Being Able to Be Stable: A Mixed Methods Analysis of Behavior and Motivation Predictors that Promote Long-Term Weight-loss Maintenance

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Being Able to Be Stable: A Mixed Methods Analysis of Behavior and Motivation Predictors that Promote Long-Term Weight-loss Maintenance

Abstract
Long-term weight-loss maintenance is challenging and a high level of failure is associated with long-term weight loss. The current research and health recommendations stress the need for research on strategies for maintaining weight loss. Researchers aim to understand what motivates individuals to adhere to weight-loss maintenance. The purpose of this study was to understand weight-loss maintenance and identify the predictors of successful weight-loss maintenance among adults. The theoretical rationale for this study, self-determination theory (SDT), suggests the existence of three fundamental psychological needs, autonomy, competence, and relatedness. Mixed methods analysis of a community organization that offers prevention and wellness resources to families and individuals was used. Both quantitative and qualitative analyses delivered an examination on how obese adults can lose significant amounts of weight and maintain those losses. Quantitative results indicated that, together, the factors of SDT do not predict whether individuals will maintain weight loss. However, at the univariate level autonomous motivation and amotivation were associated with a decreased likelihood of long-term weight-loss maintenance. The study’s qualitative results suggested strategies that support long-term weight-loss maintenance. The study’s findings offer guidance to health and wellness community organizations, the medical community, policymakers, and individuals struggling with weight-loss maintenance. Suggestions for future research to draw distinctions between strategies used to lose versus maintain weight, deliver individual support in a coordinated group setting, and policies and practices that facilitate more effective social support in medical settings were given. Outcomes from this study could be important to the establishment of successful weight maintenance interventions.

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Being Able to Be Stable: A Mixed Methods Analysis of Behavior and Motivation
Predictors that Promote Long-Term Weight-loss Maintenance

By

Rose M. Nichols

Submitted in partial fulfillment
of the requirements for the degree
Ed.D. in Executive Leadership

Supervised by
Dr. B. Evan Blaine

Committee Member
Dr. Christine Nelson-Tuttle

Ralph C. Wilson, Jr. School of Education
St. John Fisher College

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2017
Dedication

Trust in the LORD with all your heart and do not lean on your own understanding. In all your ways acknowledge Him, And He will make your paths straight.

Proverbs 3:5-6

Every good and perfect gift comes from You, my Lord and Savior. The very fact that I am here, right now, is due only to Your mercy and grace. Thank You for letting me get this far. Regardless of the pain or hardships endured, You understood them. You have used them for my good and Your glory in ways I cannot comprehend. Truly, my hope is in You.

To my loving and patient husband Tony Nichols. I just wanted to thank you for being the best husband in the world! You have always stayed strong and put up with me through thick and thin. I love you for your constant encouragement and belief in me. Listening to the hubbub about classes and this dissertation and keeping me on my toes on all that I need to do to be done. I am not sure I could have made it this far if it was not for your daily encouragement, continuous prayers, and unconditional love! You are the best thing that has ever happened in my life!

To my Mommy: You are the light of my life. All that I am, all that I hope to be, I owe to you. You taught me how to work hard for something I am passionate about and to never ever, under any circumstance, give up. You have taught me that hard work amounts to success, but success means nothing without a strong family. So, with that
being said, thank you to Momma, Lynette, Freddy, Tammy, my nieces, and nephew. Thank you for your love and support.

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Thank you God for my friends: To Leslie Smith, I can never thank God enough for positioning you in my life. When I say that, I mean it with every ounce of my being and with total conviction. You have always understood and never judged. Thank you for knowing when I needed you, even if I never said anything. To Dr. Jamie Smith-Williams: Your friendship means so much to me. You have made so many times even better simply by being you. You make me happy simply by being my friend. To Dr. Dawn Bruner, Dr. Susan Gustafson, and Leah Vance-Daniels, you all came out of nowhere and changed my life for the better. I cannot thank you enough for everything you have done to shape me into the EdDiva I am today! Thank you especially for Cloud 9 Cocktail and Mighty Fine Cohort 9! I am blessed knowing you.

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To Linda. I can call you about anything and you would drop whatever you are doing to help me in any situation. You know when I need encouragement. You know when I am at my best and when I am at my worst. I love you for the beautiful mentor you are to me! Thank you, Pastor Joel Osteen, for always putting a seed of hope in my heart, restoring my faith, reminding me that God is a good God, and He has a plan for my life. Finally, although I have not met you (yet), thank you Michelle Obama for teaching me, “There is no limit to what we, as women, can accomplish.”
Biographical Sketch

Rose Marie Nichols has worked in the non-profit, higher education, and government sectors for 29 years. Due to Mrs. Nichols’ professional experience in strategic leadership, team building, and executive planning she offers astute, analytical ideas, ingenuity, integrity, leadership, and the aptitude to work with individuals across all levels of an organization. Starting her college education in 1984, Mrs. Nichols attended the University of Rochester and graduated with a Bachelor of Arts degree in Psychology in 1988. She began attending Roberts Wesleyan College in Rochester, New York in 1997. She graduated with a Masters in Organizational Management, Cum Laude, in 1998. Currently, she is employed with the United States Department of Agriculture. As an adjunct professor, Mrs. Nichols taught Leadership Ethics in the Masters in Strategic Leadership program at Roberts Wesleyan College as an adjunct professor for 11 years. Due to her personal weight loss journey, she became a certified fitness instructor through the American Council of Exercise. As a lifestyle coach for the YMCA of Greater Rochester’s Diabetes Prevention Program (Y-DPP) and Healthy Living programming in collaboration with the University of Rochester Center for Community Health she began to share her passion for weight loss and weight loss maintenance. It was due to this passion that, in 2014, Mrs. Nichols began her doctoral studies in the Ed.D. Program in Executive Leadership. Mrs. Nichols pursued her research in the field of long-term weight-loss maintenance under the direction of Dr. Evan Blaine and Dr. Christine Nelson-Tuttle and received the Ed.D. Degree in 2017.
Abstract

Long-term weight-loss maintenance is challenging and a high level of failure is associated with long-term weight loss. The current research and health recommendations stress the need for research on strategies for maintaining weight loss. Researchers aim to understand what motivates individuals to adhere to weight-loss maintenance. The purpose of this study was to understand weight-loss maintenance and identify the predictors of successful weight-loss maintenance among adults. The theoretical rationale for this study, self-determination theory (SDT), suggests the existence of three fundamental psychological needs, autonomy, competence, and relatedness. Mixed methods analysis of a community organization that offers prevention and wellness resources to families and individuals was used. Both quantitative and qualitative analyses delivered an examination on how obese adults can lose significant amounts of weight and maintain those losses. Quantitative results indicated that, together, the factors of SDT do not predict whether individuals will maintain weight loss. However, at the univariate level autonomous motivation and amotivation were associated with a decreased likelihood of long-term weight-loss maintenance. The study’s qualitative results suggested strategies that support long-term weight-loss maintenance. The study’s findings offer guidance to health and wellness community organizations, the medical community, policymakers, and individuals struggling with weight-loss maintenance. Suggestions for future research to draw distinctions between strategies used to lose versus maintain weight, deliver individual support in a coordinated group setting, and policies
and practices that facilitate more effective social support in medical settings were given. Outcomes from this study could be important to the establishment of successful weight maintenance interventions.
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Chapter 1: Introduction

Obesity is a serious public health problem in the United States. Almost 15% of American adults were obese in 1980 (Mann et al., 2007). Results from the 2007–2008 National Health and Nutrition Examination Survey (NHANES), indicate that an estimated 34.2% of U.S. adults aged 20–74 years were overweight, 33.8% were obese, and 5.7% were extremely obese (Ogden & Carroll, 2010). More recent data from NHANES (2011-2014) indicate that the percentage of American adults who were obese increased to 37.7% (Ogden, Carroll, Fryar, & Flegal, 2015). Even with the health threats that are often linked with obesity, the prevalence of obesity in adults in the United States has continued to increase over the last several decades.

While “obesity and “overweight” are often used interchangeably, the two concepts are not equal. Obesity refers to an excess amount of body fat or adipose tissue in relation to lean body mass (National Institutes of Health, 1998; World Health Organization, 2000). One method to measure body fat is to use a body mass index (BMI). To compute an estimated BMI, multiply weight in pounds by 703, then divide the results by height in inches, and divide that result by height in inches a second time. For instance, an individual weighing 175 pounds and 5’5” tall (65 inches) would have a BMI of 29. A BMI between 18.5 and 25.9 is considered normal, 25-29.0 is overweight and 30 or greater is defined as obese (World Health Organization, 2000). Being “obese” is equivalent to being considered very overweight. A BMI over 40 generally means an
individual is no less than 100 pounds overweight and is considered severely obese (NIH, 1998; World Health Organization, 2000).

Overweight refers to increased body weight in relation to height, when related to some standard of acceptable or desirable weight (World Health Organization, 2000). Overweight may or may not be due to a rise in body fat. It may also be due to a rise in lean muscle. For instance, highly active individuals who are muscular, with little body fat, may weigh more than others of the same height. (U.S. Department of Veterans Affairs).

To state that obesity is a disease, rather than a serious health condition, can cause quite a controversy. Since June 2013, there has been a contentious debate as to whether or not obesity is a disease. At that time, the American Medical Association (AMA) voted to classify obesity as a disease (Pollack, 2013). However, numerous physicians, health organizations, and research groups have classified obesity as a disease since the 1800s (Allison et al., 2008). Such entities include the World Health Organization in 1948 (James, 2008), National Heart, Lung, and Blood Institute in 1995, National Institute of Health (NIH) in 1998 (Hamilton, 2013), Social Security Administration in 1999 (Hamilton, 2013), The Obesity Society in 2008 (Kastler, 2013), and The American Association of Clinical Endocrinologists in 2012 (Mechanick, Garber, Handelsman, & Garvey, 2012). These entities believe that obesity meets the definition of disease (American Medical Association House of Delegates, 2013); it impairs the normal functioning of the body (Bray, 2004) and decreases the life expectancy of individuals, which can lead to death (Boseley, 2016). Opponents argue that obesity is a preventable risk factor for other diseases, and conditions or a side effect (Keith et al., 2006). As both
opponents and proponents continue to dispute various reports and classifications, obesity continues to increase. Obesity, however one reasons to categorize it, is easy to identify because there is an outward appearance from the onset as weight gain and expanded girth. Since the 1980s, obesity prevalence has more than doubled and led the World Health Organization (WHO) to proclaim it a global problem and worldwide public-health crisis (Ogden et al., 2006).

Obesity has both short- and long-term physical, mental, and emotional consequences. Prevalence, incidence, high costs, and health consequences are increasing. Effective treatment plans that address obesity, particularly in adults, are urgently needed. In order to understand this need, the prevalence, incidence, consequences and costs associated with obesity must be explained.

Prevalence data is very valuable when classifying high-risk populations for interventions. Its emphasis is on individuals who have been obese or extremely obese for amounts of time, as well as those who have recently reached such levels (Pan, Freedman, Gillespie, Park, & Sherry, 2011). Prevalence specifies the degree of the problem of obesity, while incidence expresses information about the rate of developing obesity. Incidence pinpoints those who develop obesity or extreme obesity over a definite period of time (Pan et al., 2011). As a result, there is a need to study both the prevalence and the incidences of obesity.

It is also essential that a description of the consequences and the economic toll obesity has on the well-being of the U.S. population be presented. According to the Surgeon General’s Call to Action (U.S. Department of Health & Human Services, 2001), overweight, obesity, and their associated health consequences have substantial economic
consequences for the U.S. health care system. Since obesity and overweight impacts two-thirds of U.S. adults and accounts for over 20% ($200 billion) of annual direct U.S. health-care costs (Finkelstein et al., 2009), strategies must be investigated that demonstrate evidence that is useful for weight-loss and weight-loss maintenance (WLM).

**Prevalence.** Since the latter half of the 20th century, the United States has observed a dramatic upturn in the prevalence of obesity making it a public health crisis. Fifty years ago, there was no standardized and internationally recognized method to measure and evaluate what is normal weight, overweight, or obesity (Bouchard, 2008, p. 54). The Centers for Disease Control (CDC) did not accumulate figures and statistics on obesity and overweight until 1958 and only 4.8% of adults were obese in 1959 (Fortuna, 2012). Obesity rates changed only slightly during the 1960s and 1970s, but it increased severely over the following years. In July 1976, Marshall Matz, General Counsel for the 1977 McGovern Report, made a statement that echoes current public health messages, “Obesity…is the most serious malnutrition problem in the United States today, greatly increasing the risk of cardiovascular disease and diabetes” (George S. McGovern Papers, Box 616). In 2014, Ng and colleagues, while conducting a systematic analysis for the Global Burden of Disease Study, indicated that efforts to describe the great upturn in obesity in the last 3 decades concentrated on several possible contributors including changes in the composition of food intake that leads to increased calories and reductions in levels of physical activity. One predictor of obesity is the toxic food culture in the United States. In the current food culture there is a prevalence of cheap, convenient beverages and foods high in both fat and calories. While exploring trends in eating patterns between 1970 and the 1990s researchers pointed to several patterns that put
individuals at increased risk of obesity including increased consumption of soft drink, snack foods, and more frequent eating at fast-food and other restaurants (Briefel & Johnson 2004, Eknoyan 2006, Nielsen & Popkin 2004). During that same timeframe, obesity rates increased from 15.0% in the period 1976-1980 (Fryar et al., 2012; Ogden & Carroll, 2010) to 34.7% in 2013-2014 among adults (Ogden et al., 2015). Understanding how the toxic food culture impacts obesity can assist researchers in finding techniques to diminish the threat of health-related problems associated with obesity.

Wang and Beydoun (2007) led a systematic review and meta-analysis intended to provide a comprehensive depiction of the obesity condition, trends, and disparities across different demographic groups. Studies from 1990 through 2006 were examined. The analysis revealed that the prevalence of obesity and overweight increased across different sociodemographic groups in the last 30 years (Wang & Beydoun, 2007). When comparing outcomes from the 2007-2008 National Health and Nutrition Examination Survey (NHANES) to the results from the 2009-2010 survey, researchers estimated that the percentage of overweight adults aged 20 years and over decreased from 34.2% to 33% (Fryar et al., 2012; Ogden & Carroll, 2010). However, the obese percentage increased from 33.8% to 35.7% and the extremely obese adults’ percentage increased from 5.7% to 6.3% (Fryar et al., 2012; Ogden & Carroll, 2010). During these same years, the central strategies to decrease obesity rates fixated on reducing food intake and increasing physical activity. However, Skolnik and Ryan (2014) suggest that “instruction in eating less and exercising more is insufficient to produce and sustain weight-loss” (p. S3).
Incidence. Incidence is the rate of new (or recently diagnosed) cases of a disease (Pan et al., 2011). It is generally reported as the number of new cases occurring within a period of time (e.g., per month, per year). Several factors such as age, physical activity, race, and sex have all been associated with the prevalence of obesity (Flegel et al., 2010). Numerous national studies have provided prevalence data for obesity but few have provided incidence data for obesity. The purpose of the 2009 Behavioral Risk Factor Surveillance System (BRFSS) was to study the incidence of obesity and extreme obesity among U.S. adults (Pan et al., 2011).

Using data from the 2009 BRFSS, incidences of obesity and extreme obesity were studied. The general rough incidences of obesity and extreme obesity in 2009 were 4.9% for incidence of obesity and 0.7% for incidence of extreme obesity per year (Pan et al., 2011). Also discovered was that the incidences of obesity and extreme obesity varied by socio-demographic characteristics (Pan et al., 2011). For example, the incidences of obesity and extreme obesity were highest among adults aged 18 to 29 years, indicating that young adults are more likely to develop a weight problem even though the prevalence of obesity is lowest among this group (CDC, 2010).

Using the same data source, the Centers for Disease Control and Prevention (CDC) conducted a study that indicated that the South and Midwest had higher prevalence of obesity than the Northeast and West (CDC, 2010). Other research studies indicated that the South has a considerably higher incidence of extreme obesity than the Northeast, West, and the territories (Pan et al., 2011; Wang & Beydoun, 2007). As a result, it is suggested that the South may be a geographic region that merits extra obesity prevention efforts (see Appendix A).
Consequences. The increased rate of obesity and obesity-related illnesses among Americans is well documented. The significant mortality and morbidity linked to overweight and obesity has prompted an immense volume of research studies focused on developing safe and effective weight-loss methods (Sam, Troke, Tan, & Bewick, 2012). Being overweight or obese increases the risk of death, attributable frequently to cardiovascular disease (Ng et al., 2014; NIH, 1998; U.S. Department of Health & Human Services, 2001). In 1995, approximately 58 million persons in the United States had one or more categories of cardiovascular disease (CVD) which included high blood pressure, coronary heart disease, and stroke (Centers for Disease Control & Prevention, 1998).

In addition to cardiovascular disease, overweight and obese adults are at an increased risk for other serious health conditions, including cancers, depression, gallstones, high cholesterol, hypertension, kidney disease, osteoarthritis, as well as “type 2” diabetes and its complications (Eknoyan 2006; Finkelstein, Fiebelkorn & Wang 2003, Flegel et al., 2010, Fry, Zimmerman & Kappagoda 2013, Luppino 2010, Trogdon, Finkelstein, Hylands, Dellea, & Kamal-Bahl, 2008). One project that was initiated to decrease the rate of obesity and obesity-related diseases among Americans at risk for diabetes was the Diabetes Prevention Program (DPP) clinical trials. In the 10-year follow-up DPP Outcomes Study (Knowler et al., 2009), the degree of diabetes in high-risk adults was reduced by 58% with intensive lifestyle intervention (ILI) and, when compared to the placebo, the decrease with metformin was 31%. Weight loss was the leading factor in the reduced risk of diabetes (Hamman et al., 2006) together with a nutritious diet and exercise (U.S. Department of Health & Human Services, 2001). Knowler et al., (2009) indicated although a long-term drop in bodyweight and diabetes
was positive, additional quantification of long-term results would be fundamental in confirming the advantages of diabetes prevention.

Excess weight causes health problems in various ways. According to Skolnik and Ryan (2014), “The rising prevalence of obesity has generated extensive investigation into the consequences of, and the disease associated with obesity” (p. S3). Due to the increased possibility of developing illnesses such as diabetes and heart disease, treating obesity and obesity-related conditions causes an economic burden as well.

**Economic costs.** The health care costs that result from treating obesity-related illnesses are substantial. Due to these increased health care expenses, there is an emerging body of literature on the adverse economic and fiscal consequences associated with obesity (Brill, 2013, Finkelstein et al., 2003; Finkelstein et al., 2009, Finkelstein, Fiebelkorn & Wang, 2005, Trogdon, Finkelstein, Hylands, Dellea, & Kamal-Bahl, 2008). Health care expenditures due to obesity are estimated to be as high as $210 billion each year, or 21% of total national health care spending (Cawley & Meyerhoefer, 2012). In comparison, a study conducted by Eric Finkelstein et al. (2003) revealed that the costs of overweight and obesity in 1998 could have been as high as $78.5 billion and approximately half of that total was financed by Medicare and Medicaid. By 2030, U.S. health care expenses for obesity are anticipated to increase by $48 billion to $66 billion (Trust for America’s Health, 2012). Obese individuals had per capita medical costs that were 42% above spending for normal weight individuals in 2006 (Finkelstein et al., 2009). Finkelstein et al. (2009) maintain that the expenses ascribed to obesity are practically an outcome of expenses produced due to treating the illnesses that obesity stimulates. Roehrig, Miller, Lake, and Bryant (2009) conducted a study that provided
annual estimates of national personal health spending by medical condition. These
researchers found that annual medical costs for people with diabetes totaled $190.5
billion, which is a sizable amount, compared to the $27.9 billion spent on treatment of
diabetes (p. w365). This is just an example of how direct and indirect costs for obesity
related conditions such as diabetes impact the United States economy.

There are both direct medical expenses and indirect non-medical costs resulting
from increasing obesity rates. Direct medical expenses include Medicare, Medicaid,
private health insurance, medical or surgical interventions, and disease management
(Finkelstein et al., 2003, Finkelstein et al., 2005; Finkelstein et al., 2009). In the
Finkelstein et al. study conducted in 2003, it is suggested that the per capita rise in
obesity-attributable expenditures are highest for Medicare recipients, presumably because
the aging obese are anticipated to endure high services associated with obesity than
nonelderly obese (p. w3-224). Indirect medical costs include individual costs for food
and clothing expenses, declines in productivity through increases in work days missed
due to sickness or injury or through lower output on the job, and higher life insurance
premiums (Finkelstein et al., 2009). For example, in a quantitative meta-analysis
conducted by Trogdon et al. (2008), the researchers suggest that obesity may lead to a
drop in productivity due to increases in workdays lost due to health-related conditions or
injury.

Treating obesity and obesity-related illnesses costs billions of dollars a year. The
enormity of this economic problem and the great toll that obesity takes on health continue
to raise concerns on how to stop the rise in obesity (U.S. Department of Health and
Human Services, 2001). Obesity and overweight individuals who lose weight and are
able to maintain a healthy weight may reduce their risk of developing medical conditions like diabetes, thus decreasing the costs associated with obesity and overweight (Ackermann, Finch, Brizendine, Zhou, & Marrero, 2008; Brill, 2013; Finkelstein et al., 2009).

Obesity and overweight represent a rapidly growing danger to the health of the United States populace. Because obesity is linked to numerous adverse health conditions including cardiovascular disease and “type 2” diabetes, there is a need to assist individuals in not only losing weight, but maintaining a healthier body weight as well. Health methodologies to decrease obesity mainly consist of supporting individual weight-loss dieting (Bombak, 2014), not WLM. Efforts such as decreasing obesity through behavior interventions have had limited success (Wing, 2003). Therefore, discovering innovative methodologies for achieving and maintaining weight loss is essential (Williams, Earle-Richardson, Freeth, Scribani, & Monie, 2016).

Problem Statement

Weight loss is difficult to accomplish and maintaining the weight loss is an even greater challenge. Recent data and related information is strong that the prevalence of overweight and obesity is great and that obesity is growing fast. Currently the typical pattern of weight loss in individuals undertaking a lifestyle intervention is that maximum weight loss is attained at 6 months, followed by plateau and gradual regain over time (Jensen et al., 2014). Though various strategies have proven beneficial for prompting weight loss such as combining a low-calorie diet with physical activity and behavior therapy (National Institute of Health, 1998), the proportion of weight regain associated with WLM remains high (Jensen, et al., 2014; Lowe, Miller-Kovach & Phelan, 2001).
Weight-loss interventions and programs provide strategies for short-term weight loss; however, the evidence is rare that interventions and programs include WLM strategies, which differ from those used to achieve weight loss (Reyes et al., 2012). Additionally, studies investigating successful long-term weight-loss strategies (Svetkey et al., 2008; Wing & Phelan, 2005; Wing et al., 2006) have not always acquired the specifics involving WLM that can only be communicated by individuals who are actively involved in such struggles (Barnes et al., 2007; Reyes et al., 2012).

The perception of those individuals who struggle to maintain their weight loss is that long-term reduction in body weight is challenging to manage. Researchers have been studying long-term WLM since Stunkard and McLaren-Hume’s research in 1959. Their study followed 100 obese individuals referred to a nutritional weight-loss program. The findings revealed that 2 years after treatment, only 2% maintained a weight loss of at least 20 pounds (McGuire, Wing, & Hill, 1999). This first study on weight-loss maintenance established that most individuals do not succeed in long-term weight-loss maintenance.

Weight regain after weight loss remains a significant problem as well. The problem is two-fold. From a social health perspective, current research indicates that those who complete weight-loss programs lose about 10% of their body weight, only to then have some weight regain, gaining two-thirds of their weight back in 1 year and nearly all of it back within 3 to 5 years (Lowe, Miller-Kovach, & Phelan, 2001; Metzgar, Preston, Miller & Nikols-Richardson, 2014; Wadden & Stunkard, 2002). Conversely, if individuals are able to maintain weight loss for 2 years, they can decrease their risk of regain by 50% (Wing & Phelan, 2005; Wing & Hill, 2001).
From a research perspective, the evidence for the effectiveness of predictors and strategies designed to support weight maintenance following weight-loss intervention is limited (Hindle & Carpenter, 2011). A conclusion from the Clinical Guidelines for the Identification, Evaluation, and Treatment of Overweight and Obesity in Adults (National Institute of Health, 1998) was that interventions combining modifications in dietary intake and eating behaviors, physical activity, self-monitoring, and social support were most effective for weight loss. However, predictors that are effective in generating weight loss are not necessarily effective in generating long-term WLM.

The approaches for weight maintenance after successful loss differ from the approaches for attaining weight loss. Facts and correlated data concerning these approaches are vague on one very significant question: What are the most effective prevention and management strategies for not only losing weight, but also maintaining the weight loss? In both The Surgeon General’s Call to Action to Prevent and Decrease Overweight and Obesity (2001) and The Surgeon General’s Vision for a Healthy and Fit Nation (U.S. Department of Health & Human Services 2010), the research and evaluation emphasis is on exploring methodologies related to prevention and behavior interventions for overweight and obesity. However, there are no action steps that concentrate on increasing research and evaluation on best practices to maintain long-term weight loss once it is achieved.

The problem statement centers around the fact that there is an epidemic of obesity and numerous individuals who successfully lose weight are unable to maintain the weight loss. Understanding more about WLM can inform interventions and supports to support
individuals in maintaining a healthier weight. Therefore, the purpose of this proposed study is to identify predictors of successful WLM.

**Theoretical Rationale**

The theoretical rationale for the proposed study is based upon Deci and Ryan’s self-determination theory (SDT). Self-determination theory is used as a framework for clinical interventions and randomized clinical trials (Ryan, Patrick, Deci, & Williams, 2008). SDT suggests the existence of three fundamental psychological needs, which are: autonomy, competence, and relatedness. The health belief model (HBM) is a commonly used framework that endeavors to predict health-related behavior in terms of certain belief patterns. It is the most commonly used theory in health education and health promotion (Hayden, 2014). Health behavior change models are key when endeavoring to understand long-term WLM from a theoretical perspective. SDT, in contrast, emphasizes the processes through which an individual acquires the motivation for initiating new health-related behaviors and maintains them over time (Ryan et al., 2008) from a psychological needs perspective.

Maintaining weight loss is a key challenge in obesity treatment. One reason for this view is that current weight-loss programs generally disregard the important component of maintenance (Patrick, Gorin, & Williams, 2010). By investigating the experiences of successful long-term weight-loss maintainers, predictors of long-term WLM could emerge. For example, addressing how motivation is currently viewed by WLM programs or why some individuals are motivated and some are not are areas of investigation from the viewpoint of self-determination theory (SDT). Therefore, pinpointing predictors of long-term weight control in relation to motivation is especially
critical. Another reason that WLM is a different problem from initial weight loss involves modifying lifelong habits associated with being overweight or obese. A good deal of confidence that an individual can, in fact, alter their lifestyle and maintain it is required before successful intervention is possible.

Williams et al. (1996) acknowledged the HBM as the motivational approach most frequently applied in health care settings. These researchers reviewed HBM but stated their preference for the self-determination theory (SDT). They suggest that lasting behavior change necessary for maintenance depends not on complying with demands for change but rather on accepting personal ownership (autonomy) of the regulation for change. SDT requires internalizing values and regulating relevant behaviors, integrating them with a sense of self so they can become the basis for autonomous regulation.

Self-determination theory is a general theory of human motivation that addresses the importance of motivation in behavior change and its maintenance (Deci & Ryan, 2002). The theory was co-developed by psychology professors Edward L. Deci and Richard M. Ryan at the University of Rochester. According to Ryan et al. (2008), SDT is about maintenance of behaviors over a period of time, which entails individuals internalizing values and skills for change, and experiencing self-determination. SDT hypothesizes the existence of three fundamental psychological needs as the basis for motivation: autonomy, competence and relatedness (Ryan et al., 2008).

**Autonomy.** Acquiring a sense of autonomy within SDT refers to the need to be the initiator of one’s actions. Autonomy is defined by Deci and Ryan (2002) as a sense of choice and the perception that the individual is the source of their actions, as opposed to feeling forced or coerced into doing something. The more the individual recognizes
their sense of choice along with the reasons for changing, the more autonomous and therefore the more likely they are to succeed in the behavior modification (Ryan, Lynch, Vansteenkiste, & Deci, 2011). The ethical backdrop for autonomy is based on Kant’s formulation of the “categorical imperative”–treating others as ends in themselves, rather than means to an end. In the tradition of Kant, autonomy is also referred to as self-rule which encompasses the aptitude to reason, resolve, and act on thoughts and choices freely (Gillon, 1985).

Competence. Along with a sense of autonomy, internalization requires that an individual experience the competence to change. Competence concerns the feeling of effectiveness in meeting challenges, and the ability of an individual to use their skills, as well as learn new ones and grow (Deci & Ryan, 2002). Competency support involves an individual experiencing the confidence and competence to modify their behavior. When an individual is afforded the skills and tools for change and is supported is when competence emerges. Once an individual is volitionally engaged and has a high degree of willingness to act, they are then most apt to learn and apply new strategies and competencies (Ryan et al., 2008; Ryan et al., 2011). The self-determination theory proposes that competence must be accompanied by autonomy. Competence on its own is not enough to guarantee adherence.

Relatedness. Finally, SDT defines relatedness as a sense of belonging, a feeling of connection to others without having to change self (Deci & Ryan, 2002, p. 235). SDT considers relational support as crucial both as a process and as a direct effect on well-being. As a process, there is a sense of being cared for and understood, which is needed to form the experiences of connection and trust that allow internalization to happen (Ryan
et al., 2011). As a direct effect on well-being, being cared for and understood must also be perceived to be authentic in order to have relational support (Ryan et al., 2011). Relatedness concerns the need to feel close to and understood by important others. When the needs of autonomy, competence, and relatedness are met, individuals evidence optimal motivation and improved physical and psychological outcomes (Patrick et al., 2010).

Conceivably when individuals completely endorse weight loss related behavioral goals and feel not just knowledgeable but also autonomous about accomplishing those goals, their determinations could result in lifelong WLM. According to the self-determination theory (SDT) perspective, long-term behavior change would be contingent upon accepting the change as one’s own in place of obeying external demands such as following a nutritional guideline provided by an external professional such as a doctor. Addressing how motivation is currently viewed by weight-loss programs or why some individuals are motivated and some are not, mostly after attaining weight loss and entering maintenance, could be areas of investigation from the viewpoint of self-determination theory.

Little research has been undertaken to connect SDT to WLM outside of a medically-supervised setting. There are however a limited number of studies that have tested SDT motivation variables as predictors of results from a weight loss and WLM perspective. Williams and colleagues led one such quantitative study that focused on applying SDT to weight loss in 1996. Williams et al. (1996) studied patients noted as “severely obese” who joined a 26-week, medically supervised, low-calorie weight-loss program. There was also a 23-month follow-up period. Participants received weekly
group counseling to provide peer support and promote self-monitoring. Self-determination theory related motivation was evaluated directly after the intervention and analyzed as predictors of physical activity and weight loss. The findings suggested that those who were more autonomously motivated for weight-loss treatment were more likely to show up for treatment sessions and evidenced greater weight loss during the treatment program (Williams et al., 1996). Furthermore, autonomous motivation for treatment was also related to greater WLM 2 years post-intervention.

Mutually, HBM and SDT focus on the mental precursors of motivation such as attitudes, beliefs, and knowledge. Both include general health motivation where an individual’s readiness to be concerned about healthiness matters, and perceived control which is whether the individual believes they can do anything about it. The health belief model is biased toward explaining the success of information-giving and measuring its impact through knowledge and attitude surveys. It does not offer much understanding of long-term maintenance of behavior change. While research has shown that HBM is effective, there are some weaknesses. One shortcoming is that the model does not take into account how emotions such as anxiety or fear affect rational thought and decision-making (Rosenstock, Stretcher, & Becker, 1988).

HBM attempts to answer why some individuals fail to take preventive actions that might keep them healthy. The key idea of HBM is related to the perceived threat to personal health. SDT hypothesizes that fulfillment of autonomous motivation, coping competence, and social support contributes to how well an individual handles common demands in life and how independent they are compared to others.
Statement of Purpose

The current research and national health recommendations stress the need for research on strategies for maintaining weight loss. Specifically, there is an interest in answering questions as to why some individuals are successful weight-loss maintainers while others regain weight. There is also great attention being paid to understanding what motivates an individual to adhere to WLM (Teixeria et al., 2010). Another approach is to determine what behaviors are predictors of long-term success or to study those who have succeeded in maintaining weight loss and use the predictors to select the best interventions for individuals (MacLean et al., 2015). The purpose of this study was to better understand WLM and identify the predictors of successful WLM among adult long-term weight-loss maintainers (LTWLM) who have intentionally lost at least 10% of their maximum body weight and kept it off for at least 1 year. This was accomplished through a mixed methods analysis of a community organization that offers prevention and wellness resources to families and individuals in Rochester, New York. WLM efforts may involve different approaches than weight-loss efforts, specifically behavioral and motivational enhancement methods.

Research Questions

The National Institutes of Health recognizes the struggle of sustaining long-term weight loss, and further proposes that weight-loss programs be followed by an extended weight maintenance program (NIH, 1998). The 2013 American Heart Association/American College of Cardiology/The Obesity Society guidelines maintain that there are two broad objectives for weight management: (a) lessening the threat of
obesity-related comorbidities by decreasing body weight, and (b) decreasing and maintaining body weight over the long-term (Jensen et al., 2014)

The mixed methods research questions (RQs) for the study include:

RQ1. What predictors motivate individuals who are long-term weight-loss maintainers?

RQ2. What predictors do long-term weight-loss maintainers use to maintain their weight loss? How are the predictors different from those used to lose the initial weight?

**Potential Significance of the Study**

Most weight-loss studies evaluate and measure short-term weight loss, not longer-term WLM. Losing weight and maintaining weight loss involve two diverse methodologies. Losing weight is time limited while maintaining weight loss is forever. Successful weight-loss maintainers are a significant collection of individuals from which valuable evidence can be collected. Their characteristics and strategies for WLM can provide a foundation for the development of successful WLM interventions. The field of inquiry within WLM is a research area that could significantly influence the health of the U.S. population. To date, it remains generally unknown how effective WLM interventions are in “real world” situations such as community settings.

The search for strategies to improve long-term weight maintenance has been a pressing challenge for obesity researchers (West, et al., 2011). According to Wing and Hill (2001), enough data could not be found to provide dependable information on predictors of weight loss for longer than a one-year period. Few population-based studies have investigated the behavioral and motivational predictors of long-term WLM (Phelan, Wing, Loria, Kim, & Lewis, 2010). It remains clear that the great majority of individuals
who are overweight or obese are not able to keep their weight loss off for the long-term. In 2015, Teixeria and colleagues led a systematic review of the consistent self-regulation facilitators of weight control, nutritional consumption, and physical activity in medical and community behavior modification settings involving overweight and obese adults. Relative to the research conducted by Wing and Hill (2001), the researchers reviewed data presenting only slight if any weight loss realized in behavior management programs. The data also indicated that the weight loss is not maintained over the long term. Furthermore, their review specified that there is a need for research that pinpoints predictors of long-term weight control, including successful weight-loss maintenance (Teixeira et al., 2015). Outcomes from this study disclosed significant knowledge that could be important to the establishment of successful weight maintenance interventions. Some effective tools and approaches were found that offer insight into providing successful WLM. In addition, findings from this study confirm that the methods and practices for WLM are different from those of weight loss.

**Definitions of Terms**

*Amotivation*—the state of lacking intention to act; the absence of motivation and thus is not self-determined. Amotivated individuals do not behave in a purposeful manner. (Levesque et al., 2007; Ng et al., 2012). Example: “I can’t understand why I ought to work out.”

*Autonomy*—a sense of choice and the perception that the individual is the source of their actions, as opposed to feeling forced or coerced into doing something. (Deci & Ryan, 2002; Ng et al., 2012). Example: “I feel free to work out in my own way.”
Body image—the opinion an individual can have in regards to their physical frame and look and the emotional reaction to their opinion (NIH, 1998).

Body Mass Index (BMI)—the weight of an individual in pounds is multiplied by 703, then the results are divided by height in inches, and that result is then divided by height in inches a second time. A high BMI can be an indicator of high body fatness (World Health Organization, 2000).

Comorbidity—Two or more coexisting medical conditions or disease processes that are additional to an initial diagnosis (Mosby’s Medical Dictionary, 2009)

Competence—a feeling of being effective in producing desired outcomes and exercising one’s capacities (Deci & Ryan, 2002; Ng et al., 2012). Example: “I feel capable and can overcome challenges when I work out.”

Controlled motivation—being pressured by some interpersonal or inner psyche force (Deci & Ryan, 2002).

External locus of control—the belief that events or outcomes are controlled by outside forces to the self (Neymotin & Nemzer, 2014).

External regulation—motivation to comply with external pressures or rewards; a type of controlled regulation (Levesque et al., 2007; Ng et al., 2012). Example: “I work out since my doctor states I must.”

Identified regulation - a more self-determined form of extrinsic motivation that happens when an individual has identified with the personal importance of a behavior and thus accepts its regulation as his or her own (Ryan & Deci, 2000, p. 62).
Integrated regulation—the most autonomous form of extrinsic motivation, which involves internalizing the reasons for an action and aligning the action with needs and values (Ryan & Deci, 2000).

Internal locus of control—the belief that an individual’s behavior or individual characteristics control specific events or outcomes (Neymotin & Nemzer, 2014).

Intrinsic motivation—doing an activity for its inherent satisfaction rather than for some separate consequence (Santos, Silva, & Teixeira, 2016). Example: “I challenge myself and I really enjoy the process.”

Introjected regulation—when there is a focus on approval from others or self; expecting internal rewards in order to decrease internal feelings of guilt or shame (Vansteenkiste et al., 2009).

Locus of control—an individual’s belief in the extent of control one has concerning specific events in their life (Neymotin & Nemzer, 2014).

Long-term weight-loss maintenance (LTWLM)—intentionally losing at least 10% of maximum body weight and keeping it off for at least one year (Kraschnewski et al., 2010; Wing & Hill, 2001; Wing & Phelan, 2005).

Obesity—a condition of abnormal or excessive fat accumulation in adipose tissue, to the extent that health may be impaired (World Health Organization, 2000).

Overweight—increased body weight in relation to height, when related to some standard of acceptable or desirable weight (World Health Organization, 2000).

Regain—weight loss of 10% of total body weight, but the individual is unable to maintain the new weight for a 12-month period and consequently regains the weight (McKee, Ntoumanis, & Smith, 2013; Wing & Hill, 2001).
Relatedness—a sense of being respected, understood, and cared for by others (Deci & Ryan, 2002; Ng et al., 2012). Example: “I feel close to my workout buddies.”

Self-control—the capacity to abstain from acting on undesired behavioral propensities (Lazzeretti, Rotella, Pala, & Rotella, 2015).

Self-determination—a theory of motivation which hypothesizes that individuals actively and continually seek challenges and new experiences to develop and master. When a behavior is self-determined, the individual determines that the locus of control is internal to the self, whereas when the behavior is controlled, the locus of control is external to the self (Deci & Ryan, 2002).

Self-efficacy—a person’s belief about his or her ability and capacity to accomplish a task or to deal with the challenges of life (Bandura, 1977).

Weight regainer—an individual meeting the same criteria as those who have long-term weight-loss maintenance except they regained weight to within 7 pounds of their original body weight in 1 year (Byrne, Cooper, & Fairburn, 2003).

Chapter Summary

Obesity has become a serious epidemic in America. Increases in prevalence happened about 30 years ago. If this movement cannot be reversed or stopped, common health consequences of high levels of obesity will lead to increases in the prevalence of chronic sicknesses such as cardiovascular diseases and “type 2” diabetes. From an economic perspective, obesity accounts for over 20% ($200 billion) of annual direct U.S. health-care costs (Finkelstein et al., 2009). If the current movement of growth in obesity continues, aggregate health care expenditures attributable to obesity could reach $861 to $957 billion by 2030 (Go et al., 2013).
To navigate from weight loss to WLM requires long-term management. In the WLM period of weight loss, there is data that successful weight-loss maintainers cultivate new approaches and behaviors that keep them in a state of continuous attentiveness (Wing & Phelan, 2005). The definition of successful long-term WLM is intentionally losing at least 10% of maximum body weight and keeping it off for at least 1 year (Kraschnewski et al., 2010; Wing & Hill, 2001; Wing & Phelan, 2005). There are studies that suggest there is an assortment of behavioral and psychological predictors associated with successful WLM (Reyes et al., 2012; Wing & Hill, 2001). However, long-term maintenance of weight loss is frequently an elusive goal. Approximately one-third of weight loss is regained within 1 year, and the rest is usually regained within 3 to 5 years (Lowe, Miller-Kovach, & Phelan, 2001; Metzgar et al., 2014; Wadden & Stunkard, 2002). One possible reason for the low rates of WLM may be that practices that lead to weight loss differ from the practices that support WLM (Sciamanna et al., 2011).

Since WLM success is widely seen to be an unachievable goal for many individuals, it is important to understand the predictors related to successful WLM. This study sought to identify long-term weight-loss strategies that have been employed by U.S. adults. This research has its foundation in the self-determination theoretical framework. This theory addresses how motivation is viewed by weight loss interventions and why some individuals are motivated and some are not, once achieving weight loss and entering maintenance.

By determining what behaviors are predictors of long-term success, the problem of weight regain after weight loss could be reduced. The absence of success suggests that
there is a need for a better understanding of the behavioral and motivating predictors that are at the core of successful adherence to WLM goals. Chapter 2 will examine the empirical literature investigating weight-loss treatment strategies, possible moderators for obesity treatment, the dilemma of weight regain, and the gap in understanding successful weight-loss maintenance strategies. The content of Chapter 3 details the methodological approach of the study design describing the research context, research participants, methods, data collection, and data analysis. The research procedures and analyses of both the quantitative and qualitative data are explained in detail in Chapter 4. The study concludes with a discussion of the findings, implications, and recommendations for long-term weight-loss maintenance in Chapter 5.
Chapter 2: Review of the Literature

Introduction and Purpose

Long-term weight-loss maintenance after weight loss is difficult and a high level of failure is commonly associated with this challenge. The current research and national health recommendations stress the need for research on strategies for maintaining long-term weight loss. The review of literature first pinpoints predictors of weight loss by investigating several treatment strategies that facilitate weight loss and make enduring changes to individuals’ lifestyles. The second section of the literature review analyzes possible moderators of obesity treatment effectiveness. The third section reviews the dilemma of regain. The fourth section of the literature review summarizes the gaps in the literature around WLM and the limitations weight-loss programs have because of their lack of maintenance elements within their programming design. Research recommendations stemming from this literature review were addressed in the chapter summary.

Background

Obesity has become an acute public health problem, with both short- and long-term physical and psychological consequences. The United States has witnessed a dramatic increase in the prevalence and incidence of obesity and the data generated is evidence of the crisis (Ogden et al., 2006; U.S. Department of Health & Human Services, 2001). The dangers of obesity and the advantages of weight management can be found in
headlines from nationwide newscasts to professional journals. Weight loss is difficult to accomplish and maintaining the weight loss is an even greater challenge.

Numerous Americans fight obesity using many approaches from calculating calories to cutting sugar. Tools that are effective in generating weight loss, however, are not effective in generating long-term WLM. From vegetarian regimens to gluten-free diets, there actually is no agreement on what truly works long term. Research investigating successful long-term weight-loss strategies (Svetkey et al., 2008; Wing & Phelan, 2005; Wing et al., 2006) has not always acquired the details involving WLM that can only be communicated by people who are actively involved in such struggles (Barnes et al., 2007; Reyes et al., 2012). Study data is vague on two very significant questions: what are the most effective prevention and management strategies for not only losing weight, but maintaining the weight loss, and why are some individuals’ successful weight-loss maintainers while others regain weight? Acknowledging this problem, numerous foundations, institutions, governmental agencies, for-profit and not-for-profit groups have examined the state of the science and are currently striving to develop outcomes that may be practiced to advance the success of WLM. Understanding more about WLM can inform interventions and supports to help individuals maintain their healthier weight. Therefore, the research for this study was planned to better understand the effective strategies needed to improve WLM. The following research questions sought to provide empirical evidence to diminish the research gap:

RQ1. What predictors motivate individuals who are long-term weight-loss maintainers?
RQ2. What predictors do long-term weight-loss maintainers use to maintain their weight loss? How are the predictors different from those used to lose the initial weight?

Many Americans struggle to lose weight and are looking for guidance on appropriate weight-loss strategies. In the face of various hurdles to losing weight and keeping it off, research suggests that only about 20-30% of overweight and obese adults who endeavor to lose weight are successful in maintaining a weight loss of 10% of maximum body weight over a period of one year (Metzgar et al., 2014; Wing & Phelan, 2005).

In a more current study of a select group from the National Weight Control Registry (NWCR) 88% with at least a 10% weight loss were estimated to have maintained their weight loss at Year 5 and 87% at Year 10 (Thomas, Bond, Phelan, Hill, & Wing, 2014). The drawback with data from NWCR is that the research is conducted with self-identified successful weight-loss maintainers who self-report their weight and maintenance approaches. Essentially, the evidence for the efficacy of strategies intended to support weight maintenance after weight loss interventions is limited (Hindle & Carpenter, 2011). Therefore, the purpose of reviewing 300 peer-reviewed articles and meta-analyses was to conduct a systematic review of weight maintenance strategies that could contribute to an understanding of the interventions that could lead to a model to be further considered. All of the peer-reviewed articles included were published since 2000, emphasizing the increasing attention to the topic of WLM in the past 16 years.

A definition of what constitutes weight-loss maintenance should first be considered when endeavoring to evaluate the empirical literature reviewed. The definition overwhelmingly used in peer-reviewed journals for successful long-term WLM
(LTWLM) is intentionally losing at least 10% of maximum body weight and keeping it off for at least 1 year (Kraschnewski et al., 2010; Wing & Hill, 2001; Wing & Phelan, 2005). The term “intentionally” is stressed in the definition because recent studies indicated that unintentional weight loss occurs quite frequently and may have different causes and consequences than intentional weight loss (Wing & Phelan, 2005).

**Weight Management Methods**

A reliable identification of predictors of weight loss could lead to more efficient WLM treatments. The first segment of this literature review analyzes predictors of weight management by examining several treatment approaches that facilitate weight loss and WLM. Current behavioral and lifestyle approaches usually include changing dietary intake and eating behaviors, changing physical activity, problem solving, self-monitoring, setting goals, and social support. Behavior modifications are the center of managing weight loss, but frequently the outcomes of attaining the targeted weight loss and recovery from related diseases do not manifest (Kushner, 2015). Therefore another approach to weight loss which involves controlling food intake is drug therapy. The failure of conventional interventions such as behavior modification and drug therapy has generated increasing interest in an alternative method: surgical treatments. According to Snow, Barry, Fitterman, Qaseem, and Weiss (2005), surgery should be considered as a weight loss possibility for individuals with a BMI of 40 kg/m² or greater who started but were unsuccessful with a behavioral intervention and drug therapy and report obesity-related illnesses such as diabetes and hypertension. Finally, this segment of the literature review examined the effectiveness of commercial weight-loss options that concentrate on dietary intake and integrate behavioral advice or social support elements.
Behavioral and Lifestyle Weight-loss strategies

As the prevalence of obesity in the United States becomes more rampant, the need for effective approaches to improve the maintenance of weight loss is becoming ever more apparent. The long-term effects of behavioral treatments in early weight loss are intended mainly to encourage modifications in dietary intake and physical activity. The evidence for the effectiveness of strategies designed to support weight maintenance following weight loss intervention is limited (Hindle & Carpenter, 2011). Poor maintenance of weight loss seems to result from a multifaceted interaction between behavioral and psychosocial predictors. Improving the long-term effects of behavioral treatment includes discovering methods to support individuals in sustaining significant modifications in the behaviors that regulate weight loss. This literature review evaluated six behavioral treatments related to WLM: changing dietary intake and eating behaviors, changing physical activity, problem solving, self-monitoring, setting goals, and social support.

Changing dietary intake and eating behaviors. Weight loss is associated with lower caloric eating and reduced portion sizes. However, the ideal recommendation for WLM is vague. Pinto et al. (2008) examined WLM among individuals who were initially successful at losing weight for 18 months. Participants were 186 adults enrolled in the STOP Regain randomized controlled trial who, through either a commercial program, very low-calorie diet, or self-guided method, lost at least 10% of their weight in the past 2 years (Pinto et al., 2008). Eating behavior was assessed using the Eating Inventory, a 51-
item self-report scale comprised of three elements: cognitive restraint, disinhibition, and hunger. Individuals who had used a very low calorie diet regained significantly more weight than the other two groups. The large initial weight losses reached by individuals who had used a very low-calorie diet were not maintained over time (Pinto et al., 2008).

In a 12-month randomized-controlled trial testing mediators of weight loss and WLM, Teixeira et al. (2010) targeted interventions that involved implementing a diet consistent with a moderate energy deficit during a 1-year weight-loss behavior modification intervention and eventually forming eating patterns that would maintain weight loss during the 1-year follow-up period with no intervention. The main objectives of the intervention included forming eating patterns that would support WLM (Teixeira et al., 2010). Using the Eating Inventory (also known as the Three-Factor Eating Questionnaire or TFEQ), as well as the Dutch Eating Behavior Questionnaire which measures external and emotional eating, outcomes indicated that middle-aged women who lowered their emotional eating and assumed a flexible dietary restraint pattern were able to sustain their weight loss. Both Pinto et al. (2008) and Teixeira et al. (2010) concentrated on dietary intake and eating patterns; however, Pinto used a specific very low-calorie diet and found that individuals regained while Teixeira found that assuming a flexible dietary restraint pattern could lead to sustainable weight loss.

Using a target population of National Weight Control Registry members, Ogden et al. (2012) and Thomas et al. (2014) examined dietary intake and eating patterns. In 1993, researchers at the University of Pittsburgh and the University of Colorado Health Sciences Center founded the National Weight Control Registry (NWCR) to gather data on men and women who had been successful at maintaining a substantial weight loss.
NWCR, with over 10,000 members, is the leading databank of individuals successful at long-term WLM (Wing & Phelan, 2005). To be qualified to join NWCR, individuals must have maintained a weight loss of $\geq 13.6$ kg ( $\geq 30$ lbs.) for $\geq 1$ year (Metzgar et al., 2014).

Ogden et al. (2012) used a cluster analysis to categorize clusters of individuals within the NWCR that had distinctive approaches and experiences with respect to weight loss and WLM. This was the first study to use cluster analysis to categorize subgroups of individuals successful at WLM. It was probable for different subgroups to use different strategies for successful WLM, though some might also struggle considerably more than other subgroups (Ogden et al., 2012). The identification of distinctive subgroups was a first step in better understanding how to provide tailored strategies to serve weight-loss maintainers. The study revealed four clusters of NWCR participants. The first cluster was described as a healthy group (Ogden et al., 2012). Cluster 2 struggled the most with their weight and had poorer general health compared to other NWCR participants. Cluster 3 was defined as the healthiest cluster and was more likely to report losing weight on their own. Finally, Cluster 4 was the oldest group and second only to Cluster 2 with the least healthy participants (Ogden et al., 2012).

In Ogden’s study (2012), the researchers used the Block Food Frequency Questionnaire which provided estimates of daily energy intake and percentage of energy intake from fat. The results revealed that there is some evidence that Cluster 4 may be controlling their weight by eating less, perhaps by feeling less hunger or having a lower desire to eat (Ogden et al., 2012). They reported the lowest average caloric intake and ate fewer meals per day and were more likely to report that they could eat what they wanted
and still maintain their weight. Using cluster analysis to classify subgroups of individuals successful at WLM, suggests that WLM strategies are not alike in all cases (Ogden et al., 2012).

In the second study using a target population of National Weight Control Registry members, Thomas et al. (2014) also used the Block Food Frequency Questionnaire but added the TFEQ similar to the research conducted by Pinto et al. (2008) and Teixeira et al. (2010). Thomas et al. (2014) studied the course of weight loss of individuals over a 10-year period and evaluated the effect of the behavior modification. The individuals in this study, like those in Ogden’s (2012) research, reported low calorie and fat intake, high levels of dietary restraint and low levels of disinhibition related to eating. Those participants who reported large decreases in dietary restraint and increases in their level of disinhibition experienced the greatest weight regains. Therefore, maintaining low levels of dietary fat could be associated with better WLM.

One qualitative study purposed to explore dietary intake and eating patterns. A study conducted by Metzgar et al. (2014) explored facilitators and barriers to weight loss and WLM in women who participated in an 18-week comparative trial. Focus groups were conducted to promote dialogue between participants that encouraged sharing of experiences and views related to weight loss and WLM. One of the nine themes identified through data analysis was eating patterns and snacking (Metzgar et al., 2014).

Participants perceived healthy snacks to be an essential element of nutritional approaches to weight management. A majority of the women disclosed that they did not continue applying nutrition principles learned during WLM because they no longer had the group support system that was available during the 18-week comparative trial.
(Metzgar et al., 2014). The women conveyed that weekly meetings assisted them with having a greater sense of awareness of nutritional value of foods and an understanding of the relationship between dietary intake and body weight changes. During focus group discussions, women described an overall improvement in eating patterns due to selecting nutritious snacks, eating breakfast regularly and portion control (Metzgar et al., 2014).

Based on the analysis of these research articles as they relate to dietary intake and eating patterns WLM was associated with less dietary fat, lower total caloric intake, reduced frequency of snacking, and reduced portion sizes. The significance of high quality foods such as fruits and vegetables and healthy eating was also noted. Modifications involving eating breakfast on a regular basis have also been described more often among weight-loss maintainers (Metzgar et al., 2014; Wing & Phelan, 2005). The contrary eating pattern, an increase in disinhibition and decrease in eating restraint have accordingly been found for those regaining their body weight (Ogden et al., 2012; Wing & Hill, 2001). On the issue of control over eating behaviors, it has additionally been suggested that more flexible control over eating behavior is associated with weight maintenance rather than rigid control (Teixeira et al., 2010).

**Changing physical activity.** Physical activity appears to play an important role in behavioral weight maintenance strategies. Regular involvement in physical activity has been associated with long-term WLM and has been identified as a common strategy of NWCR participants (Sciamanna et al., 2011; Wing & Hill, 2001). Four studies targeting NWCR members examined the relationship between physical activity and WLM (Butryn, Phelan, Hill, & Wing, 2007; LaRose, Leahey, Hill, & Wing, 2013; Ogden et al., 2012; Thomas et al., 2014). National Weight Control Registry participants are
defined by their high levels of physical activity (Butryn et al., 2007). Usually, they exercise about 1 hour per week, typically by engaging in walking.

When Ogden et al. (2012) conducted their quantitative research using cluster analysis; there were only 5,000 NWCR members. In the study physical activity was assessed using the Paffenbarger Physical Activity Questionnaire, a tool used to evaluate weekly planned and lifestyle activity. Of the members of Cluster 1, 94.5% ranked following an exercise routine as very important and reported the highest weekly physical activity at entry into the NWCR. Although Cluster 2 (“struggling”) rated the significance of following an exercise routine almost as highly as Cluster 1, their estimated amount of physical activity was lower. The main predictor that distinguished Cluster 4 is the low level of physical activity reported (Ogden et al., 2012). The importance of following an exercise routine as a weight-loss maintainer was ranked particularly low by this cluster of individuals. In contrast with all other clusters, individuals in Cluster 4 seldom used physical activity, relying instead in eating fewer meals (Ogden et al., 2012). As discussed earlier, the strategy used most frequently by Cluster 4 was consuming fewer meals per day. These results, along with the dietary intake and eating patterns strategy, suggest that identifying distinct subgroups of weight-loss maintainers may provide the ability to tailor strategies to help with WLM.

The goal of the study conducted by LaRose et al. (2013) was to compare weight losers based on age. Young adult weight losers were considered to be 18-35 years of age. Older adult weight losers were considered to be 36-50 years of age. As in the Ogden et al. (2012) study, physical activity was evaluated using the Paffenbarger Physical Activity Questionnaire. Both young adult and older adult weight losers reported very high levels
of physical activity when admitted into the NWCR but young adults reported significantly higher levels of high intensity activity. Physical activity can help to maintain energy balance and lead to effective long-term weight control (LaRose et al. 2013). This conclusion is comparable to the Ogden et al. (2012) study which emphasized that Cluster 4, the oldest group with a mean age of 53.3 years, had the lowest levels of physical activity reported.

As stated before, Thomas et al. (2014) studied the weight loss of individuals in the NWCR over a 10-year period in order to assess the effect of behavior modification. As in the preceding two studies targeting the NWCR population, physical activity was measured with the Paffenbarger Activity Questionnaire. The successful weight losers in this study, like those in both the Ogden et al. (2012) and LaRose et al. (2013) studies reported high levels of physical activity. Participants who reported large decreases in physical activity experienced the greatest weight regains. The significant meaning from these three studies that concentrated on the NWCR and physical activity is that continued adherence to physical activity can improve long-term results. Individuals who continue to participate in modified physical activity behaviors are most likely to successfully maintain weight loss (Wing & Phelan, 2005). This conclusion was also reached in a meta-analysis of 29 studies examining long-term WLM of individuals completing a structured weight-loss program (Anderson, Konz, Frederich, & Wood, 2001). These researchers found that physical activity appears to be positively related to successful WLM.

Metzgar et al. (2014), intended to not only explore dietary intake and eating patterns, but also the role of physical activity in maintaining weight loss in women who
participated in an 18-week comparative trial. Although the initial 18-week intervention did not include an exercise component, following the intervention women recognized the significance of physical activity in maintaining weight loss. During the post-intervention focus groups women who reported the most success at WLM implemented some form of exercise, whereas women who were not successful acknowledged that their weight regain was related to an absence of physical activity.

Although physical activity is related to long-term WLM (LaRose et al., 2013; Metzgar et al., 2014; Ogden et al., 2012; Thomas et al., 2014), the ideal level of physical activity required to facilitate WLM remains unclear (Hindle & Carpenter, 2011). More research is needed in this area. Walking, however, is one of the most recurrent aspects of physical exercise reported by study participants (Butryn et al., 2007; Wing & Hill, 2001). These studies suggest that consistent physical activity may lead to sustained weight loss. A variety of approaches have been assessed and, though no particular strategy has been broadly established as effective, persistent modifications in physical activity, as well as dietary intake and eating patterns seems to be emerging as being significant.

**Problem solving.** Problem solving relates to the self-correction of problem areas related to diet and physical activity. According to the clinical guidelines of the National Heart, Lung, and Blood Institute (NHLBI, 1998), techniques to correct problems include recognizing obesity or overweight as a problem, brainstorming potential solutions, applying one of the chosen alternatives, and assessing the result. Weight maintenance interventions characteristically have concentrated on the long-term use of conventional practices of traditional weight-loss programs by encouraging problem solving to overcome barriers (Perri et al., 2001; Svetkey et al., 2008).
Perri et al. (2001) examined the difference in weight loss with a problem-solving treatment group (PST) compared to a standard behavioral therapy treatment group (BT) in 80 obese women. A 5-stage problem-solving model was used and included: (a) developing an appropriate coping perspective, (b) recognizing the particular problem being tackled, (c) identifying possible resolutions, (d) finding the probable short- and long-term consequences of the resolutions, and (e) trying out a strategy and assessing its efficacy. Outcomes showed that the PST group experienced significantly better maintenance of weight loss from months 5-11 compared to the BT group (Perri et al., 2001). In addition, the PST group had significantly greater total weight loss from baseline to month 17 compared to the BT group. Weight losses were 4.14 kilograms in the BT group and 10.82 kilograms in the PST group after 17 months. One year after completion of the original weight treatment, participants who completed PST on average maintained their whole original loss, while participants in the BT group without extended care regained more than half of their original reductions. However, whether greater group support rather than the use of problem solving was responsible for the improved result in PST participants is unknown due to a lack of detailed process measures (Perri et al., 2001).

Reyes et al. (2012) used focus groups to explore which predictors supported or prohibited maintaining weight loss among a diverse, urban populace. Eligible participants who had intentionally lost weight were categorized as “maintainers” or “regainers.” In this study there were clear differences when the two groups described their problem-solving practices. Compared to regainers, maintainers applied more productive problem-solving techniques (Reyes et al., 2012). On the contrary, regainers
described more unproductive problem-solving styles around the challenges of maintenance, mentioning avoidance or denial related to weight regain. The data suggested that behavioral skills such as problem-solving that are learned during weight loss could be stressed for long-term weight maintenance.

**Self-monitoring.** Self-monitoring of body weight can lead to the acknowledgement and consciousness of increased weight and possibly motivate some type of modification. This ability encompasses an individual paying careful attention to their behavior and the recording of some specifics of that behavior (Butryn et al., 2007). Data collected from current studies identified self-weighing and food diaries as necessary components of behavioral self-regulation (Butryn et al., 2007; Elfhag & Rossner, 2005; Ulen, Huizinga, Beech, & Elasy, 2008; Wing & Hill, 2001; Wing, Tate, Gorin, Raynor, & Flava, 2006; Wing et al., 2007).

Self-weighing, whether every day or weekly, aids in acknowledging patterns, provides an opportunity for positive reinforcement, and is believed to support self-regulation of behavior (Ulen et al., 2008). Predictors fundamental to weight loss put an emphasis on the significance of self-weighing for weight regulation. The National Weight Control Registry (NWCR) and the Stop Regain program established that regular self-weighing is related to WLM (Wing & Phelan, 2005; Wing et al., 2006).

In order to develop a clearer understanding of how different rates of self-monitoring of body weight may facilitate or act as a barrier to weight control efforts, Linde, Jeffery, French, Pronk, and Boyle (2005) evaluated self-weighing practices over time in two different groups. One group of individuals was registered in a weight gain prevention trial while the other population of obese participants enrolled in a weight-loss
trial. Regular weight checking was related to a smaller amount of weight gain and more weight loss in the two groups (Linde et al., 2005). Participants in the Linde et al. (2005) study, whose rate of self-weighing had declined, were more likely to report increases in their percentage of ingesting fat, increases in disinhibition, and decreases in cognitive control. The study found that it is likely that individuals who are gaining weight decrease their rate of self-weighing because they find it upsetting. A noteworthy result was that increasing or sustaining a self-weighing rate from baseline to one year follow-up was related to less weight regain. Linde et al. (2005) also found that regular, more intensive self-weighing may allow individuals to catch increased weight before their condition worsens and make behavior modifications to stop further weight gain.

The results of Linde et al. (2005) are comparable to outcomes described in the STOP Regain trial (Wing et al., 2006). In this clinical trial, 314 successful weight losers were randomly assigned to a control group or to a self-regulation intervention via the Internet or face-to-face. The successful weight losers within the self-regulations intervention groups who weighed themselves everyday were 82% more likely to maintain their weight loss compared with those who weighed less often.

In a study conducted by Butryn, et al. (2007), the purpose was to investigate the characteristics related to regular self-weighing and the correlation between self-weighing and WLM. Participants were members of NWCR who had lost ≥ 30 pounds and kept it off for 1 year (Butryn et al., 2007). The findings suggested that regular self-weighing may assist individuals with WLM by letting them catch weight increases before they spiral out of control and allows an individual to make behavior modifications to stop
further weight gain. In addition, the research suggested that a drop in the regularity of self-weighing is independently linked with weight regain.

Self-monitoring of food consumption is suggested to be vital for weight control. When studying the variances in the predictors involved in weight maintenance success and failure, McKee, Ntoumanis, and Smith (2013) interviewed successful weight-loss maintainers and unsuccessful regainers. They found that the majority of maintainers checked their weight maintenance by routinely using food diaries. They noted they had learned from prior experience how essential it was to keep track of what they ate for weight maintenance success. Similar to the study conducted by Byrne, Cooper, and Fairburn (2005), several of the maintainers stated self-monitoring kept them honest. In contrast, the regainers did not seem to practice self-monitoring as carefully as the maintainers. The regainers accountability seemed to be absent in regard to their weight regulation (Byrne et al., 2005). Unlike almost all of the maintainers who frequently had food diaries or habitually weighed themselves, numerous regainers seemed to end their self-monitoring practices once they reached their goal weight (Elfhag & Rossner, 2005).

While some research conveyed concerns that self-monitoring may adversely affect the mindset of an individual, a follow-up study to the Stop Regain program found that the rate of self-monitoring was in fact related to an increased control of eating, a reduction in dietary disinhibition, and a waning in symptoms of depression (Wing et al., 2007). Overall, outcomes from these studies support the idea that using a food diary every day as well as self-weighing are key parts of self-monitoring and should be emphasized as significant predictors in WLM.
**Goal setting.** Goal setting is a stratagem that is commonly used to help individuals change. Goal setting has been a common intervention practice in nutritional and physical activity behavioral modification programs (Cullen, Baranowski, & Smith, 2001). Generally, setting goals of weight loss and WLM are, at a minimum, to avoid additional weight increases and/or to decrease body weight. Once the goal of reduced body weight has been successfully attained, maintenance of the lower body weight becomes the challenge.

The social cognitive theory identifies goal setting as a significant stratagem (Shilts, Horowitz, & Townsend, 2004). If an individual is not dedicated to the goal, there will be no goal result and, subsequently, no behavior modification. Setting definite goals offers a possible plan for shaping dietary and physical activity information and skills into useful and manageable steps (Cullen et al., 2001).

In 2001, Cullen and colleagues examined 13 studies that defined the goal-setting method and their role in nutrition interventions. The four stages of effective goal setting among adults included: (a) acknowledgement of the problem, (b) setting a goal, (c) monitoring movement toward attempting that goal, and (d) self-reward for accomplishment of the goal (Cullen et al., 2001). Ten of the 13 studies presented information about the goal setting elements with only one intervention including all four goal-setting stages. Their investigation suggested that goal-setting techniques are likely to bring about modifications (Cullen et al., 2001). However, the studies engaged diverse steps to goal setting. There were significant inconsistencies across the 13 studies as to what and how to engage goal setting processes. As a result, little can be concluded about
ideal practices for nutritional behavior modifications among adults. Additionally, setting more challenging weight-loss goals did not lead to better success outcomes.

The best evidence of a successful lifestyle intervention using simple goals is the Diabetes Prevention Program Research Group trial conducted in 2002 (Powell, Calvin, & Calvin; 2007). There were only two goals: to attain a 7% weight loss and to participate in moderate physical activity for one-half hour, 5 days per week. According to Powell et al., (2007), simple goals encompassing small modifications are easiest to craft and withstand. When an individual has success at making the small modifications, there is a better likelihood that more success will occur.

Shilts et al., (2004) reviewed 13 adult studies for the main purpose of determining the effectiveness of goal setting as an approach for changing diet and physical activity behaviors. The studies investigated used goal setting to fluctuating levels. Therefore, each study was rated for degree of goal-setting support based on minimal, moderate, or full support. Minimal support meaning a goal was established and no additional support was given concerning goal feedback or completion of the goal. Moderate support denoting that a goal was established and some but not all phases of goal setting, such as barriers and feedback, were supported (Shilts et al., 2004). Full support indicating a majority of the intervention was concentrated on goal setting and completion, with extensive and fitting support given. The review results specified that goal setting presents potential in supporting nutritional and physical activity behavior modifications among adults. The researchers found reasonable data demonstrating that executing goal setting as a nutritional or physical activity behavior modification strategy is effective with adults (Shilts et al., 2004).
In order to better understand the behaviors and fundamentals that are important in sustaining weight loss, Elfhag and Rossner (2005) endeavored to arrive at a complete framework of predictors affecting weight maintenance by reviewing peer-reviewed research articles that described weight maintenance outcomes. The first predictor considered was setting goals (Elfhag & Rossner, 2005). One of the risks recognized in their examination was the setting of unrealistic goals being frequently linked to weight gain over time.

Research conducted in 2013 by McKee, Ntoumanis, and Smith, purposed to study the variances between successful and unsuccessful weight maintainers to gain insight into the predictors related to success and failure in weight maintenance. The maintainers often referred to setting weight maintenance goals and presented the awareness of weight maintenance being a way of life instead of a diet (McKee et al., 2013). The maintainers also stressed the risk of being unrealistic in their weight-related goals. Maintainers detailed the importance of setting realistic goals whereas the regainers battled with their process of weight maintenance. As in the Elfhag and Rossner (2005) study, unrealistic goal setting was documented by several regainers and provided a potential cause for the abandonment of their weight-related goals.

In sum, these studies provided support for the importance of setting realistic goals. They specified that goals provide a target for behavior modification when addressing dietary and physical activity practices. Based on the literature, a conclusion could be reached that goal setting is a good predictive indication of a method that is needed for success at weight maintenance. Further research into the practice and effectiveness of goal setting in relation to WLM is necessary.
Social support. Social support, typically from the family or a group, is used to maintain motivation and offer reinforcement for appropriate behavior modifications. Berry (2004) studied the experiences of weight loss and maintenance with women. Of the six key lifestyle change patterns developed from the evidence, the fifth pattern described social support and validation. The sense of social support and validation were found to be essential to all the women who maintained weight loss. A majority of participants found support by joining weekly weight management meetings (Berry, 2004). Some established bonds at these meetings that continued for years and were found to offer security due to being involved with others undergoing similar struggles. Similarly, in research conducted by Hammarstrom, Wiklund, Lindahl, Larsson, and Ahlgren (2014) in Northern Sweden, participants believed they received support for their eating modifications and food planning from group meetings.

Intending to develop a better understanding of the experiences of those who have been successful at weight maintenance, Hindle and Carpenter (2011) conducted a qualitative study to discover the approaches, experiences, and insights of individuals who succeeded at maintaining a weight loss of at least 10% of their original weight for one year or more. Social support was one of four key themes evident in the data analysis methodology (Hindle & Carpenter, 2011). The availability of social support was a vital element for the individuals who were able to lose and maintain weight loss. The support was considered advantageous in terms of motivation, useful counsel, and as a way of making sure their weight was frequently reviewed.

Accountability to others and support from family and friends was also expressed in a study conducted by Metzgar et al. (2014). Accountability and support were
fundamental facilitators that allowed female participants to maintain their weight loss after involvement in a weight loss intervention. Nonexistent social support from others was usually described as barriers to attaining WLM after completion of the weight-loss portion of the study (Metzgar et al., 2014). Women also acknowledged weekly group meetings during the primary trial as being beneficial for facilitating support and motivation.

Support from family and friends is central to weight maintenance, particularly when family also modified their routines and became involved in weight actions with the participants (Hindle & Carpenter, 2011). What was noteworthy in this study was the keen realization of the existence of saboteurs among their family and friends. Two-thirds of the participants felt saboteurs inhibited their efforts or encouraged individuals to discontinue watching their weight at a certain point. Notably, the participants did not seem to be adversely affected by the saboteurs. In the same way, several women participants in the Metzgar et al. (2014) study described negative feedback to their weight-loss efforts. Additional studies examining the different tactics needed to decrease the effect of saboteurs could be valuable.

Social support is generally considered an essential component of weight loss and WLM programs, irrespective of whether the support comes from family, friends, or a support group (Barnes et al., 2007; Elfhag & Rossner, 2005; Metzgar et al., 2014). Furthermore, social support has been recognized as both a facilitator and a barrier to creating behavior modifications. Depending on the environment and amount of assistance, social support can either help or hinder WLM. Social support from family and groups who are available to discuss difficulties and offer assistance when wanted
seems to be significantly greater for maintainers than for regainers. The research suggested that social support acts to defend against stress and may be used to assist individuals when making stressful decisions. However, the research did not provide evidence that there are neither particular tools nor specifics that clarify the role that social support plays in maintenance of long-term weight loss.

**Pharmacotherapy**

The increased attention to drug usage for obesity stems from the meager long-term outcomes frequently found with behavioral and lifestyle weight-loss strategies, including diet and physical activity (Wadden, Berkowitz, Sarwer, Prus-Wisniewski, & Steinberg, 2001). Pharmacotherapy is a program using medicine to manage obesity by decreasing appetite or increasing the feeling of fullness. The hypothesis for the use of prescription drugs with behavioral and lifestyle weight-loss strategies is that more successful weight loss and maintenance will result (Haddock, Poston, Dill, & Ericsson, 2002; Wadden et al., 2001).

Behavioral and lifestyle weight-loss strategies are to be tried before considering pharmacotherapy. Furthermore, pharmacotherapy should only be considered in individuals with a BMI $\geq 30$ with no obesity related illnesses or for individuals with a BMI $\geq 27$ with obesity related illnesses such as diabetes or high blood pressure (National Institutes of Health, 1998). In the last 20 years there have been several drug treatments used to address weight loss in obese adults. Pharmacological interventions include medications that suppress appetite and medications that impede absorption of fat.

The medications approved by the FDA that yield weight loss for the long-term treatment of obesity averaging 12 months are Sibutramine and Orlistat (Bray, 2008).
Sibutramine, an appetite suppression medication, was initially offered for long-term use (National Institute of Health, 1998) in 1997 in conjunction with a low-calorie diet (Kang & Park, 2012). Sibutramine was considered a safer alternate to fenfluramine and dexfenfluramine. The mixture of fenfluramine and dexfenfluramine, with phentermine, generally known as “fen-phen” was often prescribed through doctors as well as diet clinics. Dexfenfluramine had been found to produce significant weight loss in the short term but it was not designated for long-term usage (Arterburn & Hitchcock-Noel, 2001). In September 1997, the United States Food and Drug Administration (FDA) demanded the voluntary removal of fenfluramine and dexfenfluramine due to a stated link between heart disease and these remedies.

The Sibutramine Trial on Obesity Reduction and Maintenance (STORM) is a multicenter European study of WLM after weight loss that combines Sibutramine treatment with nutritional limitations, physical activity advice, and behavioral modification information (van Baak et al., 2003). All participants received 6 months of Sibutramine and a low-fat, low-calorie diet regimen. After 6 months, those who lost at least 5% of their original body weight (N=467) were then randomized into STORM, to either Sibutramine or the placebo group, for observation of WLM over the next 18 months (van Baak et al., 2003). The key result was that at the 18 month follow-up, for participants who completed the trial, 43% in the Sibutramine group maintained over 80% of their original weight loss, compared to 16% of those in the placebo group. Better weight maintenance in Sibutramine treated groups was also described in an earlier STORM trial and an additional long-term trial studying the efficacy of Sibutramine in weight maintenance (James et al., 2000; Wirth & Krause, 2001). In a meta-analysis
evaluating the effectiveness and safety of weight-loss drugs, Li et al. (2005) found that weight loss with Sibutramine was about 5% greater for individuals taking the medication than those taking a placebo. However, it is well-known that Sibutramine increases pulse rate and blood pressure in a significant number of individuals (Sheperd, 2003) and may raise the risk of heart attack and stroke. Therefore, it was taken off the market in the United States (Kang & Park, 2012).

Approved in 1998, Orlistat, induces weight loss by blocking the absorption of about one third of the fat contained in a meal with the undigested fat being expelled in stool (Bray, 2008; Derbyshire, Shek, & Szkotak, 2013; Kang & Park, 2012; Sheperd, 2003). It is not only used to help with weight loss but to also assist in reducing the possibility of regaining weight previously lost. It is suggested that Orlistat be used together with a reduced calorie regimen. Orlistat does not block the absorption of calories from sugar and other non-fat foods, so there remains a need to limit total consumption of calories. In a meta-analysis on pharmacologic treatment of obesity, Li et al. indicated that Orlistat causes significant gastrointestinal side effects (2005). These side effects are common in the beginning but they diminish as individuals learn to use the medication (Bray, 2008).

Pharmacotherapy prescribed alone is not as effective as pharmacotherapy prescribed as a part of an inclusive weight management program (NIH, 1998; Wadden et al., 2001). However, investigators in the Wadden et al. (2001) study were unable to pinpoint which components of the lifestyle modification program contributed to better outcomes. Keeping a dietary intake journal every day and increasing daily physical activity seemed to be admirable initial steps. Individuals who were prescribed a drug
only, without behavior treatment, seemed to be at greater risk of ending usage early, as they did in the Wadden et al. (2001) study. LeBlanc and colleagues, in 2011, led a systematic review of 58 trials as a follow-up to information collected in 2003 in which U.S. Prevention Services Task Force authorities recommended that primary care clinicians offer obese adults interventions that support weight loss. As a part of the review, separate meta-analyses were conducted to evaluate the results of behavioral and drug interventions on weight loss and health conditions such as those concerning cholesterol and blood pressure (LeBlanc, O’Connor, Whitlocke, Patnode & Kapka, 2011). These researchers found that long-term weight-loss data was deficient and should be a high priority for future research. According to a systematic review of randomized controlled trials (RCT) and observational studies of the effectiveness of obesity treatment (McTigue et al., 2003) the supposition was that in weight maintenance trials extended therapy with Sibutramine or Orlistat conferred some advantage but that stoppage led to quick weight regain (Bray, 2008). A meta-analysis led by Douketis, Macie, Thabane, and Williamson (2005), established that pharmacologically treated individuals were 3 times as likely as those only depending on lifestyle programs to maintain clinically significant weight losses for one to 2 years. Data from a systematic review and meta-analysis conducted in 2007 (Franz et al.) indicated that increasing the length of medication usage did not lead to additional weight loss beyond 6 months, but rather lengthier usages appeared to support weight maintenance. However, weight loss past the usual plateau at 6 months was unlikely. In a meta-analysis of 20 trials (Franz et al., 2007), pharmacological treatment with and without support prompted an 8% body weight decrease by 6 months. Ulen, Huizinga, Beech, and Elasy (2008), support this analysis
with their research indicating that dietary intake and pharmacological treatments for obesity are largely effective at inducing 8-10% weight reductions by 6 months. Weight loss then hit a plateau at 6 months. With continual drug use, however, 7-11% body weight decreases were maintained for up to 3 years (Ulen et al., 2008).

Overall, it seems that medications assisted in avoiding weight regain for at least 18 months (Haddock et al., 2002). Additional evaluation of the collective effects of lifestyle modification and weight-loss drugs for a period of 2 years or longer are needed (Wadden et al., 2001). Most data from randomized controlled trials (RCT) have studied only up to 12 months of therapy. Given the probability of rapid weight regain after termination of drug use and the desire of many individuals to not use weight-loss drugs for an indefinite period, maintenance programs to be used after termination of drug usage are also needed (Ulen et al. 2008). Finally, more long-term clinical trials need to be executed to answer the questions concerning the ideal period of treatment.

**Surgical Treatments**

Bariatric surgery is the next stage for individuals who remain severely obese after attempting methods other than surgical treatments. Weight loss surgical treatment is one possibility for weight reduction in a limited number of individuals with clinically severe obesity which is categorized as having a BMI ≥40 or ≥35 with one or more additional illnesses (NIH, 1998). Bariatric surgery limits food intake, which leads to weight loss. According to a meta-analysis of multiple studies related to surgical treatment of obesity (Maggard et al., 2005), for about one in 20 individuals who are severely obese, bariatric surgical treatment is considered the most effective technique for generating long-term weight loss (Maggard et al., 2005). Some researchers consider surgical treatment to be
the only long-term answer for weight loss and very effective; however, many individuals experience significant weight regain over time (Aguilera, 2014; MacLean et al., 2015). The hypothesis is that support after bariatric surgical procedures can increase weight loss and improve WLM.

Having surgery to produce weight loss is a serious choice. If an individual is unlikely to lose weight or keep it off over the long term using other techniques, success might be conceivable with bariatric surgery. Most individuals who have a bariatric surgical procedure have found non-surgical treatment plans ineffective (Wimmelmann, Dela & Mortensen, 2014). According to Wing and Hill (2001), bariatric surgery functions as one of the fastest and most effective weight-loss methods for severely obese individuals that can maintain a substantial loss of weight over time. However, there is no guaranteed technique, including surgical treatment, to produce and maintain weight loss.

The growing numbers of obese individuals have led to increased attention to surgical treatments to attain weight loss, and an assortment of surgical procedures has been used (Maggard et al., 2005). There are four different kinds of surgical procedures, known collectively as bariatric surgery, that are generally offered in the United States: adjustable gastric band (AGB), Roux-en-Y gastric bypass (RYGB), biliopancreatic diversion with a duodenal switch (BPD-DS), and vertical sleeve gastrectomy (VSG). Each surgical procedure has its own benefits and dangers (Maggard et al., 2005). Side effects of these surgical treatments are noteworthy and include severe adverse events in a small amount of individuals such as infection and death. Issues that must be considered when planning one of these surgical procedures include eating behaviors, health illnesses related to obesity, an individual’s BMI, and prior stomach operations. If individuals view
surgical treatment as a quick resolution and do not make proper life modifications it is likely that slow but progressive weight regain will happen (Maggard et al., 2005).

Karlsson, Taft, Ryden, Sjostrom, and Sullivan (2007) investigated 10 years of effects and tendencies in health-related quality of life (HRQL) after surgical and conventional treatment for severe obesity in Sweden. One of the conclusions was that after reaching maximum weight loss, surgically treated individuals began to gradually regain substantial amounts of weight (Karlsson et al., 2007). The study suggested that maintaining a weight loss of about 10% is enough for positive long-term effects on HRQL. However, problems maintaining weight loss over time among individuals who were surgically treated for severe obesity should not be overlooked.

In a study conducted by Bond, Phelan, Leahey, Hill, and Wing (2009), research compared those who initially lost large amounts of weight through bariatric surgical treatment to those who lost large amounts via non-surgical means. The target population was successful weight-loss maintainers who are enrolled in the National Weight Control Registry (NWCR). The NWCR is involved in ongoing longitudinal studies concerning successful weight-loss maintainers. Generally, individuals enrolled in NWCR maintain weight loss for approximately 6 years (Wing & Phelan, 2005). Fifty-eight percent of individuals who had bariatric surgery described having undergone the Roux-en-Y gastric bypass surgical procedure. Eighteen percent indicated having gastric banding and 24% did not identify the specific bariatric surgery procedure (Bond et al., 2009). The main intent of the Bond (2009) research was to assess whether NWCR participants who had lost and maintained great sums of equivalent weight through either a bariatric operation or a non-surgical methodology contrasted in weight regain over time. There were no
significant variances in the amount of weight regain between surgical and non-surgical individuals. The conclusions suggested that individuals who lost and maintained large amounts of weight through non-surgical methods were just as successful at maintaining their weight losses as individuals who lost comparable amounts of weight through surgical approaches. Additionally, individuals who achieved large weight losses through non-surgical methods had to work harder to maintain their weight losses than the individuals who endured surgical treatment.

The National Heart, Lung, and Blood Institute (NHLBI) introduced guidelines in 2008 that were revised in 2014 to evaluate cardiovascular risk, control of blood cholesterol, and management of obesity in adults (Jensen et al., 2014). One subgroup of scientists was assembled to pinpoint challenges that make maintaining a lower weight so hard and to evaluate approaches that have been used to increase success rates (MacLean et al., 2015). The evidence statements and recommendations were developed from evaluated randomized trials, meta-analyses, and observational research. One of the evidence statements concerning the effectiveness of bariatric surgery summarized that in obese adults, bariatric surgery yields better weight loss and WLM than generated by usual treatments such as behavioral and lifestyle weight-loss strategies, and weight loss effectiveness is contingent on the kind of surgery and original body weight (Jensen et al., 2014). However, the panel also recognized a significant challenge. The scientists communicated that even with the substantial weight loss after bariatric surgery, many individuals suffer sizeable weight regain over time (MacLean et al., 2015).

In 2014, Kulovitz, Kolkmeyer, Conn, Cohen, and Ferraro (2014) conducted research to determine if using either medical treatment or bariatric surgery to induce
weight loss to 15% initial body weight would alter the final ratio of fat mass to lean body mass. These researchers also investigated influences of treatment on weight maintenance after one year of 15% weight loss. Results found that weight maintenance 1 year following a 15% reduction in body weight was similar between the medical treatment and bariatric surgery groups with no significant differences (Kulovitz et al., 2014).

Though it is clear that surgical treatment will result in dramatic reductions in weight, the noteworthy unanswered concern is the maintenance of the weight loss. In spite of the frequent large weight loss and maintenance after a bariatric surgical procedure, numerous individuals experienced substantial weight regain over time (MacLean et al., 2015). To maintain the initial achievement of bariatric surgery, obesity should be treated in the long-term, as in other chronic illnesses such as diabetes or hypertension (Aguilera, 2014). Therefore, more research examining long-term weight-loss success after surgical treatment is needed.

Commercial Dieting

A recent weight management guideline from the American Heart Association (AHA), the American College of Cardiology (ACC), and The Obesity Society (TOS) recommended referring overweight and obese individuals to high-intensity programs but these same guidelines did not offer recommendations about commercial weight-loss programs (Jensen et al., 2014). There is growing recognition of the need to assess the results of all methods of weight loss and weight maintenance including weight-loss management in commercial programs. Collection of data on the long-term value of commercial programs is particularly essential. Commercial weight-loss programs are not mandated to submit data on effectiveness or safety because the marketing statements are
monitored by the Federal Trade Commission (FTC) rather than the United States Food and Drug Administration (Tsai & Wadden, 2005). Basic components to these commercial weight-loss programs are the methods used for behavioral modifications, recommendations for physical activity, and restricted caloric intake dietary guidelines (Tsai & Wadden, 2005). Commercial weight-loss programs are usually operated by company-educated counselors; occasionally individuals who have achieved a weight loss on the particular program previously and use their firsthand knowledge and practices as a measure of their qualifications as counselors.

There is an overabundance of commercial weight-loss programs in the United States. The effectiveness of these commercial weight-loss programs has seldom been thoroughly assessed and recent reviews have exposed the lack of peer-reviewed, scientific data (Lowe, Miller-Kovach, & Phelan, 2001; Tsai & Wadden, 2005). Various commercial weight-loss regimens are geared to individuals who are overweight and non-obese (Thomas, 1995). Millions of Americans a year join a commercial weight-loss program. The most common commercial weight-loss programs in the United States are Jenny Craig, LA Weight Loss, Nutrisystem, and Weight Watchers (Gudzune, 2015; Tsai & Wadden, 2005).

Research to measure the maintenance of weight loss amongst lifetime members of Weight Watchers by Lowe, Miller-Kovach, and Phelan was conducted in 2001. Weight Watchers International, founded in 1963, is the largest and best known commercial weight-loss program in the world (Heyes, 2006). This study was the first to test long-term maintenance of weight loss amongst individuals who had reached goal weight in a commercial weight-loss program (Lowe et al., 2001). Based on corrected weights,
weight regain from 1 to 5 years after weight loss ranged between 31.5 and 76.5%.

Nineteen percent of 1,002 successful individuals who met their goal weight during the program were still within 5 pounds of their goal weight 5 years later (Lowe et al., 2001). The outcomes suggested that long-term weight maintenance amongst individuals who reach goal weight in Weight Watchers was superior to those suggested in medical settings. In another study that also assessed the efficiency of the Weight Watchers program, Heshka et al., (2003) found that those in Weight Watchers lost more weight than those assigned to a self-help group after 1 year and after 2 years in a large, multisite, randomized, controlled trial.

A systematic review of commercial weight-loss programs by Tsai and Wadden (2005) suggested that Weight Watchers was the single program whose effectiveness had been established in a randomized controlled environment. However, the investigators proposed that the most common commercial weight-loss programs monitored a large group to determine retention rates and weight loss at discontinuation (Tsai & Wadden, 2005). Jenny Craig and LA Weight-loss programs were found to need controlled trials in order to determine the amount of weight loss and health benefits. Take Off Pounds Sensibly (TOPS), which seemed to be comparable to Weight Watchers due to its use of group support and weekly weigh-ins, lacked documented effectiveness (Tsai & Wadden, 2005).

In 2007, Finley et al., evaluated retention rates and weight loss in individuals participating in the Jenny Craig Platinum program. Jenny Craig was established in 1983. Designed by registered dieticians in consultation with a Medical Advisory Board, the mission is to assist individuals in attaining their weight management objectives through a
behavioral modification method which includes physical activity, a balanced approach to living, and healthy eating. Platinum membership, which is the lengthiest and broadest package, is a lifetime membership for those who attain their weight target and sustain that weight loss for 1 year. As an incentive, Platinum members are provided with audiotapes for program designed walking and a recipe book for staying at their weight target and in the program (Finley, 2007). The results suggested that this program can be an effective weight-loss tool for individuals who continue in the program for at least 14 weeks because such individuals lost more than 7% of their baseline weight (Finley et al., 2007). However, the attrition rates in the study were great which limited the analysis of the data. About 32% of the individuals were no longer active in the program at 6 weeks and 53% had dropped out by 12 weeks. This makes it challenging to conclude the efficacy of the program (Finley et al., 2007). There was also deficient data on WLM. While researchers offered results that are encouraging, further follow-up research on a large group of individuals who have completed the Jenny Craig Platinum program would provide data on the ability to assist individuals with the maintenance of their initial weight loss.

Gudzune and her associates (2015) completed an updated systematic review of the effectiveness of commercial weight-loss programs that concentrated on dietary intake and integrated behavioral modifications or social support components, regardless of whether physical activity was stressed. This updated systematic review found that individuals participating in Weight Watchers and Jenny Craig lost 2.6% and 4.9% more weight, respectively, than the control groups at 12 months (Gudzune et al., 2015). However, Weight Watchers had greater attrition rates, particularly in the control groups, which raised concerns about the internal validity of the results. Nutrisystem presented
better short-term weight loss but the three studies identified lasted only 3 to 6 months and no long-term trial outcomes were identified (Gudzune et al., 2015). Due to the data, the researchers concluded that Weight Watchers and Jenny Craig held some potential for overweight or obese individuals. Due to their extremely structured programming with in-person social support, these two commercial weight-loss programs seemed more effective in the long term than less structured interventions (Gudzune et al., 2015). Furthermore, Nutrisystem might demonstrate potential; however the absence of long-term randomized controlled trials (RCTs) prohibited convincing conclusions.

As specified previously, Tsai and Wadden (2005) found that Take Off Pounds Sensibly (TOPS), another commercial weight-loss program which seemed to be comparable to Weight Watchers due to its use of group support and weekly weigh-ins, lacked documented effectiveness. TOPS is a nonprofit, peer-led, weight-loss program. Another study using data obtained from TOPS was investigated to determine the long-term weight loss of individuals who repeatedly renewed their yearly membership for up to 7 years (Mitchell et al., 2015). When participating in TOPS, individuals attend weekly meetings during both the weight loss and weight maintenance stages. The maintenance stage is open-ended. In the TOPS model, there are nominal differences between the weight loss and weight maintenance stages, which strengthen the internalization and maintenance of weight management behaviors (Mitchell et al., 2015). The investigation indicated that individuals who repeated their participation consecutively were able to sustain a clinically significant weight loss for up to 7 years. Fifty percent of repeated renewers lost 5% or more of their initial weight in their first year in TOPS, and 62% of the repeated renewers had a collective weight loss of at least 5% at 7 years (Mitchell et
In comparison, 1-year weight loss in this examination of TOPS was lower than the examination of the Jenny Craig program conducted by Finley in 2007; however, TOPS has longer term weight change data. Also, the 1-year retention rate in this TOPS study was much greater than the 1-year retention rate of the Jenny Craig study (Finley, 2007). The group design possibly contributed to the greater 1 year retention rate.

In summary, a limited number of popular commercial weight-loss programs, including Jenny Craig and Weight Watchers, demonstrated potential in assisting with modest weight loss in overweight or obese individuals. However, most of the studied commercial weight-loss programs were not thoroughly assessed and much remains unknown about the long-term results. Johnston and colleagues led a meta-analysis of weight loss among named diet programs in 2014. Similar to a maintenance of weight-loss study conducted in 2006 (Wing, et al.) and a meta-analysis led by Franz et al. in 2007, these researchers determined that weight loss decreased at 6-month follow-up, and started to revert to the baseline average at 12-month follow-up. Therefore, it was suggested that future trials of dietary programs should emphasize maintenance of long-term weight loss (Franz et al., 2007; Johnston et al., 2014; Wing et al., 2006). While there is agreement about the dangers of obesity, there is disagreement about weight management. Treatment of obesity should emphasize significant weight loss followed by maintenance of that weight loss for a lifetime. These diverse treatment approaches, including diet, physical activity, behavior treatment, pharmacotherapy, surgery, and commercial settings shape weight loss and WLM. Their overall objectives are to decrease body weight and sustain a decreased body weight over the long term. The obstacle with these treatment approaches is that they fail to generate and maintain
significant weight loss long term (Franz et al., 2007; Kraschnewski et al., 2010; Wing & Hill, 2001). Most individuals who lose weight fully regain their weight within a few years (Franz et al., 2007; Kraschnewski et al., 2010; Wing & Hill, 2001). Therefore, the outcome is that currently there is not a clear predictor or cluster of predictors that can generate and maintain weight loss in significant numbers.

Moderators of Obesity Treatment Effectiveness

Studying different moderators of obesity treatment was particularly significant when considering the different treatment forms presented. Getting a clearer understanding of moderators can assist in adapting treatments to the needs of subgroups of individuals. Ideally, moderators identify on whom and under what conditions treatments have distinctive results. The following examination of psychological and demographic moderators of treatment was key to gaining additional insight into obesity in adults.

**Psychological moderators.** Obesity is a very diverse condition in terms of its link to adverse health outcomes, behavioral treatment and management. The diversity is particularly apparent when considering the psychological moderators associated with being overweight and obese. Psychological issues can hinder an individual from altering their existing routines and hamper their capacity to adjust their relationship with weight. Some of the common psychological moderators that run rampant and need to be addressed include: body image, depression, locus of control, motivation, self-efficacy, and self-control.

**Body image.** Fundamental beliefs about being overweight or obese can lead to thinking one is ugly, which can invade a mind through time. Body image is defined as
the opinion an individual can have in regards to their physical frame and look and the emotional reaction to their opinion (NIH, 1998). Name calling by classmates can be a significant moment in a chubby youngster’s life which lays the foundation of embarrassment and shame (NIH, 1998). This can lead to a negative body image. As these same youngsters age, an obese individual will consider themselves ugly and unlovable because of how they look.

Individuals in danger of having a poor body image are binge eaters, those who were obese during their youth, those with emotional disorders, and females (NIH, 1998, p. 22). Therefore, body image frustrations and the longing to improve physical looks often push individuals to pursue weight loss. This should lead individuals to come to terms with the actual limitations connected to their abilities to lose weight, which are typically behavioral. Otherwise, weight-loss efforts or weight regain after weight loss may only deepen the sense of failure and struggle that previously existed (NIH, 1998).

**Depression.** Investigators have been perplexed by the seeming association between obesity and depression for years. Is depression the root cause of obesity, or does obesity lead to depression? Studies have shown that there is no perfect, one-way link between obesity and depression. Instead, studies have revealed that the two tend to feed off each other in an endless loop.

There are several theories when relating obesity with depression. First, obesity escalates the threat of depression. Bjorntorp (2001) argued that depression induces abdominal obesity. Secondly, it could be that depressed individuals, overstressed or living unhealthy lifestyles, develop more obesity over time. Third, depression and obesity share risk factors equally. In a meta-analysis investigating the longitudinal
correlation between obesity and depression, Luppino et al. (2010) found a bidirectional association in both men and women. Fourth, there is no link between obesity and depression (Roberts, Deleger, Strawbridge, & Kaplan, 2003). Additional longitudinal studies are necessary in order to provide more data on the direction of the link between depression and obesity.

**Locus of control.** An essential objective of any weight loss or WLM intervention is to increase an individual’s accountability for the outcomes. The degree to which an individual believes they are in control of the outcomes that affect them is known as “locus of control” (Lazzeretti, Rotella, Pala, & Rotella, 2015; Neymotin & Nemzer, 2014). An internal emphasis is the belief that the health status of an individual is reliant on their own behaviors (Neymotin & Nemzer, 2014). For example, an individual with an internal locus of control believes that particular behaviors such as physical activity or reduced caloric consumption will yield weight loss (Williams, Grow, Freedman, Ryan, & Deci, 1996). An external locus of control is the belief that outcomes are controlled by forces external to an individual (Neymotin & Nemzer, 2014). This would be when an individual believes their health is controlled by influential others such as physicians or health authorities or that chance and fate are mostly responsible for their healthiness.

Some studies found that an internal locus of control is related to more weight loss. According to Williams et al. (1996), internally focused individuals will tend to succeed more regularly in weight-loss undertakings, including weight maintenance, than will the externally focused individuals. Other studies fail to find any dissimilarities between internal and external locus of control (Elfhag & Rossner, 2005). Similar to the research
hypothesizing the link between depression and obesity, determining whether locus of control is more internal than external, and vice versa tends to be as complicated to prove.

**Motivation.** Losing weight and maintaining weight loss is a challenge in the area of weight management. Therefore, understanding the motivation to adhere to beneficial health behaviors is vital for the maintenance of weight loss. Individuals state that they know what to do to control their weight, such as continuing physical activity and nutritional behaviors that have previously produced weight loss, but cannot motivate themselves to continue to implement the behaviors associated with weight control (West et al., 2011). Motivation is increased by stressing the inconsistencies between recent breaks in behavior and the preferred result of better health or long-term weight control.

Self-determination theory (Deci & Ryan, 2002) is a theory of human motivation that has been applied to health care. Self-determination theory (SDT) describes motivation and is supported by three central components: autonomy, competence, and relatedness. Autonomy is about the ability and choice to act, competence is the feeling of being capable of acting, and relatedness embraces the positive interactions with others that occur because of acting (Deci & Ryan, 2002). Although there are research studies that analyze motivation for health-related behaviors using the SDT framework, there had been no endeavors made to analytically group and quantify results from the research until Ng et al. conducted a meta-analysis in 2012. One of the studies identified in the meta-analysis was an investigation conducted by Williams et al. (1996). The study examined whether it is possible to forecast attendance and outcomes from motivation type. The researchers found that individuals who were identified as being more autonomously motivated attended a weight-loss program more often, lost more weight, and maintained
more weight loss. Overall, the results supported the importance of SDT as a theoretical framework to study motivational processes and to strategize interventions for better health care. SDT suggests that the behavioral modifications needed to attain weight maintenance must be integrated within self. Further, this theory proposes that successful maintenance will not happen if the motivation for behavior modifications is not self-determined (McKee, Ntoumanis, & Smith, 2013).

**Self-efficacy.** Individuals who want to change their weight need to make a realistic assessment of how hard it is going to be and what benefits can result when the objective is reached. Increased self-efficacy can assist such individuals. According to the self-efficacy theory (Bandura, 1977), self-efficacy is a confidence in one’s success of specific behaviors, as well as a confidence that an individual who does these behaviors will attain the desired results. Among psychological predictors, self-efficacy has been identified as one of the most powerful predictors of health behavior (Baranowski et al., 2003). Individuals with greater self-efficacy, within the health belief model, will more likely participate in a particular behavior, persevere until they get it right, and maintain the behavior (Baranowski et al., 2003). For example, based on the believed risk of obesity, the main source for transformation is having the self-efficacy to make the transformation to lose or maintain a healthy weight (Daddario, 2007).

In social cognitive theory (SCT), whether an individual attempts a new behavior depends on the perceived self-efficacy for undertaking the new behavior (Annesi, 2011). Based on the descriptions within these behavioral change models, a greater sense of self-efficacy leads to more effort, resilience, and perseverance. Therefore, it would be likely that greater levels of self-efficacy would lead to more successful long-term WLM. For
example, after a woman experiences weight loss, she interprets the outcomes of her weight loss, uses the interpretation to generate beliefs about her capacity to continue in WLM, and acts in line with the beliefs generated.

**Self-control.** Self-control is described as the capacity to abstain from acting on undesired behavioral tendencies (Lazzeretti et al., 2015). The struggle of sustaining self-control of behaviors related to eating and physical activity has increased from previous times partially due to individuals being bombarded with reasons to eat via the mass media, and partially because individuals are getting a variety of suggestions about eating, physical activity, and weight (Bray & Bouchard, 2004). An important finding related to WLM and self-control was discovered in an investigation conducted by McKee et al. (2013). The researchers identified a number of differences between weight-loss maintainers and weight-loss regainers and how each group applied self-control over their weight control practices (McKee et al., 2013). Self-control seemed to guide how individuals handled breaks, dealt with temptations, established practices, and self-monitored their weight.

These are just a few of the more common psychological moderators associated with obesity which can cause individuals to believe it is impossible to lose weight. By simplifying some of the common psychological problems encountered by obese individuals, an understanding was gained of how and why individuals struggle with weight management. With awareness and understanding comes the capacity to modify behaviors and uproot dysfunctions that describe struggles with weight loss and WLM.

**Demographic moderators.** The demographics of the United States are shifting in the 21st century. Due to these changes, there is a need for additional studies to
understand the most appropriate strategies and recommendations for WLM for some crucial populations, including older adults and racial/ethnic groups. Generally, studies conducted in the area of WLM are rather homogenous which means that the findings may not be generalizable to ethnic groups and those with a lower socioeconomic position. Individuals participating in research studies about WLM are asked to provide their age, educational level, ethnicity, gender, and marital status.

Kraschnewski et al. (2010) provided nationally representative estimates of long-term WLM among adults in the United States. The estimates were calculated based on the annual National Health and Nutrition Examination Survey (NHANES), which assesses the health and nutrition of a representative percentage of the population of the United States (Kraschnewski et al., 2010). Demographics of over 14,000 adults who were ever overweight or obese representing 74.6% of the entire 1996-2006 NHANES population were included (Kraschnewski et al., 2010). The population included almost equivalent numbers of males and females (Kraschnewski et al., 2010). Over 70% were non-Hispanic white, 12.5% Hispanic, and 11.8% non-Hispanic African American (Kraschnewski et al., 2010). About half of the adults completed more than high school schooling and nearly two-thirds were married or with a partner. The results from this population revealed that long-term weight loss is more common among females. The elderly, who also had a higher prevalence of long-term weight loss, stated this result to be connected to unintentional weight loss (Kraschnewski et al., 2010). Non-Hispanic whites and those with an education level below high school also had a higher prevalence of long-term WLM (Kraschnewski et al., 2010). Individuals who were married or living with a partner had a lower incidence of long-term WLM.
In contrast, the demographics of individuals recorded in the National Weight Control Registry (NWCR) differed significantly from the NHANES survey. The NWCR population did not comprise an almost equal number of males and females. Over 70% were female. Though about half of the NHANES adults finished more than high school, over 80% of NWCR individuals were college educated (Wing & Phelan, 2005). Also, there were considerably more minority participants in NHANES compared to over 90% of NWCR individuals being Caucasian (Wing & Phelan, 2005). The lone demographic that is alike in both populations was the percentage of those who were married.

The major asset of the demographic data from NHANES was that it was a population-based sample and therefore provided better insight on long-term WLM in the United States (Kraschnewski et al., 2010). The NWCR individuals were a self-selected population of 4,000 who were recruited through various periodicals in order to access their WLM efforts (Wing & Phelan, 2005). Overall, additional investigative studies are needed to examine the reasons why these specific demographics are more successful at long-term WLM.

**Regain after Weight Loss**

There is evidence that few individuals succeed at long-term weight loss. This assessment originates from a 1959 study in which Stunkard and McLaren-Hume presented data that after 2 years of treatment, only 2% maintained a weight loss of 20 pounds or more. A key problem confronting individuals who do well losing weight is that the majority cannot sustain the loss (Elfhag & Rossner, 2005). Regrettably, it is common for individuals who lose weight to return to their baseline weight within 3 to 5 years (McKee et al., 2013).
In 2001, Wing and Hill identified predictors related to weight regain. Over 1 year of follow-up with participants in the National Weight Control Registry (NWCR), 35% regained 5 pounds or more (Wing & Hill, 2001). It appeared that the first few years after successful WLM were the most vulnerable period for regain. Regainers were found to have a greater drop in physical activity, reduced level of food restriction, an increased loss of regulation when eating, and increased their fat consumption (Wing & Hill, 2001).

In a 2003 qualitative study by Byrne, Cooper, and Fairburn, research among obese females who had lost weight was conducted to examine the psychological predictors associated with successfully maintaining the lost weight as opposed to weight regain. Three groups were recruited (Byrne et al., 2003). Maintainers were females with a history of obesity who at some point within the last 2 years had lost at least 10% of their initial body weight and had maintained their weight loss for at least 1 year (Byrne et al., 2003). Regainers were females who met the same maintainer benchmarks but had regained weight. The third set of participants were females with a healthy weight and no history of obesity who had maintained their weight for at least 2 years (Byrne et al., 2003).

The study identified that regainers were unlikely to describe adherence to a low-fat eating regimen, consistent physical activity, and weight monitoring and reacted to adverse life happenings by eating (Byrne et al., 2003). Furthermore, regainers were likely to postpone reacting to weight regain and ate to escape negative circumstances and to regulate moods (Byrne et al., 2003). The results from this study suggested that weight regain should not be regarded from only a biological standpoint. Psychological
predictors may explain the absence of perseverance with weight maintenance conduct after successful weight loss.

In a conceptual review of factors in weight-loss maintenance that concentrated mostly on behavioral and psychological elements, Elfhag and Rossner (2005) described predictors that lead to successful maintenance or regain. In addition to what has previously been emphasized by Wing and Hill (2001), and Byrne et al., (2003), these investigators found that those who regain weight described having poor self-management strategies such as coping abilities. A common characteristic identified with regainers is that they are more apt to eat when reacting to negative or stressful life events and negative emotions (Elfhag & Rossner, 2005). Similar to the study conducted by Byrne et al. (2003), weight regain had been linked to self-worth in terms of shape and weight. Elfhag and Rossner (2005) also conveyed that depression occasionally had been associated with regain. Overall, those who experience weight regain were found to have more difficulties with self-management and had fewer effective techniques to handle problems. Elfhag and Rossner (2005) deliberated the likelihood that biological disorders could cause greater hunger which could contribute to weight regain and therefore struggling from a biological standpoint should be considered.

Wing and Phelan (2005) studied quantitative data collected from 4,000 individuals in the National Weight Control Registry (NWCR) who had been successful at long-term WLM. Registry members were followed over time to pinpoint variables related to sustained success at WLM. Members who regained were compared with those who maintained their body weight in order to study whether there were any standard characteristics that might differentiate the two groups (Wing & Phelan, 2005). Similar to
participants in the Wing & Hill (2001) analysis and the Byrne et al. study (2003), those who regained weight had noteworthy declines in controlling their food intake and physical activity, and increases in their proportion of calories from fat.

The investigators also studied whether NWCR members who regained weight between baseline and year one were able to recover over the following year. The results reported that only 11% recovered from even minor weight regains. Likewise, the extent of regain at year one was the strongest predictor of results from years zero to one. Members who added the most weight during year one of regain were the most unlikely to re-lose weight the next year (Wing & Phelan, 2005).

These results highlight the significance of maintaining behavior modifications during the maintenance stage of weight loss. The results also suggested that reversing weight regain appears greatest among individuals who regain the smallest amount of weight (Wing & Phelan, 2005). Therefore, stopping regain from spiraling into greater regains appeared critical to recovery among successful weight-loss maintainers.

An additional qualitative study, McKee, Ntoumanis, and Smith (2013) studied the differences in the contributing predictors involved in WLM success and regain. Comparable to the works of Byrne et al. (2003), and Elfhag and Rossner (2005), regainers were more likely than maintainers not to have attained their weight goals. Also, the regainers seemed to let one lapse turn into a complete regain (Byrne et al., 2003, McKee et al., 2013).

Numerous WLM efforts have produced a noteworthy amount of individuals who regain weight over time (Byrne et al., 2003; Elfhag & Rossner, 2005; McKee et al., 2013; Wing & Hill, 2001; Wing & Phelan, 2005). Considering that WLM success appears to be
an unachievable objective for numerous individuals, it was increasingly essential to understand the contributing factors linked to weight regain. It was challenging to separate the predictors that influence regain because it is so hard to completely assess individuals after treatment has ended. Few follow-up studies reported long-term outcomes and few studies reported outcomes for untreated control subjects (Perri et al., 2001).

The data seemed to propose that changes in behavior are stronger predictors of weight regain than biological or metabolic changes (Wing & Hill, 2001). Various studies established that different strategies are necessary in order to maintain weight loss and that interventions to stop regain would address the difficulty when an individual reached the weight maintenance period. There is a clear need to pinpoint long-term weight-loss management behaviors which will grant long-term weight regulation without the associated regain.

Many individuals successfully lose weight, but most are unable to maintain the weight loss. What was acknowledged about WLM is that there was a common opinion that practically no one succeeds in long-term maintenance of weight loss (Wing & Phelan, 2005). None of the empirical studies precisely identified the exact success or failure rates for long-term WLM.

Despite the empirical evidence, researchers associated with the National Weight Control Registry suggested that the success rate for maintaining weight loss might be about 20% (Wing & Hill, 2001). This success rate however, was defined as an intentional weight loss of at least 10% of body weight that was kept off at least one year (Wing & Hill, 2001). Weight loss is time limited; WLM is forever (Reyes, 2012, p.503).
The literature review presented a variety of analyses and data that described the successful weight-loss maintainer in relation to changes in behavior and motivation. In an attempt to synthesize further the evidence brought forth in the journal articles, a profile describing the successful weight maintainer is offered. A successful weight-loss maintainer effectively begins losing weight initially in program treatment and reaches the intentional weight-loss goal. The weight-loss maintainer adds physical activities such as walking. This individual continues to monitor the weight-related behaviors, is in control over eating behaviors and is not too bothered by hunger. Food consumption is kept at a lower level complemented by meal regularity, always including breakfast, and healthy foods are chosen in favor of high fat food. Snacking is reduced. If suffering a setback which could lead to weight regain, the weight-loss maintainer manages to handle the experience in a balanced manner without seeing it as a detrimental failure. Controls are flexible instead of unyielding and there is autonomy.

One reason that WLM has continued to be so hard to get hold of may be the failure of interventions to study the critical role of motivation in health behavior change and maintenance. This is a significant unknown. Most interventions have up until the mid-1980s concentrated predominantly on the “skills” or more practical characteristics of behavior change such as problem-solving and self-monitoring. In 1996, Williams et al. conducted a study that revealed that the concept of autonomy-supportiveness was associated with positive results in weight loss and WLM. According to the self-determination theory, an individual will continue with a behavior or not based upon the degree to which they believe the idea for initiating and subsequently continue to regulate the behavior, which comes from within themselves (Deci & Ryan, 1985).
One can speculate that the issue that exists in the literature, in theory, was that there is a need to understand more about the process of weight maintenance after intentional weight loss. Particularly the motivations and barriers to weight maintenance, from the standpoint of those who experienced it which may lead to a consensus on how to intervene to aid others in maintaining weight loss (Hill, Thompson, & Wyatt, 2005; Hindle & Carpenter, 2011; Lindvall et al., 2013; Williams et al., 1996; Wing & Hill, 2001). According to Wing and Hill (2001), research resources must be directed away from weight loss and toward maintenance of weight loss. Losing weight and keeping weight off are different practices and involve different behaviors. Therefore, research should focus on strategies for maintaining weight loss.

One can also hypothesize that the problem of poor WLM lies in a failure to develop a continuous care approach. Therefore, it is suggested that providing individuals with a program of continuous care could result in successful long-term management of weight loss. Investigating continuous care WLM empirical studies may identify models that should be tested in future research.

Gaps, Limitations, and Recommendations

Clearly, there is a need to better understand why WLM is so challenging and how it can be integrated into weight-loss programs as an essential component that leads to successful long-term WLM. The Kraschnewski et al. (2010) study concluded that more than 16% of individuals who have been overweight and obese are able to lose and maintain long-term weight loss. However, it remains clear that “mainstream Americans” who make up the great majority of the remaining 84% who are overweight are not able to lose much weight and keep it off for the long term. Further investigation of the
successful long-term WLM methods of individuals who are able to achieve success may reveal additional knowledge that was reported in the Kraschnewski et al. (2010) analysis.

In some studies, it was recognized that BMIs and self-reporting weighing were approximations, especially in the overweight and obese categories (Lowe et al., 2001). In addition, BMI does not take into account variations in body structure across ethnic groups. WLM in NWCR was self-reported, as were dietary consumption and physical activity information. Actually, there was truly no documented evidence (e.g., weigh-ins observed by the researchers) of the weight loss in members and whether they had really maintained the weight loss (Thomas et al., 2014). While it was possible that biases in self-reported current and previous weights were correlated, studies did not confirm this fact in the literature review and consequently must be confirmed by studies that include measured weights and heights.

Overall, finding the predictors related to successful WLM and understanding the behaviors and fundamentals that are critical in sustaining a reduced body weight are recommended. It has also been recommended that behavioral and motivational factors can be of particular significance for WLM and should receive more consideration (Wing & Hill, 2001). Based on the qualitative and quantitative studies conducted throughout the last decade (Barnes et al., 2007; Hindle & Carpenter, 2011; Metzgar et al., 2014; Reyes et al., 2012; Sciamanna et al., 2011; Svetkey et al., 2008; Wing & Hill, 2001; Wing & Phelan, 2005; Wing et al., 2006), future interventions should be personalized to the individual needs of each participant with attention to an individual’s biology, life phase, and prior experiences.
Chapter 3: Research Design Methodology

Introduction

This chapter describes the research design and research context in which the present study was conducted. The data collection tools (instrumentation) used in the study will also be discussed in this chapter. The chapter also describes the research participants, the procedures for data collection, and the data analysis process.

General Perspective

Long-term weight-loss maintenance is often accompanied with a great possibility of failure. Though various strategies have proven beneficial for prompting weight loss such as combining a low-calorie diet with physical activity and behavior therapy (NIH, 1998), the regain rates associated with weight-loss maintenance remain high. Weight loss interventions and programs provide strategies for short-term weight loss; however, the evidence is scarce that interventions and programs include WLM strategies which differ from those used to achieve weight loss alone (Reyes et al., 2012). Research studies are vague on two very important questions: what are the most effective prevention and management strategies for not only losing weight, but also maintaining the weight loss; and why are some individuals successful weight-loss maintainers while others regain weight? Recognizing that these issues have not been adequately addressed, various institutes, foundations, governmental agencies, for-profit and not-for-profit groups have investigated the state of the science and are currently endeavoring to develop outcomes
that may be applied to improve the success of WLM. Identifying specific predictors related to long-term success can inform interventions and supports that will benefit individuals in maintaining a healthier weight.

There are several health behavior change theories used when attempting to understand long-term WLM. Two such models, the health belief model and the self-determination model, collectively provide a framework for understanding long-term WLM. According to Daddario (2007), the health belief model proposes that individuals will be motivated to lose weight if they believe weight loss will lessen the chance of contracting a serious disease. However, the self-determination theory (SDT), a theory conceived by Deci and Ryan (1985) provides a structure that embraces components of the health belief model but advances it by understanding how individuals can be encouraged to make decisions that will have a positive effect on long-term health. The SDT stresses the methods through which an individual attains the motivation for starting new health-related behaviors and maintains them over time (Ryan et al., 2008) from a psychological needs perspective.

By investigating the experiences of successful long-term weight-loss maintainers, predictors of long-term WLM could emerge. For example, addressing how motivation is currently viewed by WLM programs or why some individuals are motivated and some are not are areas of investigation from the viewpoint of SDT. There is a need to move research efforts from solely investigating predictors of WLM to investigating the motivational factors of long-term WLM. Therefore, pinpointing predictors of long-term weight control in relation to motivation is especially critical.
Research Context and Research Questions

Much of the research addressing the issue of WLM comes from either published clinical trials or the National Weight Control Registry (Wing & Phelan, 2005). The National Weight Control Registry (NWCR) was founded in 1994 to study weight loss and weight maintenance strategies of successful weight-loss maintainers. The NWCR is the largest study ever of individuals who were highly successful at long-term maintenance of weight loss. While the large sample size and use of quantitative outcome measures are strengths of the research, there is one limitation to consider: self-reporting. A study conducted by Stubbs et al. (2012) involved NWCR participants who were a self-selected group which not only self-reported behavior changes associated with weight loss and WLM, but also self-reported body weight and physical activity. Since self-reporting tends to be biased (Stubbs et al., 2012), it is not clear if the results from this very specific group are generalizable, thus, the limitation.

This study investigated motivation and WLM. Specifically, the study investigated the form of motivation that significantly affects how much weight research participants lose and are able to successfully maintain over the long term. In order to gain a better understanding of the motivational influences of long-term weight-loss maintainers, the following research questions were addressed:

RQ1. What predictors motivate individuals who are long-term weight-loss maintainers?

RQ2. What predictors do long-term weight-loss maintainers use to maintain their weight loss? How are the predictors different from those used to lose the initial weight?
There are different forms of motivation that can arise internally from the self or from external sources. One end of the scale relates that an individual acts with volition while the other end of the scale is when an individual is feeling pressured to act. Gaining a better understanding of the motivation and behaviors of adults who are successful at long-term weight loss may support the development of effective weight maintenance components of weight loss interventions.

**Research Design**

This research study used the mixed methods research design in order to integrate both quantitative and qualitative results. Specifically, this research study centered on the explanatory sequential mixed methods model in which the investigator initially completed quantitative research and analyzed the outcomes, and then, based on the outcomes, described them in a more exhaustive, qualitative examination (Creswell, 2014). This allowed for analysis both statistically and textually. This study also employed descriptive research because its purpose was to determine maintenance strategies used by long-term weight-loss maintainers, how they are perceived by long-term maintainers, and what makes the identified strategies different from those used for initial weight loss (Joyner, Rouse, & Glatthorn, 2013). The core of mixed methods is found in the pragmatic worldview because of the concern for what works and providing the best understanding of a research problem (Creswell, 2014). For these reasons, this researcher considered the gathering of both quantitative and qualitative data would provide a more comprehensive understanding of the research problem with greater depth and insightfulness (Roberts, 2010).
**Survey.** The survey design offered a quantitative report of attitudes and behaviors of a specific target population (Creswell, 2014). It also permitted prompt turnaround in the data collection process. The identified research questions were addressed by surveying members of the Young Men’s Christian Association (YMCA) of Greater Rochester, in Rochester, New York.

**Focus group.** Two focus group sessions, involving selected long-term weight-loss maintainers, occurred at the Carlson MetroCenter branch in order to offer a qualitative perspective on the experiences of long-term weight-loss maintainers. Conducting a semi-structured group interview during the focus group sessions allowed for the understanding of themes as they related to the experiences of long-term weight-loss maintainers (Brinkmann & Kvale, 2015). The study received approvals from the risk management department of the YMCA of Greater Rochester and the Institutional Review Board (IRB) of St. John Fisher College to conduct the study.

**Research Setting and Participants**

The research setting for this study was the YMCA of Greater Rochester. The YMCA is a community organization that offers prevention and wellness resources to individuals of any age, gender, race, or religion. The YMCA strives to assist families and individuals to form and maintain healthy lifestyles on a daily basis. The organization, in general, believes that by assisting families and individuals from different experiences improve their well-being, they will play a strategic role in fostering a stronger Rochester community. Rochester, New York, a metropolitan area of about 750,000 people (http://www.census.gov/quickfacts/table/PST045215/36055) has 11 YMCA family branches open to all, and therefore they connect with individuals from all experiences.

The YMCA of Greater Rochester was deemed to be a fitting setting because nationally it is known to provide a healthy and motivational atmosphere. As an example, from 2004 to 2006 the Indiana University School of Medicine collaborated with this organization in their municipality to implement and assess a diabetes prevention program (Ackermann et al., 2008). By applying a mixed methods design, the research study found that the outcomes demonstrated the potential for successfully implementing the diabetes prevention program in community-based locations. Several other research studies found the YMCA to be a favorable means for dissemination of a low-cost model for healthy lifestyle interventions.

Employees and members of four of the 11 YMCA of Greater Rochester Family branches were invited to participate in this research. The survey was distributed to employees and members of the Eastside Family Branch, Westside Family Branch, Carlson MetroCenter, and Maplewood Family Branch. These four branches were selected based on the *2015-2016 YMCA Annual Report* unduplicated branch membership figures. The two largest suburban branches are Eastside (20,000 members) and Westside (13,000 members). The two largest urban facilities are Carlson MetroCenter (5,900) and Maplewood Family (3,600).
The Carlson MetroCenter facility was selected as the location for the focus group sessions because, as the corporate headquarters for the YMCA of Greater Rochester, it is the only facility with a private conference room and an exclusive entrance. The remaining branches are not permitted to have fully private conference rooms due to programming for children. At the family branches all meeting rooms must have one fully glassed wall to meet safety regulations.

Participants for the focus group sessions were individuals who completed the survey, volunteered their contact information, and met the definition of LTWLM, which is intentionally losing at least 10% of maximum body weight and keeping it off for at least one year (Kraschnewski et al., 2010; Wing & Hill, 2001; Wing & Phelan, 2005). In addition, in order to be considered a long-term weight-loss maintainer, participants must have been overweight or obese (BMI ≥ 25.0) at their maximum weight.

Participants were excluded if they were under the age of 19 as the YMCA of Greater Rochester categorizes youth as 0-18 years of age. Racial/ethnic identification was a demographic variable because ethnicity and race are not as well-represented in the literature about WLM as is age and gender. Therefore, this study investigated WLM as it relates to three prominent racial groups: non-Hispanic whites, non-Hispanic blacks, and Hispanics.

**Research instruments.** Two research instruments were used to conduct the study. The first research instrument consisted of a survey to obtain quantitative data (see Appendix B). Through the use of a survey, a quantitative analysis yielded needed facts and frequencies in the data collection process. The second research instrument involved two focus group sessions to obtain the qualitative data needed. The key reason for this
method of interviewing was to encourage diverse perspectives on the subject of long-term WLM (Brinkmann & Kvale, 2015).

**Survey.** The survey created for this study had 38 closed-ended questions in totality. This instrument was composed of four sections. Section A consisted of 11 questions related to current health and weight history. The questions were developed to compute BMI and categorize long-term weight-loss maintainers and weight regainers in order to address the research questions. Section B was the 15-question Treatment Self-Regulation Questionnaire (TSRQ) and Section C was the 4-item Perceived Competence Scale (PCS). Section D contained 8 questions that provided basic demographic information including age, gender, race, education, marital status, and employment. The TSRQ and PCS questionnaires were retrieved via the self-determination theory website (http://selfdeterminationtheory.org/). These questionnaires, which were established for research on SDT, are copyrighted. However, individuals interested in health care related research are welcome to use the instruments for academic research projects. The Flesch Reading Ease Formula measured the TSRQ at 83.2, which considered it easy to read with a fourth grade reading level. The PCS survey scored 61.3, which is acceptable with a “standard” rating and an eighth grade reading level.

The TSRQ is designed to assess the different forms of motivation within SDT (Deci & Ryan, 1985). This assessment tool is functional across several settings and diverse health behaviors such as diet, exercise, and smoking behaviors (Levesque et al., 2007). The TSRQ is a collection of questions concerned with why individuals attempt to change an unhealthy behavior, engage or would engage in some healthy behavior, or engage in some other health relevant behavior (http://selfdeterminationtheory.org/). This
scale has 15 items: six that assess autonomous motivation, six that assess controlled motivation, and three that assess amotivation. While the TSRQ in its original form assesses general health behaviors, for this survey the questions were modified to specifically assess behaviors in reference to long-term weight-loss maintenance. Specifically, the stem of each survey question was kept the same (see Appendix G). The survey stated, “The reason I would achieve/maintain a healthy body weight after long-term weight loss is…” Also, two of the 15 questions were modified to include the phrase “healthy weight.”

Autonomous motivation is defined as a sense of choice and the perception that the individual is the source of their actions, as opposed to feeling forced or coerced into doing something (Deci & Ryan, 2002; Ng et al., 2012). The autonomous motivation subscale consists of items #1, 3, 6, 8, 11, and 13. Controlled motivation is described as being pressured by some interpersonal or inner psyche force (Deci & Ryan, 2002). The controlled motivation subscale consists of items # 2, 4, 7, 9, 12, and 14. Amotivation is the state of lacking intention to act. Amotivated individuals do not behave in a purposeful manner (Levesque et al., 2007; Ng et al., 2012). The amotivation subscale consists of items # 5, 10, and 15 (http://selfdeterminationtheory.org/). Responses to the 15 items were given using a 7-point Likert scale ranging from 1 (not at all true) to 7 (very true) (Levesque, et al., 2007).

According to SDT, different categories of motivation underlie the behavior of individuals and each type is arranged on a continuum from having a lack of motivation and not self-determined at all, to intrinsic motivation and being self-determined (Deci & Ryan, 2002; Levesque et al., 2007). The design of the TSRQ questionnaire asks
individuals why they do or would engage in certain behaviors (http://selfdeterminationtheory.org/). Levesque et al. (2007) investigated the validity and reliability of the theoretical structure of the TSRQ across three distinct health behaviors, including diet. The researchers confirmed both the reliability and the validity of the TSRQ and its effectiveness as an assessment instrument for different health behaviors. For one study at the University of Rochester assessing behaviors related to tobacco and diet, the amotivation value was found to be unacceptable (0.41); however, the other subscales were acceptable as most had α value > 0.73 (Levesque et al., 2007).

The Perceived Competence Scale (PCS) involves relating feelings about behaving in healthy ways. It is a concise 4-item questionnaire that evaluates the point in which individuals feel confident about being able to make, or in this case, maintain a change toward a healthy behavior. Respondents indicated their agreement with each item on a 1 (not at all true) to 7 (very true) scale (http://selfdeterminationtheory.org/). According to the SDT, it was discovered that individuals who feel more competent regarding a specific behavior are more prone to making and maintaining the change and therefore demonstrate positive healthy results (http://selfdeterminationtheory.org/). Competence refers to the feelings an individual has about their personal capabilities and skills (Deci & Ryan, 2002; Ng et al., 2012). As an example, a long-term weight-loss maintainer who acquires the skill to journal their dietary intake would likely have an improved personal competence. The survey instrument used in this study appears in Appendix C. While the PCS in its original form assesses feelings about behaving in healthy ways, for this survey all four items were modified to specifically refer to maintenance of a healthy weight.
In a study investigating behavior change related to smoking, the four PCS items were used to measure the degree to which patients felt able to discontinue smoking successfully (Williams et al., 2006). The four PCS items presented good internal consistency at baseline (α = .91) and at 1 month (α = .93). The internal consistency of each subscale in the Levesque et al. (2007) study was α = 0.86 for smoking and 0.89 for diet (Levesque et al., 2007).

**Focus group session.** The second research instrument used two focus groups to gain a greater understanding of the motivation and behaviors of long-term weight-loss maintainers beyond the quantitative survey results. By choosing the focus group structure, it allowed the use of a descriptive evaluation format. The qualitative interview process used in the focus group setting encouraged participants to accurately describe what they experience and feel and their actions when it comes to long-term WLM. The focus group sessions were designed to gain information that explained weight maintenance experiences in order to determine what predictors are used by long-term weight-loss maintainers to maintain their weight loss and how they are different from those who lose weight.

A series of five open-ended questions (Appendix D) were created to support the goals of the research and the research questions posed. The questions were patterned after focus group questions developed by Hindle and Carpenter (2011), Metzgar, Preston, Miller, and Nickolson (2014), review of WLM literature (Barnes et al., 2007; Byrne, Cooper & Fairburn, 2003; Wing & Phelan, 2005) and were also derived from the SDT literature and the basic psychological needs of autonomy, competence, and relatedness. The focus group scripts structured the course of the interview in a detailed sequence of
carefully worded questions (Appendix D). The focus group protocol permitted the participants to discuss their feelings, insights, and methods related to maintaining long-term weight loss, the motivational predictors that have allowed them to maintain their long-term weight loss, and what predictors are different when relating weight loss approaches to maintenance strategies (see Appendix D).

**Procedures for Data Collection**

**Survey administration.** The survey was administered through a blend of three distinct data collection modes: group administration, Internet, and mail. Fowler (2014) states that one approach to diminish nonresponses to survey instruments is to use more than one method to collect data. Because the YMCA of Greater Rochester makes it a practice not to release e-mail addresses and mailing addresses of their employees and members, the primary mode for collecting the needed data was completed by going to four facilities where employees and members were accessible. Paper questionnaires were distributed to employees and members who agreed to complete the survey on-site. One of the significant strengths of group-administered surveys is the high response rate (Fowler, 2014). An additional benefit is having the opportunity to describe the study and respond to questions about the survey (Fowler, 2014). Small incentives such as water bottles and healthy snacks were offered to individuals who completed the survey on-site. If the individual also provided their contact information, they were eligible for one of two $50 Amazon gift cards.

Respondents were also given the option of going to a website to complete the survey. Qualtrics was used to create the online version of the survey due to its easy
interface. Qualtrics has the St. John Fisher identity included in the survey instrument so participants recognized that the college supported the dissertation research.

Respondents were provided with a brief informative document effectively and precisely describing the purpose of the research study. The document provided the website address where the survey form was available for completion and described the importance and usefulness of their completing the survey. Lastly, potential respondents who were hard-pressed for time, communicated a deficiency in computer skills, or did not have access to or did not use computers were provided with a paper survey and a self-addressed stamped envelope to return the survey form. This was a feasible third option to reach high response rates (Fowler, 2014). Because the researcher collected data from a population that is likely to be attracted to the research topic, Fowler (2014) maintains that these modes become more appealing.

**Focus group session.** The researcher served as the interviewer. With the intention of acquiring the important abilities needed to relate to the focus group portion of the study, the researcher studied webinars that concentrated on managing a focus group (Hernandez, 2014; The Ohio State University, 2013). Important skills that were integrated throughout the content of the webinars included how to communicate with focus group participants, how to handle dominant respondents and quiet participants to make each focus group as effective and well-organized as possible without bringing bias into the sessions. Furthermore, the researcher was permitted to view a videotape of an actual focus group held at the Eastman Institute of Oral Health. After the 2-hour viewing, the Dental Public Health resident, who directed the focus group with an
Associate Professor at the University of Rochester Medical Center, discussed the management of the focus group and answered questions posed by the researcher.

In order to free the researcher to efficiently serve as the interviewer, the sessions were audio recorded. Brinkmann and Kvale (2015) indicate that audio recording permits the interviewer to focus on the dynamics that take place during a focus group session. Also captured by audio recording are the pauses, tones, and precise phrasing that can be retained and studied multiple times. The focus group sessions encouraged dialogue among participants and the sharing of experiences, feelings, and opinions related to WLM. The semi-structured group interview used to gain narratives of the world of the focus group participants allowed the researcher to accurately understand the experiences of WLM in relation to motivation and long-term strategies.

A review of the survey instrument tool and the focus group questions was conducted with a group of individuals who lost weight, and were long-term weight-loss maintainers who were outside of the target population. This field-testing procedure took place to improve alignment with the research questions, confirm that the interview questions were logical, the completion timeframe was accurate, and the language was clear. Based on the review, changes were made. Such field-testing was done to decrease the possibility of poor data collection and enhanced the reliability of the results.

Convenience sampling was used to collect survey data because the survey population at the four family branches of the YMCA of Greater Rochester was easily accessible, available at given times, and willingly participated once the intent of the survey was described. Prior to the distribution of the surveys, the Health and Wellness Directors at the four branches were provided with an introductory paragraph that was sent
to branch employees via e-mail that explained the purpose of the research project and the timeframe for the circulation of the surveys at their branch (see Appendix C). This allowed employees to answer any questions raised by YMCA members. Surveys were distributed to employees and members of four of the 10 branches of the YMCA of Greater Rochester for 10 calendar days during December 2016. The Health and Wellness Directors at the four branches provided peak times when their facilities had the most members in attendance. Based on this data, a daily schedule was made of dates and times the researcher was to present at each facility to distribute and collect surveys. Peak data collection times included 5:30 – 8:30 a.m., 9:00 – 12 noon, and 6:00 – 8:00 p.m. weekdays. Weekend peak times were 7:00 – 10:00 a.m. on Saturdays and 8:00 – 12 noon on Sundays.

Once the survey data was collected the researcher used the self-reported current weight of an individual, their weight 1 year ago, and their maximum weight to identify long-term weight-loss maintainers. From these items, a measure of long-term weight change was constructed as follows: current weight and weight 1 year ago were converted to BMIs. Long term weight change = current BMI – 1 year ago BMI, with negative numbers indicating weight loss (smaller BMI) and positive numbers indicating weight gain (larger BMI). BMI was calculated by dividing the self-reported weight in pounds by the self-reported height in inches squared which was then multiplied by 703. The values were then classified into standard BMI categories as defined in Table 3.1, which are standard NIH cut points (http://www.nhlbi.nih.gov/health/educational/lose_wt/BMI/bmi_dis.htm).
### Table 3.1

*Classification of Overweight and Obesity by BMI*

<table>
<thead>
<tr>
<th>Classification</th>
<th>BMI (kg/m²)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Underweight</td>
<td>&lt;18.5</td>
</tr>
<tr>
<td>Normal</td>
<td>18.5-24.9</td>
</tr>
<tr>
<td>Overweight</td>
<td>25.0-29.9</td>
</tr>
<tr>
<td>Obesity I</td>
<td>30.0-34.9</td>
</tr>
<tr>
<td>Obesity II</td>
<td>35.0-39.9</td>
</tr>
<tr>
<td>Extreme Obesity (Obesity III)</td>
<td>40.0+</td>
</tr>
</tbody>
</table>


Survey respondents who volunteered their contact information and met the definition of long-term WLM were qualified for participation in the focus group sessions. Based on information provided concerning their current weight and height (questions #1 and #2), lowest and highest weight in the past year (question #3), and maximum weight (question #6), calculations provided current and past BMI (body mass index) measurements which allowed participants to be identified as long term maintainers. A purposive sampling strategy was used for the qualitative portion of this study. Focus group participants were selected because they purposefully informed an understanding of the research problem and significant experiences related to long-term WLM (Creswell, 2013). Focus group participants completed the survey instrument and voluntarily agreed to be contacted to participate in a session.
Individuals who met the criteria were contacted via e-mail and phone and asked to participate in a focus group session. Potential respondents were informed about what it was that they were volunteering to participate in (Appendix E). Those interested in participating in a focus group session were asked to respond back to the researcher via e-mail or phone. Once a confirmation e-mail or phone call was received, the date, place, and time of the focus group sessions were sent to the respondents along with the Informed Consent form (Appendix F). Respondents were asked to complete the informed consent, which summarized and confirmed their understanding of the research study and their ability to opt out from the study. Within the Informed Consent form (Appendix F), a statement was added to the “What will be asked of me” section in which a participant could specify if they consented to having their height and weight measurements recorded by answering yes or no and initialing.

The informed consent also clarified the choice to not answer certain questions during the focus group session. Offering the respondents this level of autonomy assisted in guaranteeing that coercion did not happen and diminish the chance of collecting biased data. After reviewing the consent form respondents were asked to bring the form to the focus group session signed and dated. The intention of the signed consent form was to provide confirmation that the researcher covered significant specifics with each respondent, and, in return, the respondents consented to the terms of the study (Fowler, 2014). In addition, the Institutional Review Board (IRB) of St. John Fisher College required written evidence that respondents were fully informed and consented. On arrival for the focus group session participants were welcomed into a private, secure room at the Carlson MetroCenter branch of the YMCA of Greater Rochester. Before the focus group
session began, with the voluntary consent of each participant, height and weight measurements were recorded in a small, private area. A Center for Community Health (CCH) volunteer, experienced with taking accurate height and weight measurements, was recruited for the purpose of weight and height data collection. The height and weight data were used to compare with the data provided in the self-reported survey responses. After the height and weight data were collected, confidentiality statements were also collected (see Appendix H). The CCH volunteer left the facility prior to the start of the focus group sessions. Copies of the signed consent forms and confidentiality statements were provided to each participant before each session began.

The first focus group session was held on a Saturday morning for a 1-hour timeframe. The second focus group was held on a Sunday afternoon for a 40-minute timeframe. The difference in time was because the Sunday session only had two participants. Therefore, the questions were thoroughly answered in a shorter period. During the focus group sessions, the researcher briefly explained the purpose of the focus group, the use of two audio recording devices, and asked the participants if they had any questions before starting the interview. The researcher then asked a series of five open-ended questions (Appendix D) that were created to support the goals of the research and the research questions. The questions were patterned after focus group questions developed by Hindle and Carpenter (2011), Metzgar, Preston, Miller, and Nickolson (2014), and were also derived from the SDT literature and the basic psychological needs of autonomy, competence, and relatedness. The focus group script structured the course of the dialogue in a detailed sequence of carefully worded questions (Appendix D). The interview session concluded with the researcher asking if there was anything else
participants wanted to bring up or ask about before the sessions closed (Brinkmann & Kvale, 2015). This provided the participants with an added chance to communicate what they have been reflecting upon during the sessions. After the focus group sessions concluded, the audio recordings and any written passages from the notes of the researcher were analyzed together for meaning (Brinkmann & Kvale, 2015).

**Procedures for Data Analysis**

Data analysis of the results was multifaceted due to the quantitative (survey) and qualitative (completion of a focus group session) processes used within the study. The survey produced correlational, descriptive, and statistical data to address the research questions. Completion of the focus group sessions resulted in exploring areas of the lives of individuals who have lived the experience of being a long-term weight-loss maintainer.

IBM’s Statistical Package for Social Sciences, version 22 (SPSS, 22) was used to provide the statistical analysis based on the data collected by the survey. SPSS produced correlational data to draw generalizations about the characteristics of the survey respondents. In addition, SPSS generated descriptive statistics (frequencies, percentages, minimums, maximums, means, and standard deviations).

Phenomenological data analysis was used to evaluate the data from the focus group sessions. First, the researcher and a professional transcriptionist transcribed the audio content from the focus group sessions. After this procedure was completed, the researcher listened to the audio recordings in their entirety to determine that transcripts were verbatim. During coding the analytic induction methodology was used to develop assertions between long-term WLM, motivation, and possible predictors associated with
weight management. The outcome of the analyses highlights important assertions, supported by testimonials, which yielded themes relevant to the lived experiences of long-term weight-loss maintainers. The researcher compiled the assertions from the focus group sessions into larger themes. Finally, the researcher used quotes from focus group participants to explain each theme.

**Chapter Summary**

This study is a mixed method design using a survey to gain the quantitative data and focus group sessions to obtain the qualitative data. The survey was distributed to employees and members at four of the 10 branches of the YMCA of Greater Rochester located in Rochester, NY. To gather quantitative data, distinct data collection modes were used: group administration, Internet, and mail. An incentive program was put in place to maximize the response rate. SPSS was used to analyze the quantitative phase of the study. Two focus group sessions were used to gather qualitative data. Both methodologies were used to answer the research questions under consideration and to gain insight into the experiences of long-term weight-loss maintainers.

The key result of the collection and analysis of the survey data was the identification of long-term weight-loss maintainers. Analytic induction was used to process the data from the focus group sessions. The process included employing a professional transcriptionist to process the audio recordings. The researcher analyzed the audio recordings to make sure all dialogue was captured accurately in the transcripts. Based on studying the qualitative data, coding, assertions, and themes were developed. The research procedures and analyses of both the quantitative and qualitative data are
explained in detail in Chapter 4. The study concludes with a discussion of the findings, implications, and recommendations for long-term WLM in Chapter 5.
Chapter 4: Results

Introduction

The purpose of this study was to better understand WLM and identify the predictors of successful WLM among adult long-term weight-loss maintainers (LTWLMs) who have intentionally lost at least 10% of their maximum body weight and kept it off for at least 1 year. This was accomplished through a mixed methods analysis of a community organization that offers prevention and wellness resources to families and individuals in Rochester, New York.

The mixed methods research questions for the study include:

RQ1. What predictors motivate individuals who are LTWLMs?

RQ2. What predictors do LTWLMs use to maintain their weight loss? How are the predictors different from those used to lose the initial weight?

The quantitative data were analyzed using crosstabs, correlations, and a binary logistic regression to identify the strategies weight-loss maintainers use to maintain their weight loss (research question #2), test for correlations between BMI, types of motivations, and perceived competence, and to determine what variables may predict WLM. All data were analyzed using SPSS version 22.

Sample Characteristics

Two nonprobability sampling techniques were used for this study: convenience sampling and purposive sampling. These techniques were used because of the affordability of the approach and the availability of subjects. Convenience sampling was
used to collect survey data since the survey population at the four family branches of the YMCA of Greater Rochester were easily accessible, available at given times, and willingly participated once the intent of the survey was described. The members of the target population were considered homogeneous because the population is comprised of adults engaged in fitness behavior. Therefore, the convenience sampling cannot be taken to be representative of the general population.

The survey was administered through a combination of three distinct data collection approaches: group administration, Internet, and mail. Paper questionnaires were distributed to employees and members who agreed to complete the survey on-site. Respondents were also presented with the choice of utilizing a website to complete the survey. Lastly, potential respondents who were pressed for time, conveyed a lack of computer skills, or did not have access to or use computers, were offered a survey and a self-addressed stamped envelope to return the survey.

The target population for this study focused on an adult population engaged in fitness behavior. This was evidenced by their membership and active participation in activities at the YMCA. Surveys were distributed to employees and members of 4 of the 11 family branches of the YMCA of Greater Rochester. Two hundred and forty-six surveys were collected within 10 calendar days during December 2016.

Of the 246 surveys collected, members and employees from the suburban Eastside Family Branch completed 31% and 26% were collected from the suburban Westside Family Branch. From the urban family branches, the completion percentages were 23% from Maplewood and 20% from Carlson MetroCenter. Of the 246 surveys collected, 34 (13.8%) were identified as LTWLMs.
The descriptive statistics for the respondents are based on self-reported data provided in the survey. There is evidence documenting that individuals may underestimate their weight and overestimate their physical activity and length of time they have maintained their weight loss (Fitzgibbon, et al., 2008; Sciamanna et al., 2011; Stubbs et al., 2012). No adjusted estimates were used in this study to adjust for this possible bias.

While survey respondents were mostly female, there was a noteworthy response rate from males. This response rate was unanticipated given that males tend to be underrepresented in weight-loss research (Pagato et al., 2012; Voils et al., 2016). Nearly three-quarters of the survey respondents were White (69.3%), married (55.8%), and nearly all (80.8%) had some college through graduate level education. Most respondents were 50 years or older and were either employed full-time (37.25%) or retired (31.0%). Over half identified the suburban branches as the locations preferred to regularly visit. Demographic information for survey respondents can be found in Table 4.1.

**Quantitative Results**

**Diet/weight-loss plans and products used.** In order to identify if there were differences between weight-loss maintainers and non-maintainers in regards to the types of weight-loss strategies they used (research question #2), a series of four 2X2 chi-square analyses were run (see Table 4.2). The chi-squared test was performed on the survey questions that asked about diet/weight-loss plans, drugs, support groups, and bariatric surgery. Diet plans included Nutrisystem, Weight Watchers, Jenny Craig, and liquid diet). Drugs included prescription medications such as Sibutramine as well as over-the-counter diet pills. Support groups included Overeaters Anonymous and Food Addicts in Recovery Anonymous. Surgery included bariatric surgery. Participants were coded as
either having used at least one diet strategy or not having used any diet strategies. The 2
(yes versus no diet strategy) X2 (maintainer versus non-maintainer) was non-significant
indicating no differences between weight-loss maintainers and non-maintainers in the use
of these diet strategies.

Table 4.1
Characteristics of Respondents

<table>
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<th>Demographic Category</th>
<th>Variable</th>
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<th>%</th>
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</thead>
<tbody>
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<td></td>
<td>Male</td>
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<td>50-59</td>
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<td></td>
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<td></td>
<td>19-29</td>
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<tr>
<td>Race:</td>
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<td></td>
<td>African American</td>
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<td>.4</td>
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<td>Maplewood Branch</td>
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</tr>
<tr>
<td></td>
<td>Carlson MetroCenter</td>
<td>53</td>
<td>21.5</td>
</tr>
</tbody>
</table>

*aDuplicate count: some individuals responded with more than one YMCA branch.

The chi-squared test of independence is used to determine if there is a significant
relationship between two categorical variables. The chi-squared test of independence
only assesses associations between categorical variables, and cannot provide any
inferences about causation. The chi-squared test of goodness-of-fit is used when there is
a nominal variable and the researcher wants to see whether the number of observations in
each category fits a theoretical expectation, and the sample size is large. In these analyses, a test of independence was used. Table 4.2 is a cross tabulation of the use of diet/weight-loss aids amongst the survey respondents.

Table 4.2

Cross Tabulation Use of Diet/Weight-Loss Aids

<table>
<thead>
<tr>
<th>Strategy</th>
<th>% Non-Maintainers</th>
<th>% Maintainers</th>
<th>$X^2$</th>
<th>$P$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diet Plans</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>76%</td>
<td>25%</td>
<td>.38</td>
<td>.54</td>
</tr>
<tr>
<td>No</td>
<td>71%</td>
<td>29%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Drugs</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>68%</td>
<td>32%</td>
<td>.13</td>
<td>.72</td>
</tr>
<tr>
<td>No</td>
<td>72%</td>
<td>28%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Support Groups</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>57%</td>
<td>43%</td>
<td>.78</td>
<td>.38</td>
</tr>
<tr>
<td>No</td>
<td>72%</td>
<td>28%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Surgery</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>43%</td>
<td>57%</td>
<td>3.07</td>
<td>.08</td>
</tr>
<tr>
<td>No</td>
<td>73%</td>
<td>27%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Types of motivations and perceived competence. The Treatment Self-Regulation Questionnaire (TSRQ) is concerned with motivation for health behaving. TSRQ assessed types of motivation (Section B of the survey). The Perceived Competence Scale (Section C of the survey) assessed the degree to which participants felt confident about being able to make (or maintain) a change toward a healthy behavior. In relation to long-term WLM, the survey assessed the degree to which respondents felt confident about being able to maintain a healthy weight.

Before testing for correlations between BMI, types of motivations, and perceived competence, as well as predictors of WLM, the summary statistics of means, minimums,
maximums, and standard deviations were examined. The summary statistics communicated in Table 4.3 indicate how the data were distributed for BMI, each of the types of motivation, and perceived competence for the survey respondents who provided data on the listed variables.

Table 4.3  
*Sample Size and Common Summary Statistics for BMI, Types of Motivations, and Competence*

<table>
<thead>
<tr>
<th>Scale</th>
<th>N</th>
<th>Q1</th>
<th>Q3</th>
<th>IQR</th>
<th>Mean</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current BMI</td>
<td>242</td>
<td>23.99</td>
<td>31.44</td>
<td>7.45</td>
<td>28.6</td>
<td>6.17</td>
</tr>
<tr>
<td>Forms of Motivation</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Autonomous</td>
<td>223</td>
<td>6.00</td>
<td>7.00</td>
<td>1.00</td>
<td>6.3</td>
<td>.89</td>
</tr>
<tr>
<td>Controlled</td>
<td>222</td>
<td>2.67</td>
<td>4.50</td>
<td>1.83</td>
<td>3.5</td>
<td>1.27</td>
</tr>
<tr>
<td>Amotivation</td>
<td>220</td>
<td>1.08</td>
<td>3.00</td>
<td>1.92</td>
<td>2.3</td>
<td>1.25</td>
</tr>
<tr>
<td>Competence</td>
<td>228</td>
<td>1.00</td>
<td>7.00</td>
<td>6.00</td>
<td>5.4</td>
<td>1.35</td>
</tr>
</tbody>
</table>

*Note.* min = minimum; max = maximum; BMI = body mass index (weight [lb] / height $^2$ [in]) x 703; Q1 = 1st Quartile, Q3 = 3rd Quartile; IQR = Interquartile Range

The average current BMI of survey respondents was 28.6; that is classified as overweight. The span of BMI scores ranged from underweight (18.2) to extreme obesity (49.9). The responses to each of the types of motivation spanned the entire range of the Likert scale which was 1-7 with seven being “very true” although the range for autonomous motivation was 2 to 7. This indicates a wide range of experiences. The subscale for autonomous motivation had a mean of 6.3, which relates to respondents, on average, believing they have carefully thought about WLM and believe it is very important for many aspects of their lives. The mean perceived competence score was 5.4, indicating that, on average, respondents believed they are able to meet the challenge.
of maintaining a healthy weight. In contrast, the mean score for amotivation was 2.3, which reflects that very few respondents reported a lack of motivation or, if motivated at all, it is likely externally motivated. The means and standard deviations for controlled, amotivation, and perceived competence were relatively consistent with one another. Only amotivation was much less strongly endorsed.

In order to determine whether there was a relationship between current body mass index (BMI), types of motivation, and perceived competence, a Pearson correlation test was run. The correlation between BMI and perceived competence was negative, moderately strong, and statistically significant ($r = -36, p = .000$). This indicates that the lower the current BMI, the higher the perceived competence. Conversely, the higher the current BMI, the lower the perceived competence.

The correlation relating perceived competence and autonomous motivation was positive, moderately strong, and statistically significant ($r = .36, p = .000$). This suggests that the higher the perceived competence, the higher the autonomous motivation and vice versa. The correlation involving amotivation and controlled motivation was positive and statistically significant ($r = .27, p = .000$) but not moderately strong. This indicates that the lower the amotivation, the lower the controlled motivation. Equally, the higher the amotivation, the higher the controlled motivation. Having a positive correlation between amotivation and controlled motivation can lead to negative outcomes such as weight regain or giving up on long-term weight loss altogether.

The correlation linking amotivation and autonomous motivation was negative, statistically significant ($r = -.22, p = .000$) but not moderately strong. This means that the higher the amotivation, the lower the autonomous motivation, and vice versa. Finally,
the correlation between controlled motivation and autonomous motivation was positive and statistically significant ($r = .20, p = .000$) but not moderately strong. This indicates that controlled motivation and autonomous motivation are largely independent.

It is important to note that although there is a correlation between the current BMI and perceived competence, it is not a causal relationship. Although current BMI and perceived competence are moderately negatively correlated, it is difficult to argue that a higher perceived competence causes a person to have a lower BMI. This is because there may be other variables responsible for this co-relationship. Table 4.4 shows the measures between current BMI, motivation, and perceived competence.

Table 4.4

<table>
<thead>
<tr>
<th>Measure</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. BMI</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Autonomous</td>
<td>-.04</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Controlled</td>
<td>.01</td>
<td>.20*</td>
<td>-</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Amotivation</td>
<td>.08</td>
<td>-.22*</td>
<td>.27*</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>5. Competence</td>
<td>-.36*</td>
<td>.36*</td>
<td>-.08</td>
<td>.01</td>
<td>-</td>
</tr>
</tbody>
</table>

*p < .05.

**Predictors of weight-loss maintenance.** To determine what variables may predict WLM, the three predictor variables of motivation (autonomous, controlled, amotivation), and perceived competence were tested using a binary logistic regression to determine if they predict WLM. WLM was a dichotomous variable (1 = maintained, 0 = not maintained). Binary logistic regression allows for testing multiple variables simultaneously. It is used in cases like this where the predictor variables are scaled and
the outcome variable is a dichotomous, nominal variable. Despite the significance of autonomous motivation and amotivation at the univariate level, the multivariate test revealed that, as a set, the motivation and competence variables do not significantly predict whether or not an individual maintains their weight loss (LR $X^2 (4, N = 208) = 8.29, p = .08$). These results indicate that there are other variables, besides those predicted by self-determination theory, that were not measured in this study that must influence whether or not individuals maintain their weight loss. Table 4.5 reports the regression results.

Although the overall regression was not significant, two predictor variables (autonomous and amotivation) were significant at the univariate level. For autonomous motivation ($Wald = 4.910, p = .027$), the odds ratio of .630 indicates that as autonomous motivation increases, the odds of maintaining weight loss are reduced by almost two-thirds. For amotivation ($Wald = 4.584, p = .023$), the odds ratio of .710 indicates that as amotivation increases, the odds of maintaining weight loss are reduced by almost three-fourths. The findings regarding autonomous motivation was unexpected in light of SDT. The findings regarding amotivation are more easily interpreted because individuals who are not highly motivated plausibly may be less likely to consistently engage in the challenging health behaviors required to maintain weight loss.

Analyses like chi-squared and binary logistic regression assume a balanced class distribution. When the data are unbalanced, the results tend to bias toward the majority class, which in this case were the non-maintainers (n=212). The maintainers (n=34), being in the minority, could contribute little to the error estimation. This imbalance was not anticipated and so was not accounted for in the sampling method.
Table 4.5

Logistic Regression Analyses Predicting Weight-loss maintenance

<table>
<thead>
<tr>
<th>Variable</th>
<th>B</th>
<th>S.E.</th>
<th>Wald</th>
<th>EXP (B)</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Autonomous</td>
<td>-.462</td>
<td>.208</td>
<td>4.910</td>
<td>.630</td>
<td>.027</td>
</tr>
<tr>
<td>Controlled</td>
<td>.197</td>
<td>.144</td>
<td>1.885</td>
<td>1.218</td>
<td>.170</td>
</tr>
<tr>
<td>Amotivation</td>
<td>-.342</td>
<td>.160</td>
<td>4.584</td>
<td>.710</td>
<td>.032</td>
</tr>
<tr>
<td>Competence</td>
<td>.218</td>
<td>.133</td>
<td>2.671</td>
<td>1.244</td>
<td>.102</td>
</tr>
</tbody>
</table>

Note. Model: $X^2 = 8.29$, $p = .08$, Cox & Snell $R^2 = .039$.

Focus Group Characteristics

Because certain qualifications were needed from the participants in order to participate in the focus groups, purposive sampling was used for the qualitative segment of this mixed methods study. The type of purposive sampling conducted was homogeneous. This was done in order to get an in-depth and unique understanding of long-term weight loss from individuals who lost 10% of their maximum body weight and kept it off for at least one year.

The qualitative interview process used in the focus group setting encouraged participants to describe what they experience and feel and their actions when it comes to long-term WLM. The focus group sessions were designed to gain information that explained weight maintenance experiences in order to determine what strategies LTWLMs use to maintain their weight loss and how they are different from what they did during their period of initial weight loss. A series of five open-ended questions (Appendix D) assessed their experience in maintaining weight loss, any difficulties maintaining the weight loss, support to help them maintain their weight loss, how they describe their experience with WLM to close friends, and advice given to others trying to
maintain weight loss. As noted earlier, when the data are unbalanced, the results tend to bias toward the majority class, which in this case were the non-maintainers. The maintainers, being in the minority, could contribute little to the error estimation.

Of the 246 surveys collected, 34 (13.8%) were identified as LTWLMs. All 34 of those individuals were invited to participate in a focus group. Eleven (32.4% of the 34) agreed to participate in a focus group and six (17.6% of the 34) actually participated. The focus group session held on Saturday was comprised of senior adults while the Sunday focus group session involved middle aged adults. The similarities in age ranges in each focus group were coincidental. Focus group participants’ demographics can be viewed in Table 4.6.

Table 4.6

<table>
<thead>
<tr>
<th>Category</th>
<th>ID# 99</th>
<th>ID# 134</th>
<th>ID# 136</th>
<th>ID#221</th>
<th>ID# 246</th>
<th>ID# 164</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pseudonym</td>
<td>“Connor”</td>
<td>“Lydia”</td>
<td>“Madison”</td>
<td>“Tyler”</td>
<td>“Benjamin”</td>
<td>“Alisha”</td>
</tr>
<tr>
<td>Age</td>
<td>64</td>
<td>75</td>
<td>75</td>
<td>60</td>
<td>55</td>
<td>47</td>
</tr>
<tr>
<td>Gender</td>
<td>Male</td>
<td>Female</td>
<td>Female</td>
<td>Male</td>
<td>Male</td>
<td>Female</td>
</tr>
<tr>
<td>Race:</td>
<td>White</td>
<td>White</td>
<td>White</td>
<td>White</td>
<td>White</td>
<td>Black</td>
</tr>
<tr>
<td>Y Membership</td>
<td>Westside</td>
<td>Carlson</td>
<td>Westside</td>
<td>Carlson</td>
<td>Carlson</td>
<td>Carlson</td>
</tr>
<tr>
<td>Self-Report</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Highest weight</td>
<td>180</td>
<td>152</td>
<td>220</td>
<td>226</td>
<td>298</td>
<td>226</td>
</tr>
<tr>
<td>How long ago</td>
<td>10 yrs.</td>
<td>2 yrs., 2 mos.</td>
<td>2 yrs.</td>
<td>6 yrs.</td>
<td>3 yrs.</td>
<td>2 yrs.</td>
</tr>
<tr>
<td>Highest BMI</td>
<td>28.2&lt;sup&gt;b&lt;/sup&gt;</td>
<td>27.8&lt;sup&gt;b&lt;/sup&gt;</td>
<td>40.2&lt;sup&gt;c&lt;/sup&gt;</td>
<td>30.7&lt;sup&gt;c&lt;/sup&gt;</td>
<td>41.6&lt;sup&gt;d&lt;/sup&gt;</td>
<td>38.2&lt;sup&gt;d&lt;/sup&gt;</td>
</tr>
<tr>
<td>BMI 1 yr. ago</td>
<td>24.69&lt;sup&gt;a&lt;/sup&gt;</td>
<td>23.99&lt;sup&gt;a&lt;/sup&gt;</td>
<td>32.53&lt;sup&gt;c&lt;/sup&gt;</td>
<td>25.90&lt;sup&gt;b&lt;/sup&gt;</td>
<td>31.40&lt;sup&gt;c&lt;/sup&gt;</td>
<td>31.1&lt;sup&gt;c&lt;/sup&gt;</td>
</tr>
</tbody>
</table>

Note. <sup>a</sup> = normal, <sup>b</sup> = overweight, <sup>c</sup> = Obesity I, <sup>d</sup> = Obesity II, <sup>e</sup> = Obesity III
Qualitative Results

**Analytic approach.** Qualitative data from the focus groups were analyzed using analytic induction (Erickson, 1986). Analytic induction includes six stages of data analysis. Stage 1 consisted of transcribing the audio recordings from the focus groups and compiling observational notes. In Stage 2, the data were grouped into distinctive elements through coding. This entailed assigning labels to lines of text so the researcher could cluster and then evaluate related pieces of information. In Stage 3, patterns and themes that emerged through the coding process were developed into declarative statements that constituted potential findings. Stage 4 involved compiling the relevant data for each assertion. For each assertion, data that reinforced, challenged, or presented different interpretations were compiled. Stage 5 entailed analyzing the assertion by testing it against the data. Based on the analysis, assertions were either amended, kept, or removed. During this stage, overarching themes were identified. The final stage required arranging the findings in an organized framework to answer the research questions.

The six themes and associated subthemes can be viewed in Table 4.7. Themes included the ideas and thoughts that were generated freely by focus group participants and that emerged repeatedly throughout the discussions and were recognized as significant themes by the researcher. The subthemes exist beneath the “umbrella” of a theme. Subthemes spotlight a few noteworthy particulars.

The results of the qualitative analyses are arranged by (a) the strategies LTWLMs use (RQ2), (b) how the long-term weight-loss strategies are different from those used to lose the initial weight (RQ2), and (c) exploring how the data relate to self-determination theory (RQ1).
Table 4.7

*Identified Themes and Subthemes*

<table>
<thead>
<tr>
<th>Theme</th>
<th>Subtheme</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eating strategies</td>
<td>Holidays</td>
</tr>
<tr>
<td></td>
<td>Distinctive for Seniors</td>
</tr>
<tr>
<td>Physical activity strategies</td>
<td>Exercise</td>
</tr>
<tr>
<td></td>
<td>Health risks</td>
</tr>
<tr>
<td></td>
<td>Mobility and dementia prevention/mental clarity for Seniors</td>
</tr>
<tr>
<td>Weight loss versus maintenance</td>
<td>Differences: Weight loss versus weight maintenance</td>
</tr>
<tr>
<td></td>
<td>Diet versus lifestyle change</td>
</tr>
<tr>
<td>Social support</td>
<td>Peers and professionals (positive)</td>
</tr>
<tr>
<td></td>
<td>Medical community (negative)</td>
</tr>
<tr>
<td>Body image</td>
<td>N/A</td>
</tr>
<tr>
<td>Self-determination theory</td>
<td>Autonomy</td>
</tr>
<tr>
<td></td>
<td>Competence</td>
</tr>
<tr>
<td></td>
<td>Relatedness</td>
</tr>
</tbody>
</table>

**Eating strategies.** Consistent adherence to a regular eating routine emerged as a common strategy for long-term WLM. Food management strategies identified by LTWLMs included reduced sugar intake, portion control, making deliberate choices such as eating more fruits and vegetables, limiting eating out, eating healthy snacks in lieu of junk food, and consuming water instead of soda and juices. Weight-loss maintainers also cited altering their cooking methods. Maintainers were conscious that they have to be mindful of the amount and kinds of food they consumed to remain at their decreased weights. This was seen in comments such as: “You want to cut up vegetables during the
day, make little snacks, you know. Throw them in the ranch dressing. But they're already made so you don't eat the junk food.” (Benjamin, 55 years old)

. . . And just being intentional about what you eat. Making a deliberate choice, stopping just a minute before you're at a buffet or something. Stop and think what it is. The other one we hadn't talked about is if you're going out to eat, eat something beforehand, so you're not as ravenous. Eat something healthy beforehand. (Lydia, 75 years old)

Focus group participants described infrequent periods of loss of control over eating. The exception was holidays. They disclosed that during the holidays there was an inability to maintain healthy eating. However, overwhelmingly, they described getting right back into their routine following the holidays. For example: “Given the holidays, it crept up a little bit, but that's what happens sometimes. I'm okay. Getting back on the bandwagon.” (Connor, 64 years old)

I mean it was Thanksgiving and it wasn't just the day of Thanksgiving. It was just that you had those leftovers and then I was, after eating healthy for a year or two, and then I just had that, oh God I haven't had this in so long, and you know it was like mac and cheese and greens. Not the greens and stuff itself but it was more like mac and cheese and the dressing and I had like, I always fix extra, and it was like that extra left over. And it was so good and I indulged in it. And that wasn't a good thing for me. But then I seen that the weight started . . . I picked up a good 8 pounds of that eating that. I started to see where my body started to change. And once I noticed that, right away, I was like no, I can't. I don't want to
go back where I was. I want to keep moving forward. And that's what I did. I took action. I gotta stay focused, keep going. (Alisha, 47 years old)

Among the LTWLMs who were senior adults (60+), consistent eating behaviors were a more commonly used strategy for WLM than exercise/physical activity. Tyler, a 60-year-old White male whose highest self-reported weight was 226 pounds emphasized the importance of adherence to an eating routine over exercise/physical activity: “You need to do both, I think it's mostly about what you put in your mouth. It's much less so about [exercise/physical activity], I think . . . . I just see that myself. That’s what I find anyway. I think exercise is a peripheral help, but it's mostly about what you eat.”

The attentiveness concerning WLM could be heard as maintainers spoke about the degree of conscious control they apply in regards to consistent eating routines. All of the maintainers in this study reported that following successful weight loss they remained vigilant about their weight, especially with regard to a regular eating routine. Keeping a consistent adherence to food management from day to day seemed to help maintain the loss because their food decisions take on a routine nature.

**Physical activity strategies.** Increased physical activity appeared to be a significant strategy in successful long-term WLM. Strategies identified by LTWLMs included being consistent and making exercise a priority, being actively involved in group exercise, and morning exercise. In addition, combining healthy eating with exercise/physical activity was a strategy that assisted in maintaining weight loss for the long-term. For these weight-loss maintainers, physical activity included exercising 3-6
days per week: “Always have your gym bag packed, ready to go. That way, there is nothing to hold you back.” (Benjamin, 55 years old) “I come [to the YMCA] about 5 days. I do 3 days of cardio and 2 days of weight room.” (Alisha, 47 years old) “You need to exercise 5 to 6 days a week… I'm at the gym 6 days a week, one or 2 hours.” (Connor, 64 years old)

“The other thing I think is, exercising in the morning. You make the commitment once. If you plan to exercise in the afternoon, so many things get in the way. If you do it in the morning, early in the morning.” (Lydia, 75 years old)

Based on these testimonies, being able to maintain weight loss for the long-term involves a substantial amount of exercise/physical activity. In addition to having a regular routine, there was also a WLM benefit of group exercise. “I do some individual stuff, but I do a lot of classes” was shared by Tyler, who decreased his BMI from 30.7 (Obesity I) to 25.9 (Overweight). He also indicated that the effect of exercise/physical activity on long-term WLM had the added benefit of an increase in energy levels, “Exercise makes me feel much, much better.”

Health risk concerns were a primary motivation for these LTWLMs being physically active. Increased exercise seems to be fundamental for the maintenance of weight loss and for reducing the health risks of such individuals. The LTWLMs cited health concerns as a key motivator for weight maintenance. Middle aged maintainers identified more emotional and mental risks for their reasons for exercise whereas senior adults were more motivated for health reasons such as maintaining mobility and preventing dementia.
Emotional and mental health risks were identified as an indirect asset to exercise/physical activity as a middle aged long-term weight-loss maintainer. For example:

It was a mental thing but I'm an addict so I go all out when it's something for gym, I'm all out. During these injuries, I have a bunch of injuries, and I've been coming here [YMCA] trying to stay out of depression . . . You know, it's a mental thing. If I miss a day here [at the YMCA], I feel like crap. (Benjamin, 55 years old)

It's a stress reliever. When I'm, sometimes you know you have those days where you struggle and you're down. And when I come here [to the YMCA] and I work out, I feel a whole lot better. Because I'm releasing, you know, some things.

(Alisha, 47 years old)

Senior adults consistently talked about the urgency to maintain mobility and prevent dementia as significant motivators for their weight maintenance efforts. For example:

“My kids, if I bring it up, are very anxious that I stay healthy and active, like their grandmother did. There's no way they wanna take care of me as an invalid, I can assure you. But if I follow my mother and my grandmother, there's 25 more years out there, so that's a substantial period of time to stay mobile. I would say, in some ways, my worry is as much about mobility as it is about weight.” (Madison, 75 years old)

“I really think exercise is more about keeping your mobility and your mental clarity and your body movement.” (Tyler, 60 years old) “Exercise is one helpful benefit in preventing, let’s say, some dementia.” (Connor, 60 years old)
Health-related quality of life issues seem to motivate LTWLMs in their efforts to manage their weight. There are possible inferences that can be drawn from LTWLMs with health related concerns and their subsequent motivation to maintain their weight loss. With middle aged adults in this sample, the motivation for maintaining weight loss was to improve emotional, mental, and physical functionality and quality of life. Seniors believed that exercise is a key motivation and behavioral strategy for long-term WLM as it improves their mental (dementia) and physical (mobility) functions and therefore their health-related quality of life. Exercise was an important motivator for both middle aged adults and seniors maintaining a long-term weight loss, be it emotionally, mentally, or physically health-related.

**Weight loss versus maintenance.** Long-term WLM strategies are different from those strategies used to lose the initial weight. Long-term weight maintenance is a difficult task. Most individuals who start with good intentions and commit to change their behaviors fail to maintain. Therefore, individuals must not only be motivated and make a commitment to lose weight and maintain it, but they must understand the difference between initial weight-loss strategies and maintenance strategies.

The focus group participants were asked if they found differences between the strategies used to lose weight and strategies to maintain the weight loss. The participants started the discussion concentrating on their weight-loss strategies which primarily were changing eating behaviors such as eating less and eliminating certain foods; increasing the amount and intensity of exercise/physical activity; and a specific self-monitoring strategy of goal-setting. The strategies associated with long-term WLM were slight variations from the weight-loss strategies. Weight maintenance strategies concentrated
on retaining constant, routine healthy eating behaviors previously learned during the weight-loss period with some deviations in food options; consistent and regular moderate intensity exercise/physical activity, and self-monitoring as it relates to being aware of slight changes in weight and progressing in the right direction promptly with little damage done. This distinction was seen in some of the descriptions provided by participants:

For me, losing those 10 to 15 pounds, I did increase my exercise, and I also increased the intensity of it a little bit. Didn't go crazy, but did increase the intensity just a little bit, and made a deliberate, conscious effort to eliminate, essentially, a lot of processed food and red meat. Then, to maintain, backed off a couple of the high intensity exercises per week and tried to maintain a more healthy, balanced diet. It seems to have been working. (Connor, 64 years old)

One distinct self-monitoring strategy was identified for weight loss. Goal setting was identified as a strategy that was commonly used by weight maintainers to help lose weight initially. However, when it came to WLM the key was to be aware of small fluctuations in weight by weighing in on a scale, checking how clothes fit, or looking at photographs. While strategies for monitoring varied, the goal was the same: “I weigh myself every morning…because then I have it in the back of my head, if I’ve gained a pound or something like that, then I am more cognizant of what I am eating.” (Lydia, 67 years old) “That's why for longer term weight loss, you gotta not let that weight creep happen.” (Tyler, 60 years old) “I will not touch that scale. I won't. I won't go near it. No, I won't…I think about my clothes and what I look like. I constantly take pictures and look at the transformation that's happening with me.” (Alisha, 47 years old)
From the dialogue about weight maintenance strategies being different from strategies used to lose weight, a conversation emerged about the contrast between the terms “diet” and “lifestyle change” for LTWLMs. The word “diet” is about what individuals eat, not what individuals go on. For LTWLMs, the definition of “diet” is about proper nutritional intake and associated more with losing weight than weight maintenance. The term is also identified as something stringent where systematic adherence is required. Their weight-loss experiences commonly began as a diet but, because it was too strict, it led to failures.

The use of the expression “lifestyle change” by LTWLMs suggests a different mindset when discussing weight loss and weight maintenance strategies. “Lifestyle change” for LTWLMs infers “ease” meaning weight loss is something you take your time with and ease into and it eventually leads to weight-loss attainment and weight maintenance for a lifetime. As an example, it is about changing eating behaviors gradually so it becomes a habit and doing it every day until it becomes a habit. Alisha, 47, contrasted the terms in this manner:

The lifestyle change. Not the diet because the diet is like, to me it’s like something strict. You got to be . . . it's like you got to follow it step by step, step this and that. I can't do the diet but the lifestyle change I feel is more easier. You can . . . you’re adjusting to something new. It's not as strict but you can take your time with it. But the diet, at first it started out, for me, I'm on a diet. But then as I was going, as I went along, I said this is too strict. You know, you got to do this and you got to do that and then you crash. But if I change my lifestyle, my way of eating, and gradually do it, it becomes a habit.
Whether the strategy is about weight loss or weight maintenance, the essential element is awareness on both ends of the scale. For LTWLMs, key weight-loss strategies consist of constructive modifications in eating behaviors, increased exercise/physical activity, and self-monitoring in the form of goal-setting. These strategies are then brought over to the weight maintenance phase with a lifestyle change mentality, perseverance, and swift response rates to any aberrations.

**Social support.** In this sample, support from peers and professionals was a facilitator of long-term WLM. Social support, usually from family members, friends, peers, or professionals was used to maintain motivation and offer reinforcement for appropriate behavior modifications. Positive social support came from sources such as family, friends, and fitness instructors. The negative social support came from some spouses and the medical community. Social support was also obtained from individuals who were also working toward weight loss and/or WLM.

Examples of positive social support were exemplified by statements such as:

I find my instructors… I do a lot of classes up here. I do some individual stuff, but I do a lot of classes. I think I'm a social person. I like it. You get to know people. The class I was just in, there was 20 some-odd people there, and I think I knew most of them…. You tend to hang around people, I think, that are similar to you. The friends I have are all very reasonably in shape, but they have their challenges and weight issues. I had lunch with a guy yesterday and he was saying about how the holidays were tougher, and he put on x amount of weight, and we were comparing notes. (Tyler, 60 years old)
I guess being around people, that helps too, for me. Kind of bored of working out at home for me but being around people, talking. And I know a few people that come to the Y and part of, like I say, the coffee hour sometimes you talk to a few people, you work out, it's better than being at home sitting in the kitchen.

(Benjamin, 55 years old)

Sometimes, positive social support was found through the maintainers themselves providing support to others:

I had a relative who called me and said that she's being motivated by what I do because she sees that I'm really into it and she's like you've always been focused and you been into it once you get started on something, you always just go through with it. And I go yeah and she was like ‘I want you to help me with trying to be healthy and lose weight,’ and I told her, I said Yeah, I'll help you. But it's not about what . . . It's about you and what you want to do. She was like well I want to do this. I want to try to lose this. So I said well if you want that, then you have to set your mind to it and be focused. I can tell you what you need to do but you gotta be the one to take charge of that. I'll be there to instruct you and help you but it’s up to you. (Alisha, 47 years)

Speaking with family members who were still attempting to lose weight reminded Alisha of what she achieved. Intermingling with those still in the process of weight loss inspired her to maintain her routine. Her influences assisted her in keeping a recognized prominence in the family. She serves as a positive role model and learning resource for others. Alisha described herself more as a social support giver than a social support
seeker as she acquires more competence and more experience in the weight maintenance stage.

Negative social support was not necessarily the result of intentionally undermining the participant’s efforts to maintain weight loss. Sometimes it was a matter of circumstances, such as when there were differences in dietary needs:

My wife's cooking is actually not a good influence on me. She had to go gluten free about 5, 6 years ago. She found out she was gluten intolerant…. It would be nice if she was more vegan or vegetarian-based. I'd find it easier, but I don't. But it's okay, we're working on it. I go to Wegmans more than she does, and I buy what I want. It's a bit of a challenge for me. It'd be nicer if it she just cooked mostly vegetarian, low-fat stuff. I would eat it. (Tyler, 60 years old)

For the four senior adult LTWLMs (60+), there was a sense of neglect from the medical community that makes maintenance harder. The comments suggest that seniors consider weight management intervention to be a significant role of doctors:

I don't think medical personnel are anywhere near as clear as they should be about weight and sugar and processed food. I think they should say like, "Here's your prescription. Don't add sugar to things. No, don't do that…. I think our doctors, our medical people should step up to the plate, as well as Y’s and things. I don't think it should just be the Y that says exercise, be healthy, and all the slogans and stuff. I really think the medical people should say, at every exam and before all of our medical care is taken away from us, we get a comprehensive exam once a year, they should be saying, "Yes, this is good. Your weight is good, but it needs to be here, or your body mass . . .” No one's done that for me . . . The medical
doctors give people pills, but they should give people much more information about weight. (Madison, 75 years old)

“They're [medical community] not holistic, life balanced focused. And that . . . It’s totally wrong, because they wanna give you a pill instead of saying no.” (Tyler, 60 years old)

Social support was deemed to be a significant motivator for WLM. Getting support from friends, peers, and professionals seem to be related to better WLM. Conversely, there seemed to be mixed findings for social support from spouses. While social support from friends, peers, and professionals seems to be valuable, involvement from a spouse is not always clearly positive and can, for some, affect WLM. Social support from fitness instructors and other YMCA members seem to enrich care, offer encouragement, and provide motivation through relatedness. While one long-term weight-loss maintainer refuted social support as a motivator, what was discovered is the difference between being a social support receiver and a social support giver. Some weight-loss maintainers can get motivation from social support through helping others. Finally, senior adult LTWLMs want more support from the medical community.

**Body image.** An unexpected finding among female LTWLMs was the emotional impact of body image and overall appearance associated with weight maintenance. Body image is the sense of satisfaction or comfort with one’s appearance. For a middle-aged female weight-loss maintainer, body image was described positively with a strong sense of self-esteem. Alisha, 47, remarked, “Yes, I think about my clothes and what I look like. I constantly take pictures and look at the transformation that's happening with me. And my clothes and yeah, my whole outer appearance and what it looks like.”
In contrast, Madison, 75, who has lost 40 pounds and maintained that weight loss for 2 years, pronounced, “I have never been happy with my weight. Even when I look back at it and I weigh 40 pounds less than I do now, never liked it. I would like to have one size clothing in my closet.” When discussing her body image and current physical frame, Madison continued to lament,

For a number of years, I hung out about 160, which is 20 pounds less than I am now. I didn't like that. Looking back on it, I wish I'd enjoyed it more…. I have to say, I go by a mirror and I don't recognize myself anymore, obviously. I don't look like what I think I look like. I look at pictures and I don't like what I see.

Even Lydia, also 75, reflected similar feelings about her body image until rather recently. “I always felt ugly, fat. I remember one time, recently, I looked at myself in the mirror and thought, "I'm not fat." What a revelation.” This, despite the fact that Lydia has held a BMI classification of “normal” for the past 26 months. Despite long-term WLM, body image is still forefront in the thoughts of both middle-aged and senior adult women.

**Self-determination theory.** In addition to understanding the experiences of weight-loss maintainers, this study also explored the extent to which self-determination theory might explain long-term WLM. The self-determination theory proposes the existence of three fundamental psychological needs as the basis for motivation: autonomy, competence, and relatedness. Vital to the self-determination theory is the difference between autonomous and controlled behaviors, which are two types of motivational behaviors that involve different reasons for behaving. When a weight-loss maintainer is self-determined, the individual acts based on choice; not based on pressure
or a sense of duty. Table 4.8 provides statements from focus group participants as they related to autonomy, competence, and relatedness.

The degree of autonomy represents the psychological need to act, which is perceived as internal. Autonomy in a long-term weight-loss maintainer would be regarded as the ability to display a sense of ownership over maintenance behaviors such as having a regular eating routine, regular moderate exercise/physical activity, self-monitoring, and social support. Through the analysis of the focus group sessions, the researcher looked for evidence of the extent to which motivation for a behavior is autonomous.

There are three categories of motivation (intrinsic, extrinsic, and amotivation) with six types of regulation (intrinsic, integrated, identified, introjected, external, and amotivation). Overall, the LTWLMs seemed to have achieved long-term WLM from the integrated and intrinsic regulation classifications. Integrated forms of motivation share many qualities with intrinsic motivation. From an integrated regulation perspective, the weight-loss maintainers had fully assimilated lifestyle change behaviors such as having a regular eating routine and regular exercise/physical activity because they were in agreement with their values and need to maintain their weight loss.

From the intrinsic motivation standpoint, it appears that these focus group participants’ maintenance behavioral strategies tended to become more internal over time.

The middle aged adult weight-loss maintainers evidenced both integrated and intrinsic regulation as well. They have internalized the reasons for their behavioral actions and assimilated them internally, becoming self-determined. As Benjamin, 55,
### Table 4.8

**Sample Statements from Focus Group Participants**

<table>
<thead>
<tr>
<th>Fundamental Psychological Need</th>
<th>Middle Aged Adult LTWLMs</th>
<th>Senior Adult LTWLMs</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Autonomy</strong></td>
<td>It’s [weight-loss maintenance] making you feel happy, it’s part of a life now. It’s become a part of my life.”</td>
<td>“It’s internal. You may get some gratification and accolades from outside individuals saying, &quot;Hey, you look great. Did you lose some weight?&quot; Or whatever, but unless it’s intrinsic–you’ve gotta want it.”</td>
</tr>
<tr>
<td><strong>Competence</strong></td>
<td>And I do educate myself a lot. I google everything, I check tables of contents on everything that I eat. I want to know what’s in it and I’m close to being a vegan because the food these days are not healthy at all.</td>
<td>“I think it's a combination of interest, education, opportunity.”</td>
</tr>
<tr>
<td><strong>Relatedness</strong></td>
<td>A lot of people come to me and they say you know I watch you and you’re an inspiration to me, all the time. I get calls, I get Facebook inboxes. People . . . I need you to help me, show me.</td>
<td>I agree 100% [internal motivation]. Going to classes here, like you said, helps because most of the people at a lot of your classes are reasonably healthy now. It’s like you’re hanging around people that are trying to do the same thing. It's helpful motivation, but it's gotta come from the inside. You gotta do it for yourself.</td>
</tr>
</tbody>
</table>

indicated, “It’s [WLM] making you feel happy, it’s part of a life now. It’s become a part of my life.” Alisha, 47, is highly intrinsically motivated as she explains,

“I want to be healthy. And I got kids and grandkids. I want to live a long time and I want to be able to take care of my, I have a 12 year old. I want to be able to
take care of my daughter. It's very important, I mean, to just maintain a healthy lifestyle."

The senior adult weight-loss maintainers presented themselves as intrinsically motivated as they highlighted behavioral strategies that addressed their self-determination. These senior adults professed that they have real choices and that they are the source of their choices, which they validate with no thought of being controlled by any external demands. They have the ability and choice to act. This was particularly evident listening to Connor, 64, who has maintained his 10% or more weight loss for 10 years, “It’s internal. You may get some gratification and accolades from outside individuals saying, "Hey, you look great. Did you lose some weight?" Or whatever, but unless it’s intrinsic—you've gotta want it.” There was a contrast with intrinsic motivation that seemed to indicate that one senior weight-loss maintainer might have been describing a more introjected regulation. For the most part, Lydia, 75, described having integrated regulation. However, when it came to body image, her motivation for WLM may be to enhance or maintain self-esteem and the feeling of worth. When describing what weight loss means to her, Lydia commented, “I can feel comfortable about myself. I always felt ugly, fat. I remember one time, recently, I looked at myself in the mirror and thought, “I'm not fat.” What a revelation.” Later, when the question was asked where their motivation comes from Lydia’s answer was, “I'm vain. I don't wanna feel fat. I don't wanna be fat.”

In this sample, long-term maintainers were motivated by a sense of ownership, mastery, and capacity to meet the challenge of maintaining a healthy weight. The focus group participants believed they are able to adopt and internalize strategies because they
understand them and practice them to maintain their weight loss. They have an ability to set moderately hard, but realistic goals, and master them to not regain weight. For example: “There are ways to deal with it [triggers; such as holidays]. Start to say, "Okay, I'm hitting a hard time here," so prepare for it or have a goal . . . Something looking toward [goal].” (Madison, 75 years old)

And I do educate myself a lot. I google everything, I check tables of contents on everything that I eat. I want to know what's in it and I'm close to being a vegan because the food these days are not healthy at all. (Alisha, 47 years old)

Just awareness, in terms of self-interest and learning and reading healthy books here and there, be it Runner's World or any other magazine that you pick up, has a tip here and there. Increased awareness. The media, social media, TV, whatever, healthy living, healthy styles. Wegmans doing their thing, and any other grocery store. I think it's all around us, if we open up our eyes and kind of wanna hear it. (Connor, 64 years old)

The longer these individuals are able to maintain their weight loss, the more they will continue their maintenance strategies. Long-term maintenance produces confidence and increased feelings of competence. This leads to learning more maintenance strategies and a positive loop of growth forms.

LTWLMs in this sample were motivated to embrace positive interactions with others that occur because of their WLM connections. Relatedness is associated with having satisfying and supportive social relationships. It involves the need to feel close to and understood by others. LTWLMs need to believe they are listened to, supported, and valued.
The focus group participants described positive interactions with others such as family members, friends, peers, and professionals. Positive feedback fuels intrinsic motivation because individuals have a basic psychological need to be connected. These LTWLMs perceive their interpersonal climate at the YMCA as more autonomy supportive and therefore report more relatedness. This leads to more ongoing involvement in YMCA classes, which in turn assists in the maintenance of their exercise routine and long-term WLM. They expressed a sense of belonging and connection when discussing the motivation they internalize because of YMCA fitness instructors and fellow YMCA members they regularly exercise with at the YMCA as a part of their routine exercise strategy. For example:

Going to the classes here, like you said, helps because most of the people at a lot of your classes are reasonably healthy now. It's like you're hanging around people that are trying to do the same thing. It's helpful motivation, but it's gotta come from the inside. You gotta do it for yourself. (Connor, 64 years old)

In summary, the experiences of these focus group participants indicate that autonomy, competence, and relatedness are positive factors and sustainable. When these three psychological needs are met, WLM becomes a way of life and can be sustained long-term. Since the needs of autonomy, competence, and relatedness are met, LTWLMs are able to demonstrate optimal motivation and improved behavioral and lifestyle strategies.

Summary of Results

This chapter presented mixed methods analyses and findings of LTWLMs among adults who are members of the YMCA of Greater Rochester. The quantitative data
results are explained further with the qualitative data. The first research question explored the predictors that motivate individuals who are LTWLMs. The second question investigated the predictors LTWLMs use to maintain their weight loss and examined how the predictors are different from those used to lose the initial weight. The self-determination theory was used to identify the relationship between long-term weight control and motivation.

The quantitative data showed that autonomous and controlled motivation, as well as amotivation and perceived competence do not predict whether an individual will maintain weight loss for the long term. These results were unexpected. The qualitative data was used to examine the results in more detail.

The LTWLMs that participated in this study want to maintain their health, which is intrinsically motivated. In particular, health risk concerns are a primary motivator for LTWLMs remaining physically active. Through both the quantitative and qualitative data collected, their measures of perceived competence seem to indicate that they believe they are able to meet the challenge of maintaining a healthy weight. They feel confident about being able to maintain the healthy behavioral strategies developed to maintain their weight loss.

Based on autonomy, participants believe they have carefully thought about WLM and believe it is very important for many aspects of their lives. This supports the quantitative finding that the higher the perceived competence, the higher the autonomous motivation. The LTWLMs seemed to have achieved long-term WLM from the integrated and intrinsic regulation categories. Such motivation is based on discovering meaningful value, having a high perceived competence measure that indicates the acceptance of
positive behavior related activities, and the sense of connection and trust with significant others such as family, friends, fitness instructors, and peers. Whether middle aged adults or senior adults, these LTWLMs practice behavioral strategies that, cultivated over time, become more internal. A discussion of the implications, limitations, and recommendations for future research will be presented in Chapter 5.
Chapter 5: Discussion

Introduction

This study examined the problem of obesity as it relates to weight-loss maintenance. There is an epidemic of obesity and many individuals who successfully lose weight are unable to maintain the weight-loss (Elfhag & Rossner, 2005). The prevalence of obesity has significantly increased over the past 30 years, in part because of environmental changes that encourage eating increased amounts of high-calorie foods, decreased exercise, and inactivity (Briefel & Johnson 2004, Eknoyan 2006, Nielsen & Popkin 2004; Ogden et al. 2006). Therefore, understanding more about weight-loss maintenance can inform the development of interventions to support individuals in maintaining a healthier weight.

Despite the need to understand maintenance of weight loss, there has been limited attention in the field of obesity and weight management. Current research centers on pinpointing the distinct features between successful weight-loss maintenance and weight regain (Elfhag & Rossner, 2005; McGuire et al., 1999; Reyes et al., 2012; Ulen et al., 2008; Wing et al., 2007; Wing & Hill, 2001). These studies propose that a range of behavior, mental, and social features are related to successful weight-loss maintenance, including (a) eating healthy meals, (b) effective coping skills, (c) maintaining a regular exercise/physical activity practice, (d) self-efficacy, (e) self-monitoring, (f) social support, and (g) the capacity to handle the stressors of life. Other studies concentrate on
A study conducted by Sciamanna et al. (2011) described some behavioral differences between weight loss and weight-loss maintenance. The findings in this study proposed that developing routines of consuming low-fat sources of protein, following a regular exercise schedule, the significance of reminders of the original purpose for weight management, and employing rewards for staying with a diet or exercise strategy were related to weight-loss maintenance rather than initial weight loss. Quantitative research that addresses the most effective weight-loss management strategies for LTWLM is sparse. There is also a need to understand the motivation behind an individual adhering to weight loss maintenance long-term.

A study conducted by Wang et al. (2015) established through a qualitative methodology that motivation is challenging to maintain when an individual enters the maintenance phase of weight loss. Interest in physical activities is replaced with boring routines. Furthermore, the sources of social support decreases considerably when individuals change from weight losers to weight-loss maintainers.

Self-determination theory (SDT) asserts that autonomy, competence, and relatedness are necessary psychological needs for attaining long-lasting change (Deci & Ryan, 2002; Ryan & Deci, 2000; Ryan et al., 2008; Ryan et al., 2011; Santos, Silva & Teixeira, 2016; Teixeira et al., 2012). Unlike other theories of motivation and behavior, SDT emphasizes autonomous self-regulation. SDT provided a theoretical framework for the current study.

The purpose of this study was to identify predictors of successful weight-loss maintenance among adult long-term weight-loss maintainers. This study used a
definition for LTWLMs suggested by Wing and Hill (2001) which focused on individuals who have intentionally lost at least 10% of their maximum body weight and kept it off for at least one year. The mixed methods research questions (RQs) for the study included:

RQ1. What predictors motivate individuals who are long-term weight-loss maintainers?

RQ2. What predictors do long-term weight-loss maintainers use to maintain their weight-loss? How are the predictors different from those used to lose the initial weight?

Outcomes from this study could be important to the establishment of successful weight maintenance interventions. Effective behavioral strategies and approaches were found and the findings confirmed that strategies for weight-loss maintenance are related to, yet distinct from, those of weight-loss. This chapter summarizes the quantitative and qualitative results and discusses the significance of findings and previous research literature reviewed in Chapter 2. In addition, the strengths and limitations of the study will be presented along with recommendations for future research and improved practices.

Summary of Results

Quantitative results. A survey instrument with 38 closed-ended questions was used that included health and weight history, the Treatment Self-Regulation Questionnaire (TSRQ), the Perceived Competence Scale (PCS), and demographic information. As indicated in the cross tabulation frequencies associated with the chi-square analyses, of the 34 participants who were classified as LTWLMs, very few reported using diet/weight-loss plans, drugs, support groups, or undergoing bariatric surgery. Correlational analyses to test the relationship between current BMI, types of
motivation, and perceived competence indicated a significant, positive relationship such that the lower the current BMI, the higher the perceived competence. There was also a significant, positive relationship between perceived competence and autonomous motivation.

Finally, to clarify what motivation variables may predict weight-loss maintenance, the three categories of motivation (autonomous, controlled, amotivation) and perceived competence were tested using a binary logistic regression. The regression indicated that, as a model, the types of motivation and perceived competence did not predict whether an individual will maintain weight loss for the long term. The motivation model explained only 4% of the variances in LTWLM status. This was not statistically significant but the power of the analyses was undercut by the imbalanced distribution of weight-loss maintainers. Nevertheless, two motivational measures were related to WLM status. Autonomous and amotivation were significant at the univariate level. For autonomous motivation, the analyses indicated that as autonomous motivation increases, the odds of maintaining weight loss are reduced by almost two-thirds. For amotivation, the analyses indicated that as amotivation increases, the odds of maintaining weight loss are reduced by almost three-fourths. The findings regarding autonomous motivation was unexpected in light of SDT. The findings regarding amotivation are more easily interpreted because individuals who are not highly motivated plausibly may be less likely to consistently engage in the challenging health behaviors required to maintain weight loss.

**Qualitative results.** The qualitative data were used to better understand strategies and motivations for weight-loss maintenance that were not captured by the
survey. Data gathered from two focus groups of LTWLMs were analyzed, revealing six themes relating to factors that influence weight-loss maintenance: (a) eating strategies, (b) physical activity strategies, (c) weight loss versus weight maintenance, (d) social support, (e) body image, and (f) self-determination. Weight maintenance strategies focused on routine healthy eating behaviors learned early on in the weight-loss phase with some differences in food selections. Focus group members specifically mentioned eating more fruits and vegetables and decreasing the consumption of sugar products. This behavior was accompanied by regular, moderate-intensity exercise/physical activity. Self-monitoring helped weight-loss maintainers be conscious of small fluctuations in weight and resuming weight maintenance strategies promptly with little weight gain. These strategies were then brought over to the weight maintenance phase with a lifestyle change mentality, perseverance, and swift responses to any aberrations.

Implications of Findings

The findings of this study have implications, both for how the study fits in the context of prior research on weight-loss maintenance and implications for public health workers and others who promote weight-loss maintenance interventions.

Findings in context of prior research. This study revealed that the behaviors associated with weight loss might not be the behaviors that facilitate weight-loss maintenance. This is similar to studies conducted by Teixeira et al. (2010) and Sciammanana et al. (2011). Both studies suggest that going from weight loss to maintenance requires some shift in behaviors. These same behaviors were identified in the National Weight Control Registry (NWCR). Among the highest weight control...
behaviors with NWCR are healthy eating, physical activity, and regular self-monitoring (Wing & Hill 2001; Wing & Phelan 2005).

Healthy eating, as stated by the Dietary Guidelines for Americans 2015-2020 stresses fruits, vegetables, whole grains, lean proteins, fatty fish, low unsaturated fats, trans fats, and cholesterol, and remaining within daily caloric needs. Healthy eating is the manner in which individuals fuel their bodies through healthy food choices. Obesity and weight maintenance researchers describe eating behaviors as the actions an individual takes to include healthy eating. Eating behaviors associated with weight loss include lower caloric eating and reduced portion sizes (Pinto et al., 2008; Teixeira et al., 2010; Wing & Phelan, 2005). Metzgar and colleagues (2014) associated the eating behaviors of LTWLMs with eating breakfast regularly, less dietary fat, lower caloric intake, nutritious snacking, and portion control. The present study found that LTWLMs identified healthy eating as the Dietary Guidelines for Americans suggest such as eating more fruits and vegetables, but they also mentioned the importance of water and decreasing sugar. They considered having a regular eating routine that involved healthy eating as the primary focus. The eating behaviors involved in a regular eating routine included eating less, eliminating foods, portion control, and limiting eating out. LTWLMs identified more with the terminology lifestyle change rather than diet as they described moving from weight loss to weight-loss maintenance. Lifestyle change for them was modifying eating behaviors gradually until they become routine.

Physical activity is critical for weight-loss maintenance, although it is seen by focus group participants in this study as second in importance to having healthy eating behaviors. For weight-loss maintenance, being habitually active was the key. Participants
described being consistent and making physical activity a priority, being actively involved in group exercise, and morning exercise. As weight-loss maintainers, the intensity level of the exercise/physical activity was vital too. Interchanging weight training with cardio during the week boosted the level of intensity, which supported maintenance of the lost weight. The physical activity findings in this study are quite different from previous weight-loss maintenance studies. For example, four studies focused on NWCR members investigated the correlation between physical activity and weight-loss maintenance (Butryn et al., 2007; LaRose et al., 2013; Ogden et al., 2012; Thomas et al., 2014). National Weight Control Registry participants were described by their elevated levels of physical activity (Butryn et al., 2007). However, they exercise about one hour per week, usually by participating in walking. Although physical activity is related to LTWLM (LaRose et al. 2013; Metzgar et al. 2014; Ogden et al., 2012; Thomas et al. 2014), the ideal level of physical activity required to facilitate weight-loss maintenance remains unclear (Hindle & Carpenter, 2011). Based on the findings in this study, high levels of physical activity could basically be an indicator of the attentiveness a long-term weight-loss maintainer gives to sustained weight loss.

For the weight-loss maintainers in this study, an important self-monitoring strategy was being conscious of small fluxes in weight by weighing in on a scale, checking how clothes fit, or looking at photographs. Self-monitoring by the participants allowed for prompt detection of weight changes, which improved ownership of the weight management practices. Other studies (Butryn et al., 2007; Wing et al., 2006) support this finding in that their results explained that those who weigh themselves at least weekly are more apt to prevent regain.
The theoretical rationale for this study was based upon Deci and Ryan’s self-determination theory (SDT) which suggests the existence of three important psychological needs which are autonomy, competence, and relatedness. When the needs of autonomy, competence, and relatedness are met, individuals demonstrate intrinsic motivation and have better physical and mental results (Patrick, et al., 2010). Williams et al. (1996) suggest that long-term behavior change needed for maintenance depends on accepting personal ownership, that is, autonomy. Therefore, they predict that with autonomy in a long-term weight-loss maintainer there is the ability to demonstrate a sense of ownership over maintenance behaviors. The more the long-term weight-loss maintainer recognizes their sense of choice along with the reasons for changing, the more autonomous and therefore the more likely the individual is to succeed in their behavioral changes (Ryan, et al., 2011).

The autonomous motivation subscale findings obtained from the Treatment Self-Regulation Questionnaire (TSRQ) revealed that the responses of the focus group participants averaged 6.3 out of the 7 point Likert scale. Both the quantitative summary statistics and the qualitative focus group findings revealed that, on average, participants had high autonomous motivation, indicating that they had thought about weight-loss maintenance and believed it was very important in their lives. The correlation between perceived competence and autonomous motivation suggested that the higher the perceived competence, the higher the autonomous motivation and vice versa. Competence involves the feelings of efficacy when experiencing challenges, and the ability of an individual to use their skills, as well as learn new ones and develop (Deci & Ryan, 2002). Self-determination theory suggests that competence must be accompanied
by autonomy (Patrick & Williams, 2012; Williams et al., 2006). Therefore, the correlation findings confirm previous research results.

However, the binary logistic regression determined that the three predictor variables of motivation (autonomous, controlled, amotivation) and perceived competence combined did not, together, predict whether an individual maintains their weight loss. However, autonomous motivation and amotivation were, at the univariate level, significantly associated with a decrease in the likelihood of weight-loss maintenance. The finding regarding autonomous motivation was unexpected, in light of SDT. However, when synthesizing the quantitative and qualitative findings, a possible explanation emerges. In the focus groups all participants talked about some form of social support as important to weight-loss maintenance. It may be that individuals who are highly autonomous are less likely to seek social support and, therefore, are less likely to maintain weight loss. This hypothesis should be tested in future research. The current data set does not allow for a definitive conclusion to be drawn. The findings regarding amotivation are more easily interpreted because individuals who are not highly motivated plausibly may be less likely to consistently engage in the challenging health behaviors required to maintain weight loss.

Based on the quantitative data analyses, collecting and analyzing the follow-up qualitative data was particularly beneficial due to some of the unanticipated outcomes that developed from the quantitative part of the study. Through the analysis of the focus group sessions, participants expressed their belief that they have carefully thought about weight-loss maintenance and believe it is very important, which suggests that autonomy and competence do exist amongst LTWLMs. The findings are comparable to the results
from a study conducted by Williams et al. (1996) and a recent meta-analysis (Ng et al., 2012) that established that participants who were identified as being autonomous maintained more weight loss.

Participants in this study demonstrated autonomous motivation and perceived competence. Through the focus group findings they also described social support as playing a role in their weight-loss maintenance. Relatedness concerns the need to feel close to and understood by important others (Deci & Ryan, 2002). The focus group findings acknowledged a sense of being cared for and respected that was vital to developing experiences of connection and trust that let autonomy result. The role of social support for these participants was consistent with findings from prior research that found social support and validation from friends and peers plus the social support that weight-loss maintainers provide to others was important for weight-loss maintenance (Barnes et al., 2007; Berry, 2004; Elfhag & Rossner, 2005; Hindle & Carpenter, 2011; Metzgar, 2014).

The self-determination theory was identified as having the potential to explain weight-loss maintenance adherence and is the reason why it was chosen as the theoretical framework for this study. Consistent with the basic concepts of SDT, this study found that successful maintenance of weight loss should happen when an individual chooses healthy behaviors such as eating and exercise/physical activities because they personally value weight-loss maintenance and its health benefits.

Originally the research design for this study included weight regainers along with LTWLMs. This was intended to provide an advantage when running correlations from the quantitative part of the research and to forecast the differences in motivation for the
qualitative part of the research. Without the addition of regainers there was a gap because forecasting the differences in motivation could not be completed. Based on the weight regainer definition (an individual meeting the same criteria as those who have LTWLM except they regained weight to within 7 pounds of their original body weight in one year), there were zero survey respondents who met that standard. The original research design, had it been executed in its entirety, could have given detailed comparative data.

Addressing why some weight-loss maintainers are motivated is an area of investigation from the viewpoint of self-determination theory (SDT). Therefore, pinpointing predictors of long-term weight control in relation to motivation is especially critical. Lasting behavior change necessary for maintenance depends on accepting personal ownership (autonomy) of the regulation for change. SDT requires internalizing values and regulating relevant behaviors, integrating them with a sense of self so they can become the basis for autonomous regulation.

Little research has been undertaken to connect SDT to WLM outside of a medically-supervised setting. This study to connect SDT to WLM was undertaken in a health and wellness community organization setting which distinguishes it from other SDT research. Based on this study the findings suggest that behavioral modifications needed to attain weight maintenance must be integrated within the self. This study moved research efforts from solely investigating predictors of WLM to investigating the motivational factors of long-term WLM. Based on the SDT framework, it was discovered that individuals who feel more competent regarding a specific behavior are more prone to making and maintaining the change and therefore demonstrate positive healthy results in that they were able to maintain their weight loss long-term.
Individuals who have intentionally lost at least 10% of their maximum body weight and kept it off for at least 1 year are identified as long-term weight-loss maintainers (Wing & Hill, 2001; Wing & Phelan, 2005; Kraschnewski et al., 2010). In the instances when weight returns, the explanation is an absence of self-control. While weight loss can be attained through behavior modifications such as changing eating and exercise activities, over the long term numerous individuals regain weight. According to Greenway (2015), in order to maintain weight loss, individuals must retain behaviors that counter physiological adaptations and other factors favoring weight regain because it is difficult to overcome physiology with behavior. Physiological alterations after weight loss, such as reductions in energy expenditure, fat oxidation and leptin levels and increases in appetite, craving and ghrelin levels, promote weight regain (Greenway, 2015, p. 1194).

Physiological mechanisms undoubtedly do effect weight-loss maintenance but the larger problem seems to be the struggles related to eating and physical activity behaviors as well as self-monitoring. To lose weight and keep it off, an individual must initiate long-term eating and physical activity strategies. For instance, studies suggest that a 7% weight loss along with moderate exercise for 150 minutes per week can reduce the threat of diabetes (Ackermann, et al., 2008; Powell et al., 2007). An increased understanding of the physiology of weight loss and regain will reinforce current research focused on behavioral and motivational predictors and support the development of future strategies to support overweight and obese individuals in their efforts to attain and maintain weight loss. The view of obesity as a physiological and behavioral health concern could lead to changes in the way researchers approach its treatment and long-term weight-loss
maintenance. Whether an individual is 250 pounds or 180 pounds, losing at least 10% of their maximum body weight and keeping it off for at least 1 year is favorable physically, emotionally, and biologically.

**Implications for public health interventions.** The findings from this study have practical implications for public health interventions to promote weight-loss maintenance. First, it should be recognized that while shorter-term, more extreme changes to eating behaviors may be effective for initial weight loss, weight-loss maintenance requires eating and exercise/physical activity behaviors that are manageable and sustainable in the long-term. Public health interventions that help individuals identify long-term strategies, promote incorporation of such strategies into one’s regular routines, and provide positive reinforcement for sustaining healthy behaviors may help individuals who have lost substantial weight to shift into maintenance behaviors. For example, community lifestyle programming delivered by trained public health professionals (community educators, nurses, physicians), fitness instructors, and volunteer LTWLMs who serve as maintenance instructors could coach LTWLMs as a multidisciplinary team. Weekly sessions could be held within both individual and group settings throughout the community for easy accessibility. By educating and guiding weight-loss maintainers, promising outcomes for LTWLM could result (Montesi, et al., 2016). Such settings would also offer the social support needed. This type of programming would be similar to The Diabetes Prevention Program (Ackermann et al., 2008) but exclusively for LTWLMs.

Second, public health interventions for weight-loss maintenance should promote strategies for self-monitoring. According to research conducted by Linde and colleagues
medical and public health recommendations for monitoring body weight do not stress self-monitoring. Self-weighing, whether every day or weekly, aids in acknowledging patterns, provides an opportunity for positive reinforcement, and is believed to support self-regulation of behavior (Butryn et al., 2007; NIH, 1998; Ulen et al., 2008). Various research findings suggest that regular self-weighing may assist individuals with WLM by letting them catch weight increases before they spiral out of control and allows an individual to make behavior modifications to stop further weight gain (Butryn et al., 2007; Elfhag & Rossner, 2005; Linde et al., 2005; NIH, 1998; Ulen et al., 2008). In addition, the research suggested that a drop in the regularity of self-weighing is independently linked with weight regain (Butryn et al., 2007; Elfhag & Rossner, 2005; NIH, 1998; Wing et al. 2007). Correcting for any weight changes requires modification of food intake. Therefore, a self-monitoring method of keeping a food diary in order to record food consumption is also suggested to be vital for weight control (Byrne et al, 2005; Elfhag & Rossner, 2005; McKee et al., 2013). Overall, outcomes from various studies support the idea that using a food diary every day as well as self-weighing are key parts of self-monitoring and should be emphasized as significant predictors in WLM (Byrne et al, 2005; Elfhag & Rossner, 2005; McKee et al., 2013).

It is important that the interventions promote not only self-monitoring, but also strategies for what to do when the monitoring indicates the start of weight gain. The LTWLMs in this study used the scale, the fit of clothing, or photographs to judge their weight-loss maintenance. This allowed for adjustments in dietary intake and exercise/physical activity. This study indicates that self-monitoring should be
accompanied by techniques for monitoring and recording emotional, mental, and physical behaviors, including those related to body image.

Third, public health interventions should assist with the establishment of social support to improve motivation for LTWLM. Such interventions could consist of weekly weight-loss maintenance support group meetings and/or the establishment of a mentoring/sponsor program design. Having a mentor or sponsor who has maintained weight loss for a longer term would be important for those just entering the weight-loss maintenance phase. Social support is generally considered an essential component of WLM, irrespective of whether the support comes from family, friends, or a support group (Barnes et al., 2007; Elfhag & Rossner, 2005; Metzgar et al., 2014). In research conducted by Hindle and Carpenter (2011), the availability of social support was a vital component for the individuals who were able to maintain weight loss. The support was considered beneficial in terms of motivation, valuable advice and guidance, and as a way of making certain their weight was regularly checked. In this study, support from peers and professionals was a facilitator of long-term WLM. Social support, usually from family members, friends, peers, or professionals was used to maintain motivation and offer reinforcement for appropriate behavior modifications.

While social support may occur within personal relationships such as family and friends, it is also possible to promote social support in other settings. For example, for these participants the YMCA provided a caring community that facilitated social support from fellow patrons and fitness instructors. Training staff of athletic facilities on ways to provide and promote social support can expand the social support available in the community. In relation to SDT, such relatedness support from training staff, health and
wellness counselors, and lifestyle coaches could include training on being empathetic to the concerns of weight-loss maintainers and providing a consistently positive interpersonal environment. Medical professionals could support the need for relatedness by expressing an understanding about how difficult maintaining a behavior change can be and reflect the concerns the individual may have about failing.

An unexpected finding in the focus group portion of this study was that four senior adult LTWLMs wanted more social support from the medical community. Although this was a negligible sample size, this was a theme that developed among all the senior adults when discussing social support. There is research that supports the discussions related to social support and the medical community. Prior research findings suggest that health care professionals frequently pass up opportunities to talk about obesity concerns with patients (Gaines, 2015). When the subjects of obesity or weight management are not discussed during medical appointments, unhealthy behaviors persist and healthy weight-loss maintenance is made more difficult. This can lead to a return to obesity, health concerns, and multiple medical visits which all further apathetic feelings and avoidance (Gaines, 2015). This may point to the need for medical personnel to focus on how to support weight loss and weight-loss maintenance. Such emphasis could increase the capacity for championing the confidence of individuals to modify their behaviors, assist them in setting realistic goals and plans for reaching those goals, validating positive self-image, and demonstrating care for the patient. Additionally, adjustments to medical office procedures such as group health education and weight-loss consultations could provide more opportunities for receiving social support from the medical community.
Strengths and Limitations

**Strengths.** This study had two methodological strengths. First, the focus on individuals who have maintained weight loss over at least a one-year period helped to address a gap in the literature on weight-loss maintenance. By studying weight-loss maintainers using both quantitative and qualitative methodologies, a more comprehensive understanding of how they maintain weight loss and motivating factors emerged.

Second, although not intended, the fact that the two focus groups ended up being divided by age, with one group consisting of middle aged adults and the other of older adults, allowed the identification of differences in health concerns, motivations, and relationship to medical providers. These findings indicate the need for considering age in future research.

**Limitations.** There were several notable limitations of this study. The limitations have been categorized into two groupings: analytical limitations and methodological limitations.

**Analytical limitations.** From an analytical focus, there were two limitations. First, a statistical limitation was that analyses like chi-square and binary logistic regression assume a balanced class distribution. When the data are unbalanced, the results tend to bias toward the majority class, which in this case were the non-maintainers of weight loss. The maintainers, being in the minority, could contribute little to the error estimation. This imbalance was not anticipated and so was not accounted for in the sampling method. Future research should use a strategy other than convenience sampling to achieve greater balance between weight-loss maintainers and non-maintainers.
Second, the lack of a second coder for the qualitative analyses may also be a limitation because there was no external validation of the coding. This limitation was partially mitigated by the fact the coder did present, review, and receive feedback from an external researcher who provided methodological guidance.

**Methodological limitations.** From a methodological perspective, there were six limitations. First, participants were recruited from a population of YMCA members due to the need to conduct convenience sampling. Individuals who have the means and motivation to join an athletic facility may differ from those who do not. Second, the sample did not represent young adults, despite findings that almost one-third of young adults are obese (NCHS Data Brief, 2015).

Third, ethnicity and race were not well-represented. In particular, only 11.8% of the 34 identified weight-loss maintainers were African American and there was only one represented in the focus groups. In general, studies conducted in the area of WLM are quite homogeneous, as was this study, which means that the findings may not be generalizable to ethnic groups. Specifically, there is limited data on African Americans who have accomplished successful long-term weight-loss maintenance.

African Americans especially are disproportionately affected by excess weight and illnesses for which obesity is a risk factor (Ogden, et al., 2006). In research conducted by Butryn and colleagues in 2007, the National Weight Control Registry (NWCR) identified a large sample of individuals (N=3,003) who were successful at long-term weight-loss maintenance. However, there were few African American participants in the identified sample (N≈74). While long-term weight-loss maintenance and better health are the fundamental objectives of weight management programs, interventions to
tackle obesity and encourage long-term weight maintenance in African Americans have produced limited outcomes (Svetkey, et al., 2008). Future studies should endeavor to recruit a wide-ranging sample of African Americans in order to discover important factors that predict weight-loss maintenance for this key population. Such research would add value and provide a better understanding of weight-loss maintenance among African Americans who have lost and maintained a significant weight loss long-term.

Fourth, the small sample size and convenience, especially for the focus groups, makes this a useful pilot study, but caution should be used when drawing conclusions or making practice recommendations based on this small, homogeneous sample. The fifth limitation was the reliance on self-reported weight. Some researchers cited that self-reported body weight and physical activity tend to be prejudiced in that individuals have a propensity for miscalculating their weight and dietary intake while over-estimating their physical activity levels (Fitzgibbon, et al., 2008; Sciamanna et al., 2011; Stubbs, et al., 2012). To overcome this limitation, weight was measured at the focus group stage to check that self-reported weight approximately equals measured weight. There may also be self-report biases in overestimating how long an individual has kept off the weight. This survey could not control for that possible bias due to not having access to any corroborating archival data.

Finally, the sixth limitation was the absence of what could have been learned during the focus group interviews based on body language and facial expressions. Brinkmann & Kvale (2015) offer the recommendation that investigators reserve 10 minutes or more after the focus group interview experience to reflect on what has been discovered from body language or tone of voice. Immediate impressions of body
language along with temperament captured throughout recordings, acquired in the form of note taking would have offered a valuable perspective for the later analysis of the transcriptions (Brinkmann & Kvale, 2015). In spite of these limitations, the combination of both quantitative and qualitative data was sufficient to identify the behavioral and motivational predictors required to sustain long-term weight loss.

**Recommendations**

In light of its strengths and limitations, the findings of this study lead to two recommendations for future research. First, further research on weight-loss maintenance should draw distinctions between strategies used to lose versus maintain weight. The qualitative responses in this study indicate that the strategies and mindsets in these phases are distinct and individuals should be questioned about them separately. Second, the recruitment of a diverse sample may require a strategy other than convenience sampling. Purposive sampling or snowball sampling may achieve a larger and more heterogeneous sample of weight-loss maintainers.

The findings regarding negative experiences with medical providers supports recommendations for policies and practices that facilitate more effective social support in medical settings. This may include policies regarding training for weight loss and maintenance care and structure of and reimbursement for medical office visits to ensure medical providers have sufficient time to counsel patients regarding weight loss and maintenance. Practice guidelines that emphasize coaching methods that reinforce intrinsic motivation and autonomy may also strengthen the role of medical providers in supporting patients with weight-loss maintenance. At the national level, the behavioral changes required to maintain weight loss indicates that to address the epidemic of obesity,
national benchmarks of weight-loss goals should be accompanied by benchmarks for weight-loss maintenance. Providing a specific public health goal intended to assist individuals not only in the attainment of a healthy body weight but also to promote balancing healthy eating with regular exercise/physical activity in order to maintain the weight-loss long-term could be a huge breakthrough in the prevalence and incidence of obesity and overweight proportions in the United States.

Finally, the findings of this study lead to recommendations for community organizations like the YMCA that can deliver individual support in a coordinated group setting, similar to exercise classes that offer compassionate support. Tailored support in a group environment is recommended in order to scale weight management methods through the target population in an economical way. Such group environments grant LTWLMs the time and tools to cultivate the necessary commitment for their intended behavior modifications and allows for the sharing of challenges, practices, and results with fitness instructors and peers. Such support promotes autonomy, competence, and relatedness. In this manner, LTWLMs can discover solutions and find support for concerns.

Community organizations might also collaborate with the medical community to create new settings to support weight loss and maintenance. A recent partnership between the University of Rochester Medical Center (URMC) and the YMCA of Greater Rochester offers a model for this type of collaboration. In summer 2015, the first partnership between a medical center and a community health and wellness organization opened in the newly expanded Eastside Family YMCA. The connection formed out of a shared desire to form a health and wellness facility that offers the community an informal
location for wellness and medical care. URMC offers nutrition and lifestyle, as well as
weight-loss programs led by doctors. Implementing weight-loss maintenance lifestyle
behaviors to the current programs would incorporate the health and wellness mission and
take it to the next stage toward lifestyle change.

Conclusion

A key challenge in the treatment of obesity is maintenance of weight loss.
Weight-loss maintenance is a difficult journey. This study used both quantitative and
qualitative research methods to deliver a thorough examination on how some obese adults
were capable of losing significant amounts of weight and maintain those losses over time.
Strategies found to support weight-loss maintenance included eating strategies, physical
activity strategies, distinguishing between weight loss versus weight maintenance, social
support, positive body image, and self-determination.

The general public, medical community, researchers, and the individuals
struggling with obesity, overweight, or weight-loss maintenance need to recognize that
these health conditions demand continuous care after the initial weight loss. The
persistent challenge for practitioners is how to expand program designs, what strategies
to develop, and which predictors to tackle to promote long-term management of weight
loss. A significant real-world challenge is to persuade the general public, medical
community and obese and overweight individuals that being obese or overweight is a
multifaceted condition that can be effectively conquered by way of a continuous care
program design beyond initial weight loss. Temporary “diet” interventions that attempt
to deliver decreases in weight are destined for failure (Linde et al., 2005; Ulen et al.,
2008; Williams et al., 2016). A continuous care approach dedicated to the realization of
the need for “lifestyle changes,” autonomy, competence, and relatedness with sensible long-term intentions is more appropriate. Successful long-term maintenance might involve maintenance programs encompassing years rather than months of continuous care.

This research study presented a variety of analyses and data that described the successful weight-loss maintainer in relation to changes in behavior and motivation. Endeavoring to integrate the data brought forth in the study beyond the reviewed literature, a revised description of a long-term weight-loss maintainer is proposed. A successful long-term weight-loss maintainer starts the weight-loss process initially considering the cumulative actions as a “diet,” involving stringent adherence which might lead to some degree of letdown until there is a realization that in order to succeed, the mindset must change to incorporate the behavioral modifications as a lifestyle change. It is at this point that weight-loss goals are achieved. The weight-loss maintainer primarily remains consistent with the initial healthy eating regimen of eating less with small, periodic adjustments followed up with an increase in the intensity of exercise/physical activity alternating between weight training and cardio throughout the week. The long-term weight-loss maintainer self-monitors their lifestyle as it relates to being aware of slight changes in weight. If a hurdle is experienced such as holidays, the maintainer progresses in the appropriate direction quickly with little harm to their health and body image. Social support from peers and professionals motivates the long-term weight-loss maintainer. Such support, typically from family members, friends, peers, or professionals is used to sustain motivation and offer reinforcement for appropriate behavior changes. During the maintenance phase the weight-loss maintainer develops autonomy (the ability
to display a sense of ownership over maintenance behaviors), experiences competence (feelings of efficacy in meeting maintenance-related challenges), and communicates relatedness (satisfying and supportive social relationships). When these psychological needs are appropriately balanced with behavioral changes, self-determination moves the weight-loss maintainer along a long-term healthy lifestyle journey.
References


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### Appendix A

**Obesity Trends* Among U.S. Adults by State**

<table>
<thead>
<tr>
<th>State</th>
<th>1990 Data</th>
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<th>State</th>
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</table>

*BMI (Body Mass Index) greater than or equal to 30, or about 30 lbs. overweight for 5'4" person.

Note: Adapted from CDC’s Behavioral Risk Factor Surveillance System (BRFSS), 1990 and 2010
Appendix B

Survey Instrument

The purpose of this survey is to gather information about weight loss and long-term weight-loss maintenance. This is a research project being conducted by Rose Marie Nichols, Group Fitness Instructor at YMCA of Greater Rochester and doctoral candidate at St. John Fisher College. As a member of the YMCA of Greater Rochester, you are being asked to participate because your responses will be essential to the research being conducted.

*Your participation in this research study is voluntary.* The outcomes may benefit individuals who are losing weight or maintaining weight loss. If you choose to participate in this research survey, you may withdraw at any time. If you elect not to participate in this study or if you withdraw from participating at any time, you will not be penalized. Your participation is very valuable and greatly appreciated.

*The survey will take about 8-12 minutes to complete.* There are 38 questions in this survey. Data is being collected from approximately 150 YMCA employees and members at two urban and two suburban branches: Carlson MetroCenter, Eastside Family Branch, Maplewood Family Branch, and Westside Family Branch.

*Your responses are confidential.* There is little risk in taking this survey. If you complete the study and agree to provide your contact information at the end of the survey in order to participate in the focus group session occurring at the Carlson MetroCenter, your responses to the actual survey will still remain confidential. Your contact information will only be used by the researcher to contact you if you are selected to participate in the focus group session.

You will be required to answer some questions while others are not required and may be skipped if you are not comfortable answering. All data will be stored in a password protected electronic format. The aggregate results of this study will be used for scholarly purposes only and results may be shared with YMCA of Greater Rochester representatives.

Completion of the survey will result in your eligibility to win one of two $50 Amazon gift cards. The survey will be available for completion from <INSERT DATE RANGE>, 2016. If you complete this survey and agree to provide your contact information at the end of the survey to participate in a follow-up focus group session occurring at one of the above-mentioned YMCA branches, your contact information will be used only by the researcher to contact you regarding scheduling of the focus group session.

If you have any questions about the research study, please contact Rose M. Nichols, 585-410-5941. This survey has been approved by the YMCA of Greater Rochester Risk Management department and St. John Fisher College IRB procedures for research involving human subjects.
Sincerely,

Rose M. Nichols,
Doctoral Candidate
St. John Fisher College
rmn04791@sjfc.edu

Please take your time to respond to each item. Please answer each question as best you can. Remember, there is no right or wrong answer to any of these items. We are just interested in hearing how you honestly think and feel. You are free to skip any questions that you do not feel comfortable answering.

All of your responses will be handled confidentially. We estimate that this survey will take you approximately 8-12 minutes to complete. Thank you for your participation. Your contributions to our research are extremely valuable!

Section A:
The following questions relate to your current health and weight history. For weight, height, and timeframe questions, your best estimate is fine.

1. What is your current weight in pounds? ________

2. What is your current height (in feet/inches)?
   Feet ________
   Inches ________

3. What was your lowest and highest weight in the past year?
   Lowest: ________
   Highest: ________

4. Would you say your current health in general is:
   - Excellent
   - Very good
   - Good
   - Fair
   - Poor
   - Don’t know

5. Which of the following statements best describes you:
   - Very underweight
   - Somewhat underweight
   - Right weight
   - Somewhat overweight
   - Overweight
6. What is the highest weight you have ever been (women, with the exception of pregnancy)? ________

7. How long ago were you at your highest weight?
   Years ________
   Months ________

8. How tall were you without shoes when you were at this highest weight?
   Feet ________
   Inches ________

9. Have you gained more than 5 pounds over the last year?
   ☐ Yes
   ☐ No

10. Have you had bariatric surgery?
    ☐ Yes
    ☐ No

11. Please check all diet/weight loss plans or products you are using now or have tried in the past:
    ☐ Prescription medications (i.e. Orlistat, Sibutramine)
    ☐ Food Addicts in Recovery Anonymous
    ☐ Jenny Craig
    ☐ Liquid diets
    ☐ Nutrisystem
    ☐ Overeaters Anonymous
    ☐ Over-the-counter diet pills
    ☐ Weight Watchers
    ☐ None of these
    ☐ Other: _____________________________
Section B:
The following questions relate to the reasons why you would either start losing weight or continue to maintain weight you have already lost. Different people have different reasons for doing that, and we want to know how true each of the following reasons is for you. All 15 responses are to the same question. Please indicate the extent to which each reason is true for you using the following 7-point scale:

1 2 3 4 5 6 7
Not at all true Somewhat true Very true

The reason I would achieve/maintain a healthy body weight after long-term weight loss is:

1. Because I feel that I want to take responsibility for my own health. _______
2. Because I would feel guilty or ashamed of myself if I was not at a healthy weight. _______
3. Because I personally believe it is the best thing for my health. _______
4. Because others would be upset with me if I did not. _______
5. I really don’t think about it. _______
6. Because I have carefully thought about it and believe it is very important for many aspects of my life. _______
7. Because I would feel bad about myself if I was not at a healthy weight. _______
8. Because it is an important choice I really want to make. _______
9. Because I feel pressure from others to do so. _______
10. Because it is easier to do what I am told than think about it. _______
11. Because it is consistent with my life goals. _______
12. Because I want others to approve of me. _______
13. Because it is very important for being as healthy as possible. _______
14. Because I want others to see I can do it. _______
15. I don’t really know why. _______

Section C:
Please indicate the extent to which each statement is true for you, assuming that you were intending either to permanently improve your weight now or to maintain a healthy weight. Use the following scale:

1 2 3 4 5 6 7
Not at all true Somewhat true Very true

I feel confident in my ability to maintain a healthy weight. _______
I now feel capable of maintaining a healthy weight. _______
I am able to maintain a healthy weight permanently. _______
I am able to meet the challenge of maintaining a healthy weight. _______
Section D:

1. Which YMCA location(s) do you regularly visit?
   - Carlson MetroCenter
   - Eastside
   - Maplewood
   - Westside

2. What is your age?
   - 19-29
   - 30-39
   - 40-49
   - 50-59
   - ≥ 60

3. What is your gender?
   - Male
   - Female
   - Not listed (please specify): _____________________

4. Are you of Hispanic, Latino, or Spanish origin?
   - No, not of Hispanic, Latino, or Spanish origin
   - Yes, Mexican or Mexican American
   - Yes, Puerto Rican
   - Yes, Cuban
   - Yes, another Hispanic, Latino, or Spanish origin. Please enter identify below (ex. Dominican, Columbian): _____________________

5. What is your race?
   - White
   - Black or African American
   - American Indian or Alaska Native
   - Asian
   - Native Hawaiian or other Pacific Islander
   - Some other race: _____________________

6. Please check years of school completed.
   - Less than High School
   - High School (10-12 yrs.)
   - Some college (less than 4 yrs.)
   - Undergraduate/College degree
   - Graduate or Professional Education
7. What is your marital status?
   - Married
   - Separated
   - Divorced
   - Widowed
   - Never Married
   - Not Married (living with significant other)

8. Are you currently employed?
   - Employed full-time
   - Employed part-time
   - Self-employed
   - Not currently employed
   - Retired
   - Student
   - Other (please specify) ___________________________________

Thank you for completing the survey! You are now eligible to win one of two $50 Amazon gift card. The gift cards will be given away to survey respondents who have completed the survey at the branch. If you win, you will be contacted by the researcher, Rose Nichols, via e-mail to discuss how to redeem your gift card. Please provide your e-mail address below if you wish to be eligible for the giveaways.

If you are willing to voluntarily participate in a focus group session, which will occur at one of the branches, please provide your contact information. Your contact information will only be used by the researcher to contact you regarding scheduling of the focus group session if you are selected.

We would be happy to answer any question that may arise about the study. Your questions will be confidential. Please direct your questions or comments to Rose M. Nichols (rmn04791@sjfc.edu or 585-410-5941) or Dr. Bruce Blaine (bblaine@sjfc.edu or (585) 899-3808).

If you wish to be eligible for the gift card giveaways, please provide your e-mail address below:

______________________________________________________
Yes, I would be interested in voluntarily participating in a focus group session, if selected. My contact information is:
Name: _______________________________ Phone Number: _______
Appendix C

WhenToWork.com message from Health and Wellness Directors
(Eastside, Westside, Carlson MetroCenter, and Maplewood)

NEWS YOU CAN USE! <DATE>

Rose Nichols, a Group Fitness Instructor of the YMCA of Greater Rochester, is pursuing her doctoral degree at St. John Fisher College. Her doctoral dissertation involves circulating a survey to individuals who have made a lifestyle change in the area of weight loss/weight-loss maintenance. The <BRANCH NAME> is supporting Rose’s doctoral research by permitting her to set-up a table in the lobby from <START DATE> to <END DATE>, in order to ask YMCA members to complete the survey. Employees may also complete a survey for Rose’s doctoral study only when off duty.

We wanted to make you aware of this research in case any YMCA members should approach you about the survey and/or the table set-up in the lobby. If anyone has any questions or concerns about the research or the survey, please feel free to contact Rose Nichols or me directly.

Thank you!

<NAME>, Health and Wellness Director
<BRANCH NAME>
Appendix D

Focus Group Protocol for Long-Term Weight-loss maintainers

Phrases or passages in *italics* are instructions for the researcher.

Part 1: Upon Arrival (pre-focus group session)

*WELCOME EACH FOCUS GROUP PARTICIPANT. GO THROUGH INFORMED CONSENT PROCESS. TAKE TO PRIVATE AREA TO TAKE WEIGHT AND HEIGHT MEASUREMENTS IF WRITTEN CONSENT OBTAINED FROM CONSENT FORM. RECORD MEASUREMENTS IN RESEARCH NOTEBOOK. IF PARTICIPANT DECIDES NOT TO TAKE WEIGHT OR HEIGHT MEASUREMENTS, ASK THE PARTICIPANT IF THEY ARE WILLING TO SELF-REPORT AN ESTIMATED WEIGHT AND HEIGHT.*

*DISTRIBUTE COPIES OF SIGNED CONSENT FORMS TO EACH PARTICIPANT AFTER WEIGHT AND HEIGHT MEASUREMENTS TAKEN.*

Part 2: Welcome

*WELCOME ALL FOCUS GROUP PARTICIPANTS. GO THROUGH INFORMED CONSENT PROCESS WITH ENTIRE FOCUS GROUP. HAVE EACH PARTICIPANT COMPLETE A NAMETAG (FIRST NAME ONLY) AND INTRODUCE THEMSELVES BY STATING SOMETHING UNIQUE ABOUT THEIR WEIGHT LOSS OR WEIGHT-LOSS MAINTENANCE EXPERIENCE. DISTRIBUTE COPIES OF SIGNED CONSENT FORMS TO EACH PARTICIPANT AFTER WEIGHT AND HEIGHT MEASUREMENTS ARE TAKEN.*

Part 3: Introduction/Consent Forms

*INTRODUCE THE FOCUS GROUP SESSION WITH THE FOLLOWING:*

Thank you for coming today. The purpose of this study is to probe more deeply into your experiences as a long-term weight loss maintainer or weight regainer. If you have comments or concerns that span a longer period, please do to hesitate to bring them forward. We would like to record the session so that I can study your statements, but know that the experiences shared today will be confidential and will go no further than this research study. Anything you say here will be held in strict confidence and will be anonymous; we will not tell individuals outside this room what you communicate today. Do I have your permission to record?

As a reminder, a requirement of participating in this focus group session is that all participants have read and signed a consent form. Please review once again the signed consent form returned to you upon your arrival today. If you have any questions, I would be happy to answer them for you *<PAUSE FOR ANY QUESTIONS; ANSWER APPROPRIATELY>*. If, at any time, you wish to stop your participation in the focus group, you have the option to leave the group with no questions asked.

Part 4: Questions
ASK THE FOLLOWING QUESTIONS AND ALLOW APPROPRIATE RESPONSE TIME FOR PARTICIPANTS.

1. Please describe your success in maintaining weight loss.
   a. Prompts:
      i. Are there any strategies that help you maintain your weight loss?
      ii. Where did you learn about these strategies?
      iii. Who or what has influenced you as you maintain your weight loss?
      iv. How has anyone or anything challenged you or made it difficult for you to keep up with your efforts to maintain your weight loss?

2. Please describe any difficulties in maintaining your weight loss/regaining your weight.
   a. Prompts:
      i. What situations are most challenging in maintaining your weight loss?
      ii. How do you handle these situations?
      iii. How did overcoming these challenges or difficulties help you learn and grow?

3. Please describe any supports you have to help you maintain your weight loss.
   a. Prompts:
      i. What have you found most helpful? Why?
      ii. Who was most supportive of your efforts? In what ways?

4. If we were to ask a close friend of yours, how would they describe your experience with weight loss management?

5. What advice would you give others trying to maintain weight loss?

Thank you for sharing your time and experience. Your answers are valuable to us as we learn more about how to improve future weight-loss maintenance interventions.

BEFORE DEPARTING, PROVIDE EACH PARTICIPANT WITH A $10 GIFT CARD TO CORELIFE EATERY.
Appendix E

Preliminary Email for Potential Focus Group Participants

Dear YMCA Member:

Thank you for volunteering to participate in a Focus Group session to gather information about weight loss, long-term weight-loss maintenance, and weight regain. Rose Nichols, doctoral candidate at St. John Fisher College will be leading the focus group. The study is part of her dissertation research and will be used to help learn more about how to improve future weight-loss maintenance interventions.

The focus group, to be held on <DATE>, from <START TIME> until <END TIME> at the Carlson MetroCenter branch will include other YMCA members. (Continental breakfast/Lunch) will be provided.

While participation is completely voluntary, your participation will help us effectively address the way we understand strategies for maintaining long-term weight loss. Please be assured that anything you say during the focus group will be kept strictly confidential, and no information will be released that can be linked to you. Before the focus group begins, with your consent, your height and weight measurements will be recorded. Providing your measurements is voluntary. Please complete the attached Focus Group Informed Consent Form and bring it with you to the Focus Group on <DATE>. I will be contacting you by telephone to give you more details about this important session and answer any questions you may have about the study. You are also welcome to call me at 585-410-5941. We hope you will be able to join us for this important discussion. Thank you for your time and consideration.

Rose M. Nichols, Doctoral Candidate
St. John Fisher College
rmn04791@sjfc.edu
Appendix F

Focus Group
Informed Consent Form
St. John Fisher College

What is the study about? This is an invitation to participate in a research study for a dissertation conducted by Rose M. Nichols, doctoral candidate in the Ralph C. Wilson, Jr. School of Education department of St. John Fisher College in Rochester, New York. The study is interested in your personal long-term weight-loss maintenance experiences. We are asking you to take part in this research study because we are interested in learning information about long-term weight-loss maintenance. You are receiving this notification because you participated in the Being Able to Be Stable Survey at the YMCA of Greater Rochester and volunteered to be contacted if you met the criteria to participate in the focus group session.

What will be asked of me? You will receive an invite to participate in a focus group session with other long-term weight-loss maintainers. The focus group will consist of four to five fellow long-term weight-loss maintainers led by a moderator (Chrzanowska, 2002). You will be given the opportunity to communicate your personal perspective on the subject of long-term weight-loss maintenance. The focus group session may take 60-90 minutes. As a part of your participation in the focus group, your height and weight measurements will be recorded 15-20 minutes before the start of the focus group session. Please indicate below if you consent to having your height and weight measurements recorded before the start of the focus group session. Providing your measurements is voluntary.

☐ Yes, I consent to having my height and weight measurements recorded. _______ (initials)

☐ No, I DO not consent to having my height and weight measurements recorded, but I am willing to participate in the focus group session. _______ (initials)

Who is involved? The following individuals are involved in this research project: Rose M. Nichols (Doctoral Candidate, St. John Fisher College), Dr. Bruce Blaine (Dissertation Chair, St. John Fisher College), Dr. Christine Nelson-Tuttle (Dissertation Committee Member, St. John Fisher College), and Laura Fasano (Vice President of Healthy Living, YMCA of Greater Rochester).

Are there any risks? The risk of the study includes the chance that others might see or hear the results of your height and weight measurements. We will do our best to prevent this from happening by refraining from verbalizing your height and weight. Some of the questions might be sensitive since they are about personal experiences and practices. You may stop the study at any time. You may also choose not to reply to any questions that you feel uncomfortable answering.
**What are some benefits?** There is no benefit to you by participating in this research study. The results may be of scientific interest. This study may increase our knowledge on predictors that make long-term weight-loss maintenance successful.

**Is the study confidential?** The data collected in this study is confidential. Only the researchers in this study will see the data. Some situations exist in which the researcher must disclose personal information. Such cases include when the researcher suspects harm to self, harm to children, harm to elderly, or others. Data will be protected throughout the length of the study and destroyed within seven years of the study.

**Can I stop participating in the study?** If you do not want to be in this research study, you do not have to participate. Participation in this research project is voluntary. If you decide to participate, you are free to withdraw at any time. No penalty exists for withdrawal. You can skip any questions if you do not want to respond. Your participation will provide important information to inform existing interventions related to maintaining weight loss for the long-term and obesity.

**What steps do I take if I have questions about my rights as a research participant?** If you have questions about your rights, any grievances, or concerns about problems that occurred in the study, please contact the researchers identified in this consent form. To speak with someone outside of the study team, you can contact St. John Fisher College’s Institutional Review Board at irb@sjfc.edu.

We would be happy to answer any questions that may arise about the study. Your questions will be confidential. Please direct your questions or comments to Rose M. Nichols (rmn04791@sjfc.edu or 585-410-5941) or Dr. Evan Blaine (bblaine@sjfc.edu).

**Signatures**

I have read the above description for the current study, **Being Able to Be Stable**. I have read and understand the nature of the study and my rights as a participant. My signature indicates that I voluntarily agree to participate in the study.

Name of Participant: _____________________________________________________

Signature of Participant: __________________________________________________

Date: _________________________________________________________________

Researcher’s Name: Rose M. Nichols

Researcher’s Signature: __________________________________________________

Date: _________________________________________________________________
Upon receipt of your informed consent, we will e-mail you a reminder invitation to the focus group session. You will be given a copy of this form when you arrive at the focus group session.
## Appendix G

*Research Questions/Survey Questions/Focus Group Questions/Frame Matrix*

### Survey Questions

<table>
<thead>
<tr>
<th>Research Question #1: What predictors motivate individuals who are long-term weight-loss maintainers?</th>
<th>Related Self-determination Theory basic psychological need</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Note:</strong> Section A is weight and height data collection as well as weight history data collection (Questions 1-13)</td>
<td></td>
</tr>
<tr>
<td><strong>Section B (TSRQ)</strong></td>
<td></td>
</tr>
<tr>
<td><em>The reason I would achieve/maintain a healthy body weight after long-term weight loss is:</em></td>
<td></td>
</tr>
<tr>
<td>1) Because I feel that I want to take responsibility for my own health.</td>
<td>Autonomous motivation</td>
</tr>
<tr>
<td>2) Because I would feel guilty or ashamed of myself if I was not at a healthy weight.</td>
<td>Controlled motivation</td>
</tr>
<tr>
<td>3) Because I personally believe it is the best thing for my health.</td>
<td>Autonomous motivation</td>
</tr>
<tr>
<td>4) Because others would be upset with me if I did not.</td>
<td>Controlled motivation</td>
</tr>
<tr>
<td>5) I really don’t think about it.</td>
<td>Amotivation</td>
</tr>
<tr>
<td>6) Because I have carefully thought about it and believe it is very important for many aspects of my life.</td>
<td>Autonomous motivation</td>
</tr>
<tr>
<td>7) Because I would feel bad about myself if I was not at a healthy weight.</td>
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</tr>
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</tr>
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<td>9) Because I feel pressure from others to do so.</td>
<td>Controlled motivation</td>
</tr>
<tr>
<td>10) Because it is easier to do what I am told than to think about it.</td>
<td>Amotivation</td>
</tr>
<tr>
<td>11) Because it is consistent with my life goals.</td>
<td>Autonomous motivation</td>
</tr>
<tr>
<td>12) Because I want others to approve of me.</td>
<td>Controlled motivation</td>
</tr>
<tr>
<td>13) Because it is very important for being as healthy as possible.</td>
<td>Autonomous motivation</td>
</tr>
<tr>
<td>14) Because I want others to see I can do it.</td>
<td>Controlled motivation</td>
</tr>
<tr>
<td>15) I don’t really know why.</td>
<td>Amotivation</td>
</tr>
</tbody>
</table>

### Section C: Perceived Competence Scale (PCS)

*Please indicate the extent to which each statement is true for you, assuming that you were intending either to permanently improve your weight now or to maintain a healthy weight. Use the following scale:*

<p>| 1) I feel confident in my ability to maintain a healthy weight. | Competence |</p>
<table>
<thead>
<tr>
<th>Question</th>
<th>Competence</th>
</tr>
</thead>
<tbody>
<tr>
<td>2) I now feel capable of maintaining a healthy weight.</td>
<td><strong>Competence</strong></td>
</tr>
<tr>
<td>3) I am able to maintain a healthy weight permanently.</td>
<td><strong>Competence</strong></td>
</tr>
<tr>
<td>4) I am able to meet the challenge of maintaining a healthy weight.</td>
<td><strong>Competence</strong></td>
</tr>
</tbody>
</table>

**Section D**

*Note: Section D is demographic data (Questions 1-6)*

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**Focus Group Questions: Long-Term Weight-loss maintainers**

<table>
<thead>
<tr>
<th>Research Question #2: What predictors do long-term weight-loss maintainers use to maintain their weight loss?</th>
<th>Related Self-determination Theory basic psychological need</th>
</tr>
</thead>
<tbody>
<tr>
<td>1) Please describe your success in maintaining weight loss.</td>
<td>Related Self-determination Theory basic psychological need</td>
</tr>
<tr>
<td>a. Prompts:</td>
<td>Autonomous Motivation Controlled Motivation Amotivation Competence Relatedness</td>
</tr>
<tr>
<td>i. Are there any strategies that help you maintain your weight loss.</td>
<td></td>
</tr>
<tr>
<td>ii. Where did you learn about these strategies?</td>
<td></td>
</tr>
<tr>
<td>iii. Who or what has influenced you as you maintain your weight loss?</td>
<td></td>
</tr>
<tr>
<td>iv. How has anyone or anything challenged you or made it difficult for you to keep up with your efforts to maintain your weight loss?</td>
<td></td>
</tr>
</tbody>
</table>

| 2) Please describe any difficulties in your weight loss/regaining your weight. | Autonomous Motivation Controlled Motivation Amotivation Competence |
| a. Prompts: | | |
| i. What situations are most challenging in maintaining your weight loss? | | |
| ii. How do you handle these situations? | | |
| iii. How did overcoming these challenges or difficulties help you learn and grow? | | |
3) Please describe any supports you have to help you maintain your weight loss.
   a. Prompts:
      i. What have you found most helpful? Why?
      ii. Who was most supportive of your efforts? In what ways?

4) If we were to ask a close friend of yours, how would they describe your experience with weight loss management?

5) What advice would you give others trying to maintain weight loss?

<table>
<thead>
<tr>
<th>Prompts</th>
<th>Autonomous Motivation</th>
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<tbody>
<tr>
<td></td>
<td>Controlled Motivation</td>
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<tr>
<td></td>
<td>Amotivation</td>
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<td></td>
<td>Competence</td>
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<td></td>
<td>Relatedness</td>
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<td>Competence</td>
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<tr>
<td></td>
<td>Relatedness</td>
</tr>
</tbody>
</table>
Appendix H

Confidentiality Statement for Focus Group Participants

I, _______________________________________________, understand that I will be part of a research study, conducted by researcher Rose Nichols, as a focus group participant at the ____________ branch of the YMCA of Greater Rochester. I understand that as a focus group participant in this study I have agreed in good faith that all responses in the focus group session will remain strictly confidential. I understand that I have a responsibility to honor this agreement. I hereby agree not to share any information from the focus group session with anyone beyond the researcher named above.

Any violations of this agreement would constitute a serious breach of ethical standards, and I pledge not to do so. I understand a breach of ethical standards may also jeopardize the research study, and affect the status of the researcher as a candidate in the doctoral program at St. John Fisher College.

___________________________________   ________________________
Printed Name of Focus Group Participant     Date

___________________________________   ________________________
Signature of Focus Group Participant      Date

___________________________________   ________________________
Printed Name of Researcher       Date

___________________________________   ________________________
Signature of Researcher       Date