

<table>
<thead>
<tr>
<th></th>
<th>Baseline</th>
<th>Post-Treatment</th>
<th>Baseline</th>
<th>Post-Treatment</th>
<th>Baseline</th>
<th>Post-Treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eating Self-Efficacy³</td>
<td>117.1 (21.8)</td>
<td>96.6 (17.6)</td>
<td>104.4 (19.2)</td>
<td>92.4 (25.7)</td>
<td>95.9 (30.5)</td>
<td>78.9 (32.0)</td>
</tr>
<tr>
<td>Negative Affect Scale⁴</td>
<td>73.3 (16.3)*</td>
<td>57.3 (13.5)</td>
<td>56.3 (18.4)</td>
<td>51.3 (18.7)</td>
<td>51.2 (21.3)</td>
<td>39.8 (18.6)</td>
</tr>
<tr>
<td>Exercise Self-Efficacy</td>
<td>846.3 (250.3)</td>
<td>997.8 (287.7)</td>
<td>866.0 (251.8)</td>
<td>872.7 (405.8)</td>
<td>879.4 (207.3)</td>
<td>899.8 (467.9)</td>
</tr>
<tr>
<td>Self Esteem</td>
<td>29.5 (4.7)*</td>
<td>32.6 (5.4)</td>
<td>28.2 (4.6)</td>
<td>31.6 (4.2)</td>
<td>32.7 (4.9)</td>
<td>34.5 (4.6)</td>
</tr>
<tr>
<td>Binge Eating</td>
<td>21.3 (6.4)</td>
<td>13.5 (6.6)</td>
<td>21.8 (7.5)</td>
<td>14.4 (7.5)</td>
<td>17.1 (7.8)</td>
<td>11.2 (8.3)</td>
</tr>
</tbody>
</table>

* p< .05, ** p< .01; Early versus Late Onset of Obesity

¹ Post-Treatment/Maintenance Changes: Percent of weight lost at the completion of the 6-month treatment phase and percent of weight changed at the completion of the 6-month maintenance phase.

² Pre-Post: Measures taken at baseline and upon completion of the 6-month weight loss intervention.

³ Reverse Scored

⁴ Negative Affect Subscale of Eating Self-Efficacy Scale was used as an additional measure of emotional eating. Negative Affect was significantly different between the child (ages 0-12) and adult groups (ages 19+) only. After controlling for baseline BMI this relationship became non-significant.
<table>
<thead>
<tr>
<th></th>
<th>Ages 0-12 Onset</th>
<th>Baseline Measures</th>
<th>Ages 19 - Adult Onset</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>BMI</strong></td>
<td>41.5 (8.8)**</td>
<td>36.9 (3.3)</td>
<td>33.78 (3.6)</td>
</tr>
<tr>
<td>Body Image</td>
<td>93.6 (10.3)</td>
<td>97.7 (11.9)</td>
<td>100.1 (10.2)</td>
</tr>
<tr>
<td>Emotional Eating</td>
<td>.46 (.33)</td>
<td>.57 (.26)</td>
<td>.62 (.39)</td>
</tr>
<tr>
<td>Lapses</td>
<td>.30 (.41)*</td>
<td>.78 (.30)</td>
<td>.78 (.37)</td>
</tr>
<tr>
<td>Temptations</td>
<td>.54 (.38)</td>
<td>.37 (.33)</td>
<td>.53 (.42)</td>
</tr>
</tbody>
</table>

**Averages**

<table>
<thead>
<tr>
<th></th>
<th>Ages 0-12 Onset</th>
<th>Ages 13-18 Onset</th>
<th>Ages 19 - Adult Onset</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average Activity kcals</td>
<td>572.8 (158.8)</td>
<td>677.9 (326.1)</td>
<td>493.0 (156.4)</td>
</tr>
<tr>
<td>Difference in Daily Calories Consumed (kcals)</td>
<td>435.1 (409.2)</td>
<td>415.8 (317.2)</td>
<td>707.0 (611.1)</td>
</tr>
<tr>
<td>Outcome Expectancies</td>
<td>63.3 (13.2)</td>
<td>66.2 (17.5)</td>
<td>68.7 (10.8)</td>
</tr>
</tbody>
</table>

* p< .05, ** p< .01; Early versus Late Onset of Obesity

---

5 Baseline BMI was significantly different between the age 0-12 and age 19-adult groups only.
6 Results for emotional eating are reported as means. Multiplying by 100 equals percent of time participants experienced positive or negative emotion during a dietary temptation and/or lapse. Lapses were significantly different between child and adolescent onset groups only.
7 Lapses and temptations were computed as separate components of emotional eating. Multiply means by 100 for percentage of time participants experienced positive or negative emotion during a temptation or lapse. Adolescent and adult groups had significantly more lapses than the child group. The relationship became non-significant after controlling for baseline BMI.
8 Averages: Measures were computed as averages across the 6-month weight loss intervention.
9 Caloric intake reported at posttreatment subtracted from intake reported at baseline.