THE ROLE OF SOCIAL SUPPORT IN WEIGHT STABILITY MAINTENANCE

BY

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Abstract

Although it is common for dieting attempts to be initially successful, it is rare for weight to be permanently kept off successfully. This leads to weight cycling, a practice that is associated with negative physical and mental health outcomes. The major purpose of this study was to investigate the roles of social support and sex as it relates to successful weight maintenance, along with associated factors such as perceived stress and overeating behaviors. An online survey was distributed to a sample of students from a large Midwestern university (*N* = 311). Participants completed measures that assessed their social support for eating habits and exercise, overeating behaviors, perceived stress, success in dieting, frequency of diet attempts, Body Mass Index (BMI), and demographics.

Results indicated that women reported higher frequency of diet attempts, more overeating behaviors, higher perceived stress, lower success in dieting, and lower BMI scores than did men. Women were not any more or less likely than men to receive social support for eating habits and exercise. Contrary to the hypothesis, social support for eating behaviors (both encouragement and discouragement) was a negative predictor of success in dieting, and a positive predictor of frequency of diet attempts, overeating behaviors, perceived stress, and BMI. Social support for exercise was a positive predictor of success in dieting, and a negative predictor of frequency of diet attempts, overeating behaviors, perceived stress, and BMI. Overall, this study established that there is a relationship between social support and behaviors associated with successful weight maintenance. Future research should try to establish if social support is a causal factor in dieting attempts, success in dieting, overeating behaviors, and BMI, while carefully controlling for sex effects.

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On a personal level, Mary Vess has been a constant source of inspiration and motivation during my entire tenure in the program. She helped keep my spirits up during difficult times, and kept pushing me to exceed expectations every step of the way. This project (and nothing in my life) would be the same without her presence in my life.

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Chapter One:

Rationale and Literature Review

This study was designed to investigate the role that social support plays in affecting the behaviors that lead to weight cycling in individuals. The major purpose of the study was to investigate whether or not social support and sex serve as significant contributors to success in dieting and/or disordered eating behaviors. The secondary purpose of the study was to investigate the relationship that factors such as perceived stress and eating behaviors have on body mass index (BMI) and perceived dieting success.

In this chapter, a rationale for the study is provided and relevant literature is reviewed. The review of relevant literature overviews the prevalence of and long-term success rates of dieting, the background behind weight cycling, the effects of stress on weight maintenance, the diet and weight loss literature related to social support, the role biological sex has in weight maintenance, and finally, the relevant theory guiding the study. At the end of Chapter One, hypotheses and research questions are presented. in Chapter Two, the methodology that was used to assess the hypotheses and research questions is described. Chapter Three provides the results of the study. And, finally, in Chapter Four, a discussion and interpretation of the results is offered, as well as theoretical and practical implications of the current research. In addition, Chapter Four also notes the limitations and future directions of the current research study.

Prevalence and Success of Dieting

Attempting to lose weight via dieting (i.e., specifically changing nutritional intake and exercise habits) is quite a common occurrence in the United States and many places around the world. Estimates about the number of people who are on diets are difficult to measure, but one

source estimated that there were around 108 million people on diets in the United States ("100 million dieters, $20 billion: The weight-loss industry by the numbers," 2012), while the BBC reported in 2004 that 13 million adults in the United Kingdom were trying to lose weight most of the time ("Many people diet most of the time," 2004). Even though recent trends indicate that dieting frequency may be declining, this may only be because people are not calling what they are doing a "diet" anymore, although they are still behaving in a similar manner (Aubrey, 2013).

Although diets are often initially successful, the long-term outcomes (or maintaining the weight lost) do not leave room for optimism. Kramer, Jeffery, Forster, and Snell (1989) observed this long ago when they recruited 152 subjects to complete a 15-week behavioral diet program that included diet and exercise instruction, behavioral skills training, cognitive behavior modification, and relapse prevention training. While men lost 13 kilograms (kg) and women lost 8.6 kg on average immediately after the treatment, a follow-up assessment four years later found that only three percent of participants stayed at or below their post-treatment weight. While women had better weight loss maintenance than men, this finding still shows how difficult it is to maintain weight loss in the long run.

A study conducted by Fildes, Charlton, Rudisill, Littlejohns, Prevost, and Gulliford (2015) corroborated this finding when they conducted a longitudinal analysis of Body Mass Index (BMI) records for 76,704 obese men and 99,791 obese women from the United Kingdom. Fildes et al.'s (2015) conclusion was that for people with BMI ranging from 30.0 to 34.9, the annual probability to obtain a normal weight was 1 in 210 for men, and 1 in 124 for women. This rate exponentially increases to 1 in 1290, and 1 in 677, respectively, for people with morbid obesity

(BMI = 40.0-44.9). Americans do not seem to fare much better: A survey of 500 Americans by McGuire, Wing, and Hill (1999) reported that 62% of those who were overweight lost at least 10% of their maximum weight at least once in their lives. While nearly half of these people maintained the weight loss for at least one year, only 21% of those with a history of obesity could maintain this loss to the time of the survey.

The results of these studies call into question the effectiveness of dieting. The studies that do claim success often overestimate the effectiveness of weight loss plans, due to high attrition rates in long-term studies by participants not getting the results they desire (Mann, Tomiyama, Westling, Lew, Samuels, & Chatman, 2007). Mann et al. (2007) go on to claim that these studies show that one-third to two-thirds of dieters regain more weight than what they lost on their diets, meaning that dieting might even be counterproductive toward people's overall health goals. Despite how ineffective dieting appears to be based on the findings of these studies, dieting is still commonplace in society. It is so common that people who fail to maintain their weight loss often try to lose it again, leading to the phenomenon known as weight cycling.

Weight Cycling

Weight cycling, otherwise known as yo-yo dieting, is a phenomenon first observed and coined by Brownell, Greenwood, Stellar, and Shrager (1986) when examining the effects of repeated cycles of weight loss and regain in rats. The term is derived from observations of people who lose and regain weight repeatedly throughout their lives. In popular culture, the most prominent examples of yo-yo dieters have been celebrities, such as Oprah Winfrey, whose weight loss (and gain) exploits have been well-documented throughout her television show

history (Baumeister & Tierney, 2011).

Research has investigated the mechanisms and causes of weight cycling behaviors. The research has approached weight cycling behaviors through both biological and behavioral science perspectives. In support of biological mechanisms, Brownell et al. (1986) found that in the second cycle of caloric restriction and refeeding, male rats lost weight at half the rate of the first cycle, and regained weight at three times the rate of the first cycle. This effect accelerated with more cycles. Blackburn et al. (1989) replicated this finding in humans by having obese patients go through two caloric restriction and refeeding cycles. Despite beginning each cycle at the same mean weight, patients demonstrated significantly less weight loss on the second cycle. The suggested reason for this decelerated rate of weight loss is that weight cycling leads to lower rates of metabolism.

However, the above biological explanation has been challenged. Dale and Saris (1989) conducted a study where differences in weight loss and resting metabolic rates were compared between: (1) weight cyclers who changed both their exercise and eating habits, (2) regular dieters who also changed their exercise and eating habits, and (3) regular dieters who only changed their eating habits. The study found that those who dieted and exercised experienced significantly more weight loss after 14 weeks than those who merely dieted. However, no differences were found between dieters who did and did not weight cycle. Although this study has limitations in its small sample size and lack of a second weight cycler condition, it suggests that people may have control of their weight, regardless of its cyclical nature, so long as they control both their caloric intake and physical activity regimen.

So, what causes people to weight cycle? One reason might be that most people fail to

keep the weight off from their first diets. Ayyad and Andersen (2000) suggest that the median success rate (i.e., kept off at least 20 pounds) of diets after at least three years is only 15%. Coupled with Blackburn's et al. (1989) finding, this hints that the *way* people diet is not sustainable in the long run. These studies (and many diet attempts overall) have people restrict their caloric intakes to lose weight. The problem is that people rarely sustain their restricted intakes. This idea is featured in Geissler, Miller, and Shah (1987), where 16 post-obese women were compared to 16 women without a history of weight problems (i.e., the control group). Although the two groups had a similar average height, weight, and age, the post-obese women had a 15% lower metabolic rate, and consumed significantly fewer calories than the women in the control group (despite only trying to maintain their current weight). So, those who do succeed at diets maintain their restricted caloric intake in the long term. Thus, it would make sense that these less restrictive cycles would cause weight regain, because of the increased efficiency of storing and conserving energy.

An estimated 41% of women have intentionally lost between five and nine pounds at least twice (Field et al., 1999), and severe weight cycling (defined as losing over 11 pounds at least three times with regain each time) in Finnish adults was reported by 10% of women and 7% of men (Lahti-Koski, Mannisto, Pietinen, & Vartiainen, 2005). So, regardless of the mechanisms or causes, weight cycling is a well-documented phenomenon in both research and popular culture, and it is prevalent among the world population.

Health Effects of Weight Cycling

Research has found evidence mainly supporting the notion that intentional weight cycling has a negative impact on the physical health of people who partake in it. This is not

immediately apparent, because in obese patients, weight cycling does not appear to have adverse effects on fat distribution or metabolic risk (Bosy-Westphal, Kahlhöfer, Lagerpusch, Skurk, & Müller, 2015). However, since people who are obese often have metabolic risk factors (e.g., Type II Diabetes), it is difficult to discern the impact of weight cycling on this population. Another study found that people who have a history of weight cycling may have an increased risk of mortality by way of heart disease and cancer (Amigo & Fernandez, 2007).

It is possible that the negative effects of weight cycling are more severe in normal weight people. Dulloo, Jacquet, Seydoux, and Montani (2006) reported that people who recover weight after substantial weight loss (i.e., both intentionally or unintentionally via disease or famine) often gain back less than half of the muscle they lost, with the weight being replaced by fat. Considering that an estimated 6% of men and 24% of women within the normal weight range try to diet (Kruger, Galuska, Serdula, & Jones, 2004), it is concerning that a significant portion of people are changing their body compositions in a negative way. Similarly, Montani, Schutz, and Dulloo (2015) reported that several metabolic and cardiovascular risk factors (e.g., insulin resistance, hypertension) can be identified in people of normal body weight who have weight cycled. Two studies (Yatsuya et al., 2003; Zhang et al., 2005) that utilized samples of middle-age Japanese men found that weight cycling was positively associated with the risk of developing hyperinsulinemia (a condition that produces excess insulin the bloodstream), and metabolic syndrome (a group of risk factors that increase the risk of heart disease and other health problems). Although risk was found to be higher in participants with a higher BMI, the risks were still apparent in normal weight participants who weight cycled.

Despite these risk factors, studies are not in agreement about the effects of weight

cycling on mortality rates. Lee and Paffenbarger (1992) conducted a survey with 11,703 Harvard alumni (i.e., people who are likely financially well off and have easy access to healthcare resources). The survey assessed weight, height, physical activity, and cigarette habits at two time points that were 11 to 15 years apart, and investigated mortality from any cause in the interim. Those who lost and gained more weight (i.e., weight cyclers) were associated with significantly increased mortality from all causes except cancer.

Similarly, Rzehak, Meisinger, Woelke, Brasche, Strube, and Heinrich (2007) conducted a similar survey with 505 men. A 15-year follow up was conducted after initial examination, and 183 deaths were observed among the men. Compared to people who stayed non-obese during the 15-year period, weight fluctuations were found to be a major risk factor for all causes of mortality, while stable obesity and weight gain during the 15-year follow up was not.

In addition, Diaz, Mainous, and Everett (2005) followed a cohort of 8,479 people for 21 years, and tracked their weight change at five time points to categorize participants into either stable non-obese, stable obese, weight gain, weight loss, or weight fluctuation groups. Even after controlling for pre-existing disease and initial BMI, people in the weight fluctuation groups were found to have higher mortality rates.

While these three studies (and some others; see Lissner et al. 1991, for another example) have supported the association between weight cycling and mortality, some research has found different results. Stevens et al. (2012) conducted a study which surveyed 55,983 men and 66,655 women. The researchers found out about participants' history of weight cycling, and followed up with them 16 years later. Participants that died during the follow-up period had their information utilized to form a regression model. After accounting for age, BMI, and

other risk factors, high numbers of weight cycles were found not to be associated with mortality. Stevens et al. (2015) utilized the same sample and methodology to investigate for the incidence of cancer. Models that adjusted for BMI did not find an association between cancer and weight cycling. These studies by Stevens and colleagues are hard to ignore, given their sample sizes and use of control variables. Another component to consider when evaluating this line of research is the directionality of the relationships between variables. Many life-threatening diseases have effects on the gain and loss of body weight, so weight cycling in some these instances may have been unintentional.

Although weight cycling likely has a detrimental impact on physical health, the impact of weight cycling on people's mental health is limited, based on the limited amount of previous research conducted about this topic. A review done by Brownell and Rodin (1994) found that weight cycling was sometimes associated with increased psychopathology and was consistently associated with binge eating behaviors, regardless of the body weight of the individual. Venditti, Wing, Jakicic, Butler, and Marcus (1996) also reported a consistent association between weight cycling and binge eating, but after adjusting for binge eating behaviors, weight cycling was related to perceived physical health, but not other psychological measures. While the physical and mental health effects of weight cycling are not catastrophic, they certainly are significant and should be addressed. This study assessed participants for disordered eating behaviors because of the connection it has with weight cycling, and therefore dieting success.

Relationship Between Weight and Stress

Stress is consistently associated with negative outcomes across the board, both physically and mentally. Stress also has a relationship with the weight loss process. In a study

investigating the relationship between stress and appetite, Groesz et al. (2012) looked at perceived and chronic stress, drive to eat, and reported food frequency intake in 457 women. Both chronic and perceived stress were associated with feelings of disinhibited eating, binge eating, and ineffective attempts to control eating. Groesz et al. (2012) suggest that eating, in this case, is used for comfort and to cope with stress. Outside of stress created by life events, dieting may also be a cause of stress. Tomiyama, Mann, Vinas, Hunger, DeJager, and Taylor (2010) conducted an experiment where 121 women were assigned to one of four conditions: (1) a control group where women ate normally and did not track what they ate, (2) a monitoring group where women tracked their caloric intake but ate normally, (3) a restricting group that was provided a 1,200 calorie a day diet that they did not keep track of and, finally, (4) a monitoring and restricting group where women were told to track their restricted intake of 1,200 calories a day. The women's perceived stress and cortisol levels were measured before the intervention and again three weeks later after the intervention. Perceived stress increased a small to moderate amount as a result of monitoring calories and cortisol levels increased moderately as a result of restricting calories. The results of this study thus demonstrate that dieting has both a psychological and biological impact on stress, and that dieting stress operates in multiple capacities.

Even without dieting, weight is a cause of stress. Schvey, Puhl, and Brownell (2014) assessed 123 normal weight and overweight women for salivary cortisol levels both before and after watching a video that either stigmatized weight or a neutral video. Regardless of weight, women who watched the stigmatizing video showed significantly increased cortisol activity compared to women who watched the neutral video. No differences were observed between

normal weight and overweight women in the study, as they both found the video upsetting and did not enjoy seeing obese people being stigmatized in the media.

In addition, stress may be a cause of weight gain. In conjunction with the findings from Groesz et al. (2012), which detail the eating behavior mechanisms of stress, there are also physiological effects of stress on weight. This is best evidenced in Cushing's syndrome, a disorder characterized by excess exposure to glucocorticoids such as cortisol (Shibli-Rahhal, Van Beek, & Schlechte, 2006). Shibli-Rahhal et al. (2006) state that one of the results of this prolonged exposure is obesity, particularly in the abdominal area. However, successful therapy of Cushing's syndrome (which involves correcting cortisol levels to a normal range) makes the visceral fat disappear (Björntorp, 2001). Synthesizing this information together, Tomiyama (2014) argued that weight stigmatization creates a positive feedback loop, wherein stigma creates stress, stress leads to increased eating and cortisol, more eating and cortisol leads to weight gain, and weight gain leads to increased stigma. Because of the role stress appears to play in weight gain, this study assessed perceived stress in participants.

If stress leads to weight gain, then social relationships and social support may be able to prevent (or control) weight gain by serving as a buffer against the impacts of stress. Burleson and MacGeorge (2002) define supportive communication as "verbal and nonverbal behavior produced with the intention of providing assistance to others perceived as needing that aid" (p. 374). Cutrona (1996) gives a similar definition, calling it "the fulfillment by others of basic ongoing requirements for well-being" (p. 3). This behavior is often performed by friends and family of the recipient, but can also be provided by coworkers or professionals. According to Cohen and Wills (1985), the benefits of social support operate both directly (i.e., support

provides a regular positive experience for recipients that increases feelings of positive affect and self-worth), and as a buffer against stress (i.e., social support can prevent an appraisal to a stressful event, or it can help with reappraisal of the stressor so as to prevent a harmful response). Cobb (1976) suggests that successful social support interactions are protective against the health consequences of life stress. Successful social support is seen in a variety of situations, including low birth weight of a child, recovering from alcoholism, depression, and tuberculosis. It has also been investigated in the context of weight loss.

Social Support and Weight Loss

Social support is the primary construct being investigated in this study. The role of social support in weight loss has been moderately researched, but leaves questions to be answered. It is clear that family and friends play a role in a person's diet and exercise habits, but *how* they are an influence is not as clear. In a review by McLean, Griffin, Toney, and Hardeman (2003), it was found that involving spouses in weight-related interventions improved their effectiveness, but interventions targeting adolescents were more effective if the intervention did not also target adolescents' mothers. While McLean et al. (2003) did not elaborate which behaviors spouses utilize to improve the effectiveness of weight loss interventions, one of the reviewed studies (Murphy, Williamson, Buxton, Moody, Absher, & Warner, 1982) suggested that spouse attendance at treatment sessions was the most important component to success. Part of social support is indeed just "being there" for someone (Cutrona, 1996), and these findings may demonstrate that idea. In addition, Murphy et al. (1982), as well as Pearce, Lebow, and Orchard (1981), suggest that the effects of spousal support were most evident at the 12-month follow up point, indicating a role for spousal support in the maintenance of weight loss.

Other studies have more directly investigated the role social support plays in weight loss. Kiernan et al. (2012) reported that most women participating in a behavioral weight loss program (where women met weekly to review and gain feedback on goals, receive cognitive behavior change techniques from an instructor, and then set new behavioral goals for the coming week) never or rarely experienced support from friends or family. However, it is not clear if the lack of support had an effect on the success of the program, because women who reported never experiencing friend support were the most likely to lose weight. Contrary to Kiernan et al. (2012), Ball and Crawford (2006) found that friend encouragement of physical activity was associated with significantly less weight gain over two years, and less sabotage of healthy eating and physical activity by friends was associated with significantly more weight gain over two years. Based on these findings, the effects of friend support on weight loss success remains unclear.

One role that social networks may play is in terms of instrumental support, or tangible services and advice. Thomas, Hyde, Karunaratne, Kausman, and Komesaroff (2008) conducted open-ended interviews with 76 people living with obesity. The topics of discussions in the interviews included their experiences with diets, whether they worked for them or not, the impact dieting had on their physical and emotional health, and their attitudes towards physical activity. Participants in these interviews reported that their friends and family members were the ones who introduced them to weight loss techniques and felt more accepted when trying these techniques with members of their social network. However, most participants also reported that the diets they tried did not result in sustained weight loss.

Wing and Jeffery (1999) was one of the few studies that incorporated social support into

a weight-loss intervention. One hundred sixty-six participants participated in a standard behavioral treatment for weight loss. In this 16-week treatment, participants attended meetings that included a weigh-in session, a lecture or discussion period, and a review of participants' self-monitoring records. In addition, participants were given nutrition intake goals, along with a meal plan and grocery list that would satisfy those goals. The study employed a two-by-two design. Participants were either recruited alone, or were recruited with three friends or family members. Half of the participants were also given social support resources and strategies, in addition to the standard behavioral treatment. Some examples of social support resources and strategies included providing contact information for other participants in the program, requiring homework assignments that participants were required to work on together outside of class, and planned times to eat meals and exercise together outside of class.

Wing and Jeffery (1999) found that people who went through the treatment with friends and family experienced greater weight loss and were more likely to maintain their weight loss after ten months. People who were also given social support strategies were no more or less likely to lose more weight than those who only went through the standard behavioral treatment. But, participants given the social support resources and strategies were significantly more likely to maintain their weight loss after ten months. This finding demonstrates not only evidence for the contribution that social support via the presence of others plays in outcomes, but it also suggests that effective social support may be critical for people to maintain their weight loss in the long term and to not have to try dieting again.

The findings by Wing and Jeffery (1999) have been corroborated by correlational studies, which found that self-reported friend and coworker support for healthy eating, and

family support for physical activity, were associated with weight loss after a 24-month period (Wang, Pbert, & Lemon, 2014). Wang et al. (2014) also found that if family members undermined healthy eating (e.g., gave the participant foods they are trying not to eat or ate high fat foods in front of the participant), it was associated with weight gain after 24 months. However, Perri et al. (1987) conducted a study where 32 obese participants completed a 16-week behavioral therapy program plus a four-week, peer-support maintenance program. In the peer-support program, participants were instructed on how to form their own peer self-help groups. Going through both of these programs did not result in significant maintenance of weight loss after seven or 18 months for participants.

An interview study conducted by Kayman, Bruvold, and Stern (1990) gives hint at the role social support may play in successful weight maintenance. Kayman et al. (1990) interviewed 44 women who lost weight at least one time and regained it (relapsers), 30 women who have successfully maintained their weight loss (maintainers), and 34 women who were of average weight and have maintained that weight for their adult lives (control). In the interviews, women answered questions about various topics, including their diet and weight-loss history, reasons for gaining or sustaining weight, involvement in weight control from other people, exercise patterns, eating patterns, and perceived social support. These responses were categorized to highlight differences between the groups. Kayman et al. (1990) found that maintainers and control subjects used more problem-focused than emotion-focused coping strategies than did relapsers. In addition, relapsers reportedly sought less support and had fewer people available for support than did maintainers. The results of this study provide evidence that social support plays a role in the maintenance of long-term weight loss.

A similar finding can be seen in men as well. Jeffery et al. (1984) conducted a 15-week intervention program with 89 middle-aged men that involved weekly meetings, diet and exercise instruction, behavioral skills training, and a financial contract for weight reduction. At a two-year follow-up observation, perceived support received by friends and family was significantly and positively related to weight loss. Although both studies (i.e., Kayman et al., 1990 and Jeffery et al., 1984) reveal evidence for the role of social support in weight loss maintenance, both studies used social support measures that have not demonstrated reliability or validity (e.g., interview items and two "yes" or "no" items after a one-year follow-up).

Overall, the results from studies involving social support and weight loss have displayed a mix of results. But, the most well controlled studies have demonstrated that social support can be an effective instrument in assisting with keeping off weight in the long run.

The Role of Sex in Weight Maintenance

There are unique challenges for men and women when it comes to weight maintenance. This is tacitly acknowledged in the literature, with many studies (including several cited above) skewed in participant sex composition, and some even recruiting *only men* or *only women*. One such instance is the increased pressure for women to fit a particular image or body shape. Feingold and Mazzella (1998) conducted a meta-analysis examining 222 studies focused on sex differences in attractiveness and body image. The meta-analysis found that even though women in these studies were, on average, rated higher in objective physical attractiveness than men, men still rated themselves as more physically attractive than did women. In addition, this difference has become more pronounced since the 1970s.

The desire to become more attractive has manifested in several ways. One of these

ways is through bariatric surgery, a procedure performed on the stomach or intestines to promote greater and longer lasting weight loss. The frequency of these procedures went up dramatically from 1998 (13,365 procedures per year) to 2002 (72,177 procedures per year) (Santry, Gillen, & Laurderdale, 2005). Santry et al. (2005) also found that, in that same period, the already high percentage of women using this procedure went up from 81% to 84%.

Sex differences have also been observed, unfortunately, through the increased rate of eating disorders. Smink, Hoeken, and Hoek (2012) compared prevalence rates of eating disorders between men and women, and found that women comprise a majority of the cases. In the United States, the lifetime prevalence for anorexia nervosa is 0.9% for women, and 0.3% for men. For bulimia nervosa, the lifetime prevalence is estimated to be between 0.9% and 1.5% for women, compared to 0.1 and 0.5% for men. For eating disorders not otherwise specified, and binge eating disorders, the lifetime prevalence is 3.5% for women, and 2.0% for men.

Separate from threats to body image and perceived attractiveness, differences in approaching weight maintenance may be driving the differences in outcomes between men and women. Davy, Benes, and Driskell (2006) surveyed male and female college students regarding their use of diets, eating habits, and their assessments of their own and fellow students' nutrition. Marked differences between men and women were found regarding their use of diets and beliefs about nutrition. More men than women had never tried to diet, and more women had tried low carbohydrate and low fat diets than men. In addition, a significantly smaller proportion of men thought that it was important to limit their carbohydrate or fat consumption, and a higher percentage of women felt that they needed to lose weight. The

stark differences noted here highlight that men and women have different outlooks when it comes to nutritional concerns and it affects whether they choose to diet.

Even if men and women both choose to diet, there are still further sex differences to acknowledge and consider. Forster and Jeffery (1986) recruited 55 men and 58 women to participate in a behavioral weight loss program that consisted of weekly meetings with instruction in proper nutrition, exercise, and behaviors. At a one-year follow up, it was found that women were more successful at maintaining weight loss than were men. Forster and Jeffery (1986) suggested that this may be the result of women having a network that is more supportive of weight maintenance than men

In addition to the program, participants were assessed regarding factors that could be associated with weight change, such as weight history and eating patterns. A few notable sex differences emerged in Forster and Jeffery's (1986) research. For example, women ate more frequently than men in response to mood, while men ate more frequently during social situations. In addition, men reported a greater self-efficacy in ability to control their eating prior to the treatment, but this difference did not persist after the treatment. On the other hand, men reported greater self-esteem both before and after the treatment. The results here suggest that men and women may need different levels or types of support from their networks to succeed and, in turn, their networks may provide different levels of support for their weight maintenance goals. Given the role that sex appears to play in weight maintenance, this study investigated the role sex plays in relation to dieting success and social support.

Theoretical Underpinnings

Most of the research conducted regarding social support with weight loss has lacked the

backing of a theoretical perspective or model, presumably to instead focus on clinical outcomes of interventions. However, research on other components of weight management (e.g., interventions at a population level; see Johnson et al., 2008) have utilized models and theories to design their interventions. One such model is the transtheoretical model (TTM) of health behavior change (Prochaska & Velicer, 1997). As the name suggests, the model has been utilized to help solve several health behaviors, including quitting drugs, practicing safe sex, and getting necessary doctor tests. The model makes several assumptions. First, the model is not trying to capture all the complexities of behavior change. Second, the model assumes that behavior change is a process that occurs over time, and in stages. Third, these stages are open to change and are also stable across time and people. This means that not everyone starts at the same stage and that it is possible to progress to further stages, or to go backwards to prior stages. Fourth, planned interventions are necessary to move forward from the early stages. Fifth, behavior patterns are under control by not just self-control, but also a combination of biological and social factors.

The TTM process, according to Prochaska and Velicer (1997), comes in four stages: (1) pre-contemplation (e.g., realizing that you want or need to lose weight), (2) contemplation (e.g., contemplating what to do about the desire to lose weight), (3) action (e.g., changing diet and exercise behaviors to lose weight), and (4) maintenance (e.g., permanently keeping up what was started during the action stage after weight is lost). In the case of a weight cycler, the dieter will most of the time successfully make it past the action stage (Stage 3), but will, over time, fail in the maintenance stage (Stage 4), and will ultimately regress back into the contemplation stage (Stage 2) or pre-contemplation stage (Stage 1). In line with the fourth

assumption of the TTM model, people are possibly lacking the planned interventions necessary to make it past the maintenance stage successfully. And in line with the fifth assumption of the TTM model (i.e., behavior patterns are under control by biological and social factors), the current study aimed to investigate the social factors that facilitate success through the maintenance stage (Stage 4) of weight control.

To better conceptualize what is necessary to succeed in the above stages of the TTM process, this study utilized Self-Determination Theory (SDT) in combination with the TTM. SDT is an approach that focuses on motivation and how people develop inner resources for behavioral self-regulation (Ryan & Deci, 2000). Specifically, SDT examines how people satisfy their innate psychological needs, the most significant of which being competence (a belief in one's capabilities), autonomy (an internal perceived locus of causality), and relatedness (the need to feel connectedness with others). Interventions to satisfy these needs have been successful in facilitating adherence to exercise routines and weight reduction (Silva et al., 2010). People often meet these needs through their support networks (Kaplan, Cassel, & Gore, 1977), so examining the ability (or competence) of a dieter's social support system may help predict whether they will succeed in their diet in the long term or not. SDT adds insight to some of the core constructs in the TTM. Namely, SDT can provide an explanation for how participants develop the self-efficacy (or belief in one's ability to succeed at tasks) needed to avoid relapsing back into unhealthy habits, and how to overcome temptations.

Hypotheses and Research Questions

Based on prior literature, age and health conditions that affect diet/weight were controlled for in the study. Given the above review, the following hypotheses and research

questions were posited:

H1: After controlling for age and health conditions that affect diet/weight, women (compared to men) will: (a) receive more social support for eating habits, (b) attempt more diets than men, (c) report more success in dieting than men, and (d) report more overeating behaviors.

RQ1: After controlling for age and heath conditions that affect diet/weight, will women (compared to men) have the same levels of: (a) social support for exercise, (b) perceived stress, and/or (c) BMI?

H2: After controlling for age, health conditions that affect diet/weight, and sex, social support for eating habits and/or exercise from family will be: (a) negatively related to number of diets attempted, (b) positively related to success in dieting, (c) negatively related to overeating behaviors, (d) negatively related to perceived stress, and (e) negatively related to BMI.

H3: After controlling for age, health conditions that affect diet/weight, and sex, social support for eating habits and/or exercise from friends will be: (a) negatively related to number of diets attempted, (b) positively related to success in dieting, (c) negatively related to overeating behaviors, (d) negatively related to perceived stress, and (e) negatively related to BMI.

In addition, potential interactions between predictor variables in relation to outcome variables were investigated.

Chapter Two:

Method

Participants

Three hundred and sixty-five individuals from the United States completed the survey, and came from two recruitment tools. The first recruitment tool was a study distribution list used by a large Midwestern university. This tool distributes study announcements to university employees (faculty, staff, and clinical faculty) who are interested in participating in research studies. An estimated 10 participants were recruited via this tool.

The second recruitment tool was an undergraduate research pool utilized by one of the departments at a large Midwestern university. Undergraduate students may participate in research studies to receive extra credit for courses in the department. An estimated 355 participants were recruited via this tool. Forty participants were removed from analyzes due to failing to pass quality checks [31 participants did not consistently or accurately answer questions about their height, weight, and/or BMI; five participants reported that they were under the age of 18; two participants gave an unrealistic response to the number of diets question (i.e., over 26); and two participants responded “Not applicable” to too many of the items related to social support (over 75% of the items)]. An additional 14 participants over the age of 25 were removed to analyze a sample with fewer outliers. This left 311 participants (*M* age = 19.32, *SD* = 1.31, age range: 18-25) in the final analyses.

One hundred and eighty-three participants identified their sex as female (58.8%). Most participants (90.7%) stated that the highest degree they earned was a high school degree, 4.2% completed up to an associate’s degree or equivalent, 3.4% completed up to a bachelor’s degree

or equivalent, and 1.6% did not wish to identify the highest degree that they earned. No participants earned a master's degree, professional degree, or doctoral degree. Thirty-two participants (10.3%) identified that they are of Latino or Hispanic origin. Racially, 79.7% of the sample identified as white, 8.7% identified as Asian, 5.8% identified as black or African-American, 5.1% identified as multi-racial, 1.9% identified as American Indian or Alaska native, 1.0% identified as native Hawaiian or "other" Pacific Islander, and 4.2% did not wish to identify their race. Participants were allowed to choose all races that applied to them, so the total percentage adds up to over 105.4%.

The mean BMI for the sample as reported by participants was 23.858 (*SD* = 3.947), with participants reporting BMIs as low as 15.8 and as high as 42.7. The BMIs observed in this study were, on average, lower than the BMIs observed in the Center for Disease Control's (CDC) 2013-2014 edition of the National Health and Nutrition Examination Survey (NHANES), which observed a mean BMI of 25.678 (*SD* = 7.955) ("NHANES – questionnaires, data sets, and related documentation," 2017). Using an independent samples t-test that compared BMI between participants in the sample of this study to those in the NHANES, this mean difference was found to be significant, $t(9364) = 4.018$, $p < .001$. The mean number of diets attempted for the sample in this study, as reported by participants, was 2.10 (*SD* = 3.327). Thirty-eight participants (12.2%) reported having health conditions that affected their eating habits and/or exercise. Thirty-five of these participants were willing to explain their condition. Common responses included asthma (*n* = 9), issues with blood glucose levels (e.g., hypoglycemia, diabetes) (*n* = 5), and mood disorders (*n* = 4). Correlations between all the observed variables can be found in Table 1.

Procedures

The study was created and hosted by the Qualtrics study service. Participants read a consent form on the screen that informed them about what would happen in the study, how long it would take to complete, the possible risks, and remuneration (for participants from the undergraduate research pool). If participants consented, they clicked a button below the consent form that was labelled "Yes, I wish to proceed." Participants first completed the social support and eating habits survey, followed by the social support and exercise survey. After completing both surveys, participants completed the Binge Eating Scale, followed by the Perceived Stress Scale and the Regulatory Success in Dieting Scale. Upon completion of the Regulatory Success in Dieting Scale, additional information including sex, age, education, ethnicity, race, height, weight, BMI, estimated number of diets attempted, and presence of health conditions that affect eating habits or exercise were collected. The additional items asked can be found in Appendix F. The study's methods and procedures were approved by the KU Institutional Review Board (IRB). The approval letter from the University of Kansas Institutional Review Board can be found in Appendix G.

Measurements

Social support and eating habits. To measure support from family and friends, a scale was adapted from Sallis, Grossman, Pinski, Patterson, and Nader (1987). The social support and eating habits survey contained ten items that asked participants about things people might do or say to someone who is trying to improve their eating habits. The scale contained two subscales, each with five items. The first subscale was encouragement (e.g., "Encouraged me not to eat 'unhealthy foods' (cake, salted chips) when I'm tempted to do so"), and the second

subscale was discouragement (e.g., “Refused to eat the same foods I eat”). Participants rated each item from 1 (None) to 5 (Very often) for their interactions with both family and friends. If a question did not apply to a participant, they could choose to select a “does not apply” option. When “does not apply” was selected, it was recoded to a one in the analyses. The sum of the encouragement subscale items, and the sum of the discouragement subscale items, were used separately for analyses. A reliability analysis of the five items related to encouragement found a Cronbach alpha of .794 for family (*M* = 14.215, *SD* = 4.951), and .743 for friends (*M* = 10.698, *SD* = 3.887), indicating good reliability. For the five items related to discouragement, the Cronbach alpha for family was .732 (*M* = 12.515, *SD* = 3.984), and for friends was .685 (*M* = 13.029, *SD* = 3.802), indicating fair to good reliability. See Appendix A for a full copy of the social support and eating habits survey adapted from Sallis et al. (1987).

Social support and exercise. To measure social support and exercise patterns for participants, a second survey adapted from Sallis et al. (1987) was used. The social support and exercise survey contained ten items that asked participants about things people might do or say to someone who is trying to improve their eating habits. Examples of items include “Offered to exercise with me” and “Helped plan activities around my exercise.” Participants rated each item from 1 (None) to 5 (Very often) for their interactions with both family and friends. If a question did apply to a participant, they could choose to select a “does not apply” option. When “does not apply” was selected, it was recoded to a one in the analyses. The sum of all the items from the social support and exercise survey were used for analyses. A reliability analysis of the ten items related to social support and exercise found a Cronbach alpha of .911 for family (*M* = 28.045, *SD* = 9.326) and .911 for friends (*M* = 28.984, *SD* = 9.244), indicating excellent reliability.

See Appendix B for a full copy of the social support exercise survey adapted from Sallis et al. (1987).

Both scales from Sallis et al. (1987) have been widely utilized. A recent Google Scholar search (September, 2016) found that Sallis et al. (1987) has been cited in over 950 books and articles. The scale has demonstrated reliability, with the alpha reliabilities for factors used in this study ranging between .80 and .91. The scales correlated positively with self-reported diet and exercise habits. In addition, the scales did not significantly correlate with the quality or quantity indexes in Sarason, Levine, Bashman, and Sarason's (1983) Social Support Questionnaire.

Overeating behaviors. An adapted version of the Binge Eating Scale (BES) by Gormally, Black, Daston, and Rardin (1982) was used to assess participants' overeating behaviors. The BES contained 16 items. Eight of the items each assessed a different feeling or cognition (e.g., feelings of guilt or self-hate, cravings for food), and the other eight items described behaviors (e.g., pace of eating, eating when bored). For each item, participants were asked to read three or four statements and to indicate which statement of those best described how they felt concerning their own eating behavior. Each statement was scored with a point value between zero and three assigned to it, with zero indicating "no overeating problem" and three indicating "a severe overeating problem." For example, a participant read these four statements: "I don't have any difficulty eating slowly in the proper manner" (zero points), "Although I seem to 'gobble down' foods, I don't end up feeling stuffed because of eating too much" (one point), "At times, I tend to eat quickly and then, I feel uncomfortably full afterwards" (two points), and "I have the habit of bolting down my food, without really chewing it. When this happens I

usually feel uncomfortably stuffed because I've eaten too much" (three points). The participant chose the statement of those four that best described their own feelings. The scale was scored by summing up the values of all 16 chosen statements. A reliability analysis of the 16 items from the BES found a Cronbach alpha of .889 (*M* = 10.331, *SD* = 7.884), indicating very good reliability. See Appendix C for a full copy of the BES, adapted from Gormally et al. (1982).

The BES has been shown to have both high reliability and validity. In two samples of overweight people, the alpha reliability was to .85, indicating a good internal consistency between the items (Gormally et al., 1982). In addition, Gormally et al. (1982) compared the scale scores to assessments of binge eating severity made by trained interviewers who categorized each participant as having either a severe, moderate, or no level binge eating severity. It was found that the BES successfully discriminated between these categories to the same degree that the interviewers did. A more recent study (Gow, Trace, & Mazzeo, 2010) utilized the BES, and reported an alpha reliability of .86.

Perceived stress. To measure participant stress levels, the Perceived Stress Scale (PSS) was adapted from Cohen, Kamarck, and Marmelstein (1983). The PSS contained 14 items that asked participants how often they felt or thought a certain way regarding various feelings and thoughts related to stress in the last month. Examples of items include "How often have you dealt successfully with irritating life hassles?" (reverse scored) and "How often have you found yourself thinking about things you have to accomplish?" Participants rated each item from 1 (never) to 5 (very often). After reverse scoring the necessary items, the sum of all the items was used for analyses. A reliability analysis of the 14 items from the PSS found a Cronbach alpha of .830 (*M* = 42.968, *SD* = 7.206), indicating very good reliability. See Appendix D for a full copy of

the PSS, adapted from Cohen et al. (1983).

The PSS has been shown to have both high reliability and validity. In an initial assessment, Cohen et al. (1983) assessed two separate samples of college students, as well as a sample people participating in a smoking cessation program. Alpha reliabilities came out to .84, .85, and .86, respectively, showing a good internal consistency between the items. The test-retest correlation for college students who took the CSS again two days later was .85. The test-retest correlation for smoking cessation program participants who took the CSS again six weeks later was .55. In addition, the PSS was found to be correlated with life-event scores, depressive and physical symptoms, utilization of health services, social anxiety, and smoking-reduction maintenance, all of which are expected correlates. A more recent study (Davis & Sandman, 2010) utilized the PSS, and found an alpha reliability of .80. In addition, another recent study (Cacioppo, Hawkley, & Thisted, 2010) reported that the PSS was strongly associated with loneliness, as well as depressive symptoms.

Success in dieting. To measure perceptions of dieting success, the Perceived Self-Regulatory Success in Dieting Scale (PSRS) was adapted from Meule, Papies, and Kübler (2012). The PSRS contained five items and it was used to differentiate between successful and unsuccessful dieters. The three items from Meule et al. (2012) were: “How successful are you in watching your weight?”, “How successful are you in losing extra weight?”, and “How difficult do you find it to stay in shape?” (reverse scored). In addition, two unique items were added. These items were: “How important is it to you to lose weight?” and “How satisfied are you with your body weight?” Participants rated each item from 1 (not successful/not difficult) to 7 (very successful/very difficult). In addition, each item included a “not applicable” option if

participants have never attempted to lose weight. Participants who answered “not applicable” for any of the items were not scored or used in analyses that involved success in dieting (*n* = 50). This left 261 participants for analyses that involved success in dieting. The PSRS was scored by taking the average of all the items. A reliability analysis of the five items from the PSRS found a Cronbach alpha of .411 (*N* = 258, *M* = 4.174, *SD* = .964), indicating poor reliability. However, after removing the item “How important is it to you to lose weight?”, Cronbach’s alpha increased to .792 (*N* = 261, *M* = 4.121, *SD* = 1.348), indicating good reliability. Thus, only the four remaining items were used for analyses. See Appendix E for a full copy of the PSRS, adapted from Meule et al. (2012).

Reliability and validity of the PSRS were assessed in Meule et al. (2012). Using four samples consisting of mostly women, Cronbach alpha scores ranged from .72 to .79, indicating good consistency, considering the number of items. In addition, the PSRS demonstrated convergent validity by being positively associated with flexible control, and negatively associated with rigid control, the food cravings questionnaire, the Yale food addiction scale, and the number of days where binge eating episodes occurred. The PSRS was not associated with attention, motor, or non-planning components of the Barratt impulsiveness scale, demonstrating discriminant validity.

Chapter Three:

Results

To test the hypotheses, a series of 21 multiple hierarchical regressions were conducted. Regressions were usually performed for the total sample (N = 311), but exceptions to this are noted. Age and health condition were entered in the first model as control variables for all the regression analyses. The only time that the pair significantly predicted any of the outcome variables was for overeating behaviors, R^2 change = .025, F change (1, 307) = 3.872, p = .022. In this instance, people with health conditions reported more overeating behaviors than those who did not, β = -.143, p = .012, sr^2 = .020. Age and health condition as a block of variables did not significantly predict any of the other dependent variables.

Sex as a Predictor Variable

To test the first group of hypotheses and research questions, a series of 11 multiple regression analyses were conducted. Specifically, age and health condition were entered in the first model as control variables and sex was entered in the second model as the predictor variable for each of the following hypothesis tests. Hypothesis 1a predicted that sex would be a significant predictor of social support for eating habits, with women receiving more social support for eating habits. To test hypothesis 1a, four separate hierarchical regression analyses were conducted, each of which considered one of the four measures (i.e., family encouragement, family discouragement, friend encouragement, and friend discouragement) as the dependent variable. Sex did not significantly predict encouragement from family (R^2 change = .003, F change (1, 307) = 1.002, p = .318), encouragement from friends (R^2 change = .001, F change (1, 307) = 0.239, p = .625), discouragement from family (R^2 change = .000, F change (1,

307) = 0.135, p = .713), or discouragement from friends (R^2 change = .007, F change (1, 307) = 2.090, p = .149). Thus, hypothesis 1a was not supported.

Hypothesis 1b predicted that sex would be a significant predictor of number of diet attempts, with women attempting more diets than men. To test hypothesis 1c, number of diet attempts was entered into the regression equation as a dependent variable. Sex significantly predicted the number of diet attempts, R^2 change = .022, F change (1, 307) = 6.853, p = .009. The significant effect for sex revealed that females attempted more diets than males, β = -.148, p = .009, sr^2 = .022. Thus, hypothesis 1b was supported.

Hypothesis 1c predicted that sex would be a significant predictor of success in dieting, with women reporting greater success. To test hypothesis 1c, success in dieting was entered into the regression equation as a dependent variable. Sex significantly predicted success in dieting (N = 261), R^2 change = .076, F change (1, 257) = 21.338, p < .001. The significant effect for sex revealed that males reported more success in dieting than females, β = .278, p < .001, sr^2 = .076. This finding failed to find support for hypothesis 1c.

Hypothesis 1d predicted that sex would be a significant predictor of overeating behaviors, with women reporting more overeating behaviors. To test hypothesis 1d, BES score was entered into the regression equation as a dependent variable. Sex significantly predicted overeating behaviors, R^2 change = .041, F change (1, 307) = 13.427, p < .001. The significant effect for sex revealed that females reported more overeating behaviors than males, β = -.203, p < .001, sr^2 = .041. Hence, hypothesis 1d was supported.

Research question 1a asked whether sex would be a significant predictor of social support for exercise. To assess research question 1a, two separate hierarchical regression

analyses were conducted, each of which considered one of the two measures (i.e., family support for exercise, and friend support for exercise) as the dependent variable. Sex did not significantly predict social support for exercise from family (R^2 change = .002, *F* change (1, 307) = 0.558, *p* = .456), or from friends (R^2 change = .004, *F* change (1, 307) = 1.198, *p* = .275).

Research question 1b asked whether sex would be a predictor of perceived stress. To test research question 1b, PSS score was entered into the regression equation as a dependent variable. Sex significantly predicted perceived stress, R^2 change = .014, *F* change (1, 307) = 4.465, *p* = .035. The significant effect for sex revealed that females reported more perceived stress than males, β = -.119, *p* = .035, sr^2 = .014.

Research question 1c asked whether sex would be a predictor of BMI. To test research question 1c, BMI was entered into the regression equation as a dependent variable. Sex significantly predicted BMI, R^2 change = .023, *F* change (1, 307) = 7.256, *p* = .007. The significant effect for sex revealed that males reported a significantly higher BMI than females, β = .152, *p* = .007, sr^2 = .023.

Family Social Support as a Predictor Variable

To test the second group of hypotheses, a series of five multiple regression analyses were conducted. Specifically, age and health condition were entered in the first block, and sex was entered in the second block as control variables. Family encouragement for eating habits, family discouragement for eating habits, and family social support for exercise were entered in the third block as predictor variables for each of the following hypothesis tests. Hypothesis 2a predicted that family social support would be a significant negative predictor of number of diet attempts. To test hypothesis 2a, number of diet attempts was entered into the regression

equation as a dependent variable. The family social support model significantly predicted number of diets attempted, R^2 change = .034, F change (3, 304) = 3.681, p = .012. The significant effect revealed that higher amounts of family discouragement was related to increased diet attempts, β = .150, p = .009, sr^2 = .021. Family encouragement (β = .078, p = .251) and family support for exercise (β = .012, p = .856) were not significant predictors. Because discouragement is an unsupportive behavior, hypothesis 2a was partially supported.

Hypothesis 2b predicted that family social support would be a significant positive predictor of success in dieting. To test hypothesis 2b, success in dieting was entered into the regression equation as a dependent variable. The family social support model significantly predicted success in dieting (N = 261), R^2 change = .104, F change (3, 254) = 10.836, p < .001. The significant effect revealed that higher amounts of family encouragement was related to less success in dieting, β = -.319, p < .001, sr^2 = .068. In addition, higher amounts of family support for exercise was related to more success in dieting, β = .355, p < .001, sr^2 = .086. Family discouragement was not a significant predictor, β = -.01, p = .861. Regarding eating habit encouragement, hypothesis 2b was rejected. But, regarding support for exercise, hypothesis 2b was supported.

Hypothesis 2c predicted that family social support would be a significant negative predictor of overeating behaviors. To test hypothesis 2c, BES score was entered into the regression equation as a dependent variable. The family social support model significantly predicted overeating behaviors, R^2 change = .120, F change (3, 304) = 14.912, p < .001. The significant effect revealed that higher amounts of family encouragement was related to increased overeating behaviors, β = .218, p = .001, sr^2 = .032. The significant effect also revealed

that higher amounts of family discouragement was related to increased overeating behaviors, β = .244, p < .001, sr^2 = .056. In addition, higher amounts of family support for exercise was related to fewer overeating behaviors, β = -.193, p = .002, sr^2 = .026. Regarding eating habit discouragement and support for exercise, hypothesis 2c was supported. But, for eating habit encouragement, hypothesis 2c was rejected.

Hypothesis 2d predicted that family social support would be a significant negative predictor of perceived stress. To test hypothesis 2d, PSS score was entered into the regression equation as a dependent variable. The family social support model significantly predicted perceived stress, R^2 change = .085, F change (3, 304) = 9.732, p < .001. The significant effect revealed that higher amounts of family discouragement was related to higher perceived stress, β = .209, p < .001, sr^2 = .041. In addition, higher amounts of family support for exercise was related to less perceived stress, β = -.212, p = .001, sr^2 = .031. Family encouragement was not a significant predictor, β = .125, p = .058. Thus, hypothesis 2d was supported.

Hypothesis 2e predicted that family social support would be a significant negative predictor of BMI. To test hypothesis 2e, BMI was entered into the regression equation as a dependent variable. The family social support model significantly predicted BMI, R^2 change = .085, F change (3, 304) = 9.714, p < .001. The significant effect revealed that higher amounts of family encouragement was related to higher BMI, β = .303, p < .001, sr^2 = .062. In addition, higher amounts of family support for exercise was related to lower BMI, β = -.265, p < .001, sr^2 = .049. Family discouragement was not a significant predictor, β = .051, p = .356. Regarding eating habit encouragement, hypothesis 2e was rejected. But, regarding support for exercise, hypothesis 2e was supported.

Friend Social Support as a Predictor Variable

To test the third group of hypotheses, a series of five multiple regression analyses were conducted. Specifically, age and health condition were entered in the first block, and sex was entered in the second block as a control variable. Friend encouragement for eating habits, friend discouragement for eating habits, and friend social support for exercise were entered in the third block as predictor variables for each of the following hypothesis tests. Hypothesis 3a predicted that friend social support would be a significant negative predictor of number of diet attempts. To test hypothesis 3a, number of diet attempts was entered into the regression equation as a dependent variable. The friend social support model significantly predicted the number of diets attempted, R^2 change = .075, F change (3, 304) = 8.461, $p < .001$. The significant effect revealed that higher amounts of friend encouragement was related to increased diet attempts, $\beta = .131$, $p = .044$, $sr^2 = .012$. In addition, higher amounts of friend discouragement was related to increased diet attempts, $\beta = .198$, $p = .001$, $sr^2 = .033$. Friend support for exercise was not a significant predictor, $\beta = .002$, $p = .970$. Regarding friend encouragement for eating habits, hypothesis 3a was rejected. But, regarding friend discouragement for eating habits, hypothesis 3a was supported.

Hypothesis 3b predicted that friend social support would be a significant positive predictor of success in dieting. To test hypothesis 3b, success in dieting was entered into the regression equation as a dependent variable. The friend social support model significantly predicted success in dieting ($N = 261$), R^2 change = .067, F change (3, 254) = 6.666, $p < .001$. The significant effect revealed that higher amounts of friend support for exercise was related to greater success in dieting, $\beta = .270$, $p < .001$, $sr^2 = .056$. Friend encouragement ($\beta = -.064$, $p =$

.349) and friend discouragement (β = -.113, p = .067) were not significant predictors. Hypothesis 3b was supported.

Hypothesis 3c predicted that friend social support would be a significant negative predictor of overeating behaviors. To test hypothesis 3c, BES score was entered into the regression equation as a dependent variable. The friend social support model significantly predicted overeating behaviors, R^2 change = .113, F change (3, 304) = 13.887, p < .001. The significant effect revealed that higher amounts of friend encouragement was related to increased overeating behaviors, β = .157, p = .012, sr^2 = .017. The significant effect also revealed that higher amounts of friend discouragement was related to increased overeating behaviors, β = .267, p < .001, sr^2 = .061. In addition, higher amounts of friend support for exercise was related to less overeating behaviors, β = -.164, p = .006, sr^2 = .021. Regarding eating habit discouragement and support for exercise, hypothesis 3c was supported. But, for eating habit encouragement, hypothesis 3c was rejected.

Hypothesis 3d predicted that friend social support would be a significant negative predictor of perceived stress. To test hypothesis 3d, PSS score was entered into the regression equation as a dependent variable. The friend social support model did not significantly predict perceived stress, R^2 change = .024, F change (3, 304) = 2.514, p = .059. Hypothesis 3d was not supported.

Hypothesis 3e predicted that friend social support would be a significant negative predictor of BMI. To test hypothesis 3e, BMI was entered into the regression equation as a dependent variable. The friend social support model significantly predicted BMI, R^2 change = .057, F change (3, 304) = 6.363, p < .001. The significant effect revealed that higher amounts of

friend encouragement was related to higher BMI, β = .160, p = .015, sr^2 = .018. In addition, higher amounts of friend support for exercise was related to lower BMI, β = -.243, p < .001, sr^2 = .046. Friend discouragement was not a significant predictor, β = .084, p = .158. Regarding eating habit encouragement, hypothesis 3e was rejected. But, regarding support for exercise, hypothesis 3e was supported.

Additional Analyses: Significant Interaction Effects

To test for significant moderator effects between predictor variables and outcome variables, a series of regression analyses were conducted using Hayes (2013) PROCESS on mediation and moderation. Results indicated that there were two notable interactions, both of which involved perceived stress as a moderating variable. The first analysis indicates a trend that interactions between sex and PSS score may predict number of diets (β = -.112, *SE* = .0632, t = -1.772, p = .077), indicating that perceived stress may be a moderator. The relationship predicted that when perceived stress was low, sex had no effect on the number of attempted diets, but when perceived stress was moderate or high, sex differences were observed. The second analysis indicated that the interactions between family support for exercise and PSS score significantly predicted success in dieting (β = -.003, *SE* = .001, t = -2.058, p = .041), indicating that perceived stress was a significant moderator. The relationship predicted that when perceived stress was low or moderate, family support for exercise significantly predicted success in dieting, but when perceived stress was high, family support for exercise did not predict success in dieting.

Chapter Four:

Discussion

This study surveyed a sample of mainly college students to investigate the relationships between social support for eating habits, social support for exercise, overeating behaviors, perceived stress, success in dieting, number of attempted diets, and BMI. Several hypotheses and research questions were posited. Results revealed that a majority of these hypotheses were at least partially supported. For the research questions, it was found that social support for exercise is not associated with sex, while women reported higher perceived stress and BMI.

Role of Sex

Overall, sex was shown to play a significant role in weight maintenance and related behaviors. Sex was found to be a significant predictor for number of attempted diets, success in dieting, overeating behaviors, perceived stress, and reported BMI. It can be concluded that women on average are more conscious about weight. Compared to men, women attempted more diets, reported less success in dieting, and engaged in more overeating behaviors. This is all true, although men reported higher BMI than women. Women's lower BMI might be because of this increased consciousness. This higher consciousness of weight is likely also an indication of the increased social pressures on women to maintain a particular body image or body shape, as discussed in Chapter One.

Comparing these results to the hypotheses, it was not successfully predicted that women would report less success in dieting, lower perceived stress, and lower BMI than men, but these findings have sufficient alternative explanations. Regarding the success in dieting discrepancy, the hypothesis was made based off findings by Forster and Jeffery (1986), who

reported that women attained more success in maintaining weight loss than did men after completing a behavioral weight loss program (see Chapter One for more details about this study). To measure this, Forster and Jeffery (1986) measured weight before the program, as well as one year after the program. In this study, a subjective, one-shot questionnaire was utilized to measure success. This type of measure may obfuscate the reality of whether participants have maintained weight loss or not. In addition, the situation in Forster and Jeffery (1986) (i.e., a coordinated behavioral weight loss program) was not similar to the situation being experienced by a sample of college students, who are likely following a less structured plan for weight maintenance, or no plan at all.

Regarding stress differences, the literature review perhaps stayed too local in its scope, and only considered stress within the realm of dieting. Globally, sex differences in stress are well noted in the literature. One example is Brougham, Zail, Mendoza, and Miller (2009), who investigated the sources of stress and coping strategies of 166 college students. It was found that college women reported a higher level of overall stress than did college men. Another study (Matud, 2004) reported that although men and women do not report a difference in the number of life events, women rate these life events as more negative and less controllable than men. In addition, Matud (2004) reported that women scored significantly higher than men in the amount chronic and minor daily stressors. So, although the literature review failed to appropriately discuss and predict sex differences in stress, the finding is actually not unexpected.

The differences between men and women on BMI, however, are not easy to make sense of. The data found using the 2013-2014 NHANES ("NHANES – questionnaires, data sets, and

related documentation", 2017) do not suggest that men have higher BMI than women. If anything, it suggests the opposite. An independent samples t-test comparing men and women on BMI using the NHANES data found that women (M = 26.248, SD = 8.508) on average have a higher BMI than men (M = 25.086, SD = 7.290), $t(9053) = -6.966$, $p < .001$. Any explanation to justify this difference is only speculation, as specific findings and research are sparse. One potential explanation may be due to the use of a sample of college students in this study. The women in this study, on average, are more conscious about their weight than men, and decreased BMI may be the result of this consciousness. Perhaps women's consciousness decreases as women age, or the weight lost from the extra diets attempted is not kept off, and therefore shows up again later in life.

One area where sex was not a factor was in the amount of social support received for eating habits and exercise. Due to the social pressures on women to maintain particular body images and types, it was expected that women would have received more social support for eating habits (which from friends, was in turn a predictor of dieting attempts), but not more social support for exercise (which was not a predictor of dieting attempts). This did not turn out to be the case, and it might be because sex differences in social support are more evident with regard to who gives, rather than receives, the social support. Burleson and Kunkel (2006) concluded that men and women have similar standards for what constitutes effective support, and that men and women are both likely to seek and receive support from women. Since families (with very rare exceptions) are cross-sex groups, and people in college usually have both same- and cross-sex friendships, it should not be a surprise that men and women rated their received support as the same. Overall, future studies focusing on weight maintenance

need to make a conscious effort to account and control for sex differences.

Role of Social Support

To discuss the role social support has with the outcome variables, each component of social support that was measured will be examined more closely. The role of support for eating habits is discussed first, followed by the role of support for exercise, and finally the differences between friend and family support is explored.

Eating habits. The most surprising aspect of this study's results was that encouragement for eating habits predicted dieting attempts (friends only), success in dieting (family only), overeating behaviors, and BMI in directions that were the opposite of what the hypotheses posited. In other words, encouragement for eating habits predicted more diet attempts, less success in dieting, more overeating behaviors, and higher BMI. This is not the first time that the social support for eating habits scale has produced a surprising result: Wing and Jeffery (1999; see Chapter One for a summary of this study) reported that in one of the intervention groups (i.e., those who were recruited for standard behavioral treatment and social support training with friends), higher positive family support for eating habits was related to poorer weight loss. The opposite was true for friend support in this study, however. So, perhaps there is an explanation to why these findings went against predictions. Regarding dieting attempts, the hypothesis predicted that social support for eating habits would reduce the number of attempted diets because it was assumed that more support would help bolster lifestyle changes that ended up becoming permanent. Perhaps encouragement of eating habits instead makes people want to start diets, but it takes more than just encouragement to keep up the changes made.

Regarding success in dieting, one possible explanation that could be further investigated is whether certain types of social support are more effective than others. In diets, it is more a matter of *when* rather than *if* people will give into temptations. Encouragement and reminders from family friends not to eat unhealthy foods might happen frequently, but it is not realistic, because there are too many tempting situations to avoid in everyday life to stay away from unhealthy food forever. Perhaps, in addition to helping avoid unhealthy foods in first place, the most effective support for eating habits gives advice for how to recover from making pitfalls, and helps teach effective techniques. This is already conceptualized in social support literature. Goldsmith, McDermott, and Alexander (2000) distinguished between helpful (problem-solving utility), supportive (relational assurance), and sensitive (emotional awareness) support. It appears that the Sallis et al. (1987) scale included statements that measured supportive and sensitive support, but not helpful support. Future studies will want to look specifically into the effectiveness of these helpful supportive behaviors, as that *type* of support may be more useful in weight maintenance.

The reason overeating behaviors were positively associated with encouragement for eating habits can be understood by looking more closely at the definition of an eating disorder. The fifth edition of the Diagnostic and Statistical Manual of Mental Disorders (2013) states that eating disorders such as anorexia nervosa and bulimia nervosa are characterized by constant thoughts about food. It follows that if someone is thinking about food more often than the average person, he or she likely talks about it more often than the average person, and therefore encouragement of eating habits will come up more often. Future studies should investigate the directionality of social support and overeating behaviors more closely to see if

friends and family enable, or indirectly encourage, behaviors associated with eating disorders.

The reasoning behind the positive predictive relationship between encouragement for eating habits and BMI is not clear. Future studies would do well do investigate the direction of this relationship. It seems more likely that having a higher BMI leads to more encouragement of eating habits, rather than encouragement of eating habits leading to higher BMI. This could be because people with higher BMI are more likely to be attempting changes to eating habits, thus there is more reason to have conversations and remarks about someone's eating habits.

Exercise. While social support for eating habits was associated with worse outcomes, social support for exercise positively predicted success in dieting, and negatively predicted overeating behaviors, perceived stress (family only), and BMI. Except for overeating behaviors, these are the same as the expected benefits of exercise as noted in the popular press (e.g., "Physical Activity and Health," 2017). Because exercise and diet changes are usually recommended simultaneously, the effects of exercise on eating habits are not as clear. These findings seem to indicate that social support for exercise is indeed an effective and worthwhile behavior.

How is this behavior associated with better outcomes, while support for eating habits, a similar behavior, is almost the opposite? One answer may lie perhaps in comparing the items of each measure. The items that the social support for eating habits scale (see Appendix A) measure are neither tangible actions or even statements that will lead to actions. Compare this to the social support for exercise scale (see Appendix B), which has items such as "Exercised with me," which are clear actions that the friend or family member does to support the respondent. Outside of the measures' potential validity issues, another difference between

exercise and eating habit support is that people may feel like it is easier to talk about exercise than eating habits, because eating habits may be considered more personal, and thus talked about less. In addition, eating has more potential to be done "wrong" and thus to be perceived as more stressful. The only times that exercise would be considered bad by a person is if it ended in exhaustion or injury. So, when people discuss exercise, the discussions are more often positive in nature, and not about problems that are particularly stressful. In contrast, given the amount of foods available that consist of little else but sugar, eating can be done badly, and discussions about food often are about how to be better. As already mentioned, many strategies here can be seen as encouraging, but fewer of them are effective at helping be better with food. Meanwhile, forms of exercise as simple as walking more often are recommended by places such as the Mayo Clinic, and have proven benefits ("Walking: Trim Your Waistline, Improve Your Health," 2017).

Support from family versus friends. Except for number of diet attempts, support from family served as a stronger predictor than friends when it came to success in dieting, overeating behaviors (the effect difference between family and friends here is miniscule, however), perceived stress, and BMI. Past research has not compared the effectiveness of family to friend social support, and it is not clear what may have generated these differences. One possible explanation involves the college student sample utilized in this study. Many people who completed the study were in their first or second year of school, and thus may not have had many friends who are influential in their lives around them frequently. Because of that, family influence was stronger in areas that are affected more by longer lasting or deeper connections (i.e., success in dieting, perceived stress, and BMI).

In contrast, the number of diets attempted was more strongly predicted by friends than family. Although the reasoning for this difference is not entirely clear, the college student sample may have played a role once again. Some researchers argue that peers matter more than parents do when it comes to development and influence (Gladwell, 1998) and, in college, most people are influenced more by their peers due a lack of parental presence. Therefore, friends are more effective than parents at influencing actions such as diet attempts. Studies in the future should seek to confirm if differences in friend and family support exists. If these differences exist, future work can find out during what periods of life these differences are seen, and what creates these differences.

Perceived Stress as a Moderator

Two interactions were revealed by the results of this study, and both involved perceived stress as the moderating variable. The first interaction found a trend indicating that when perceived stress was moderate or high, women attempted more diets than men, but this was not the case when perceived stress was low. The interaction falls in line with Groesz et al. (2012, see Chapter One for a summary of the study), who found that perceived stress was associated with ineffective attempts to control eating. The second interaction found that when perceived stress was low or moderate, family support for exercise positively predicted success in dieting, but this was not the case when perceived stress was high. The literature review on the relationship between weight and stress (see Chapter One) suggested that social support can serve as a *buffer* from stress. The result of the second interaction seems to suggest that social support fails to serve as a buffer if stress becomes too high. Both effect sizes were small, however, so more research should be done on the moderating effects of stress before making

any definitive conclusions.

Strengths and Limitations of the Current Study

This study demonstrated many strengths that make its findings reliable. All the scales used, especially the BES and PSS, were found to be consistent and reliable. The sample of participants from a large Midwestern university was large enough for sufficient power, and was also well controlled regarding demographic differences. All of this was a proper set up for a study that investigated a new combination of concepts relevant to weight loss and maintenance. The results, which produced small to moderate effect sizes, indicate that there may be effective and ineffective ways to properly support someone that is trying to maintain weight loss. Therefore, the findings validate a need for further exploration, preferably with a design that can explore the directionality of these relationships.

There are limitations to be noted about this study. Although the homogenous sample of college students was useful for isolating effects due to the predictor variables, the sample's lack of diversity in age, education, and life experiences make the findings hard to generalize. This is evident when comparing the BMI of the sample to the BMI of a sample representative of the population at large. In addition, the method of data collection makes it difficult to make conclusive statements about the findings. Often, studies about weight loss collect data at more than one point in time, and do not rely on self-report for measures such as BMI. Future studies will need to utilize objective measurements to confirm the self-reported findings of this study. This is especially a concern when interpreting findings regarding number of diets attempted, which was measured using only one item. The accuracy of that item was dependent on the participant's memory, which may be prone to understating or exaggerating the number of diets

attempted.

Theoretical Implications

From a theoretical perspective, the findings of this study make sense in the framework of Self-Determination Theory (SDT; Ryan & Deci, 2000). It appears that social support for exercise habits helps satisfy the innate psychological needs of competence, autonomy, and relatedness, while also giving participants the self-efficacy they need to succeed in their weight maintenance. Social support for eating habits, on the other hand, may undermine one's competence and autonomy. The examples of eating habit encouragement seen in the social support for eating habits scale potentially come across as controlling, or may imply that the person giving support does not think the recipient can control their eating habits. Undermining competence and autonomy in this case may not allow recipients to develop enough self-efficacy to overcome temptations and maintain their healthier habits. In the framework of the Transtheoretical Model (TTM; Prochaska & Velicer, 1997), the findings also make sense, because it shows that social factors can either facilitate or inhibit success during the action and maintenance stages of weight loss.

Conclusion

The findings of this study have important implications for how to approach both one's own and others' attempts at weight loss and maintenance. The first consideration is to be aware of the role sex plays in weight. For several reasons (but not because of individuals' capabilities), weight maintenance and its related outcomes are more difficult to achieve for women. Therefore, better understanding of the unique challenges faced by men and women in weight maintenance will lead to greater success. It is also important to support the efforts

friends and family take to exercise more. If the results of this study reflect reality, then being socially supportive of exercise should take priority over being socially supportive of eating habits. For eating habits, it may be best to remain uninvolved with people's dieting efforts. Being aware of and following these considerations may help break the cycle of repeated weight gain and loss, and thereby promote successful weight maintenance.

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Appendix A: Social Support and Eating Habits Survey

Below is a list of things people might do or say to someone who is trying to improve their eating and exercise habits. Please read and give an answer to every question. If you are not trying to make any dietary or exercise changes, then some of these questions may not apply to you. If that is the case, then you should select the "Does not apply" option.

Please rate each question **twice**. Under **family**, rate how often anyone that you consider family has said or done what is described during the last three months. Under **friends**, rate how often your friends, acquaintances, or coworkers have said or done what is described during the past three months.

1 (none) 2 (rarely) 3 (a few times) 4 (often) 5 (very often) N/A (does not apply)

1. Encouraged me not to eat “unhealthy foods” (e.g.: cake, salted chips) when I’m tempted to do so.
2. Discussed my eating habit changes with me (asked me how I'm doing with my eating changes).
3. Reminded me not to eat unhealthy foods.
4. Complimented me on changing my eating habits ("Keep it up," "We are proud of you").
5. Commented if I went back to my old eating habits.
6. Ate unhealthy foods in front of me.
7. Refused to eat the same foods I eat.

8. Brought home foods I'm trying not to eat.
9. Got angry when I encouraged them to eat healthy foods.
10. Offered me food I'm trying not to eat.

Appendix B: Social Support and Exercise Survey

1 (none) 2 (rarely) 3 (a few times) 4 (often) 5 (very often) N/A (does not apply)

1. Offered to exercise with me.
2. Gave me helpful reminders to exercise ("Are you going to exercise tonight?").
3. Gave me encouragement to stick with my exercise program.
4. Changed their schedule so we could exercise together.
5. Discussed exercise with me.
6. Planned for exercise on recreational outings.
7. Helped plan activities around my exercise.
8. Asked me for ideas on how they can get more exercise.
9. Exercised with me.
10. Talked about how much they like to exercise.

Appendix C: Eating Habits Checklist

Below are groups of numbered statements. Read all of the statements in each group and mark the one that best describes the way you feel about controlling your eating behavior.

#1

(0) 1. I don't feel self-conscious about my weight or body size when I'm with others.

(0) 2. I feel concerned about how I look to others, but it normally does not make me feel disappointed with myself.

(0) 3. I do get self-conscious about my appearance and weight which makes me feel disappointed in myself.

(3) 4. I feel very self-conscious about my weight and frequently, I feel intense shame and disgust for myself. I try to avoid social contacts because of my self-consciousness.

#2

(0) 1. I don't have any difficulty eating slowly in the proper manner.

(1) 2. Although I seem to "gobble down" foods, I don't end up feeling stuffed because of eating too much.

(2) 3. At times, I tend to eat quickly and then, I feel uncomfortably full afterwards.

(3) 4. I have the habit of bolting down my food, without really chewing it. When this happens I usually feel uncomfortably stuffed because I've eaten too much.

#3

(0) 1. I feel capable to control my eating urges when I want to.

(1) 2. I feel like I have failed to control my eating more than the average person.

(3) 3. I feel utterly helpless when it comes to feeling in control of my eating urges.

(3) 4. Because I feel so helpless about controlling my eating I have become very desperate about trying to get in control.

#4

(0) 1. I don't have the habit of eating when I'm bored.

(0) 2. I sometimes eat when I'm bored, but often I'm able to "get busy" and get my mind off food.

(0) 3. I have a regular habit of eating when I'm bored, but occasionally, I can use some other activity to get my mind off eating.

(2) 4. I have a strong habit of eating when I'm bored. Nothing seems to help me break the habit.

#5

(0) 1. I'm usually physically hungry when I eat something.

(1) 2. Occasionally, I eat something on impulse even though I really am not hungry.

(2) 3. I have the regular habit of eating foods, that I might not really enjoy, to satisfy a hungry feeling even though physically, I don't need the food.

(3) 4. Even though I'm not physically hungry, I get a hungry feeling in my mouth that only seems to be satisfied when I eat a food, like a sandwich, that fills my mouth. Sometimes, when I eat the food to satisfy my mouth hunger, I then spit the food out so I won't gain weight.

#6

(0) 1. I don't feel any guilt or self-hate after I overeat.

(1) 2. After I overeat, occasionally I feel guilt or self-hate.

(3) 3. Almost all the time I experience strong guilt or self-hate after I overeat.

#7

(0) 1. I don't lose total control of my eating when dieting even after periods when I overeat.

(2) 2. Sometimes when I eat a "forbidden food" on a diet, I feel like I "blew it" and eat even more.

(3) 3. Frequently, I have the habit of saying to myself, "I've blown it now, why not go all the way" when I overeat on a diet. When that happens I eat even more.

(3) 4. I have a regular habit of starting strict diets for myself, but I break the diets by going on an eating binge. My life seems to be either a "feast" or "famine."

#8

(0) 1. I rarely eat so much food that I feel uncomfortably stuffed afterwards.

(1) 2. Usually about once a month, I eat such a quantity of food, I end up feeling very stuffed.

(2) 3. I have regular periods during the month when I eat large amounts of food, either at mealtime or at snacks.

(3) 4. I eat so much food that I regularly feel quite uncomfortable after eating and sometimes a bit nauseous.

#9

(0) 1. My level of calorie intake does not go up very high or go down very low on a regular basis.

(1) 2. Sometimes after I overeat, I will try to reduce my caloric intake to almost nothing

to compensate for the excess calories I've eaten.

(2) 3. I have a regular habit of overeating during the night. It seems that my routine is not to be hungry in the morning but overeat in the evening.

(3) 4. In my adult years, I have had week-long periods where I practically starve myself. This follows periods when I overeat. It seems I live a life of either "feast or famine."

#10

(0) 1. I usually am able to stop eating when I want to. I know when "enough is enough."

(1) 2. Every so often, I experience a compulsion to eat which I can't seem to control.

(2) 3. Frequently, I experience strong urges to eat which I seem unable to control, but at other times I can control my eating urges.

(3) 4. I feel incapable of controlling urges to eat. I have a fear of not being able to stop eating voluntarily.

#11

(0) 1. I don't have any problem stopping eating when I feel full.

(1) 2. I usually can stop eating when I feel full but occasionally overeat leaving me feeling uncomfortably stuffed.

(2) 3. I have a problem stopping eating once I start and usually I feel uncomfortably stuffed after I eat a meal.

(3) 4. Because I have a problem not being able to stop eating when I want, I sometimes have to induce vomiting to relieve my stuffed feeling.

#12

(0) 1. I seem to eat just as much when I'm with others (family, social gatherings) as

when I'm by myself.

(1) 2. Sometimes, when I'm with other persons, I don't eat as much as I want to eat because I'm self-conscious about my eating.

(2) 3. Frequently, I eat only a small amount of food when others are present, because I'm very embarrassed about my eating.

(3) 4. I feel so ashamed about overeating that I pick times to overeat when I know no one will see me. I feel like a "closet eater."

#13

(0) 1. I eat three meals a day with only an occasional between meal snack.

(0) 2. I eat 3 meals a day, but I also normally snack between meals.

(2) 3. When I am snacking heavily, I get in the habit of skipping regular meals.

(3) 4. There are regular periods when I seem to be continually eating, with no planned meals.

#14

(0) 1. I don't think much about trying to control unwanted eating urges.

(1) 2. At least some of the time, I feel my thoughts are pre-occupied with trying to control my eating urges.

(2) 3. I feel that frequently I spend much time thinking about how much I ate or about trying not to eat anymore.

(3) 4. It seems to me that most of my waking hours are pre-occupied by thoughts about eating or not eating. I feel like I'm constantly struggling not to eat.

#15

(0) 1. I don't think about food a great deal.

(1) 2. I have strong cravings for food but they last only for brief periods of time.

(2) 3. I have days when I can't seem to think about anything else but food.

(3) 4. Most of my days seem to be pre-occupied with thoughts about food. I feel like I live to eat.

#16

(0) 1. I usually know whether or not I'm physically hungry. I take the right portion of food to satisfy me.

(1) 2. Occasionally, I feel uncertain about knowing whether or not I'm physically hungry. At these times it's hard to know how much food I should take to satisfy me.

(2) 3. Even though I might know how many calories I should eat, I don't have any idea what is a "normal" amount of food for me.

Appendix D: Perceived Stress Scale

The questions in this scale ask you about your feelings and thoughts during the last month. In each case, you will be asked to indicate how often you felt or thought a certain way. Although some of the questions are similar, there are differences between them and you should treat each one as a separate question.

1 (never) 2 (almost never) 3 (sometimes) 4 (fairly often) 5 (very often)

1. In the last month, how often have you been upset because of something that happened unexpectedly?
2. In the last month, how often have you felt that you were unable to control the important things in your life?
3. In the last month, how often have you felt nervous and "stressed"?
4. In the last month, how often have you dealt successfully with irritating life hassles? (reversed)
5. In the last month, how often have you felt that you were effectively coping with important changes were occurring in your life? (reversed)
6. In the last month, how often have you felt confident about your ability to handle your personal problems? (reversed)
7. In the last month, how often have you felt that things were going your way? (reversed)
8. In the last month, how often have you found that you could not cope with all the things that you had to do?

9. In the last month, how often have you been able to control irritations in your life? (reversed)
10. In the last month, how often have you felt that you were on top of things? (reversed)
11. In the last month, how often have you been angered because of things that happened that were outside of your control?
12. In the last month, how often have you found yourself thinking about things that you have to accomplish?
13. In the last month, how often have you been able to control the way you spend your time? (reversed)
14. In the last month, how often have you felt difficulties were piling up so high that you could not overcome them?

Appendix E: Perceived Self-Regulatory Success in Dieting Scale

Please answer the following questions. If you don't feel that this question applies to you, then please select "Not applicable."

How successful are you in watching your weight?

Not successful 1 2 3 4 5 6 7 Very successful

Not Applicable

How successful are you in losing extra weight?

Not successful 1 2 3 4 5 6 7 Very successful

Not Applicable

How difficult do you find it to stay in shape? (reversed)

Not difficult 1 2 3 4 5 6 7 Very difficult

Not Applicable

How important is it to you to lose weight?

Not important 1 2 3 4 5 6 7 Very important

Not Applicable

How satisfied are you with your body weight?

Not satisfied 1 2 3 4 5 6 7 Very satisfied

Not Applicable

Appendix F: Additional Questions Asked to Participants

Please answer the following questions.

My sex is:
Female
Male

What is your age? [fill in the blank]

What is the highest degree you have earned?
High School Degree or equivalent
Two-Year or Associate's Degree or equivalent
Bachelor's Degree or equivalent
Master's Degree or equivalent
Professional Degree (e.g., J.D., M.D., D.V.M., Pharm.D)
Doctoral Degree or equivalent
Other
Do not wish to respond

Are you of Latino or Hispanic origin?
Yes
No
Do not wish to respond

In which racial category/ies do you most strongly identify? [select all that apply]
American Indian or Alaska Native
Asian
Native Hawaiian or Other Pacific Islander
Black or African American
White
Multi-racial
Do not wish to respond

What is your estimated height?
Feet: (Fill in the blank)
Inches: (Fill in the blank)

What is your estimated weight? (In pounds) [fill in the blank]

What is your estimated body mass index (BMI)? If you need to calculate your BMI, then click here ("here" hyperlinks to https://www.nhlbi.nih.gov/health/educational/lose_wt/BMI/bmicalc.htm). [fill in the blank]

In the past 12 months, how many serious attempts have you made to lose weight? A serious attempt means that you changed the way you ate and/or exercised for a period of at least two weeks. [fill in the blank]

Do you have any health conditions that affect your eating habits and/or exercise?
Yes
No

If you answered yes to the question above, and if you feel comfortable sharing, please indicate below what the condition is. [fill in the blank]

Appendix G: KU Institutional Review Board (IRB) Approval Letter

KU THE UNIVERSITY OF KANSAS Research

APPROVAL OF PROTOCOL

November 9, 2016

Adam Raimond
raimond@ku.edu

Dear Adam Raimond:

On 11/9/2016, the IRB reviewed the following submission:

Type of Review:	Initial Study
Title of Study:	Assessing the role of social support in weight stability maintenance
Investigator:	Adam Raimond
IRB ID:	STUDY00140154
Funding:	None
Grant ID:	None
Documents Reviewed:	• WeightMaintenanceStudy_InformationSheet.docx, • WeightMaintenanceStudy_IRB_Protocol_v2.pdf, • WeightMaintenanceStudy_RecruitmentAnnouncement_KUMC.docx, • Recruitment Announcement for Basic Course, • KUMC Recruitment Documentation, • Weight Maintenance Study Survey (Full)

The IRB approved the study on 11/9/2016.

1. Notify HSCL about any new investigators not named in original application. Note that new investigators must take the online tutorial at https://rgs.drupal.ku.edu/human_subjects_compliance_training.
2. Any injury to a subject because of the research procedure must be reported immediately.
3. When signed consent documents are required, the primary investigator must retain the signed consent documents for at least three years past completion of the research activity.

Continuing review is not required for this project, however you are required to report any significant changes to the protocol prior to altering the project.

Please note university data security and handling requirements for your project:
https://documents.ku.edu/policies/IT/DataClassificationandHandlingProceduresGuide.htm

You must use the final, watermarked version of the consent form, available under the "Documents" tab in eCompliance.

Sincerely,

Stephanie Dyson Elms, MPA
IRB Administrator, KU Lawrence Campus

Human Research Protection Program
Youngberg Hall | 2385 Irving Hill Rd | Lawrence, KS 66045 | (785) 864-7429 | research.ku.edu/hrpp

Table 1. Correlations Between Variables Used in the Study for the Total Sample (*N* = 311)

Variables	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1. Age	-													
2. Health Conditions (1 = yes, 2 = no)	-0.022	-												
3. Sex (0 = female, 1 = male	0.055	0.053	-											
4. BMI	-0.032	0.072	.153**	-										
5. Family Eating Habit Encouragement	-0.035	0.092	-0.054	.171**	-									
6. Friend Eating Habit Encouragement	0.036	-0.062	0.026	0.077	.498**	-								
7. Family Eating Habit Discouragement	-0.025	-0.038	-0.024	0.104	.196**	.331**	-							
8. Friend Eating Habit Discouragement	-0.069	0.003	-0.086	0.087	.319**	.355**	.700**	-						
9. Family Support for Exercise	-0.067	0.1	-0.041	-0.1	.534**	.318**	0.005	.138*	-					
10. Friend Support for Exercise	-0.084	-0.009	0.057	-.140*	.336**	.457**	.148**	.181**	.537**	-				
11. BES Score	-0.064	-.141*	-.213**	.200**	.164**	.178**	.297**	.312**	-0.077	-0.048	-			
12. PSS Score	-0.071	-0.081	-.127*	-0.021	0.057	0.008	.239**	0.111	-.140*	-0.097	.303**	-		
13. Number of Diets Attempted	0.008	-0.086	-.151**	.182**	0.113	.204**	.171**	.255**	0.05	0.089	.343**	0.077	-	
14. Success in Dieting (N = 261)	-0.021	0.051	.277**	-.386**	-0.121	0.033	-0.072	-0.108	.188**	.247**	-.522**	-.208**	-.134*	-

*p < .05. **p < .01. **Note:** BMI = Body Mass Index, BES = Binge Eating Scale, PSS = Perceived Stress Score.