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# The relationship between body image and weight maintenance in community women enrolled in weight-loss programs

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# THE RELATIONSHIP BETWEEN BODY IMAGE AND WEIGHT MAINTENANCE IN COMMUNITY WOMEN ENROLLED IN WEIGHT-LOSS PROGRAMS

by

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# Dedication

I wish to dedicate this work to my loving and supportive husband, Jeffery. His constant encouragement made this project feasible. I am truly grateful for his motivational abilities at the points when I was struggling through this process.

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## Abstract

Research suggests that poor body image, low self-esteem, and depression may be associated with failure to maintain weight loss (Lean, 2000). However, definitive results are lacking, necessitating further research. Both successful and unsuccessful weight maintainers (N = 148) were recruited from weight-loss programs. Self-report measures on dimensions of body image, depression, and self-esteem were administered at baseline and a three-month follow-up. Results suggest that those with early-onset obesity have more body image dissatisfaction than those with late-onset obesity, which appears to be due to BMI differences between groups with the former having a higher BMI than the later. Other results indicate no differences between short-term and long-term weight maintainers on change in body image in three months. Furthermore, change in body image is not a significant predictor of successful weight maintenance. Further research will be necessary to clarify the relationship between body image and weight maintenance.

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## Statement of the Problem

Obesity is a national epidemic in the United States with more than 27% of the adult population classified as clinically obese and an additional 34% classified as overweight (United States Department of Health and Human Services, 2001). This equates to roughly one in every two Americans, or 129.6 million people, being either overweight or obese (Flegal, Carroll, Ogden, & Johnson, 2002). From 1991 to 1998, the prevalence of obesity jumped 5.9% (Mokdad, Serdula, Dietz, Bowman, Marks, & Koplan, 1999). Further research is necessary to develop more effective weight loss and maintenance treatments and thereby alleviate the overwhelming epidemic of a society burdened by the medical conditions associated with obesity.

Many studies have shown that those who carry excess weight have significant increased risks of morbidity and mortality. A recent study has reported that, in any given year, an estimated 280,184 deaths in the United States may be attributable to obesity (Allison, Fontaine, Manson, Stevens & VanItallie, 1999). Additionally, the health outcomes of overweight or obese Americans are not favorable. As body mass increases, risk factors for many diseases including cardiovascular disease, type two diabetes, certain cancers, gallstones, and osteoarthritis increase (Field, Barnoya, & Colditz, 2002). For example, it is estimated that 67% of people diagnosed with type two diabetes have a body mass index greater than 27 $kg/m^2$, classifying them as overweight or obese (United States Department of Health and Human Services, n.d). Many other obesity-related

medical complications have been identified including hypertension, stroke, dyslipidemia, respiratory disease, and gout (Must, Spadano, Coakley, Field, Colditz, & Dietz, 1999; Pi-Sunyer, 2002).

Overweight individuals' increased need for medical care creates significant economic and financial burdens, both to the individual and to society. The Surgeon General's Obesity Report estimated that in the year 2000, the annual cost of obesity was $117 billion, which is comparable to the cost of cigarette smoking. This figure includes $61 billion in direct costs such as doctor and hospital visits and $56 billion in indirect costs such as lost wages and the value of future earnings lost by premature death (United States Department of Health and Human Services, 2001). Furthermore, Elmer, Brown, Nichols, and Oster (2004) recently completed a retrospective investigation of medical care costs associated with weight. They found that individuals who maintained their weight over a three-year period had significantly fewer medical costs than individuals who gained more than twenty pounds during that same time period. Clearly, further research is necessary to combat the adverse personal and societal consequences of the obesity epidemic.

To date, the focus of prevention and treatment efforts has been on healthy lifestyle modification through daily exercise and a balanced diet. Research suggests that individuals are successful with weight loss using this approach (Wadden & Osei, 2002; Blair & Holder, 2002). However, many who are initially successful in such programs are unable to maintain a healthy weight for extended periods (Wing & Klem, 2002; Perri, 2002; Perri & Corsica, 2002). Consequently, recognizing that diet and exercise alone may not explain the weight maintenance problem, researchers

have begun to explore psychological contributors to obesity. Preliminary studies suggest that social and interpersonal issues, difficulty with cognitive processes, binge eating, mood disturbances, self-esteem problems, and body image disturbances may be important risk factors for weight regain (Friedman & Brownell, 1995). Many have called for further research on the role of psychological factors in obesity and successful weight maintenance (Friedman & Brownell, 2002; Wadden & Osei, 2002; Perri & Corsica, 2002; Sarwer & Thompson, 2002; Johnson, 2002; Foster & McGuckin, 2002; Rosen, 2002; Wadden & Sarwer, 1999; Greenwood & Pittman-Waller, 1988).

Body image disturbance – purported to operate through cognitive, affective, behavioral, and perceptual mechanisms (Rosen, 2002) – is one psychological factor that may contribute to the lack of success in weight loss and maintenance. Many studies have demonstrated the efficacy of a cognitive-behavioral approach to the treatment of body image disturbances (Cooper, Fairburn, & Hawker, 2003; Friedman & Brownell, 1996). However, to date, these studies have been limited to short-term investigations of weight loss not fully assessing body image disturbances; follow-up studies examining these implications during weight maintenance remain to be conducted (Cash, 2002). Therefore, the proposed study will examine body image during weight maintenance after a significant weight loss.

## Literature Review

To gain an understanding of the previous research in these areas, the relevant empirical literature will be highlighted. First, an overview of obesity research will be presented, including prevalence and treatment information. Second, a

discussion of factors associated with weight maintenance will be explored with an emphasis on its limited state. Finally, the related research on body image and its suggested impact on weight maintenance will be reviewed.

*Measurement of Obesity*

According to the World Health Organization (WHO, 2002), Body Mass Index (BMI) is the preferred classification system for obesity and is equal to weight in kilograms divided by height in meters squared. A BMI ranging from 18.5 to 24.9 $kg/m^2$ constitutes the normal weight classification; a BMI ranging from 25.0 to 29.9 $kg/m^2$ constitutes overweight classification, and a BMI greater than 30 $kg/m^2$ constitutes obesity (WHO). The WHO further subdivides the obese category into Obese Class I (BMI of 30.0 to 34.9), Obese Class II (BMI of 35.0 to 39.9), and Obese Class III (BMI >40.0). Several other organizations have adopted this obesity classification system, including the National Institute of Diabetes and Digestive and Kidney Diseases, the National Heart, Lung, and Blood Institute, and the National Center for Chronic Disease Prevention and Health Promotion. In part, the BMI-based obesity classification system is widely used because of its empirical support with respect to identifying weight-related medical complications (Manson, Skerrett, & Willett, 2002). However, some have criticized the BMI system because it fails to distinguish fat tissue from muscle tissue, sometimes resulting in extremely muscular people being classified as overweight, which may not be accurate (Foreyt, Poston, McInnis, & Rippe, 2003). Likewise, those with high bone density may also be misclassified. Nonetheless, BMI remains an inexpensive and practical classification

system for most obesity research (Manson, Skerrett, & Willett, 2002; Must et al., 1999).

An alternative measure of obesity that has received some empirical support is waist circumference (WHO, 2002). This measure correlates closely with BMI and with risk factors for obesity-related diseases (WHO). A waist circumference greater than 102 centimeters for men and 88 centimeters for women represents overweight status (WHO). The use of this measurement is most helpful in distinguishing visceral obesity from gluteofemoral obesity (Bjorntorp, 2002). Visceral obesity occurs when the majority of excess adipose tissue is located in the abdominal area and surrounds the organs of the body; hence the term “apple-shaped” is often used. In contrast, gluteofemoral obesity occurs when the majority of excess adipose tissue is located on the periphery of the body, typically in the hips, thighs, gluteus, and legs. These individuals are often referred to as “pear-shaped.” Research indicates that individuals with more visceral fat have increased risk factors of morbidity than those with gluteofemoral fat (Bjorntorp; Despres, 2002; Pi-Sunyer, 2002; Manson, Skerrett, & Willett, 2002). Additionally, preliminary research suggests that individuals with higher levels of visceral fat have higher rates of psychopathology when compared to individuals with comparable BMI levels (Lapidus, Bengtsson, Hallstrom, & Bjorntorp, 1989). This suggests that method of obesity measurement should be considered in research.

*Definition of Obesity*

Obesity is defined as an excess accumulation of adipose tissue and is hypothesized to be an interaction of environmental and genetic influences (Atkinson,

1999). Identical twin studies have revealed a high degree of concordance in body weight in twins reared together and apart (Atkinson). In addition, animal studies have identified multiple genes that contribute to obesity (Price, 2002). Overall, biology is speculated to account for 25% to 40% of the variance in human body weight, highlighting the importance of genetics in the etiology of obesity (Horgen & Brownell, 2002).

Research on environmental influences on weight has focused on familial factors, activity levels, eating patterns, drugs, stress, and psychological complications (Atkinson, 1999) as well as the "toxic environment" of today's society (Horgen & Brownell, 2002). The latter term refers to the ubiquitousness of inexpensive, high-fat, high-calorie food that permeates the typical American lifestyle. Fast-food chains, notorious for unbalanced meals and gigantic portions, have become an integral part of American society. In addition, technological advances such as elevators, escalators, shuttle buses, and remote controls have made Americans' lives less physically demanding, further contributing to the obesity epidemic. However, it is important to note that these environmental factors have the potential to be altered, whereas the biological basis of obesity is fixed and not subject to modification.

*Psychological Aspects of Obesity*

While the medical complications of obesity have been identified in many studies, research on psychological factors has been much more limited. Early studies comparing obese and non-obese individuals reported minimal associations between general psychopathology and obesity and concluded that obesity does not

increase the risk for psychological problems (Friedman & Brownell, 1995). However, it may be inaccurate to assume that obese individuals are homogenous in regards to levels of obesity, risk factors, and cognitive interpretations of being obese. Preliminary research has suggested that these facets of obesity should be investigated when conducting research on obesity and psychopathology (Friedman & Brownell, 2002). More recent research has suggested a relationship between obesity and psychopathology, mostly with depression (Dixon, Dixon, & O'Brien, 2003; Faith, Matz, & Jorge, 2002) and self-esteem (Ogden, 2003; Hill & Williams, 1998). However, a simple or single association is unclear, and it appears that multiple covariations between psychopathology and obesity exist (Faith, Matz, & Jorge, 2002).

In addition to its medical and psychological sequelae, obesity carries with it a social stigma that can engender prejudice and discrimination in virtually all aspects of life (Blaine, DiBlasi, & Conner, 2002). This stigma has been implicated in the decreased self-esteem, negative emotions, and cognitive dysfunction often experienced by obese individuals (Wadden, Womble, Stunkard, & Anderson, 2002). Sobal and Stunkard (1989) add that the disparagement of obese individuals is the last socially acceptable form of prejudice in society despite the increased knowledge of the genetic etiology of obesity. The remediation of such psychological sequelae may require interventions to promote the development of coping strategies as this stigma against obese individuals continues to the present (Puhl & Brownell, 2003).

Recently, body image disturbance has become a focus in obesity research. Studies have demonstrated that obese individuals tend to misperceive – and,

particularly, underestimate – their actual body size (Valtolina, 1998). Additionally, research suggests that obese individuals tend to have high levels of body dissatisfaction, with elevations notable on both cognitive and affective measures of distress about body size (Schwartz & Brownell, 2004; Sarwer & Thompson, 2002; Hill & Williams, 1998). Clearly, further research is warranted to better understand the complex interrelationships between psychological factors and obesity.

*Treatment of Obesity*

Obesity treatment research has examined many different treatment approaches across a variety of settings. Current treatment recommendations are based on the level of obesity, with more comprehensive and intensive treatment programs typically recommended for those who are more severely obese. Recommendations for behavioral changes in diet and physical activity are often accompanied by cognitive interventions designed to restructure irrational, irrelevant, or maladaptive beliefs. Bariatric surgery is regarded as the most intensive procedure, and may be recommended when obesity confers a high risk of debilitating illnesses and diseases.

Wadden and Osei (2002) have proposed a four level step-care decision matrix in developing an appropriate treatment intervention. For slightly overweight individuals (BMI less than 27kg/$m^2$), the recommended treatment is the least intensive and involves self-directed diet and exercise as well as counseling with a physician to ensure appropriate nutrition and exercise. For overweight individuals (BMI of 27-29.9kg/$m^2$), the recommended treatment is a combination of a self-help program, a commercial program, and a behavioral program. The self-help and

commercial programs provide more structure and support for individuals who lack the internal motivation necessary to succeed. Examples of these programs include Overeaters Anonymous (OA), Taking Pounds off Sensibly (TOPS), and Weight Watchers (WW). The behavioral treatment option focuses on self-monitoring, problem-solving, cognitive restructuring, social support, and the use of reinforcement contingencies. For obese individuals (BMI 30-39.9kg/$m^2$), the recommended treatment is a portion-controlled, low calorie diet of 900-1200 kilocalories a day and pharmacotherapy. The low calorie diet often involves structured meal plans or liquid meal replacements. Medications to regulate appetite and satiety such as sibutramine and medications to cause nutrient malabsorption such as orlistat have recently been approved by the Food & Drug Administration for long-term use and may assist obese individuals with weight loss and maintenance. For severely obese individuals (BMI is greater than 40kg/$m^2$), the recommended treatment is bariatric surgery. This treatment option is the most drastic and involves surgically restructuring the digestive tract to allow for minimal food absorption. While these recommendations serve as a useful guide, treatment decisions should also be based on various other considerations including known risk factors, type of obesity (visceral or gluteofemoral), gender, age, previous efforts, psychological state, and patient preference. Wadden and Stunkard (2002) provide a comprehensive review of treatment approaches.

*Definition of Weight Maintenance*

There are many barriers to the study of weight maintenance and relapse prevention. First, there is little consensus regarding the definition of weight

maintenance, both in terms of how much weight must be lost and how long it must be maintained (Wing & Klem, 2002). Jeor, Brunner, Harrington, and Scott (1997) suggested that weight fluctuations exceeding five pounds can be used to classify individuals as maintainers, gainers, or losers. However, Lean (2000) has commented on some common confounds in the study of weight maintenance with the most important being the failure to account for the passage of time. That is, for most individuals, weight and body fat gradually increase throughout the first six decades of life, simply due to expected age-related changes in body tissue composition. Therefore, over time, a five-pound weight increase would classify virtually all individuals as gainers, rendering the Jeor et al. (1997) definition of little utility for studying weight maintenance. However, Lean (2003) suggests that a target weight gain goal of less than 1.5 pounds in two years is reasonable.

Successful weight maintenance is a common problem for individuals who have lost weight. It is well documented that many individuals who lose weight eventually regain some, if not all, of it back (Byrne, Cooper, & Fairburn, 2003; Byrne, 2002; Wing & Klem, 2002; Lean, 2000; Turner, Wang, & Westerfield, 1995). Perri (2002) reported that individuals who completed a behaviorally based obesity treatment program lost approximately 9% of their body weight and regained half of the lost weight back within one year and the remainder within five years. It is estimated that between 50 and 80% of individuals follow this pattern (Perri & Corsica, 2002). Research on long-term weight maintenance is limited because most longitudinal studies do not extend beyond one year and because most studies have focused specifically on weight loss, not maintenance.

Due to the lack of information on successful weight maintenance, the National Weight Control Registry (NWCR) was organized by James Hill and Rena Wing in the mid 1990s (Wing & Klem, 2002). The database is limited to those who have lost at least thirty pounds and who have been able to maintain that weight loss for a least one year. More than three thousand individuals have met this definition of weight maintenance and are members of the NWCR. The average weight loss of a NWCR member is 66 pounds and length of maintenance is 6 years (Wing & Klem). Consequently, in recent years, studies based on NWCR data have consistently used the criterion of losing at least thirty pounds and maintaining it for one successive year as successful weight maintenance (Klem, Wing, Lang, McGuire, & Hill, 2000; Klem, Wing, McGuire, Seagle, & Hill, 1997; McGuire, Wing, Klem, Lang, & Hill, 1999; Sarlio-Lahteenkorva & Rissanen, 1998; Shick, Wing, Klem, McGuire, Hill, & Seagle, 1998).

In contrast to the NWCR definition, other researchers have suggested that successful weight maintenance be defined as losing 10% of one's body weight and maintaining it (within 1.5 pounds) for one year. This definition has been gaining popularity due to its focus on a percentage of weight rather than a fixed number (Byrne, Cooper, & Fairburn, 2003), thereby taking into consideration, for example, the difference between a thirty-pound weight loss in someone who weighs 120 pounds initially versus someone who weighs 300 pounds initially.

Finally, the Institute of Medicine (IOM) has suggested an even more lenient measurement of weight maintenance. Specifically, the IOM considers a 5% weight loss that is maintained for one year to constitute successful weight maintenance

(Perri & Corsica, 2002). The justification of this determination is that serious health consequences of obesity are dramatically reduced with a minimal weight loss of 5%. In summary, weight maintenance research has relied upon a variety of definitions for weight maintenance, yielding an overall lack of consensus and an inability to compare findings across studies.

*Factors Associated with Weight Maintenance*

Despite differing conceptualizations of weight maintenance, the NWCR and other research studies have identified some factors that appear to contribute to successful weight maintenance. Morton (1988) found that behavioral aspects of maintenance including adherence to a low-fat diet, adequate physical exercise, and accessing available social support post-treatment prevented weight relapse. Foreyt and Goodrick (1994) suggested that having more realistic weight loss goals and slowing the weight loss process may improve the likelihood of weight maintenance after weight loss. They also commented on the potential for psychological factors – including depression and personality disturbances – to interfere with weight maintenance.

Additional research focused on cognitive and behavioral strategies that promote weight maintenance and relapse prevention (Turner, Wang, & Westerfield, 1995). McGuire, Wing, Klem, Lang, and Hill (1999) have identified the following risk factors of weight regain in successful maintainers: shorter duration of weight loss period, larger weight losses, higher levels of depression, higher dietary disinhibition, and more frequent binge-eating. Beyond these primarily behavioral factors, however, research has revealed that negative thoughts and perfectionistic attitudes

are common cognitive dysfunctions associated with failure to maintain weight loss (Pasman, Saris, & Westerterp-Plantenga, 1999). Lean (2000) summarized low self-esteem, self-deception, depression, and distorted body image as psychological symptoms associated with failure to maintain weight loss. In a qualitative study analyzing weight maintenance, Byrne, Cooper, and Fairburn (2003) observed that many of these same variables were related to relapse. Yet Byrne (2002) points out that how these factors influence weight maintenance is still unknown; further research is necessary to gain a better understanding of the complex nature of psychological factors involved in weight maintenance.

### *Weight Maintenance in Obesity Treatment*

Building upon these preliminary reports of weight relapse risk factors, Cooper and colleagues developed a cognitive-behavioral treatment program that attempted to address these potential impediments of successful weight maintenance (Cooper, Fairburn, & Hawker, 2003; Cooper & Fairburn, 2002). The treatment program includes restructuring body image disturbances, hypothesized to have an impact in weight maintenance. Research into the efficacy of this treatment approach is still in its infancy and warrants continued investigation.

### *Definition of Body Image*

Historically, the concept of body image was exclusively associated with research on eating disorders, in particular anorexia nervosa and bulimia nervosa. In the third edition of *The Diagnostic and Statistical Manual of Mental Disorders*, body image disturbance was a criterion for anorexia nervosa (American Psychological

Association, 1980). However, more recent research suggests that individuals with anorexia do not invariably experience both body dissatisfaction and body misperception that defined body image disturbances (Garfinkel, 2002). In fact, anorexic individuals do not overestimate their size, suggesting an accurate body image, but they do experience body dissatisfaction. Thus, in the current version of *The Diagnostic and Statistical Manual of Mental Disorders* (American Psychological Association, 2000), body image misperception is no longer a diagnostic criterion.

Body image is generally regarded to be a multifaceted construct, but a consistent definition is lacking. Initial attempts to operationalize the construct centered on dissatisfaction and perceptual disturbances, with dissatisfaction containing cognitive, affective, and behavioral dimensions (Waller & Barnes, 2002). However, some researchers disagree with this conceptualization. Banfield and McCabe (2002) recently completed a factor analysis on a summary of items from ten body image measures and found three different factors accounted for the majority of the variance in the construct. These factors were labeled as follows: cognitions and affect regarding body, body importance and dieting behavior, and perceptual body image. Waller and Barnes (2002) also suggested that body image may be an "elastic" construct that is dependent on a number of social and psychological factors including body image disturbances. Thompson and van den Berg (2002) argue that attitudinal body image, or body dissatisfaction, is generally classified into four components: global dissatisfaction, affective distress, cognitive aspects, and behavioral avoidance. Sarwer and Thompson (2002) assert that the universal term "body image" is useless unless it is accompanied by a specification of what

psychological processes are being included in its definition. In summary, the limited research on body image suggests that four distinct components are typically included in the construct of body image. These four components are cognitive, affective, behavioral, and perceptual aspects of body image (Rosen, 2002).

The disjointed nature of the early body image research and evident need for conceptual clarity in the field prompted the publication of the first journal focusing solely on body image. This journal is appropriately titled *Body Image: An International Journal of Research* and is edited by a major contributor to the field, Thomas Cash. In the introduction to the journal, Cash (2004) provides a brief overview of the topic of body image and discusses how body image may more appropriately be referred to as *body images*, suggesting several factors being integrated into the construct of body image. He also notes the limits of the field and the vast amount of research that is necessary before a more thorough understanding of the topic can be achieved.

Body image has also been conceptualized differently by the various psychological orientations including psychodynamic, information-processing, feministic, behavioral, and cognitive-behavioral. Each approach has developed a multifaceted theory of body image, but integration between the approaches has been minimal, thereby compounding the problem of clearly and consistently defining the term “body image.” Yet the majority of the research being conducted is according to the cognitive-behavioral perspective (Cash, 2002b).

*Measuring and Assessing Body Image*

The lack of a clear consensus of the definition of body image dramatically affects both measurement and assessment. Body image is currently understood as a multifaceted construct, which necessitates several approaches to measurement. Stunkard and Mendelson (1967) developed a figural scale to assess body image disparagement by noting the discrepancy between current and ideal selves. Since this time, several researchers have developed additional figural scales to assess the perceptual component of body image (Williamson, Davis, Bennett, Goreczny, & Gleaves, 1989; Thompson & Gray, 1995; Gardner, Stark, Jackson, & Friedman, 1999). It appears that in the future with increased accessibility to technology, researchers will be exploring perceptual body image by examining the discrepancy between how individuals view themselves and their actual BMI by using advancements in computer morphing and distortion (Thompson & Gardner, 2002; Schlundt & Bell, 1993). Behavioral, cognitive, and affective aspects of body image are often measured using self-report questionnaires. Appendix A lists numerous body image assessment tools that have sound psychometric properties.

Although several different methods of measuring body image exist, the assessment of body image in obese individuals remains problematic because a standard definition of the construct is lacking (Rosen, 2002). One suggested approach is to use the diagnostic criteria for body dysmorphic disorder, minus the criterion for “normal” appearance (Rosen). Specifically, this criterion requires a preoccupation with appearance that causes clinically significant distress or impairment in social, occupational, or other important areas of functioning (American

Psychological Association, 2000). Other researchers have suggested the use of cutoff scores on standard measures of body image. However, this is problematic because norms for obese individuals on these measures often are not available (Rosen, 2002). Until definitional and measurement uniformity can be achieved, it is incumbent upon investigators to specify the exact definition and assessment procedure utilized so that body image findings can be replicated and extended in future studies (Sarwer & Thompson, 2002).

*Body Image and Obesity*

Connections between body image disturbance and obesity were first introduced by Stunkard and Mendelson (1967), who reported that, some – but not all – obese individuals experience body image disturbance. Individual differences and environmental factors may influence body image in obese (and non-obese) individuals. The term “normative discontent” is used frequently in research to characterize obese individuals’ tendency to experience an overall greater degree of body image disturbance than the general population (Cash, 2002). However, others have demonstrated considerable heterogeneity among obese individuals (Sarwer & Thompson, 2002; Rosen, Orosan, & Reiter, 1995; Rosen & Reiter, 1996; Cooper, Taylor, Cooper, & Fairburn, 1987; Sarwer, Wadden, & Foster, 1998).

Individuals who are obese before age sixteen (early-onset) have a higher BMI, greater body dissatisfaction, and lower self-esteem than those with late-onset (after age sixteen) obesity (Wardle, Waller, & Fox, 2002). Sorbara and Geliebter (2002) found similar results focusing on the perceptual aspect of body image. Some speculate that differences between early and late-onset obesity may be due to the

differential impact of a variety of factors including childhood teasing, parental criticisms, a more persistent adolescent self-image, and/or societal pressures to be thin. These differences between early onset and late onset individuals also are present after weight loss as evidenced by Adami, Gandolfo, Campostano, Meneghelli, Ravera, and Scopinaro (1998). They found that after weight loss, individuals with early onset obesity experienced more body dissatisfaction than late onset obesity individuals with similar BMI scores. Further, these early onset individuals' body image was similar to currently obese individuals, and late onset individuals' body image was similar to individuals who had never been obese. These results provide additional support for Offman and Bradley's (1992) findings that the construct of body image may develop sometime in early childhood or adolescence. Overall, it is speculative that the age of onset of obesity is somehow related to body image.

Weight trajectories have also been shown to impact body image (Schwartz & Brownell, 2004). For example, an individual weighing 170 pounds would have a different body image if she previously weighed 200 pounds versus 120 pounds. The current trajectory of weight also has implications for those obese individuals who have a history of weight cycling, or are constantly gaining and losing weight (Schwartz & Brownell). This instability of weight increases the risk for body image disturbance. Research has also shown that individuals who engage in binge-eating patterns have a higher level of body image disturbance and may also have problems with weight cycling.

Individual and cultural factors also may affect body image. Research has shown that women experience a higher degree of body image dissatisfaction than men, with Caucasian women experiencing the most dissatisfaction (Schwartz & Brownell, 2004). African Americans generally experience less body image dissatisfaction than Caucasian Americans do, although they typically are more overweight (Celio, Zabinski, Wilfley, 2002). This suggests that varying standards of attractiveness exist among cultures and may influence one's body image. Research examining body image in other cultures is limited, but preliminary results suggest that Hispanic Americans and Asian Americans have similar levels of body image disturbances as Caucasians (Altabe & O'Garo, 2002; Kawamura, 2002). Careful consideration of cultural influences on body image is a necessary step in understanding this multifaceted construct.

*Body Image and Weight Change*

The relationship between body image disturbances and weight loss has also been a focus of research activity. Weight loss has been reported to be associated with significant improvements in body image, yet these changes may not correlate with the amount of weight loss (Foster, Wadden, & Vogt, 1997). These findings suggest that there may be a threshold effect of body image as weight loss occurs, with small initial losses accounting for greater body image improvements and later more dramatic losses accounting for less body image improvement (Foster & Matz, 2002).

Vestigial obesity, or more commonly referred to as "phantom fat," may also play a role in the relationship between body image and weight maintenance. Initially

identified by Cash, Counts, & Huffine (1990) through cross-sectional research, vestigial fat refers to formerly overweight individuals demonstrating more body image disturbances than matched never-overweight controls. In fact, they demonstrated body image disturbances similar to that of overweight individuals. However, not all research supports this phenomenon and more prospective studies have found no evidence of it (Cash, 1994). Other factors, such as age of onset and social issues of obesity, may have implications in this phenomenon, necessitating further research.

*Treatment of Body Image Disturbances*

Despite the unclear conceptualization of the construct of body image, many researchers and clinicians have included treatment of its disturbances within the framework of the treatment of obesity. The cognitive-behavioral approach to the treatment of obesity includes a component that directly addresses the body image disturbances that may affect the individual and have an impact on the success of the treatment (Cooper, Fairburn, & Hawker, 2002; Rosen, Orosan, & Reiter, 1995). Addressing and treating body image disturbances in obese individuals has been beneficial to successful obesity treatment. Yet it is unclear whether the effectiveness of this treatment approach is due to cognitive restructuring, behavioral treatment, or a combination of the two (Sarwer & Thompson, 2002). In addition, there is little longitudinal research addressing the impact of body image change on continued weight maintenance (or vice versa); this remains an important area to pursue in future research (Rosen, 2002; Sarwer & Thompson, 2002; Wadden & Sarwer, 1999).

In summary, little is known about the nature, extent, latency, variability, and implications of changes in body image that may occur during the process of weight loss and weight maintenance. In one treatment study incorporating cognitive-behavioral therapy for obesity, Rosen, Orosan, and Reiter (1995) observed improvements in body image within eight sessions. In another treatment study, Cooper, Fairburn, and Hawker (2002) organize their treatment into a minimum of twelve to eighteen sessions spanning twenty-four to thirty-six weeks, hypothesizing that this time period is sufficient to promote body image change. In addition, there is substantial research indicating that weight loss does not necessarily change body image perception and that a formerly overweight individual's body image is closer to obese individuals than it is to that of non-obese (Sarwer & Thompson, 2002; Cash, Counts, & Huffine, 1990). Wadden and Sarwer (1999) note that body image therapy may have its biggest impact in weight maintenance, not weight loss. However, its exact impact remains unclear and warrants further investigation.

Obesity's prevalence in today's society made this study a timely and necessary endeavor. Obesity truly is a national epidemic that needs to be addressed and researched with an emphasis on weight maintenance. A better understanding of the relationship between weight maintenance and body image disturbances may ultimately assist health care professionals in the treatment and prevention of obesity.

## Statement of Research Hypotheses

This study sought to further explore the nature and extent of body image changes that occur in weight maintenance after a significant loss. Body image was conceptualized through cognitive, affective, behavioral, and perceptual dimensions,

with distinct measures for each component specified later. Weight maintenance was conceptualized as maintaining a stable weight within two pounds for the duration of the study. Significant weight loss was defined as losing either thirty pounds of initial body weight or ten percent of initial body weight. The following hypotheses were tested:

1. Consistent with related research, weight-maintained participants with early-onset (before age sixteen) obesity will experience more body dissatisfaction than participants with late-onset (older than age sixteen) obesity.
2. Participants who have maintained a significant weight loss for less than twelve months will experience a larger change in body image than participants who have maintained a significant weight loss longer than twelve months.
3. Change in body image (including cognitive, affective, behavioral, and perceptual components), low levels of depressive symptomology, and high levels of self-esteem will be independent predictors of successful weight maintenance, with cognitive and affective body image change being the strongest predictors.

Moreover, it is anticipated that this short-term prospective study will provide data justifying the embarkment of a more comprehensive longitudinal study to further our understanding of the interrelations between body image changes and weight maintenance.

# Method

## *Participants*

One hundred forty-eight adult women were recruited using availability sampling from fourteen *Curves for Women* fitness centers and one *Taking Off Pounds Sensibly* weight-loss center in Michigan. *Curves for Women* fitness centers promote healthy weight loss and maintenance through a sensible diet and an exercise program incorporating both aerobic and strength training techniques in a three-times-a-week, thirty-minute routine. *Taking Off Pounds Sensibly* centers promote healthy weight loss through weekly weigh-in meetings incorporating healthy nutrition and appropriate levels of exercise. Oral permission of the establishment owners was obtained prior to data-collection. This study recruited only female participants because research suggests that men's body image may differ significantly from women, which may confound results (Sorbara & Geliebter, 2002).

The following inclusion criteria were met by all participants:

1. Participants had a BMI greater than 25kg/$m^2$ at some point in their lives and therefore are classified as having a lifetime history of being overweight.
2. Participants completed an informed consent for screening (Appendix B) and an informed consent agreement to participate in the research (Appendix C).
3. Participants were at least eighteen years of age.
4. Participants agreed to complete the follow-up portion of the study in approximately three months.

The following exclusion criteria were used to obtain an appropriate sample, aid in retention of participants, and ensure that design requirements of the study were met.

1. Participants who intended to move from the area during the duration of the study were not included in the study.
2. Participants who were pregnant or were considering becoming pregnant in the next six months were excluded from the study.
3. Participants who were in body image or obesity-related therapy beyond that offered by the *Curves for Women* or *Taking Off Pounds Sensibly* programs were also excluded from the study.

Overall, participant demographic and characteristic information is summarized in Table 1. Participants ranged in age from 18 to 74 ($M$ = 43.8, $SD$ = 12.5) and were predominantly Caucasian (96.6%). Almost half (44.9%) of the sample were post-menopausal and had a mean time since onset of menopause of 5.9 years ($SD$ = 5.9). The participants' heaviest BMI ranged from 22.3 to 74.1 ($M$ = 34.3, $SD$ = 8.6) and their current BMI ranged from 18.8 to 47.0 ($M$ = 27.9, $SD$ = 5.9). The majority expressed a desire to continue to lose weight from baseline information (70.5%) and reported that weight became an issue for them anywhere from all their life to age 62 years ($M$ = 21.7, $SD$ = 11.3).

Table 1

*Demographic and Weight-related Characteristics of Total Sample*[a]

| | Total (N = 148) |
|---|---|
| *Demographics* | |
| Age (in years) | 43.8 ± 12.5 |
| Race – Caucasian | 142 (95.9) |
| Ethnicity – Non-Hispanic | 136 (91.9) |
| Location – Fitness Center | 122 (82.4) |
| Location – Weight –Loss Center | 26 (17.6) |
| *Weight-related Characteristics* | |
| Post-menopausal | 66 (44.6) |
| Time since Menopause[b] (in years) | 5.9 ± 5.9 |
| Experience of Menopause Symptoms – Negative[b] | 14 (26.4) |
| Experience of Menopause Symptoms – Neutral[b] | 33 (62.3) |
| Experience of Menopause Symptoms – Positive[b] | 6 (11.3) |
| Heaviest BMI (in $kg/m^2$) | 34.3 ± 8.6 |
| Current BMI (in $kg/m^2$) | 27.9 ± 5.9 |
| Weight Maintenance Duration (in months) | 13.9 ± 50.7 |
| Intention to Maintain Weight | 42 (28.4) |
| Intention to Lose Weight | 103 (69.6) |
| Age of Onset of Obesity (in years) | 21.7 ± 11.3 |
| Baseline Depression Score | 12.2 ± 9.5 |
| Baseline Self-Esteem Score | 32.7 ± 4.8 |

*Note.* [a]Values are expressed as n (%) or *M* ± *SD*.
[b]This information was obtained from only post-menopausal participants.

*Instruments*

Several measures are available to assess the construct of body image. Appendix A lists common measures used in body image research and the presence of the properties that are essential in this type of research. Careful consideration of the most important factors to this research topic yielded the following criteria used to select the study measures:

1. The measures had to possess valid and reliable psychometric properties for the purpose of this study.

2. They had to be brief self-report measures for the practical purpose of ease of administration.
3. They had to be sensitive to small effects of body image change.
4. They had to tap the defined construct of body image, specifically the cognitive, affective, behavioral, and perceptual components.
5. They had to be appropriate for use with an overweight or obese sample.

In light of these considerations, the following measures were used in this study.

*Screening Information/Follow-Up Information.* This brief questionnaire (Appendix B) was used to ensure that all participants met the inclusion and exclusion criteria for the study before they continued. An abbreviated version of this questionnaire was also given during the follow-up portion of the study (Appendix C).

*Multidimensional Body Self-Relations Questionnaire-Appearance Scale (MBSRQ-AS).* The MBSRQ-AS (Appendix D) is a 34-item self-report subscale of a 69-item questionnaire measuring attitudinal aspects of body image (Cash, 2000). This subscale specifically measures the cognitive and affective components of appearance and body image. For this study, only the appearance evaluation, overweight preoccupation, and self-classified weight subscales were administered to shorten the questionnaire to thirteen items. The appearance evaluation subscale is scored by obtaining the mean of the seven items and can range from 1 to 5, with a higher score indicating more body image satisfaction. The overweight preoccupation subscale has the same range and also is scored by obtaining the mean of the four items, with higher scores indicating more preoccupation with being overweight. Self-classified weight is a two item subscale that is scored similar to the previous

subscales, with higher scores indicating classification as more overweight. The remaining subscales were not used in this study because they focused on feelings and thoughts associated with specific body areas satisfaction, appearance orientation, and overall health and fitness, which are not areas of interest for this study. The MBSRQ-AS has demonstrated excellent psychometric properties. It is reliable based on internal consistency (Cronbach's alpha = .73 to .89 on the subscale level) and test-retest reliability ($r$= .74 to .91) according to the published manual (Cash, 2000). It also has demonstrated sensitivity in measuring body image change as it has been used in treatment outcome studies (Cash, 1994; Butters & Cash, 1987) and has strong discriminant, convergent, and construct validity (Cash, Counts, Hangen, & Huffine, 1989). The MBSRQ-AS has been standardized using a community population numbering over two thousand including overweight individuals. This measure is intended for participants over the age of eighteen and was used in this study to assess cognitive and affective components of body image.

*Body Image Assessment for Obesity (BIA-O).* The BIA-O (Appendix E) is a perceptual measure of body image dissatisfaction developed to include severely obese individuals (Williamson, Womble, Zucker, Reas, White, Blouin, & Greenway, 2000). This measure contains eighteen silhouettes varying from very thin to severely obese and is an extension of the original Body Image Assessment (BIA). This scale is composed of two subscales, Current – Ideal Body Dissatisfaction and Current – Realistic Body Dissatisfaction. These subscales are scored by finding the discrepancy between current body size and ideal or realistic body size. The range of scores can be from -17 to 17, with a higher score indicating more body

dissatisfaction. Although the BIA-O is a relatively new figural stimulus for assessing body image dissatisfaction, it has demonstrated sufficient psychometric properties. Test-retest reliability at a two-week interval were favorable ($r$ = .77 to .93). Concurrent validity with two established body dissatisfaction measures (Body Shape Questionnaire and Body Dissatisfaction Scale of the Eating Disorder Inventory) was shown with all intercorrelations being highly significant ($p < .01$). The sample used to validate this measure was also large, with 784 community participants with BMI scores ranging from 15.7 kg/m$^2$ (Underweight) to 61.7 kg/m$^2$ (Obese Class III), with a mean BMI of 28.1 kg/m$^2$ (Overweight). Norm values were also calculated using this more overweight sample, which is relatively rare in the study of body image. For the present study, this measure assessed perceptual body image dissatisfaction by noting the two discrepancies: one between current body size selection and an ideal body size selection (Current – Ideal), and the other between current body size selection and a realistic body size selection (Current – Realistic).

*Body Image Avoidance Questionnaire (BIAQ).* The BIAQ (Appendix F) is a 19-item questionnaire that assesses the behavioral facets of body image and the frequency of body image avoidance behaviors. Scoring is obtained by adding the item responses and can range in value from 0 to 95, with a higher score indicating more avoidant behaviors. The BIAQ was developed by Rosen, Srebnik, Saltzberg, & Wendt (1991) and has excellent psychometric properties. It is reliable by both test-retest ($r$ = .87) and internal consistency (Cronbach's alpha = .89) standards and correlates highly with negative attitudes about weight and perceptual distortion of size. In addition, it has demonstrated concurrent validity with the Body Size

Estimation Test and Body Shape Questionnaire (Rosen, Srebnik, Saltzberg, & Wendt). In the present study, this questionnaire was used to measure the behavioral component of the multidimensional construct of body image.

*Center for Epidemiologic Studies – Depression Scale (CES-D).* The CES-D (Appendix G) is a brief 20-item self-report questionnaire assessing depressive symptoms in non-clinical populations. This measure has demonstrated good psychometric properties including internal consistency reliability (Cronbach's alpha = .84 to .90), test-retest reliability ($r$ = .51 to .54) and several measures of validity including convergent and discriminant (Radloff, 1977). The norms are based on several samples of more than one thousand community participants and suggest that a score above sixteen may indicate significant clinical depressive symptoms. Overall, the psychometric properties of this measure indicate that it adequately measures depressive symptomology in non-clinical populations. In the present study, this measure was used to assess the relationship between depressive symptoms, weight maintenance, and body image.

*Rosenberg Self-Esteem Scale (RSES).* The RSES (Appendix H) is a brief 10-item measure of self-esteem (Rosenberg, 1965). This is a widely used measure because of its ease of administration, its face validity, its brevity, and its unidimensionality. The RSES also has the best psychometric properties of any other comparable self-esteem scale (Byrne, 1996). Gray-Little, Williams, and Hancock (1997) replicated the excellent psychometric properties of this measure and concluded that it is a highly reliable and internally consistent measure of global self-esteem. The range of scores can vary from 10 to 40, with higher scores indicating

more self-esteem. This measure was used in the present study to assess the relationship between self-esteem, body image, and weight maintenance.

*Procedure*

Consent to recruit participants at *Curves for Women* and *Taking Off Pounds Sensibly* locations was given by the respective owners of the centers (Appendix I). Arrangements were made to set up a table at each location to recruit participants and to collect data. One to two weeks before participant recruitment, informative posters were displayed at each of the fifteen locations to spark participant interest. These posters gave only minimal information about inclusion/exclusion criteria, benefits and risks of the research, and that incentive prizes would be awarded to each participant.

Either the principal investigator or a research assistant was at each location for the time specified on the informative poster to collect screening information from potential participants. Each individual interested gave informed consent for the screening questionnaire (Appendix J) and then completed basic demographic information (Appendix K) to determine if they were eligible to participate based on inclusion/exclusion criteria. The purpose, nature, and duration of the study were explained to those who met the requirements of the study. The participants were asked to sign an informed consent to participate in the study, and an oral commitment to complete the follow-up portion of the study was obtained from each participant to minimize attrition. Participants were also asked to voluntarily provide contact information for themselves and a close relative to assist in obtaining follow-up data if necessary (Appendix L). Each participant was assigned a random

participant number that was used for the duration of the study. At this point, each participant was given a battery of questionnaires to complete, including the MBSRQ-AS, the BIA-O, the BIAQ, the CES-D, and the RSES. Some participants completed the battery immediately, and others elected to take them with them to complete. If participants took them, they were given a manila envelope to seal the questionnaires in to ensure confidentiality, and arrangements were made to drop the information back off at the recruitment location for the principal investigator or research assistant to pick up. Last, participants were reminded of the follow-up portion of the study.

The follow-up portion of the study began three months after the baseline portion, following the same procedure. Careful tracking occurred to ensure that each participant was surveyed three months after she completed the first battery. The principal investigator or research assistant posted times for participants to complete the follow-up portion of the research at the recruitment location. If they were unable to complete the follow-up that day, the retention strategies suggested by Cotter, Burke, Loeber, & Navratil (2002) were used and the principal investigator contacted them either by telephone or by electronic mail to schedule a more convenient time to complete the study. The close relative contact information was not necessary to attain the desired follow-up sample size and consequently was not used. A packet of questionnaires almost identical to the initial packet including the MBSRQ-AS, the BIA-O, the BIAQ, the CES-D, the RSES, and a follow-up questionnaire were distributed to participants to complete. Again, some participants elected to complete the questionnaires immediately, and others took them to complete at a later time. Arrangements were made with the recruitment location to hold the completed

questionnaire, sealed in a manila envelope to ensure confidentiality, until the principal investigator or research assistant returned to collect them. When the completed questionnaires were obtained, participants were informed that their participation in the study was over and were given their incentive to participate in the study. Pedometers, stopwatches, body-fat analyzers, exercise videos, and running radios were available. Finally, participants were thanked for their contribution and cooperation. Overall, 127 participants completed the follow-up set of questionnaires, giving a retention rate of 85.8%.

*Informed Consent and Ethical Treatment*

All participants were ensured ethical treatment according to the American Psychological Association (APA) standards (APA, 2002) throughout the duration of the study. Informed consent to participate in the initial screening (Appendix J) was obtained before entry into the research project. Participants were asked to read, question any ambiguities, and sign the informed consent, where it was specified that they would be able to withdraw from the study at any time without penalty. The participants also were asked to give consent allowing the principal investigator to access relevant information from the respective *Curves for Women* file. However, very few participants agreed to this aspect. Generally, this information was only obtained from women who were unable to recall their current or heaviest weight. Informed consent to participate in the main research project was also obtained (Appendix K), where participants were assured that their information would be kept strictly confidential with data identified only by a random participant number. Only the principal investigator had access to personal identifying information, which was

kept separate from other data in a secure locked location. Participants were also asked to complete their questionnaires and seal them in a manila envelope to ensure confidentiality.

This study involved minimal risk to participants, who were fully informed of the risk involved within the project. Referrals to appropriate professional services were available should participants experience some emotional or psychological discomfort. However, no participants requested this referral information. Participants were also informed of the expected benefits of the study and were aware that the information may be disseminated at conferences, poster sessions, and in the literature. The principal investigator also has the results of the study available should any participant want to obtain it.

Additionally, human subjects research approval was obtained from Eastern Michigan University's Department of Psychology to ensure safety and protection the participants. This review examined the study's research-related risks to participants as well as informed consent and confidentiality. This approval was granted in August of 2004 prior to data collection. This study involved minimal risk to the participants, had no deception of the participant, participants were not particularly vulnerable, and the study involved no other invasive procedures.

*Statistical Analyses*

Initially, descriptive statistics were calculated. Demographic and characteristic information were compared to determine if any subgroups were significantly different. The variables compared for each respective hypothesis were age, race, ethnicity, location where information was obtained, and menopausal status.

Independent samples t tests and nonparametric chi square tests were calculated. Furthermore, it was a concern that the multiple definitions of the weight maintained group may compose two distinct groups. Independent samples t-tests were conducted to identify any significant differences between the groups, allowing the difference to be controlled in subsequent analyses.

The first hypothesis was tested using several t-tests for independent samples after classifying participants as either early-onset obesity individuals or late-onset individuals. Participants were defined based on their self-reported height and weight at age sixteen, which was suggested by previous research (Wardle, Waller, & Fox, 2002). Significant differences between the two groups were analyzed using mean differences of body dissatisfaction on the MBSRQ-AS, BIA-O, and the BIAQ. These analyses were repeated controlling for BMI to determine if body image dissatisfaction accounted for the differences between the groups.

Hypothesis two was also analyzed using several independent samples t-tests. Participants were divided into two groups of maintainers suggested by previous research: those who have maintained a significant weight loss longer than twelve months and those who have maintained a significant weight loss for less than twelve months (Klem, Wing, McGuire, Seagle, & Hill, 1997). Significant differences between these two groups were analyzed using change in body image from baseline to follow-up on each body image measure (the MBSRQ-AS, the BIA-O, and the BIAQ).

Hypothesis three used two groups of participants: successful maintainers and unsuccessful maintainers based on weight change during the three month follow-up portion and self-reported current weight length. Correlational and binary logistic

regression analyses were used to examine this hypothesis. Initially, eight predictor variables – Appearance Evaluation, Self-Classified Weight, Overweight Preoccupation, Current-Ideal Body Dissatisfaction, Current-Realistic Body Dissatisfaction, BIAQ, depressive symptoms, and self-esteem – were analyzed to determine the degree of correlation with successful weight maintenance status. The body image predictors were analyzed using change in each factor from baseline to follow-up, whereas the depressive symptoms and the self-esteem levels were analyzed using baseline levels. The remaining significant variables were then analyzed using binary logistic regression to identify independent predictors of successful weight maintenance status and the strength of the predictors.

## Results

The operational definition for significant weight loss has varied across previous studies, necessitating a comparison of the two most commonly applied definitions: having lost thirty pounds from initial body weight versus having lost ten percent of initial body weight. Independent samples t-tests were conducted on several demographic variables to identify significant differences between those meeting the thirty pound definition (n = 80) and those meeting only the less stringent ten percent definition (n = 46). Table 2 lists the demographic and weight-related characteristics of each group.

Table 2

*Demographic and Weight-related Characteristics of Weight Maintenance Groups*[a]

| | Thirty Pound (n = 80) | Ten Percent (n = 46) | *p* |
|---|---|---|---|
| *Demographics* | | | |
| Age (in years) | 43.5 ± 12.6 | 44.5 ± 13.0 | *ns* |
| Race – Caucasian | 77 (96.3) | 44 (95.7) | *ns* |
| Ethnicity – Non-Hispanic | 75 (93.8) | 41 (89.1) | *ns* |
| Location – Fitness Center | 63 (78.8) | 41 (89.1) | *ns* |
| Location – Weight –Loss Center | 17 (21.3) | 5 (10.9) | *ns* |
| *Weight-related Characteristics* | | | |
| Post-menopausal | 31 (38.8) | 22 (47.8) | *ns* |
| Time since Menopause[b] (in years) | 5.7 ± 6.3 | 7.7 ± 6.3 | *ns* |
| Heaviest BMI (in $kg/m^2$) | 36.9 ± 9.7 | 30.2 ± 5.3 | <.01 |
| Current BMI (in $kg/m^2$) | 27.8 ± 6.0 | 26.6 ± 4.9 | *ns* |
| Weight Maintenance Duration (in months) | 20.1 ± 68.0 | 5.4 ± 6.6 | *ns* |
| Intention to Maintain Weight | 27 (33.8) | 13 (28.3) | *ns* |
| Intention to Lose Weight | 52 (65.0) | 33 (71.7) | *ns* |
| Age of Onset of Obesity (in years) | 19.2 ± 11.8 | 25.4 ± 10.8 | <.01 |
| Baseline Depression Score | 10.9 ± 10.1 | 13.4 ± 9.3 | *ns* |
| Baseline Self-Esteem Score | 33.0 ± 4.5 | 31.9 ± 4.8 | *ns* |

*Note.* [a]Values are expressed as n (%) or *M* ± *SD*.
[b]This information was obtained from only post-menopausal participants.

Heaviest BMI, $t$ (123.753) = 5.027, $p$<.01, $d$ = .90377, and age of obesity-onset, $t$ (122) = -2.881, $p$<.01, $d$ = -0.52166, were significantly different between weight maintenance groups. Individuals meeting criteria for the thirty pound definition were significantly heavier and had earlier onset of obesity than those meeting criteria for the ten percent definition. Conversely, there were no significant differences on age ($t$ = -.457, *ns*), menopausal status, $X^2$ (1) = .87; *ns*, duration of successful weight maintenance ($t$ = 1.881, *ns*), current BMI ($t$ = 1.225, *ns*), or intention to maintain/lose weight, $X^2$ (1) = .277; *ns*. Therefore for all analyses

presented subsequently, both groups will be combined to include the maximum number of participants.

*Hypothesis One: Early versus Late-Onset Obesity*

Previous research has suggested a cutoff point of sixteen years to differentiate between early-onset and late-onset obesity (Wardle, Waller, & Fox, 2002). Using this criterion, the group with early-onset obesity had an average onset age of 10.3 $\pm$ 3.5 years, and those with late-onset had an average onset of 27.8 $\pm$ 9.8 years. Table 3 highlights significant differences between the groups. Relative to those with late-onset obesity, those with early-onset obesity had a significantly higher BMI at their reported heaviest weight, $t$ (73.153) = 3.922, $p$<.001, $d$ = .759, and also had a higher current BMI, $t$ (77.618) = 2.894, $p$<.01, $d$ = .549. There also were significant differences on intention to maintain or lose weight, with early-onset individuals more likely to want to lose weight, $X^2$ (1) = 7.707; p <.01.

Table 3

*Baseline Weight-related Characteristics of the Early-Onset (before age sixteen) and Late-Onset (age sixteen and older) Obesity Groups*[a]

| | Early-Onset (n = 46) | Late-Onset (n = 82) | *p* |
|---|---|---|---|
| Post-menopausal | 18 (39.1) | 35 (42.7) | *ns* |
| Time since Menopause[b] (in years) | 5.3 ± 6.0 | 7.0 ± 6.4 | *ns* |
| Heaviest BMI (in kg/m$^2$) | 38.6 ± 10.0 | 32.0 ± 7.4 | <.01 |
| Current BMI (in kg/m$^2$) | 29.4 ± 6.4 | 26.2 ± 5.1 | <.01 |
| Weight Maintenance Duration (in months) | 17.8 ± 84.6 | 12.9 ± 28.3 | *ns* |
| Intention to Maintain Weight | 8 (17.4) | 33 (40.2) | <.01 |
| Intention to Lose Weight | 37 (80.4) | 49 (59.8) | <.01 |
| Age of Onset of Obesity (in years) | 10.3 ± 3.5 | 27.8 ± 9.8 | <.01 |
| Baseline Depression Score | 9.6 ± 9.3 | 12.9 ± 9.9 | *ns* |
| Baseline Self-Esteem Score | 32.7 ± 4.4 | 32.6 ± 4.9 | *ns* |

*Note.* [a]Values are expressed as n (%) or *M* ± *SD*.
[b]This information was obtained from only post-menopausal participants.

Independent samples t-tests were conducted to test the hypothesis that those with early-onset obesity would experience more body dissatisfaction than those with late-onset obesity. Results were significantly different for several measures of body image dissatisfaction. Figure 1 displays mean MBSRQ-AS subscale scores. On the Appearance Evaluation subscale, which assesses cognitive and affective body image satisfaction, those with early-onset obesity had more dissatisfaction than late-onset obesity individuals, $t$ (126) = -2.355, $p < .05$, $d$ = -.4196. Furthermore, on the Self-Classified Weight subscale, those with early-onset obesity classified themselves as more overweight than those with late-onset obesity, $t$ (126) = 3.176, $p$ <.01, $d$ = .5659. However, there was no significant difference between the two groups on the Overweight Preoccupation subscale, $t$ (126) = .884, *ns*.

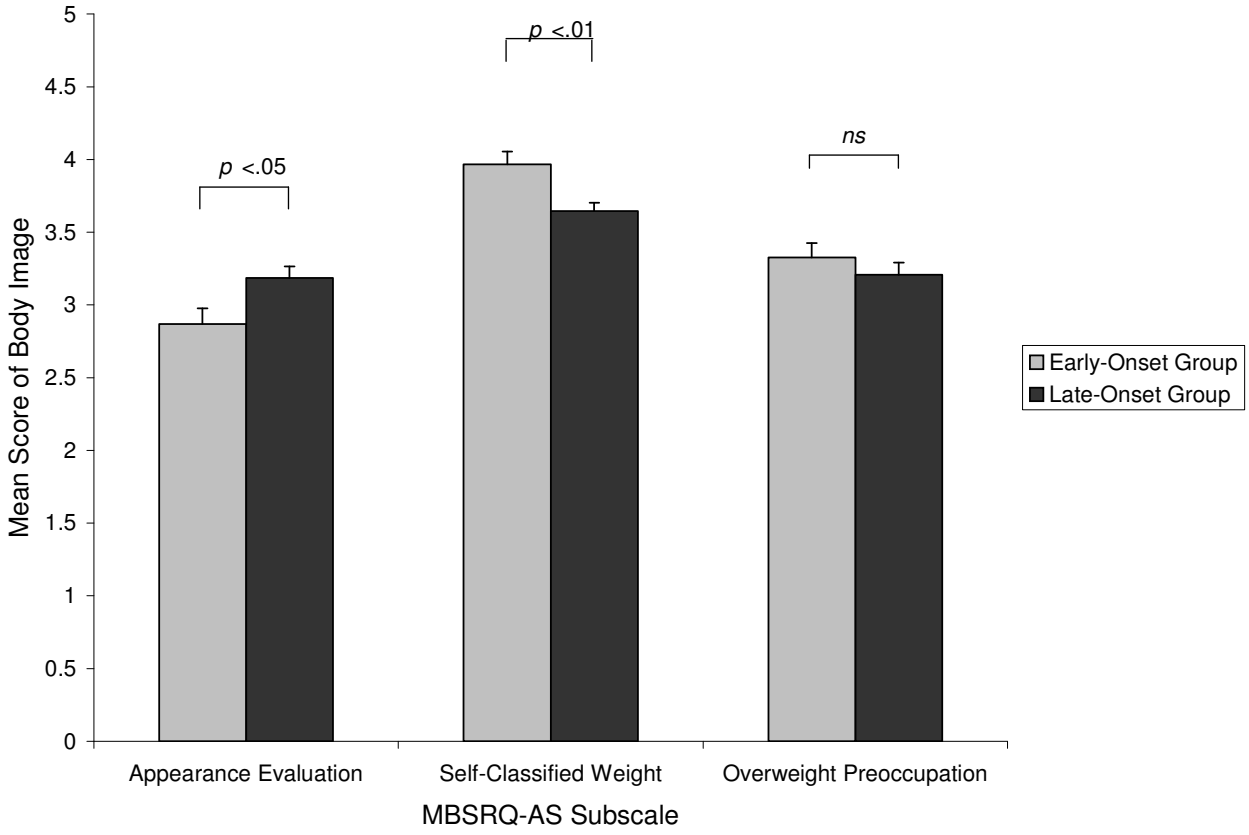


*Figure 1.* Mean Multidimensional Body Self-Relations Questionnaire – Appearance Scale cognitive and affective body image scores (+*SE*) for early-onset obesity (n = 46) versus late-onset obesity groups (n = 82).

Figure 2 displays the mean scores on the BIA-O, which assesses perceptual body image dissatisfaction. The first subscale (Current – Ideal) indicates the discrepancy between one's current body size and one's perceived ideal body size. The second subscale (Current – Realistic) indicates the discrepancy between one's current body size and one's perceived realistic body size. Those with early-onset obesity had significantly more body image dissatisfaction than those with late-onset obesity on both the Current – Ideal subscale, $t$ (126) = 2.668, $p$ <.01, $d$ = .4754, and on the Current – Realistic subscale, $t$ (126) = 2.234, $p$ <.05, $d$ = .398.

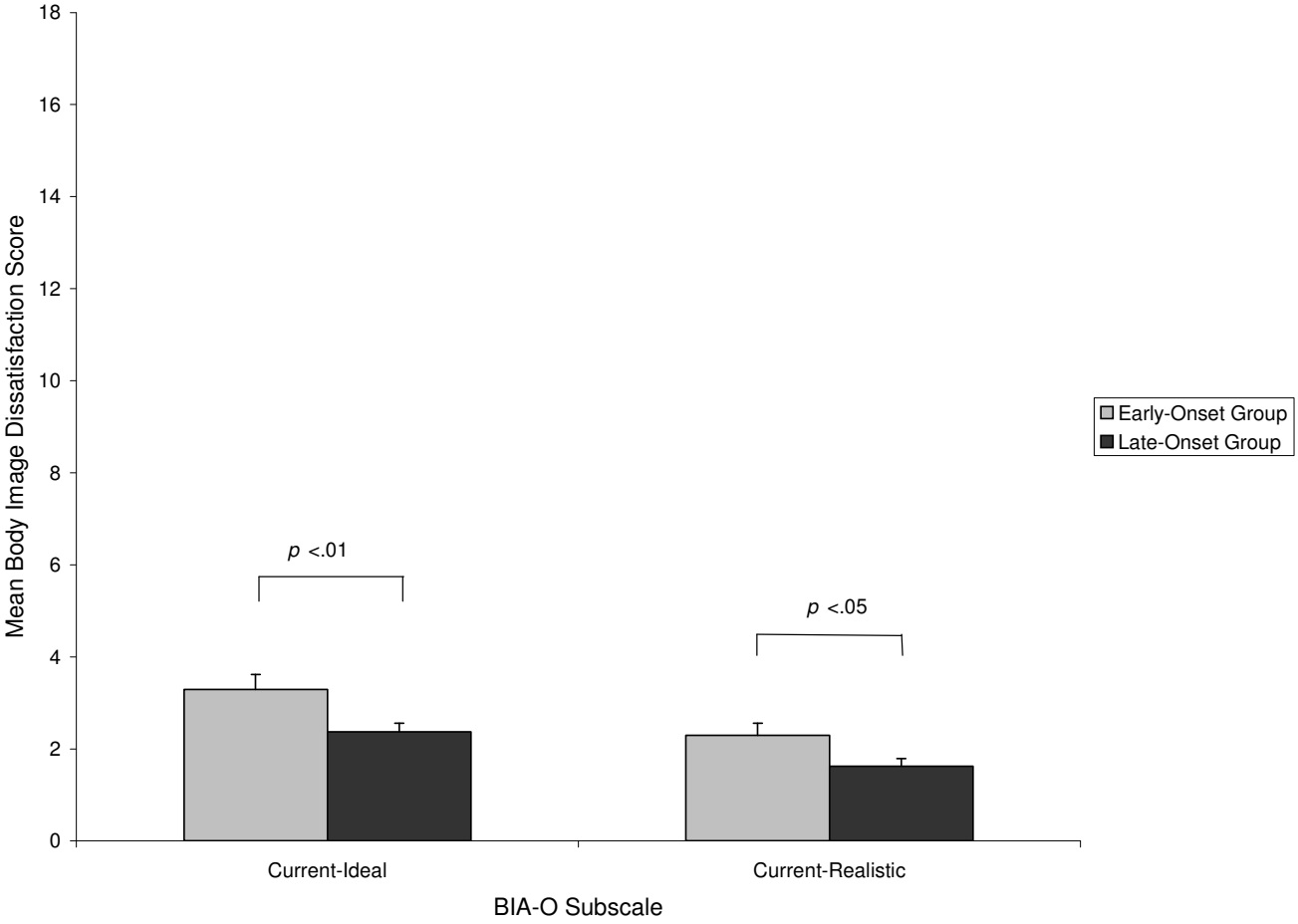


*Figure 2.* Mean Body Image Assessment for Obesity perceptual body image dissatisfaction scores (+*SE*) for early-onset obesity (n = 46) versus late-onset obesity groups (n = 82).

Figure 3 displays mean scores on the BIAQ, which is a behavioral measure of body image. Again, relative to those with late-onset obesity, those with early-onset obesity endorsed greater body image dissatisfaction as manifested through behavioral tendencies, $t\,(125) = 2.25$, $p < .05$, $d = .4025$.

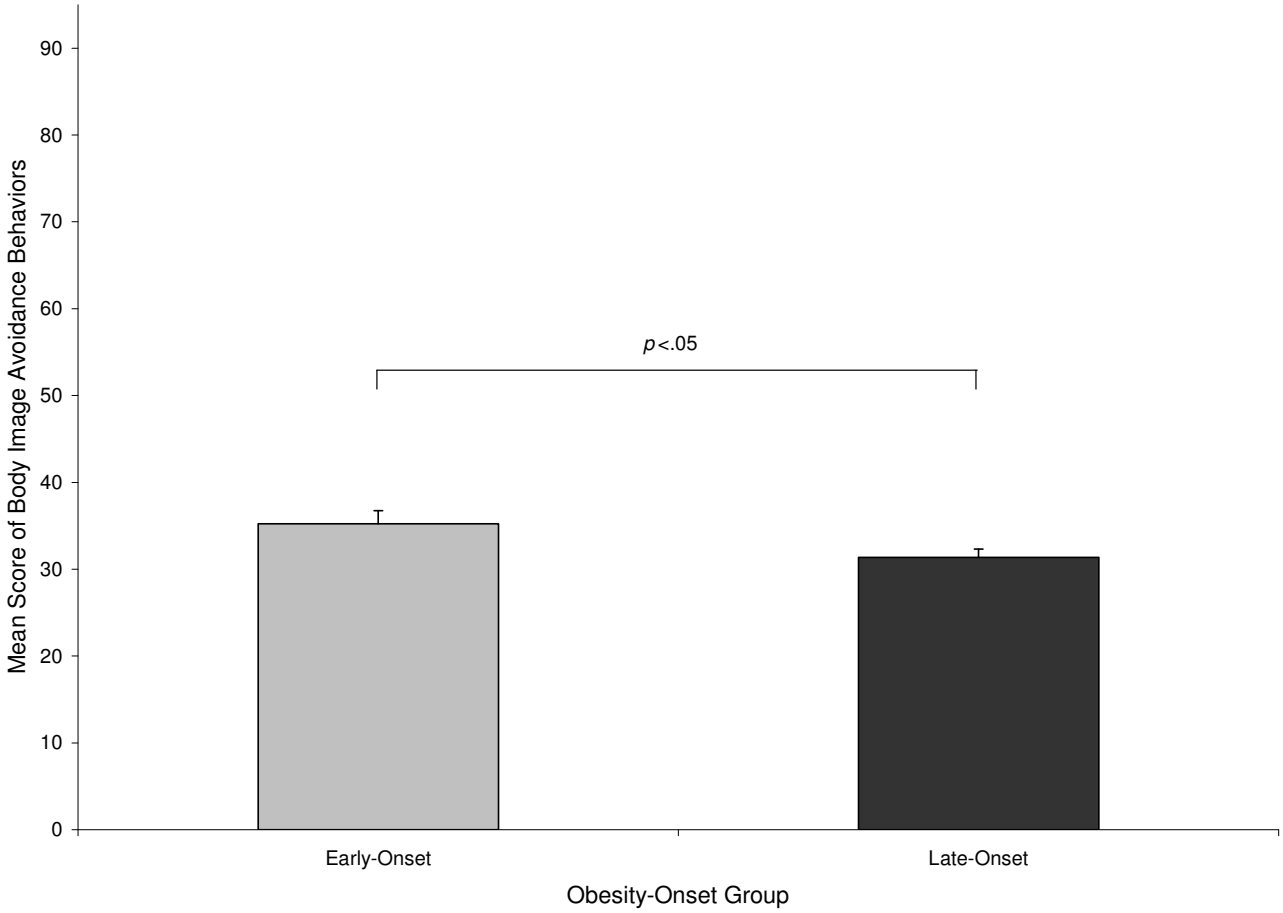


*Figure 3*. Mean Body Image Avoidance Questionnaire behavioral body image scores (+*SE*) for early-onset obesity (n = 46) versus late-onset obesity groups (n = 82).

Previous research has suggested that BMI may account for the relation between age of obesity onset and body image. It has been reported that individuals with larger BMI report significantly more body image dissatisfaction (Cash, 2002). As shown in Figure 4, in the present study the early-onset group had a significantly higher mean current BMI. Therefore, analyses of covariance (ANCOVAs) were completed on each measure of body image controlling for BMI. For the MBSRQ-AS subscales, BMI accounted for a significant proportion of variance on the Appearance Evaluation subscale, $F(1) = 17.86$, $p < .001$, $\eta_p^2 = .126$ and the Self-Classified

Weight subscale, $F$ (1) = 149.6, $p$ <.001, $\eta_p^2$ = .547, but not on the Overweight Preoccupation subscale, $F$ (1) = 3.689, *ns*. For the BIA-O subscales, BMI also accounted for a significant proportion of variance on both the subscales, the Current – Ideal, $F$ (1) = 66.67, $p$ <.001, $\eta_p^2$ = .35, and the Current – Realistic, $F$ (1) = 79.837, $p$ <.001, $\eta_p^2$ = .392. On the BIAQ, BMI also accounting for a significant portion of the variance, $F$ (1) = 5.187, $p$ <.05, $\eta_p^2$ = .04. Overall after controlling for BMI, none of the observed differences between early-onset and late-onset obesity individuals remained significant on any measure of body image.

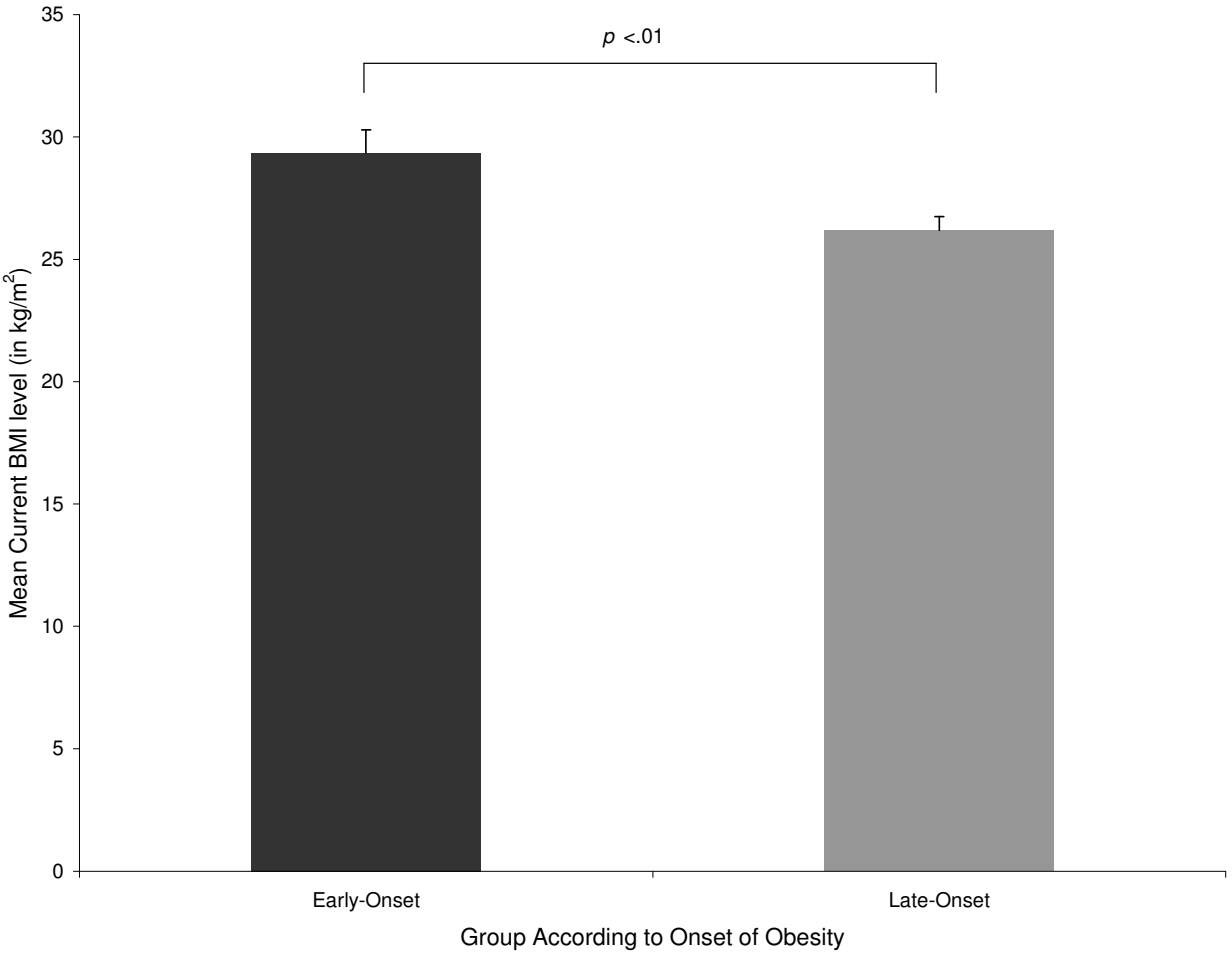


*Figure 4.* Mean current body mass index (BMI) level (+*SE*) for early-onset obesity (n = 46) versus late-onset obesity groups (n = 82).

*Hypothesis Two: Body Image as a function of Weight Maintenance Duration*

Participants were categorized into two groups based on duration of successful weight maintenance. Previous research has suggested that successful weight maintenance be defined as maintaining a weight within 1.5 pounds (Lean, 2003). However, many participants only recorded weights to the nearest pound, necessitating a two-pound criterion for the present study. Participants were classified as long-term maintainers (n = 19) if they had maintained their weight for twelve months or longer. Participants were classified as short-term maintainers (n = 33) if they had maintained their weight for less than 12 months. Table 4 compares weight-related characteristics. Significant group differences were identified on three variables: current BMI, $t$ (50) = 2.767, $p$ <.01, $d$ = .783, weight maintenance duration, $t$ (18.334) = -3.002, $p$ <.01, $d$ = 1.4, and intention to maintain/lose weight, $X^2$ (1) = 17.035; $p$ <.001.

Table 4

*Weight-related Follow-up Characteristics of Long-term and Short-term Maintainers*[a]

| | Long-term (n = 19) | Short-term (n = 33) | *p* |
|---|---|---|---|
| Post-menopausal | 8 (42.1) | 17 (51.5) | *ns* |
| Time since Menopause[b] (in years) | 8.8 ± 6.1 | 5.9 ± 6.2 | *ns* |
| Heaviest BMI (in kilograms/meters$^2$) | 32.5 ± 6.6 | 34.6 ± 7.8 | *ns* |
| Current BMI (in kg/m$^2$) | 24.7 ± 4.2 | 28.7 ± 5.4 | <.01 |
| Change in BMI (in kg/m$^2$) baseline to follow-up | .05 ± .23 | -.04 ± .24 | *ns* |
| Weight Maintenance Duration (in months) | 26.1 ± 29.6 | 5.6 ± 3.7 | <.01 |
| Intention to Maintain Weight | 13 (68.4) | 4 (12.1) | <.01 |
| Intention to Lose Weight | 6 (31.6) | 29 (87.9) | <.01 |
| Age of Onset of Obesity (in years) | 26.9 ± 14.1 | 22.8 ± 13.5 | *ns* |
| Follow-Up Depression Score | 9.4 ± 8.2 | 9.1 ± 7.9 | *ns* |
| Follow-Up Self-Esteem Score | 33.7 ± 3.7 | 33.0 ± 4.5 | *ns* |

*Note.* [a]Values are expressed as n (%) or $M \pm SD$.
[b]This information was obtained from only post-menopausal participants.

Independent samples T-tests were conducted to test the hypothesis that those with a shorter duration of successful weight maintenance would experience greater change in body image. Change in body image was defined as the discrepancy between each body image measure from baseline to a three-month follow-up. None of the MBSRQ-AS subscales were significantly different between groups [Appearance Evaluation $t$ (50) = -.651, *ns;* Self-Classified Weight $t$ (50) = -.586, *ns*; Overweight Preoccupation $t$ (50) = 1.167, *ns*]. Additionally, no significant differences were found on either subscale of the BIA-O [Current – Ideal $t$ (50) = -.536, *ns*; Current – Realistic $t$ (50) = -.475, *ns*]. Furthermore, there were no significant differences between the groups on the BIAQ, $t$ (50) = .497, *ns*. To summarize, short-term maintainers and long-term maintainers did not differ significantly on change in body image over a three-month period.

*Hypothesis Two Exploratory: Comparing Maintainers to Weight Gainers and Losers*

Additional information on body image was also collected from individuals who gained or lost weight between baseline and follow-up. Weight-related characteristics of these groups are summarized in Table 5. Significant group differences were identified on four variables: current BMI, $F$ (3) = 3.163, $p$ <.05, $\eta_p^2$ = .084, change in weight from baseline to follow-up, $F$ (3) = 60.603, $p$ <.001, $\eta_p^2$ = .636, weight maintenance duration, $F$ (3) = 8.197, $p$ <.001, $\eta_p^2$ = .191, and intention to maintain/lose weight, $X^2$ (3) = 17.515; $p$ <.001.

Tukey's Post Hoc analyses revealed that short-term maintainers had significantly higher BMIs than long-term maintainers ($p$ <.05) but did not differ from gainers or losers. Additionally, long-term maintainers were more likely to intend to

maintain their current weight. Furthermore, losers had higher BMI change than the other groups ($p$ <.001), and long-term maintainers maintained current weight for a longer duration than the other groups ($p$ <.001). However, these final two differences were expected as they were used to operationally define the groups.

Table 5

*Weight-related Follow-up Characteristics of Long-term and Short-term Maintainers, Weight Gainers, and Weight Losers*[a]

| | Gainer (n = 37) | Short-term (n = 33) | Long-term (n = 19) | Loser (n = 21) | *p* |
|---|---|---|---|---|---|
| Post-menopausal | 17 (45.9) | 17 (51.5) | 8 (42.1) | 5 (23.8) | *ns* |
| Time since Menopause[b] (in years) | 6.5 ± 7.1 | 5.9 ± 6.2 | 8.8 ± 6.1 | 5.0 ± 4.8 | *ns* |
| Heaviest BMI (in kg/m$^2$) | 33.9 ± 7.5 | 34.6 ± 7.8 | 32.5 ± 6.6 | 31.8 ± 6.9 | *ns* |
| Current BMI (in kg/m$^2$) | 28.0 ± 5.4 | 28.7 ± 5.4 | 24.7 ± 4.2 | 25.3 ± 5.7 | <.05[c] |
| Change in BMI (in kg/m$^2$) baseline to follow-up | 1.4 ± 1.1 | -.04 ± .24 | .05 ± .23 | -1.18 ± .65 | <.01[d] |
| Weight Maintenance Duration (in months) | 6.7 ± 19.8 | 5.6 ± 3.7 | 26.1 ± 29.6 | 1.5 ± 1.3 | <.01[e] |
| Intent to Maintain Weight | 14 (37.8) | 4 (12.1) | 13 (68.4) | 6 (28.6) | <.01[f] |
| Intent to Lose Weight | 23 (62.2) | 29 (87.9) | 6 (31.6) | 15 (71.4) | <.01[g] |
| Age of Obesity Onset (in years) | 20.9 ± 10.4 | 22.8 ± 13.5 | 26.9 ± 14.1 | 18.8 ± 7.0 | *ns* |
| Follow-Up Depression | 14.4 ± 13.4 | 9.1 ± 7.9 | 9.4 ± 8.2 | 13.5 ± 9.8 | *ns* |
| Follow-Up Self-Esteem | 33.0 ± 5.0 | 33.0 ± 4.5 | 33.7 ± 3.7 | 31.0 ± 6.6 | *ns* |

*Note.* [a]Values are expressed as n (%) or $M \pm SD$.
[b]This information was obtained from only post-menopausal participants.
[c]Short-term>long-term.
[d]Loser<gainer, short-term, and long-term
[e]Long-term>gainer, short-term, and loser
[f]Long-term>short-term
[g]Long-term<short-term

Multivariate ANOVAs were conducted to identify group differences between short-term weight maintainers (n = 33), long-term weight maintainers (n = 19), weight losers (n = 21), and weight gainers (n = 37) on measures of body image. There were significant group differences on the Current – Ideal subscale of the

BIA-O, $F(3) = 4.980$, $p < .01$, $\eta_p^2 = .125$, but the Current – Realistic subscale only approached significance, $F(3) = 2.467$, $p = .066$, $\eta_p^2 = .066$. Tukey's Post Hoc analysis of the change on the Current – Ideal subscale indicates that individuals who lost weight had a significant improvement in their perceptual body image relative to gainers ($p < .05$), short-term maintainers ($p < .05$), and long-term maintainers ($p < .05$). Figure 5 shows the change in body image on the Current –Ideal subscale of the BIA-O among the groups.

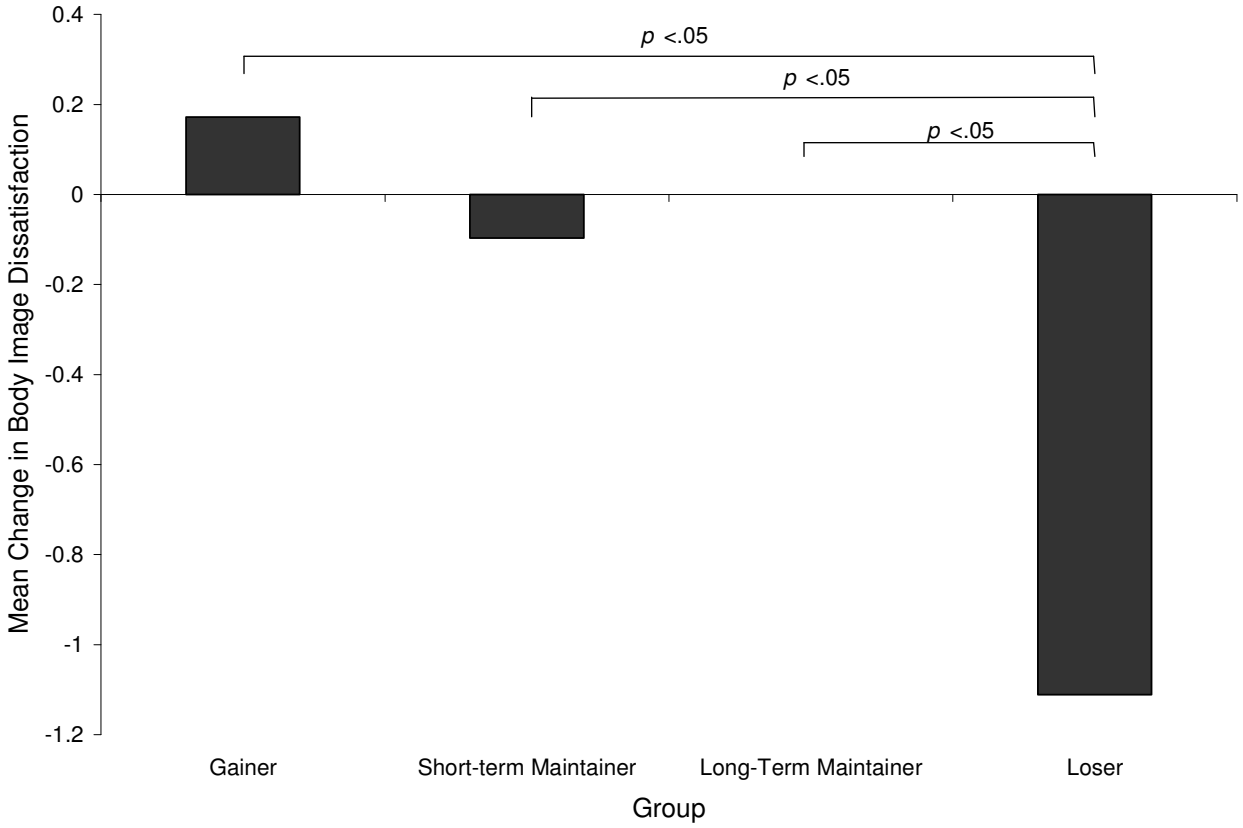


*Figure 5.* Mean change in perceptual body image dissatisfaction from baseline to follow-up as a function of weight duration classification with negative scores indicating less dissatisfaction and positive scores indicating more dissatisfaction.

Furthermore, there was a significant difference between the groups on the Appearance Evaluation subscale, $F(3) = 2.868$, $p < .05$, $\eta_p^2 = .076$, but not on the

other body image subscales [Self-Classified Weight $F$ (3) = 2.166, *ns*; Overweight Preoccupation $F$ (3) = 2.089, *ns*; and BIAQ $F$ (3) = .183, *ns*]. When examining Tukey's Post Hoc analyses on the Appearance Evaluation subscale, no significant differences were found between the groups.

In light of significant differences between the groups (see Figure 6), multivariate analyses were conducted to control for BMI. The differences between the groups remained significant on both the Appearance Evaluation subscale, $F$ (3) = 2.742, $p$ <.05, $\eta_p^2$ = .07, and the Current – Ideal subscale, $F$ (3) = 5.484, $p$ <.01, $\eta_p^2$ = .137. Furthermore, even after controlling for BMI, significant differences remained between the groups on the Current – Realistic subscale, $F$ (3) = 2.957, $p$ <.05, $\eta_p^2$ = .079.

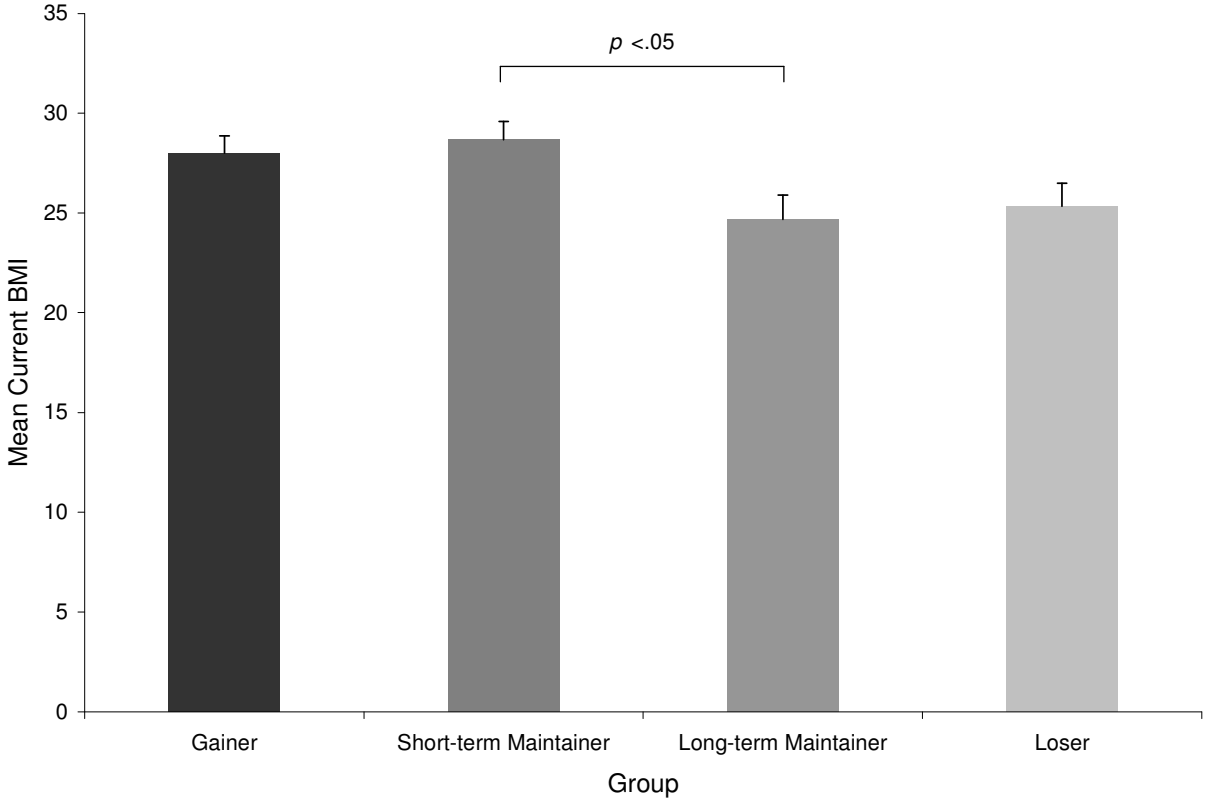


*Figure 6*. Mean current body mass index – BMI (+*SE*) at follow-up by weight duration group: gainer (n = 37), short-term maintainer (n = 33), long-term maintainer (n = 19), and loser (n = 21).

The minimal change in body image from baseline to follow-up suggests that three months may not be an appropriate time interval to detect body image change, making it possible that it may have already changed or may change in the future. In the present study the data to explore the latter possibility was available. Therefore, a cross-sectional analysis examining body image change at a longer weight maintenance duration was conducted using baseline data. Participants were divided into three groups according to duration of successful weight maintenance. Long-term maintainers (n = 34) were defined as those who had maintained their current weight for twelve months or longer prior to baseline. Short-term maintainers (n = 92) were defined as those who had maintained their current weight for less than twelve

months. Non-maintainers (n = 17) were defined as those who had regained previously-lost weight. Table 6 provides weight-related information on these groups.

Table 6

*Baseline Characteristics of Long-term, Short-term, and Non-maintainers*[a]

| | Non-maintainer (n = 17) | Short-term maintainer (n = 92) | Long-term maintainer (n = 34) | *p* |
|---|---|---|---|---|
| Post-menopausal | 12 (70.6) | 34 (37.0) | 16 (47.1) | *ns* |
| Time since Menopause[b] (in years) | 3.3 ± 3.2 | 5.7 ± 5.5 | 9.3 ± 8.0 | *ns* |
| Heaviest BMI (in kg/m$^2$) | 32.9 ± 6.0 | 34.7 ± 8.0 | 32.5 ± 9.1 | *ns* |
| Current BMI (in kg/m$^2$) | 31.5 ± 5.7 | 28.3 ± 6.0 | 25.0 ± 4.7 | <.01[c] |
| Weight Maintenance Duration (in months) | 9.8 ± 13.4 | 3.2 ± 2.7 | 44.8 ± 97.8 | <.01[d] |
| Intention to Maintain Weight | 1 (5.9) | 20 (21.7) | 20 (58.8) | <.01[e] |
| Intention to Lose Weight | 15 (88.2) | 72 (78.3) | 14 (41.2) | <.01[f] |
| Age of Onset of Obesity (in years) | 22.9 ± 7.6 | 21.0 ± 11.6 | 24.4 ± 11.4 | *ns* |
| Baseline Depression Score | 9.6 ± 6.9 | 12.6 ± 11.1 | 9.5 ± 9.1 | *ns* |
| Baseline Self-Esteem Score | 34.3 ± 5.9 | 32.2 ± 5.4 | 33.8 ± 3.5 | *ns* |

*Note.* [a]Values are expressed as n (%) or *M* ± *SD*.
[b]This information was obtained from only post-menopausal participants.
[c]Long-term<Short-term<Non-Maintainer
[d]Long-term>short-term=non-maintainer
[e]Non-maintainer<short-term=long-term
[f]Long-term<short-term=non-maintainer

Multivariate ANOVAs were conducted on body image measures by duration of weight maintenance. Two of the three MBSRQ-AS subscales were significantly different between groups [Appearance Evaluation, $F(2) = 7.171$, $p < .001$, $\eta_p^2 = .094$, Self-Classified Weight, $F(2) = 9.051$, $p < .001$, $\eta_p^2 = .116$, Overweight Preoccupation, $F(2) = 0.296$, *ns*]. Both subscales of the BIA-O were significantly different (Current – Ideal, $F(2) = 7.520$, $p < .001$, $\eta_p^2 = .098$, and Current – Realistic, $F(2) = 9.927$, $p < .001$, $\eta_p^2 = .126$). Furthermore, results on the BIAQ were significantly different among the groups, $F(2) = 3.710$, $p < .05$, $\eta_p^2 = .051$.

Tukey's Post Hoc analyses were conducted on each significant body image measure to determine which groups differed. Non-maintainers demonstrated significantly less body satisfaction than both the short-term maintainers ($p < .05$) and the long-term maintainers ($p < .001$) on the Appearance Evaluation subscale. Long-term maintainers classified themselves as less overweight than both non-maintainers ($p < .001$) and short-term maintainers ($p < .001$) as indicated by the Self-Classified Weight subscale. Figure 7 shows these differences.

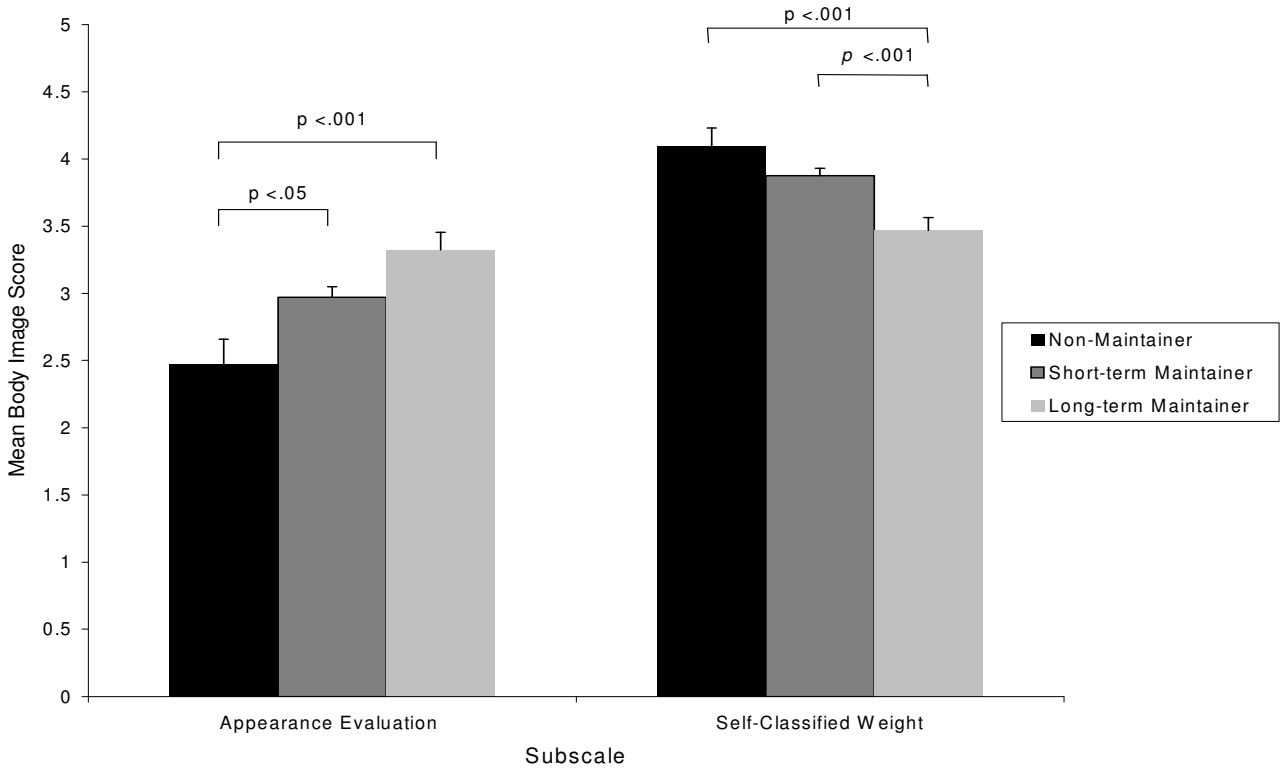


*Figure 7.* Mean MBSRQ-AS subscale scores as a function of baseline weight maintenance category: non-maintainers (n = 17), short-term maintainers (n = 92), and long-term maintainers (n = 34).

Long-term maintainers also demonstrated less perceptual body image dissatisfaction than non-maintainers ($p < .001$) and short-term maintainers

($p < .05$ and $p < .001$) on the Current – Ideal subscale when examining Tukey's Post Hoc analyses. Similar results were found on the Current – Realistic subscale with long-term maintainers demonstrating less perceptual body image dissatisfaction than non-maintainers ($p < .001$) and short-term maintainers ($p < .001$). Figure 8 shows these group differences.

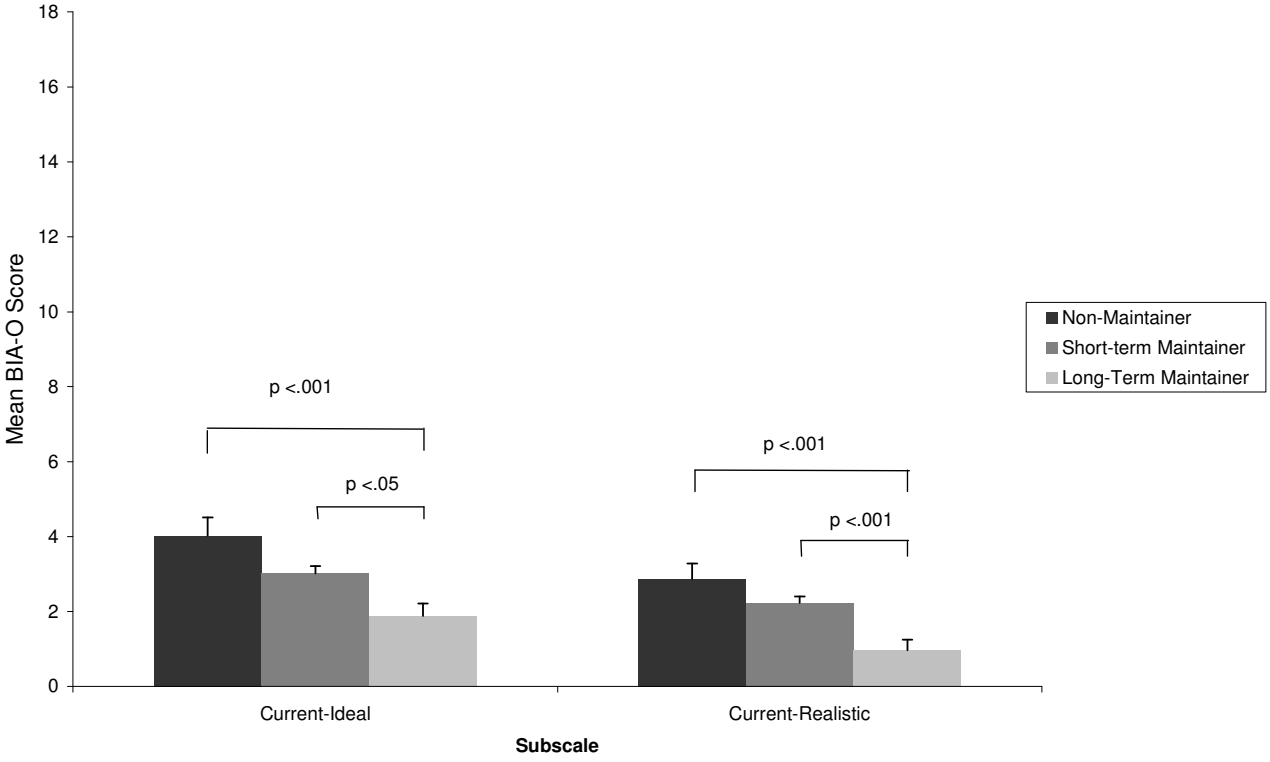


*Figure 8.* Mean BIA-O perceptual body image dissatisfaction score (+*SE*) as a function of baseline weight maintenance category: non-maintainers (n = 17), short-term maintainers (n = 92), and long-term maintainers (n =34).

Additionally on the BIAQ, Tukey's Post Hoc Analyses revealed that long-term maintainers demonstrated less body image avoidance behaviors than short-term maintainers ($p < .05$). This difference is shown in Figure 9.

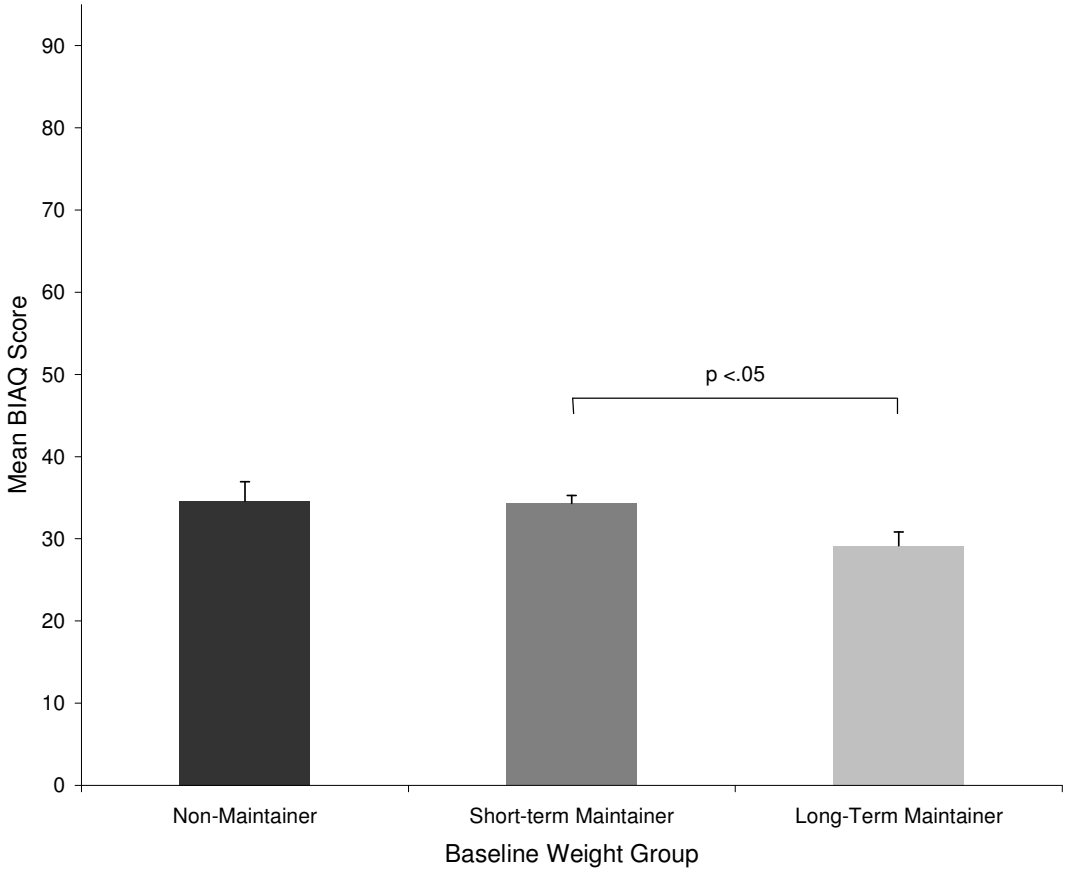


*Figure 9.* Mean BIAQ score (+*SE*) by baseline weight maintenance category: non-maintainers (n = 17), short-term maintainers (n = 92), and long-term maintainers (n =34).

However, there were group differences on current BMI, $F(2) = 7.994$, $p < .001$, $\eta_p^2 = .118$, shown in Figure 10, with the long-term maintainers having a lower current BMI than both the short-term maintainers ($p < .05$) and the non-maintainers ($p < .001$). After controlling for current BMI, the differences on all measures of body image were not significant.

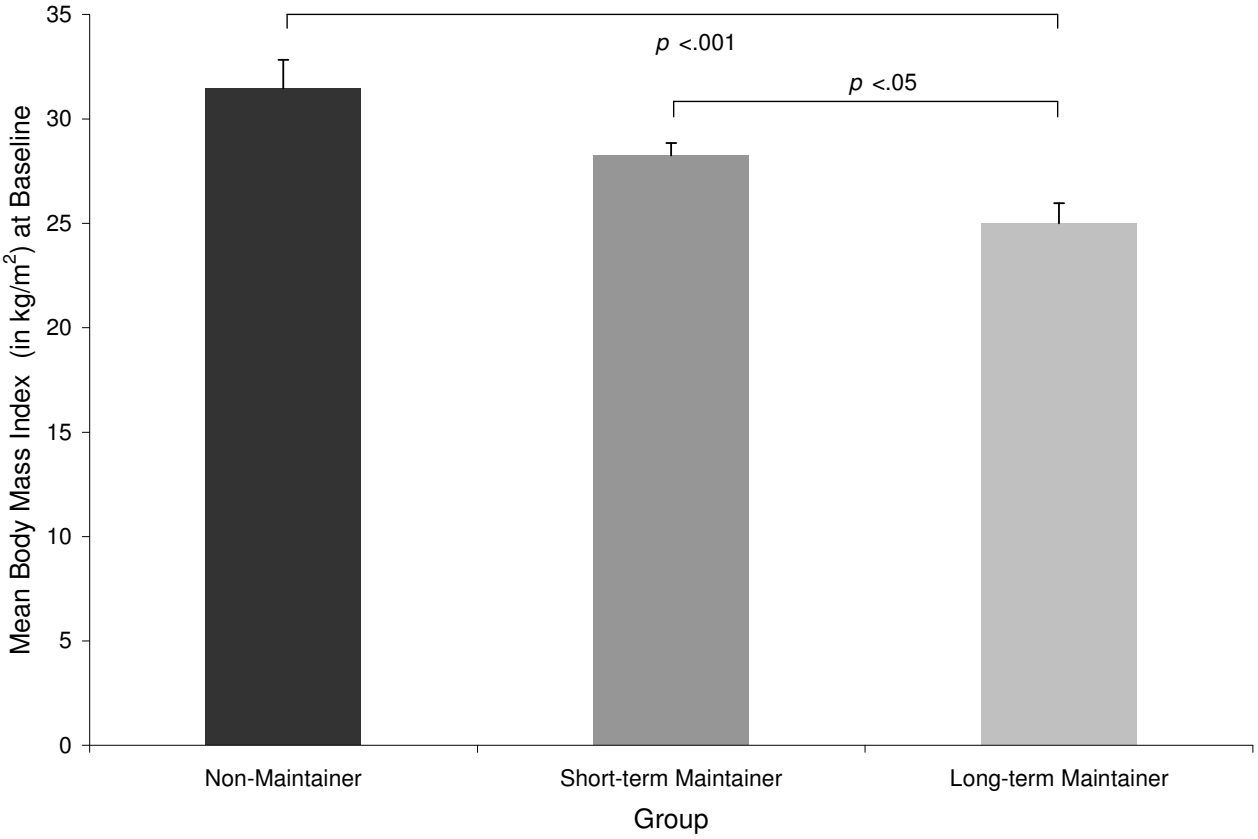


*Figure 10.* Mean baseline body mass index (+*SE*) by weight maintenance classification.

*Hypothesis Three: Predictors of Successful Weight Maintenance*

Participants were classified according to weight maintenance status at follow-up. Successful maintainers (n = 73) were defined as those who maintained their baseline weight within two pounds or were less than their baseline weight at follow-up. Non-maintainers (n = 37) were defined as those who gained two pounds or more between baseline and follow-up. Table 7 provides weight-related information by group.

Table 7

*Weight-related Characteristics of Successful and Unsuccessful Weight Maintainers at Follow-up*[a]

| | Non-Maintainers (n = 37) | Maintainers (n = 73) | *p* |
|---|---|---|---|
| Post-menopausal | 17 (45.9) | 30 (41.1) | *ns* |
| Time since Menopause[b] (in years) | 6.5 ± 7.1 | 6.2 ± 5.7 | *ns* |
| Heaviest BMI (in kilograms/meters$^2$) | 33.9 ± 7.5 | 33.2 ± 7.2 | *ns* |
| Current BMI (in kg/m$^2$) | 28.0 ± 5.4 | 26.7 ± 5.5 | *ns* |
| Weight Maintenance Duration (in months) | 6.7 ± 19.8 | 9.8 ± 18.0 | *ns* |
| Intention to Maintain Weight | 14 (37.8) | 23 (31.5) | *ns* |
| Intention to Lose Weight | 23 (62.2) | 50 (68.5) | *ns* |
| Age of Onset of Obesity (in years) | 20.9 ± 10.4 | 22.8 ± 12.4 | *ns* |
| Baseline Depression Score | 14.8 ± 11.5 | 10.2 ± 8.2 | <.05 |
| Baseline Self-Esteem Score | 32.5 ± 5.1 | 32.7 ± 4.6 | *ns* |

*Note.* [a]Values are expressed as n (%) or *M* ±*SD*.
[b]This information was obtained from only post-menopausal participants.

A binary logistic regression model was used to determine predictors of successful weight maintenance at a three-month follow-up. The variables included in this analysis were those variables with significant bivariate (Spearman's Rho) correlations with weight maintenance status: change in Appearance Evaluation from Baseline to Follow-Up, change in Self-Classified Weight (Baseline to Follow-Up), and baseline depression (CES-D). The correlation matrix of all potential predictors is shown in Table 8.

Table 8

*Correlation Coefficients for Predictors of Weight Maintenance Status*

| | Status | AP | SC | OV | CI | CR | AV | DE |
|---|---|---|---|---|---|---|---|---|
| Status | --- | | | | | | | |
| AP | .20* | --- | | | | | | |
| SC | -.25** | -.29** | --- | | | | | |
| OV | .16 | .10 | -.13 | --- | | | | |
| CI | -.14 | -.17 | .27** | -.09 | --- | | | |
| CR | -.01 | -.13 | .23* | -.09 | .67** | --- | | |
| AV | -.02 | -.09 | -.01 | .23* | -.00 | -.06 | --- | |
| DE | -.19* | -.14 | .07 | -.03 | -.02 | -.04 | -.13 | --- |
| SE | .03 | .04 | -.03 | .04 | -.04 | .02 | .20* | -.72** |

*Note.* * $p < .05$ ** $p < .01$. Status (Maintenance status – successful maintainers or unsuccessful maintainers); AP (Change in Appearance Evaluation from baseline to follow-up); SC (Change in Self-Classified Weight from baseline to follow-up); OV (Change in Overweight Preoccupation from baseline to follow-up); CI (Change in Current-Ideal body size from baseline to follow-up); CR (Change in Current-Realistic body size from baseline to follow-up); AV (Change in BIAQ from baseline to follow-up); DE (depression level at baseline), SE (self-esteem at baseline).

Regression results indicated that the overall model fit was not strong (-2 log likelihood = 125.872) but was statistically reliable in distinguishing between successful and unsuccessful weight maintenance, $X^2$ (3) = 14.619; $p < .01$. With this model, only 70.0% of the participants were correctly classified as either successful or unsuccessful weight maintainers. Regression coefficients are presented in Table 9. *Wald* statistics indicated that baseline depression (CES-D) is a significant predictor of successful weight maintenance (β = -.046, SE = .022, *Wald* = 4.216,

$p < .05$, $e^b = .955$). Change in Appearance Evaluation approached significance (β = .908, *SE* = .513, *Wald* = 3.133, $p = .077$, $e^b = 2.479$) and Change in Self-Classified Weight was not significant.

Table 9

*Regression Coefficients for Predictors of Successful Weight Maintenance*

| | *B* | *Wald* | *df* | *p* | Odds Ratio |
|---|---|---|---|---|---|
| Appearance Evaluation | .908 | 3.133 | 1 | .077 | 2.479 |
| Self-Classified Weight | -1.300 | 2.617 | 1 | .106 | .272 |
| Baseline Depression | -.046 | 4.216 | 1 | <.05 | .955 |
| Constant | 1.198 | 11.039 | 1 | <.001 | 3.314 |

*Hypothesis Three Exploratory: Predictors of Weight Fluctuation*

It was hypothesized that the lack of good model fit in the previous logistic regression analysis may have been due to differences between weight maintainers and weight losers. Therefore, a multinomial logistic regression analysis was conducted to identify predictors of three weight fluctuation groups: non-maintainers (n = 37), maintainers (n = 52), and weight losers (n = 21). Weight-related characteristics of each group are listed in Table 10.

Table 10

*Weight-related Characteristics of the Weight Fluctuation Groups at Follow-Up*[a]

| | Non-Maintainer (n = 37) | Maintainer (n = 52) | Loser (n = 21) | *p* |
|---|---|---|---|---|
| *Characteristics* | | | | |
| Post-menopausal | 17 (45.9) | 25 (48.1) | 5(23.8) | *ns* |
| Time since Menopause[b] (in years) | 6.5 ± 7.1 | 6.7 ± 6.1 | 5.0 ± 4.8 | *ns* |
| Heaviest BMI (in kg/m$^2$) | 33.9 ± 7.5 | 33.8 ± 7.4 | 31.8 ± 6.9 | *ns* |
| Current BMI (in kg/m$^2$) | 28.0 ± 5.4 | 27.2 ± 5.3 | 25.3 ± 5.7 | *ns* |
| Change in BMI (in kg/m$^2$) baseline to follow-up | 1.4 ± 1.1 | -.01 ± .24 | -1.2 ± .65 | <.01[c] |
| Weight Maintenance Duration (in months) | 6.7 ± 19.8 | 13.1 ± 20.4 | 1.5 ± 1.3 | <.01[d] |
| Intention to Maintain Weight | 14 (37.8) | 17 (32.7) | 6 (28.6) | *ns* |
| Intention to Lose Weight | 23 (62.2) | 35 (67.3) | 15 (71.4) | *ns* |
| Age of Onset of Obesity (in years) | 20.9 ± 10.4 | 24.3 ± 13.7 | 18.8 ± 7.0 | *ns* |
| Baseline Depression Score | 14.8 ± 11.5 | 9.2 ± 8.5 | 12.7 ± 7.2 | <.05[e] |
| Baseline Self-Esteem Score | 32.5 ± 5.1 | 33.3 ± 3.9 | 31.2 ± 5.6 | *ns* |

*Note.* [a]Values are expressed as n (%) or *M* ±*SD*.
[b]This information was obtained from only post-menopausal participants.
[c]Loser<maintainer<non-maintainer
[d]Loser<maintainer
[e]Maintainer<non-maintainer

Again, the variables included as predictors were those variables with significant bivariate (Spearman's Rho) correlations with weight fluctuation status. They are change in Appearance Evaluation from baseline to follow-up, change in Self-Classified Weight (baseline to follow-up), change in Overweight Preoccupation (baseline to follow-up), and change in Current – Ideal body dissatisfaction (baseline to follow-up). The correlation matrix showing all potential predictors is presented in Table 11.

Table 11

*Correlation Coefficients for Predictors of Weight Fluctuation Groups*

| | Status | AP | SC | OV | CI | CR | AV | DE |
|---|---|---|---|---|---|---|---|---|
| Status | --- | | | | | | | |
| AP | .22* | --- | | | | | | |
| SC | -.23* | -.29** | --- | | | | | |
| OV | .20* | .10 | -.13 | --- | | | | |
| CI | -.24* | -.17 | .27** | -.09 | --- | | | |
| CR | -.12 | -.13 | .23* | -.09 | .67** | --- | | |
| AV | -.05 | -.09 | -.01 | .23* | -.00 | -.06 | --- | |
| DE | -.08 | -.14 | .07 | -.03 | -.02 | -.04 | -.13 | --- |
| SE | -.04 | .04 | -.03 | .04 | -.04 | .02 | .20* | -.72** |

*Note.* * $p < .05$ ** $p < .01$. Status (Maintenance status – successful maintainers or unsuccessful maintainers); AP (Change in Appearance Evaluation from baseline to follow-up); SC (Change in Self-Classified Weight from baseline to follow-up); OV (Change in Overweight Preoccupation from baseline to follow-up); CI (Change in Current-Ideal body size from baseline to follow-up); CR (Change in Current-Realistic body size from baseline to follow-up); AV (Change in BIAQ from baseline to follow-up); DE (depression level at baseline), SE (self-esteem at baseline).

Regression results indicated that again the overall model fit was not strong (-2 log likelihood = 203.209) but was statistically reliable in distinguishing between the three groups, $X^2$ (8) = 24.889; $p < .01$. With this model, only 58.2% of the participants were correctly classified. Regression coefficients comparing both maintainers and losers to non-maintainers are presented in Table 12. *Wald* statistics indicated that change in Current – Ideal body dissatisfaction is a significant indicator of weight loss during the three-month follow-up, β = -.673, SE = .256, *Wald* = 6.915,

$p < .01$, $e^b = .510$). All other variables were not significant predictors of weight maintenance status.

Table 12

*Regression Coefficients for Predictors of Non-Maintainers, Maintainers, and Losers*

| Group | Variable | *B* | *Wald* | *df* | *p* | Odds Ratio |
|---|---|---|---|---|---|---|
| Maintainers | Appearance Evaluation | .742 | 1.838 | 1 | *ns* | 2.099 |
| | Self-Classified Weight | -1.293 | 2.456 | 1 | *ns* | .275 |
| | Overweight Preoccupation | .440 | 1.301 | 1 | *ns* | 1.553 |
| | Current – Ideal Body Size | -.018 | .009 | 1 | *ns* | .982 |
| Losers | Appearance Evaluation | .955 | 1.836 | 1 | *ns* | 2.598 |
| | Self-Classified Weight | -.500 | .217 | 1 | *ns* | .607 |
| | Overweight Preoccupation | .865 | 2.554 | 1 | *ns* | 2.374 |
| | Current – Ideal Body Size | -.673 | 6.915 | 1 | <.01 | .510 |

*Note.* The reference category is non-maintainers.

## Discussion

The present study sought to understand how body image factors may be related to successful weight maintenance in adult women. Researchers have suggested that the psychological aspects of the obesity epidemic, such as body image, may have their most important role in weight maintenance rather than weight loss (Wadden & Sarwer, 1999). However, there is limited research available examining this exact relationship, which calls for further inquiry. The present study aimed to provide a preliminary understanding of this complex association between body image and successful weight maintenance and to provide a benchmark for further research in this area.

The first aim of this study was to examine the difference in body image between individuals who became overweight before the age of sixteen (early-onset) and individuals who became overweight after the age of sixteen (late-onset). This

hypothesis was based on previous research, suggesting that early-onset obesity individuals experience more body image dissatisfaction than late-onset individuals (Wardle, Waller, & Fox, 2002). This is an extension of previous research because a slightly different sample was recruited: overweight community women attempting to maintain or lose weight independently rather than obese women seeking professional medical treatment.

Results demonstrate that early-onset individuals were less satisfied with their body, classified themselves as more overweight, engaged in more body image avoidant behavior, and experienced more perceptual body image dissatisfaction than late-onset individuals. The magnitude of these differences was moderate, with effect sizes ranging from .31 to .52. However, the observed differences appear to be a function of BMI, which accounted for a considerable proportion of variance in these analyses (anywhere from 6% to 57%). Furthermore, there were no significant differences between groups on any measure of body image after controlling for current BMI. This suggests that current degree of obesity (i.e. BMI level), rather than age of onset, is an influential factor in body image.

The present results are inconsistent with previous reports in the literature. It was expected that differences between the groups would remain after controlling for BMI, as suggested by Wardle, Waller, and Fox (2002) and Sorbara and Geliebter (2002). However, Schwartz and Brownell (2002) may provide a plausible explanation for the discrepant results. They point out that differences in age of onset may not emerge in studies that are examining a particular subtype of obese population. For example, certain subsets of the obese population have demonstrated higher levels

of body image disturbances, such as binge-eating obese individuals (Striegel-Moore, Wilson, Wilfley, Elder, & Brownell, 1998). If researchers are examining only this particular subset of the population, there may not be enough variability within this subset to also distinguish differences between early and late-onset obesity. This suggests that differences between early and late-onset groups may be more discrepant in certain subsets of the obese population. In the present study, it is difficult to ascertain if participants fall into a specified subset of the obese population as this was not directly investigated. The present sample was composed of overweight adult women attempting to maintain or lose weight independently and differed from samples used in previous research, which has typically focused on obese women seeking medical treatment. The heterogeneity of the obese population has long been a troublesome issue for researchers and has been a demonstrated source of conflictual research results. Friedman and Brownell (1995) have examined this phenomenon and have suggested improved research methods. Overall, it appears that Schwartz and Brownell's (2002) suggestion may explain why differences between the age of obesity onset groups were not found after controlling for BMI.

These findings also suggest that participants in the present study have a somewhat realistic view of their body image, considering that as their BMI levels increased so did their body image dissatisfaction regardless of their age of onset. This provides support for the "normative discontent" theory, which suggests that overweight individuals have a tendency to experience greater body image dissatisfaction (Cash, 2002). Most previous research in this area has sampled

treatment-seeking obese participants, which is problematic for generalization of the entire obese population (Schwartz & Brownell, 2002). The present study extended previous research by sampling a community population to gain a better understanding of this particular subset of the obese population. It is clear that larger population studies are necessary to gain a better understanding of body image dissatisfaction in the entire obese population.

Overall, results provide additional information about body image factors related to age of obesity-onset in a group of overweight women who are attending a fitness or weight loss support group. It appears that BMI may mediate the relationship between age of onset and body image dissatisfaction, since early-onset participants are significantly heavier than late-onset participants and that BMI accounted for a considerable portion of the variance of body image dissatisfaction. It is clear that further research is necessary to develop a better understanding of how age of onset and body mass index interact and contribute to body image dissatisfaction.

The second hypothesis aimed to understand how body image changes occur during weight loss and weight maintenance. This is a relatively new area of research and results are only preliminary as little longitudinal information is available. However, many researchers have postulated a general relationship between body image change and successful weight maintenance (Rosen, 2002; Sarwer & Thompson, 2002; Wadden & Sarwer, 1999).

Results of the present study indicate no differences on body image change in short-term and long-term weight maintainers over a three-month follow-up period.

Secondary analyses comparing subgroups who gained versus lost weight revealed that losers had less perceptual body image dissatisfaction than maintainers and gainers. This provides support for the threshold effect mentioned previously, where small initial changes in weight promote large changes in body image (Foster & Matz, 2002).

This present study extends the previous research on the threshold effect by examining body image change in participants who have been able to successfully maintain weight loss, which is an unexplored area of research. Results from the cross-sectional analyses indicate that body image does change in weight maintainers as long-term maintainers classify themselves as less overweight, have less perceptual body image dissatisfaction, and engage in less body image avoidant behaviors than short-term maintainers. However, these differences may also be accounted for by the significant BMI differences among the groups. Further research matching short-term and long-term weight maintainers on BMI may be helpful to better understand this association. Furthermore, longitudinal research would be helpful to pinpoint body image change in weight-maintained individuals.

It is important to note that only one dimension of body image improved, leaving the other dimensions unchanged, raising the intriguing possibility that perceptual changes in body image may be an early aspect of body image to change or adapt to the physical body changes. However, it also is equally possible that perceptual changes in body image may be a later aspect to change. Further research should investigate whether changes in cognitive, affective, and behavioral dimensions of body image occur at a delayed rate or perhaps do not change at all.

Research examining body image change as a function of duration of weight loss or maintenance is non-existent; to our knowledge, no studies examining this phenomenon have been conducted. Clearly, further research examining changes in body image at the dimensional level is warranted to improve our understanding of its impact in successful weight loss and weight maintenance.

It is also thought-provoking that the body image changes observed in the cross-sectional analyses of weight-maintained participants did not coincide with the results of the longitudinal aspect of this study. This suggests that a three-month follow-up may be insufficient to document any significant body image changes that might occur over time among successful weight maintainers. The cross-sectional aspect of the study suggests that a twelve-month follow-up may be more appropriate to truly measure any body image change because of significant differences in body image between short-term and long-term maintainers. Long-term maintainers had significantly better body image compared to short-term maintainers across all dimensions, suggesting that a change in body image occurs during this time frame. However, there is no research currently available to guide this theory, but the data obtained in the present study warrant such an investigation.

The minimal body image change observed over the three-month follow-up period also suggests that body image may be a relatively stable construct or dispositional trait. This is the predominant assumption in the current body image research as the majority of the measurement techniques assess body image as a stable trait excluding the possibility of a situational body image (Thompson, 2004). However, scientific exploration of body image as a dispositional trait has yet to be

completed (Cash, 2002). Therefore, longitudinal studies should be continued to obtain more conclusive evidence.

The findings of the present study could also contribute to the situational theory of body image, which emphasizes its fluidity across circumstances. Several studies have demonstrated daily, short-term fluctuations in body image among a variety of samples and situations (Melnyk, Cash, & Janda, 2004; Amorose, 2001; Haimovitz, Lansky, & O'Reilly, 1993). This suggests that situational body image should also be considered when examining body image changes. In the present study, participants (for the most part) completed the questionnaires at baseline and follow-up in similar contexts. The recruitment centers attempt to promote a positive body image within their programs. Therefore, participant responses to the questionnaires may have been influenced by this setting. In this context, the results are similar to the findings presented by Tiggemann (2001), who reported that individuals involved in a body-focused positive situation reported more body image satisfaction than individuals in a body-focused negative situation. The distinction between disposition and situation is important when researching body image and should be considered in future research.

A final aim of the present study was to identify psychological predictors of successful weight maintenance and to examine the strength of each predictor. It was anticipated that change in body image would be a significant predictor of successful weight maintenance. However, a good fit was not found with the data obtained at the three-month follow-up. Taking into consideration the implications of the previous hypothesis and the lack of substantial body image change in a three-month period,

the failure to identify a good model fit is not surprising. A twelve-month follow-up may provide sufficient time for body image to change and thereby permit identification of important relationships between body image and successful weight maintenance. However, this is only speculative, as current research examining this association is not available.

Baseline depression was a significant predictor of successful weight maintenance in the present analyses. This is not surprising as previous research has suggested that those with higher depression levels are less likely to successfully maintain weight (McGuire, Wing, Klem, Lang, & Hill, 1999). It also appears that depression is separate from affective body image as they are not correlated. This indicates that depression may be an independent predictor of weight maintenance, not related to body image. However, it is possible that these predictors are related in an unknown way. Clearly, further research should examine the interrelations between depression, body image, and successful weight maintenance.

Additional psychological contributors, besides body image, depression, and self-esteem, may be important in predicting successful weight maintenance. Previous research has suggested that level of social support may be related to successful weight maintenance (Elfhag & Rossner, 2005; Gorin, Phelan, Tate, Sherwook, Jeffery, & Wing, 2005; Wing & Jeffery, 1999). While support from friends may contribute to successful weight maintenance, the support of family involvement has received more mixed results (McLean, Griffin, Toney, & Hardeman, 2003). Understanding how social support impacts weight maintenance is another area that merits further investigation.

It has also been suggested that motivational style may contribute to successful weight maintenance. Williams, Grow, Freedman, Ryan, and Deci (1996) have suggested that Self-Determination Theory may be applicable to weight loss and weight maintenance. They propose that autonomously motivated individuals would be more likely to achieve successful weight maintenance, making this a predictor worthy of study. In related research, it has been demonstrated that individuals with an internal locus of control may be more likely to achieve success at weight maintenance (Nir & Neumann, 1995). Clearly, motivational factors should be considered when attempting to develop a comprehensive model of successful weight maintenance.

Personality factors may also contribute to a comprehensive model of successful weight maintenance. Bolocofsky, Coulthard-Morris, and Spinler (1984) suggested that certain personality variables were significant predictors of weight maintenance, but little follow-up research is available. Byrne, Cooper, and Fairburn (2003) suggested that a lack of vigilance and a dichotomous thinking style contributed to weight regain, but specific personality traits have not been identified. Additionally, Sarlio-Lahteenkorva and Rissanen (1998) have suggested that increased anxiety may contribute to successful weight maintenance in the form of more vigilance of weight fluctuations. Such research suggests that personality should also be examined when attempting to identify predictors of successful weight maintenance.

Overall, the aforementioned contributors should be considered to develop an integrated and comprehensive psychological model of predictors of successful

weight maintenance. Incorporating all potential psychological contributors to successful weight maintenance may enhance the understanding of this complex phenomenon and provide a theoretical framework for future research.

Despite the substantial implications of this research, several limitations should be acknowledged. First, data were obtained using participant self-report measures, which have the potential to be inaccurate and subject to social desirability effects. In addition, potentially sensitive demographic information including height and weight measurements was also obtained via self-report. In a few select cases where the participant was unable to recall heaviest weight or current weight, information was obtained from weight loss group files. Many of the participants did not elect to give the principal investigator permission to access weight loss files, which may limit the reliability of the reports. However, the participants are generally weighed and measured as a part of their program on a monthly basis, presumably making them more likely to accurately report their height and weight. Research has suggested that self-reported weight and height is accurate (Klesges, Klem, Epkins, & Klesges, 1991; Stunkard & Albaum, 1981).

It also is a concern that the present study sample may not represent the general population. The participants were from one state in the Midwest, which has the second highest rate of obesity in the nation, with 24.4% of the population being classified as obese (United States Department of Health and Human Services, 2001). The sample was also limited in terms of racial/ethnic diversity. Information obtained from the United States Census website, www.census.gov, indicates that the racial breakdown of the sample should be as follows: 89.7% Caucasian, 5.6%

African-American, 0.3% American Indian or Alaska Native, 1.7% Asian, and 0% Native Hawaiian or Other Pacific Islander. In addition, 2.6% of the sample should be Hispanic and 96.1% of the sample should be Not of Hispanic or Latino Origin to adequately represent the local population. However, the sample was composed of 96.6% Caucasians and 99.3% individuals Not of Hispanic or Latino origin. Overall, this limits the ability to generalize the findings to the general population but it is likely that the present sample is representative of the Caucasian female population. It is clear that further research should use alternate recruitment methods and locations to obtain a more representative sample of the general population.

Another limitation of the present study is that seasonal weight fluctuations were not assessed. Visscher and Seidell (2004) found that levels of BMI were higher in winter than summer months and suggested that seasonal differences in measurement of obesity should be taken into account. This study began data collection in August and finished with follow-up data in March. The majority of the participants were recruited in October with follow-up taking place in January after the seasonal holidays, which may have influenced BMI measurements. However, every attempt was made to spread the data collection throughout the seasons to control for this factor.

Furthermore, as mentioned in the literature review, the topics discussed in this study are extremely difficult to operationally define. The accuracy of BMI measurements and their applicability to the definition of obesity have long been debated (Foreyt, Poston, McInnis, & Rippe, 2003). Additionally, it remains unclear how to best operationally define weight maintenance (Wing & Klem, 2002). The

definitions suggested by Lean (2003) were used in the present study; however, that does not ease the difficulty in comparing these results to other studies. The lack of consensus is a limitation in the present study as well as in the entire research area.

It also is possible that the present sample may have a selection bias due to recruitment methods and stringent inclusion criteria. Successful weight maintainers were recruited to test the hypotheses of the present study and were a subset of all women attending these programs. It is unknown as to how the women who participated in the present study differed from other members who elected not to participate. Clearly, further research taking into consideration the possible selection bias would be beneficial. Additionally, the stimulus value of the principal investigator and research assistant may also have influenced participation in the present study. The principal investigator has been a long-term successful member of *Curves*, which was known to some of the participants. However, many participants may have speculated that the principal investigator or the research assistant collecting data did not have weight issues, which may have influenced results. Further research should be completed to determine if the stimulus value of research assistants collecting data may influence overweight women's participation in research.

Last, other potentially important moderating variables were not taken into account simply because they were not a focus of the study. Marital status, level of social support, expectations about weight, and socioeconomic status are a few of the factors that were not addressed in the present study. It is possible that these factors could contribute to the understanding of the topic.

Despite these limitations, the findings of the present study are intriguing and call for additional research. Little is known about the psychological correlates of successful weight maintenance as it has only recently become a focus of study. Furthermore, the implications of body image dissatisfaction for successful weight maintenance are unclear. To the author's knowledge, no other studies have examined how body image may influence weight maintenance despite the clear suggestions that this is an area of needed research by experts in the field (Rosen, 2002; Sarwer & Thompson, 2002; Wadden & Sarwer, 1999). Understanding how body image and related factors may contribute to weight maintenance may provide an opportunity for intervention to assist individuals struggling with weight-related issues. Due to the growing trend of obesity, it is clear that this research is necessary to resolve and alleviate this epidemic.

Based on these findings, future studies examining the relationship between body image and successful weight maintenance are being coordinated. Currently, a twelve-month follow-up of the present study is being planned, incorporating other possible predictors of successful weight maintenance. It is hoped that additional information about the process of body image change will be obtained, allowing researchers to more fully understand body image at the dimensional level. Furthermore, additional information on other predictors of successful weight maintenance may provide a more comprehensive model to best address the current obesity epidemic.

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# Appendices

Appendix A

*Common Valid and Reliable Measures of Body Image*

| Name of Measure | Author(s) | Items | Self-Report | Sen-sitive | Beh-avioral | Cog-nitive | Affec-tive | Per-ceptual |
|---|---|---|---|---|---|---|---|---|
| Figure Rating Scale | Stunkard et al. (1983) | N/A | | X | | | | X |
| Contour Rating Scale | Thompson & Gray (1995) | N/A | | X | | | | X |
| Body Image Assessment | Williamson et al. (1989) | N/A | | X | | | | X |
| Body Image Assessment for Obesity | Williamson et al. (2000) | N/A | | X | | | | X |
| Individual Contour Drawing Scale | Gardner et al. (1999) | N/A | | X | | | | X |
| Eating Disorder inventory, Body Dissatisfaction subscale | Garner et al. (1983) | 7 | X | X | X | X | X | |
| Body Satisfaction Scale | Slade et al. (1990) | 16 | X | X | | X | X | |
| Body-Esteem Scale, Revised | Mendelson et al. (2001) | 23 | X | | | X | X | |
| Multi-dimensional Body-Self Relations Questionnaire | Cash (2000) | 69 | X | X | X | X | X | |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Body Shape Questionnaire | Cooper et al. (1987) | 34 | X | X | | X | X | |
| Physical Appearance State and Trait Anxiety Scale | Reed et al. (1991) | 16 | X | X | | X | X | |
| Body Image Avoidance Questionnaire | Rosen et al. (1991) | 19 | X | X | X | | | |
| Physical Appearance Behavioral Avoidance Test | Thompson et al. (1994) | | X | | X | | | |
| Appearance Schemas Inventory | Cash & Labarge (2000) | 14 | X | X | | X | X | |
| Body Image Quality of Life Inventory | Cash (2000) | 19 | X | X | X | X | X | |
| Situational Inventory of Body Image Dysphoria | Cash (1994) | 50 | X | X | | | X | |
| Body Shape Scale | Beebe (1995) | 7 | X | | | | X | |

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Appendix B

# SCREENING INFORMATION

**DIRECTIONS: Please mark the appropriate box for your response.**

1. What is your racial identity?

   ☐ Caucasian ☐ Black/African American ☐ American Indian/Native Alaskan

   ☐ Asian ☐ Native Hawaiian/Other Pacific Islander

2. What is your ethnic identity?

   ☐ Hispanic or Latino origin ☐ Not of Hispanic/Latino origin

3. What is your birthday? ☐☐ Month ☐☐ day ☐☐☐☐ year

4. Are you currently pregnant or do you intend to get pregnant within the next six months?

   ☐ Yes ☐ No

5. Have you been told by a professional that you may be experiencing symptoms of menopause? ☐ Yes ☐ No

   If yes, when was this? ☐☐☐☐ Year

   if yes, are you taking any hormone treatments for it? ☐ Yes ☐ No

6. Have you experienced any symptoms that may be related to menopause such as hot flashes, irritability, insomnia, or missed periods? ☐ Yes ☐ No If you are perimenopausal or postmenopausal, how would you rate the overall experience?

   ☐ Positive ☐ Neutral ☐ Negative

7. Are you currently in treatment by a physician/psychologist/ health service professional for obesity, body image problems, depression, or self-esteem problems?

   ☐ Yes ☐ No

8. How tall are you? ☐ feet ☐☐ inches

9. Do you agree to complete additional questionnaires in approximately 3-6 months?

   ☐ Yes ☐ No

10. Have you lost thirty (30) or more pounds at some point in your life?

    ☐ Yes ☐ No

    If yes, when did you reach this goal? ☐☐ Month ☐☐☐☐ Year

11. Have you lost 10% of your initial body weight at some point in your life? (i.e., if you weighed 220 pounds initially, you would have had to lose 22 pounds).

    ☐ Yes ☐ No

    If yes, when did you reach this goal? ☐☐ Month ☐☐☐☐ Year

*Please continue on the back of this page*

## SCREENING INFORMATION Page 2

12. What was your heaviest weight in pounds? ☐☐☐ pounds
13. What was your heaviest weight in pounds since joining your group? ☐☐☐ lbs
14. What is your current weight in pounds? ☐☐☐ Pounds
15. How long have you been at this current weight? ☐☐ months
16. Do you intend to maintain your current weight? ☐ Yes ☐ No
17. If you do not intend to maintain your weight, what do you intend to do? ☐ Lose (How much? ☐☐ lbs) ☐ Gain (How much? ☐☐ lbs) ☐ Don't Know
18. Given your best estimate, what was your weight and height at age sixteen?
    ☐☐☐ Pounds ☐ feet ☐☐ inches
19. How old were you when weight became an issue for you? ☐☐ years. What was your weight and height at this time? ☐☐☐ Pounds ☐ feet ☐☐ inches
20. Are you willing to complete an informed consent to participate in this study if eligible to participate? ☐ Yes ☐ No
21. Are you willing to give consent for the researchers to obtain information from your group membership file if you are eligible to participate? ☐ Yes ☐ No

***YOU ARE FINISHED WITH THE INITIAL SCREENING.***

***THANK YOU FOR YOUR PARTICIPATION!!!***

Appendix C

## Follow-Up Questionnaire

1. Are you currently pregnant or did you become pregnant in the last three months?
   ☐ Yes ☐ No
2. Have you experienced any changes in your menopausal status in the last three months (such as developing hot flashes, night sweats, or missed periods)?
   ☐ Yes ☐ No
3. Are you currently in treatment by a physician/psychologist/ health service professional for obesity, body image problems, depression, or self-esteem problems? ☐ Yes ☐ No
4. How tall are you in inches? ☐☐ inches
5. What is your current weight in pounds? ☐☐☐ pounds
6. How long have you been at this current weight? ☐☐ months

Appendix D

# MBSRQ-AS

INSTRUCTIONS – PLEASE READ CAREFULLY

The following page contains 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** is 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 the items.

| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|
| **Definitely Disagree** | **Mostly Disagree** | **Neither Agree Nor Disagree** | **Mostly Agree** | **Definitely Agree** |

_____ 1. My body is sexually appealing.

_____ 2. I constantly worry about being or becoming fat.

_____ 3. I like my looks just the way they are.

_____ 4. I am very conscious of even small changes in my weight.

_____ 5. Most people would consider me good-looking.

_____ 6. I like the way I look without my clothes on.

_____ 7. I like the way clothes fit me.

_____ 8. I dislike my physique.

_____ 9. I am physically unattractive.

_____ 10. I am on a weight-loss diet.

**For the remainder of the items use the response scale given with the item and enter your answer in the space beside the item.**

_____ 11. I have tried to lose weight by fasting or going on crash diets.

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

_____ 12. I think I am:

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

_____ 13. From looking at me, most other people would think I am:

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

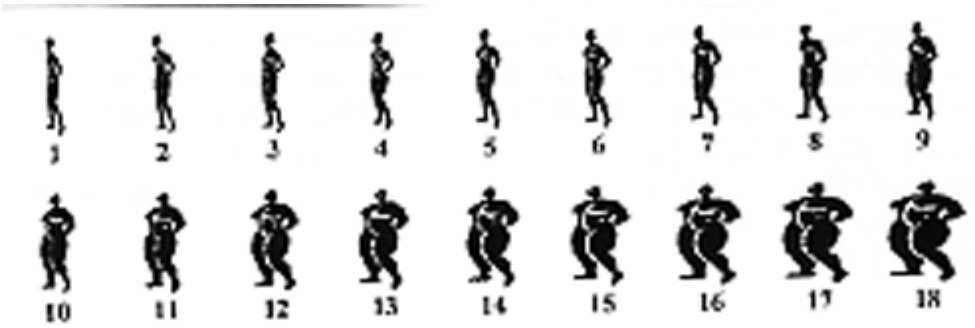
Appendix E

## BIA-O

_____ 1. Select the silhouette that most accurately depicts your body size as you perceive it to be.

_____ 2. Please select the silhouette that most accurately depicts the body size that you would most prefer.

_____ 3. Please select a silhouette that represents a body size that you believe is realistic for you to maintain over a long period of time.



Appendix F

# BIAQ

DIRECTIONS: Circle the number that best describes how often you engage in these behaviors at the present time.

| | | Always | Usually | Often | Some-times | Rarely | Never |
|---|---|---|---|---|---|---|---|
| 1. | I wear baggy clothes | 5 | 4 | 3 | 2 | 1 | 0 |
| 2. | I wear clothes I do not like | 5 | 4 | 3 | 2 | 1 | 0 |
| 3. | I wear darker color clothing | 5 | 4 | 3 | 2 | 1 | 0 |
| 4. | I wear a special set of clothing, e.g., my “fat clothes” | 5 | 4 | 3 | 2 | 1 | 0 |
| 5. | I restrict the amount of food I eat | 5 | 4 | 3 | 2 | 1 | 0 |
| 6. | I only eat fruits, vegetables, or other low calorie foods | 5 | 4 | 3 | 2 | 1 | 0 |
| 7. | I fast for a day or longer | 5 | 4 | 3 | 2 | 1 | 0 |
| 8. | I do not go out socially if I will be “checked out” | 5 | 4 | 3 | 2 | 1 | 0 |
| 9. | I do not go out socially if the people I am with will discuss weight | 5 | 4 | 3 | 2 | 1 | 0 |
| 10. | I do not go out socially if the people I am with are thinner than me | 5 | 4 | 3 | 2 | 1 | 0 |
| 11. | I do not go out socially if it involves eating | 5 | 4 | 3 | 2 | 1 | 0 |
| 12. | I weigh myself | 5 | 4 | 3 | 2 | 1 | 0 |
| 13. | I am inactive | 5 | 4 | 3 | 2 | 1 | 0 |
| 14. | I look at myself in the mirror | 5 | 4 | 3 | 2 | 1 | 0 |
| 15. | I avoid physical intimacy | 5 | 4 | 3 | 2 | 1 | 0 |
| 16. | I wear clothes that will divert attention from my weight | 5 | 4 | 3 | 2 | 1 | 0 |
| 17. | I avoid clothes shopping | 5 | 4 | 3 | 2 | 1 | 0 |
| 18. | I don’t wear “revealing” clothes (e.g., bathing suits, tank tops, or shorts) | 5 | 4 | 3 | 2 | 1 | 0 |
| 19. | I get dressed up or made up | 5 | 4 | 3 | 2 | 1 | 0 |

Appendix G

## CES-D Scale

INSTRUCTIONS FOR QUESTIONS: Below is a list of ways you might have felt or behaved. Write the number that best describes how often you have felt this way during the past week.

0 Rarely or none of the time (less than 1 day)
1 Some or a little of the time (1-2 days)
2 Occasionally or a moderate amount of the time (3-4 days)
3 Most or all of the time (5-7 days)

DURING THE PAST WEEK:

_____1. I was bothered by things that usually don't bother me.

_____2. I did not feel like eating; my appetite was poor.

_____3. I felt that I could not shake off the blues even with help from my family or friends.

_____4. I felt that I was just as good as other people.

_____5. I had trouble keeping my mind on what I was doing.

_____6. I felt depressed.

_____7. I felt that everything I did was an effort.

_____8. I felt hopeful about the future.

_____9. I thought my life had been a failure.

_____10. I felt fearful.

_____11. My sleep was restless.

_____12. I was happy.

_____13. I talked less than usual.

_____14. I felt lonely.

_____15. People were unfriendly.

_____16. I enjoyed life.

_____17. I had crying spells.

_____18. I felt sad.

_____19. I felt that people disliked me.

_____20. I could not get "going."

Appendix H

## RSES

INSTRUCTIONS: Indicate which response best describes how much you agree or disagree with the following statements.

1 Strongly Agree
2 Agree
3 Disagree
4 Strongly Disagree

_____1. On the whole, I am satisfied with myself.

_____2. At times I think I am no 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 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, at least on an equal plane with others.

_____8. I wish I could have more respect for myself.

_____9. All in all, I am inclined to feel that I am a failure.

_____10. I take a positive attitude toward myself.

# Appendix I

## Recruitment Centers

Curves for Women Locations

1. Bad Axe, Michigan
2. Caro, Michigan
3. St. Clair Shores, Michigan
4. Sterling Heights, Michigan
5. Lake Orion, Michigan
6. Orion Township, Michigan
7. Livernois - Rochester Hills, Michigan
8. Auburn – Rochester Hills, Michigan
9. West Ypsilanti, Michigan
10. East Ypsilanti, Michigan
11. South Ypsilanti, Michigan
12. Ann Arbor, Michigan
13. Canton, Michigan
14. Plymouth, Michigan

Taking Off Pounds Sensibly Locations

1. Sandusky, Michigan

Appendix J

# Informed Consent for Screening to Participate in Research Body Image and Weight Maintenance

Amy S. Collings – Principal Investigator

1. **Purpose of Screening and How Long It Will Last**: The purpose of this screening is to determine whether you are eligible to participate in a study on weight maintenance based on set inclusion and exclusion criteria. We cannot tell you in advance what the eligibility criteria are, but it is anticipated that many members of this weight loss group will be eligible. This screening should take only approximately five minutes to complete.
2. **Participation Withdrawal or Refusal to Participate**: Participation in this screening is completely voluntary and you may choose to quit at any time without penalty.
3. **Description of the Screening Including Procedures to be Used**: After you provide consent to participate in the screening, you will be asked to complete a questionnaire to determine whether you meet specified inclusion criteria. This questionnaire will ask you demographic information, your current weight and height, and information on your weight history. You also will be asked to consent to allow the principal investigator to obtain your weight history from your weight loss group files. This information will be used solely to verify your maximum weight. After you complete the screening, the research staff will examine it to determine eligibility. If you are eligible, you will be asked to continue with the research project. However if you are ineligible, your participation will be complete and no further information will be obtained from you. Regardless of eligibility, you are entitled to obtain the results of the study from the Principal Investigator (*Amy Collings; Phone: XXX-XXX-XXXX; Email: XXX@XXX.com*).
4. **Description of any Procedures that may Result in Discomfort or Inconvenience**: There are no known or anticipated procedures in this screening that may result in discomfort or inconvenience to you. You will be required to disclose personal information about your weight history, which may result in some participants feeling a bit uncomfortable.
5. **Confidentiality of Information Obtained**: Results of the screening will be kept completely confidential to the extent permitted by law. Participant will be given a random number for identification purposes and will use this number on all individual responses. These responses will be kept separate from any identifying information. Any information that identifies you personally will not be released without your written permission.
6. **Expected Risks of the Screening**: There are no known or anticipated risks for participating in the screening. Some questions may ask you about sensitive issues in your life, which may elicit an emotional response.
7. **Expected Benefits of the Study**: Your participation in this screening, if chosen to participate in the research project, may enhance general knowledge about how body image influences weight maintenance and provide researchers a better understanding of weight maintenance risk factors and body image. Researchers are indebted to the volunteers who consent to participate in research activities to gain scientific knowledge about psychological phenomenon.

*Please continue on the back page.*

**RESEARCH PARTICIPANTS' RIGHTS**: I have read and agree to all of the above. I am aware that any questions that I may have about the screening can be answered by Amy Collings and I am aware of how to contact her. I have been told of the risks, discomforts, and the benefits of participation in the study. I understand that some questions may be sensitive to me and might make me uncomfortable. I understand that my participation in this screening is voluntary and I may remove myself at any time without penalty. I understand the steps that will be taken to ensure my confidentiality. If I feel that I have experienced a negative emotional or psychological response to the screening, I agree to contact Amy Collings for a referral to a mental health agency if necessary. I also understand I should notify Amy Collings if I am having difficulty while completing the screening.

I additionally understand that if I have questions or concerns about how this screening has been conducted, I have the right to contact the Chairperson of the Psychology Department's Human Subjects Review Board *(Dr. Karen Saules; Phone: XXX-XXX-XXXX, Electronic Mail: XXX@XXX.edu)*.

I understand my rights as a research participant and I voluntarily consent to participate in this screening. I additionally understand the purpose, intent, and necessity of the present screening. I will receive a copy of this consent form for my future reference.

_____ _____

*Participant's Signature* *Date*

_____

*Participant's Name (Print)*

_____ _____

*Signature of Witness* *Date*

_____ _____

Signature of Principal Investigator Date

Appendix K

# INFORMED CONSENT FOR PARTICIPATION IN RESEARCH

**Body Image and Weight Maintenance**

Amy S. Collings – Principal Investigator

1. **Purpose of Study and How Long It Will Last**: The purpose of this study is to examine how one's body image affects the maintenance of one's weight. Participants will be asked to complete questionnaires two times about three months apart, with each session taking approximately twenty to thirty minutes to complete.
2. **Participation Withdrawal or Refusal to Participate**: Participation in this study is completely voluntary and you may choose to quit the research project at any time without penalty. Your decision to participate or not will in no way affect your membership.
3. **Description of the Study Including Procedures to be Used**: The study is designed to examine the scores obtained on questionnaires. Once it has been determined that you are eligible to participate, you will be asked to complete a survey that asks you about your weight history and your thoughts, feelings, and perceptions associated with your weight. You also will be asked to provide contact information of a close relative or friend that will be used in the event that we are unable to contact you with the personal information that you provided. When you are finished, you will be asked to seal your answers in a manila envelope to protect your confidentiality and give them to the principal investigator, or, if she is not on site, to designated personnel who will set them aside for the investigator to pick up at her next visit. Three months later, you will be asked to complete additional surveys almost identical to the initial set. Again, when you are finished, you will seal your responses in a manila envelope and return it to the principal investigator as done previously. At this point, your participation in the research study is complete.
4. **Description of any Procedures that may Result in Discomfort or Inconvenience**: There are no known or anticipated procedures in this study that may result in discomfort or inconvenience to you. You will be required to disclose personal information about your weight history, which may result in some participants feeling a bit uncomfortable.
5. **Confidentiality of Information Obtained**: Results of these surveys will be kept completely confidential to the extent permitted by law. All responses and identifiable information will be kept secure by being locked in a file cabinet. Participants will be given a random number for identification purposes and will use this number on all survey materials. Individual survey responses will be kept separate from any identifying information and any information that identifies you personally will not be released without your written permission. A list of names and identification numbers will be kept by the principal investigator to organize the information and to remind participants of their number at follow-up. Only the principal investigator will have access to this list and will store it securely in a separate location from the individual responses. The information from your weight loss group file will be retrieved by the principal investigator and other staff will not know your identification number unless requested by you. Information from this study may be reported or published, including in the principal investigator's Master's Thesis, but your identity will be kept confidential in any publications or presentations.
6. **Expected Risks of the Study**: There are no known or anticipated risks for participating in the study. Some questions may ask you about sensitive issues in your life, which may elicit an emotional response.
7. **Expected Benefits of the Study**: Your participation in this study should enhance general knowledge about how body image influences weight maintenance and provide researchers a better understanding of weight maintenance risk factors and a better conceptualization of body image. In addition, when you complete the study, you will be given a choice of a small gift (a pedometer, stopwatch, or body-fat analyzer). No additional compensation for your participation will be offered.
8. **Use of Research Results**: The research in this study will be published in the principal investigator's Master's Thesis, as well as psychological journals, and also may be presented at

conferences and poster sessions. As a participant, you are entitled to meet with the Principal Investigator (*Amy Collings; Phone: XXX-XXX-XXXX; Email: XXX@XXX.com*) to obtain the results of the study and for any other questions or concerns.

9. **Consent to Obtain Information**: An aspect of the project will be examining your history of weight loss, thereby making it necessary to obtain specific information from your weight loss file. By initialing the following, you will consent for the principal investigator to obtain the following information from your file, which will be used solely for the purpose of verification of weight history:
   a. Date of membership_____*(initial)*
   b. Height and Weight at membership_____*(initial)*
   c. Maximum Weight during membership_____*(initial)*
   d. Minimum Weight during membership_____*(initial)*
   e. Most recent height and weight measurement at the time of the initial questionnaire session_____*(initial)*
   f. Most recent height and weight measurement at the time of the follow-up questionnaire session_____*(initial)*

   This information will be kept confidential and will be stored in a locked file cabinet, separate from any identifying information.

**RESEARCH PARTICIPANTS' RIGHTS**: I have read and agree to all of the above. Any questions that I may have were answered by Amy Collings and I am aware of how to contact her should I have further questions. I have been told the risks, discomforts, and the benefits of participation in the study. I understand that some questions may be sensitive to me and might make me uncomfortable. I understand that my participation in this study is voluntary and I may remove myself from the study at any time without penalty. I understand that the results of this study may be published or presented but my individual records will not be disclosed unless required by law. I understand the steps that will be taken to ensure my confidentiality. If I feel that I have experienced a negative emotional or psychological response to the study, I agree to contact Amy Collings for a referral to a mental health agency if necessary. I also understand I should notify Amy Collings if I am having difficulty while completing the questionnaires.

I additionally understand that if I have questions or concerns about how this study has been conducted, I have the right to contact the Chairperson of the Psychology Department's Human Subjects Review Board *(Dr. Karen Saules; Phone: XXX-XXX-XXXX, Electronic Mail: XXX@XXX.edu)*.

I understand my rights as a research participant and I voluntarily consent to participate in this study and follow its requirements. I additionally understand the purpose, intent, and necessity of the present study. I will receive a copy of this consent form for my future reference.

_____ _____
*Participant's Signature* *Date*

_____
*Participant's Name (Print)*

_____
Participant's Complete Address

_____ _____
*Participant's Email Address* *Participant's Phone*

_____ _____
*Signature of Witness* *Date*

_____ _____
*Signature of Principal Investigator* *Date*

Appendix L

# PERSONAL CONTACT INFORMATION

**Body Image and Weight Maintenance**

Amy S. Collings – Principal Investigator

The following information will be used only in the event that the researchers are unable to obtain your follow-up information in 3-6 months. This identifying information will not been kept with the other information that you will give and will be kept in a secure locked location.

Participant Name:_____
Complete Street Address:_____
City:_____ State:_____ Zip Code:_____
Daytime phone number:_____
Evening phone number:_____
Electronic Mail Address:_____
Any facsimile number:_____

Close Relative Information (in the event that the researchers are unable to contact you with the above information, please provide information of a close relative or friend that would know current contact information for you).

Close Relative Name:_____
Complete Street Address:_____
City:_____ State:_____ Zip Code:_____
Daytime phone number:_____
Evening phone number:_____
Electronic Mail Address:_____
Any facsimile number:_____

I agree to provide the above information for the sole purpose of collection of follow-up information. I give consent for the researcher to contact the close relative identified above in the event that the researcher cannot contact me directly.

_____ _____
*Participant's Signature* *Date*

_____
*Participant's Name (Print)*

_____ _____
*Signature of Witness* *Date*

_____ _____
*Signature of Principal Investigator* *Date*