

**The Weight of Connection: Associations between attachment, relationship satisfaction, and body image in Weight Loss Surgery recipients and their romantic partners**

by

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## **Abstract**

Weight Loss Surgery (WLS) is a set of surgical procedures designed to help individuals that are obese or overweight lose weight in a shorter period compared to diet and exercise alone (Wolfe et al., 2016). Romantic relationships can be protective in terms of health, as relationships can positively affect health concerns, and in turn, health concerns can affect relationships as well (Kiecolt-Glaser & Wilson, 2017). Attachment often plays a role in understanding relationship dynamics, and the literature supports the use of attachment in terms of understanding the complexities of health-related behavior associated with obesity and WLS (Leung et al., 2019; Shakory et al., 2015; Taube-Schiff et al., 2015). The aim of this study was to understand the associations between relationship and sexual satisfaction, attachment, attachment ambivalence, self esteem, and body image for both individuals and couples where one or both partners have undergone WLS.

Results indicated that relationship satisfaction was associated with less body image concerns at the individual level. Attachment avoidance and attachment ambivalence was associated with less relationship satisfaction at both the individual and couple level. Attachment anxiety was associated with more relationship satisfaction and more body image concerns at the individual level. There was no evidence for attachment orientation or relationship variables of one partner influencing the body image of the other partner. Although attachment appears to be an important influence on body image after WLS, these findings suggest that individual attachment appears to be more important on body image outcomes as opposed to their partner's attachment orientation.

Keywords: Weight Loss Surgery, attachment, ambivalence, body image, relationship satisfaction, couples

## Chapter I

### Introduction

As obesity rates climb in many parts of the western world, more patients are electing to receive bariatric surgery, often referred to as Weight Loss Surgery (WLS). These procedures can improve the quality of life for patients and extend life expectancy through the reduction of medical comorbidities when subsequent behavioral modification programs are effectively utilized post-surgery (Dixon, 2010). When establishing and maintaining health related goals, such as the behavioral modifications needed for success with WLS, social support is imperative and can either enhance or undermine progress (Uchino et al., 2018). Many times, one's spouse is the main source of social support; however, adult romantic attachment and the role that it plays in WLS outcomes is not well understood in the current literature.

In terms of attachment, the most basic distinctions are between secure and insecure attachment orientations. Research has shown that if a patient has a healthy, or secure, attachment with their romantic partner, this may positively impact a patient's adherence to health change behavior (Pietromonaco et al., 2013). Conversely, if a patient has an insecure attachment to their romantic partner, this may negatively impact health. Studies have shown those with avoidant attachment are more likely to experience pain, while those with anxious attachment are more likely to experience cardiovascular issues, as compared to those with secure attachment (McWilliams & Bailey, 2010) Furthermore, those who have an insecure attachment style (anxious, or avoidant) are more likely to participate in risky health behaviors (Ahrens et al., 2012; Pietromonaco et al., 2013).



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Research focused on romantic attachment and WLS is limited, however, similar effects on health could logically be expected. Moreover, given the progress in the attachment research since early studies on childhood attachment, different dimensions of attachment such as ambivalence may be more/less important than global relationship attachment for health, including WLS outcomes. Therefore, the overall goal of this study is to better understand the link between WLS outcomes and intimate relationships. Specifically, this study looks to examine body image after WLS, attachment (including ambivalence) and romantic relationship dynamics.

### **Obesity and Overweight**

Overweight is defined by a body mass index (BMI) of 25kg/m<sup>2</sup> or greater, while obesity as defined by a BMI of 30kg/m<sup>2</sup> or greater (WHO, 2021). It is currently estimated that one third of the United States population is considered to be obese, and these numbers are expected to climb (Wang, 2008). As of 2021, 39% of adults ages 18 and older are overweight (WHO). Worldwide, 13% of adults are obese (WHO, 2021). Obesity affects women more than men; 15% of women and 11% of men are considered obese (WHO, 2021). Although both conditions are troublesome for health outcomes, obesity is associated with higher morbidity and mortality (WHO, 2021).

The obesity epidemic plaguing many parts of western countries is startling in terms of health outcomes and mortality rates among adults and children (CDC, 2021), especially those in the BIPOC community. According to the CDC (2021), obesity affects non-Hispanic black adults the most at 49.6%, followed by Hispanic adults at 44.8%. Non-Hispanic white adults have an obesity rate of 42.2%, and non-Hispanic Asian adults have an obesity rate of 17.4%. Additionally, individuals of lower socioeconomic status tend to have higher obesity rates, and individuals without a college degree tend to be at higher risk for obesity (CDC, 2021).

### **Health Consequences of Obesity: Morbidity and Mortality**

Obesity contributes to many health conditions and research has identified “metabolic syndrome” as the overarching contributor to disease in individuals who are obese. According to Dixon (2010), obesity creates health risks associated with visceral adipose tissue, which is associated with inflammation and metabolic complications in the body. Specifically, increased adipose tissue is associated with cardiovascular disease, asthma, sleep apnea, dyslipidemia, gout, polycystic ovarian syndrome, and certain types of cancer (Dixon, 2010). Metabolic syndrome is also associated with inflammation throughout the body (Monteiro, 2010). Researchers and physicians have described the inflammation due to metabolic syndrome as “low grade chronic inflammation” (Monterio, 2010). This chronic inflammation is associated with continuous activation of the innate immune system which contributes to autoimmune dysregulation leading to conditions such as diabetes, polycystic ovarian syndrome, gout, cardiovascular disease, and neurovascular problems (Monterio, 2010). In a meta-analysis of Cleveland Clinic electronic health data, it was found that patients who were considered obese had a seven-to-twelve-fold increase in likelihood for developing Type 2 Diabetes, which the authors suggest leads to cardiovascular health concerns, and eventual mortality (Pantalone et. al, 2017).

Not only is obesity associated with medical comorbidities, Allison et al. (1999) estimated that approximately 300,000 deaths per year are attributed to obesity in the United States alone. Moreover, 80% of these deaths occur in a person with a BMI of > 30. Although obesity does not necessarily cause death intrinsically, there has been a robust link established in the literature that directly connects obesity and the severe multifaceted illnesses, as described above, that often lead to mortality (Allison et al., 1999). In 2018, researchers suggested that the obesity epidemic in the United States is related to the slowing of mortality improvement throughout the country

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(Preston et al., 2018). On average, obesity is related to reducing life expectancy after age 40 by 0.9 years in the United States and was responsible for 189,000 deaths in 2011 alone (Preston et al., 2018).

### **Treatments for Obesity**

There are a few treatments for obesity employed frequently by health professionals. These treatments are designed to either lessen the number of calories taken in by an individual through dietary changes, or through appetite suppression via medication treatment. Other methods include surgical options that employ a combination of both mechanisms combined with physical restrictions via changes to the stomach and small intestine.

**Diet based.** Less invasive options to combat obesity are dietary therapies, which can include a focus on macronutrient composition, calorie restriction, meal replacement, and changing of dietary style (Ruban et al. 2019). All these options change the patient's diet and encourage them to adopt a healthier lifestyle in terms of food consumption. For example, macronutrient composition therapy involves counting macronutrients such as fats, carbohydrates, and proteins (Ruban et al. 2019). In macronutrient composition dietary therapy, reduction in fat intake is typically the first intervention utilized by nutritionists or primary care physicians (Ruban et al., 2019). Other options include caloric restriction, meaning the number of calories consumed per day is reduced, and increasing the level of exercise a patient gets throughout the week. This change in eating behavior and increase in physical exertion will put the patient in a caloric deficit and theoretically lead to weight loss. Meal replacement strategies include finding less calorie dense and more nutritious options for meals that the patient already eats (Ruban et al., 2019). This could include drinking meal replacement shakes/beverages instead of a meal or swapping food choices from less healthy to healthier options (e.g., white rice for brown rice)

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during a meal. The last noninvasive option for weight loss is changing the dietary style of the patient, which could include adopting a Mediterranean style diet (Bendall et al., 2017). A Mediterranean style diet includes a reduction in fatty food such as cheese and other dairy options, and a decrease in meat consumption. A typical Mediterranean diet also includes an increase in the number of fruits, vegetables, and grains consumed.

Among these noninvasive strategies Mediterranean style diets have been shown to decrease cardiovascular risk, and promote weight loss (Ruban et al., 2019). A meta-analysis showed that Mediterranean diets are associated with decreased “central obesity” (ie. circumference of the abdomen as compared to hip circumference). Sixteen out of the eighteen studies that involved utilizing a Mediterranean diet for treatment of obesity found a statistically significant decrease in waist circumference (Bendall et al., 2017).

**Pharmacotherapy.** Many medications are on the market and are utilized to either suppress appetite, accelerate weight loss by decreasing fat consumption by the gut, or a combination of both mechanisms. Many of these medications have side effects such as incontinence, gastrointestinal upset, nausea, and various psychological symptoms (Ruban et al., 2019). Newer drugs on the market include serotonin agonists to suppress hunger, and amphetamine type stimulants in combination with anti-antiepileptic components to increase energy utilization (Ruban et al., 2019). A meta-analysis of the studies conducted on real world users of pharmaceutical treatments for obesity suggested that medications contribute to weight loss for only some users (Ahmad et al., 2021). Anywhere between 14-58% of people who utilize pharmacological measures for obesity lose approximately greater than or equal to 5% of their body fat. However, much of this success that comes with pharmacological treatments has to do

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with adherence to the medication, in which many people have difficulty maintaining (Ahmad et al., 2021).

**Weight Loss Surgery (WLS).** Bariatric surgery, also called Weight Loss Surgery (WLS), can be very effective for individuals who are morbidly obese, as it allows them to lose weight quickly, therefore getting a jump start on their behavior modification programs in terms of weight loss (Wolfe et al., 2016). WLS is indicated for individuals with a BMI of 40 or greater, or individuals with a BMI of 35-40 with associated conditions such as cardiovascular disease, diabetes, sleep apnea, or hypertension (Wolfe et al., 2016). Recently, WLS has been used in patients with a BMI of 30-35 with comorbid type 2 diabetes, although this is uncommon (Wolfe et al., 2016).

WLS involves a surgical intervention in the digestive tract to stimulate weight loss by decreasing the volume of the stomach (Wolfe et al., 2016). Newer studies have shown that WLS not only impacts the physical size and volume of the stomach, but it can also impact neural and endocrine function (Wolfe et al., 2016). Different types of WLS include Roux-en-Y Gastric Bypass, Sleeve Gastrectomy, Biliopancreatic Diversion with Duodenal Switch, and other less invasive device implantation procedures.

The Roux-en-Y Gastric Bypass is completed by transecting part of the stomach into a one-ounce pouch, and then diverting the absorption of nutrients into the small intestine (Wolfe et al., 2016). This procedure leaves the vagal nerve intact, which decreases neural deficits caused by the procedure, but may create endocrine deficiencies in B12, iron, and other micronutrients (Wolfe et al., 2016).

In the Sleeve Gastrectomy procedure, approximately 80% of the stomach is removed and the remaining part is left in a tubular shape directly connected to the small intestine. This

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procedure allows for some reduction of food intake, but the main mechanism of weight loss for this procedure is an increased amount of gastric emptying (Wolfe et al., 2016). Gastric emptying is the process in which food moves through the digestive tract. When utilizing Sleeve Gastrectomy, food will move more quickly through the stomach, and be moved along into the small intestine for digestion when this procedure is utilized.

The Biliopancreatic Diversion with Duodenal Switch procedure is used the least due to a higher number of complications. In this procedure, a gastric sleeve is constructed and then an anastomosis, or surgically implanted diversion, is created between the stomach and small intestine (Wolfe et al., 2016). This allows for less absorption of nutrients because some of the fibers from the stomach and small intestine are intentionally severed (Wolfe et al., 2016).

Other types of WLS include implantation of devices to restrict food intake and decrease nutrient absorption. These include Adjustable Gastric Banding, Intermittent Vagal Blockade. In an Adjustable Gastric Banding procedure, a gastric band is placed at the proximal end of the stomach, and can be inflated or adjusted by a subcutaneous balloon to further restrict caloric intake (Wolfe et al., 2016). As the patient slowly reduces their amount of caloric intake due to this banding, the balloon may be adjusted accordingly. The Intermittent Vagal Blockade is the least often used in terms of devices and includes a lead that is inserted into the diaphragm to block the hunger cues sent from the brain via the vagus nerve (Wolfe et al., 2016).

In terms of outcome data, a study conducted on those who received the Adjustable Gastric Band, looked at weight loss outcomes at 5 years postoperative. Morbidly obese individuals in this study began with a mean preoperative BMI of 41.8/kg. At 5 year follow up, in a sample of these same individuals had a mean BMI of 28.9/kg (Galal et al., 2020). These data suggest that WLS is effective in reducing overall BMI in those who are morbidly obese. In the

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same study, researchers looked at individuals with a BMI over 50, defined as “super obese”. These individuals who received the Gastric Band procedure had a mean preoperative BMI of 54.3/kg, and a postoperative BMI of 33.7/kg. These results for both categories of obesity suggest that WLS in terms of Gastric Banding, is effective for weight loss (Galal et al., 2020).

A predictor for how effective WLS is for individuals can be partially explained via neural circuits. As aforementioned, WLS can impact both neural and endocrine functioning (Wolfe et al., 2016). In a longitudinal study conducted by Holsen, Davidson, Cerit & colleagues (2018) researchers looked at preoperative and postoperative WLS hormone levels, neuroimaging, and behavioral evaluation in order to determine changes in a patient’s neural and endocrine functioning. It was found that those in the study had lost an average of 29% of their initial body weight at 12 month follow up. Utilizing a lab-based scenario where participants were presented with highly palatable foods, their neural activity, endocrine functioning, and behavioral presentation were evaluated. It was found that these individuals had less activity in the parts of the brain associated with reward and pleasure (i.e., nucleus accumbens, amygdala, caudate, and pallidum.) In addition, these patients showed an increase in prefrontal cortex activation suggesting that they were better able to control their desires for food. Hormonal levels of ghrelin, insulin, leptin, and glucose were also shown to be reduced, suggesting greater ability for fasting (Holsen et al., 2018). These results suggest that not only does WLS change the size and volume of the stomach, but also contributes to significant changes in both neural and endocrine function. Based on this work, it is hard to know whether or not it was the surgery or subsequent behavioral change associated with surgery that resulted in these changes in function; however, the results support the fact that these changes are essential for WLS to be successful.

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However, a minority of patients who receive WLS do not reach their weight loss goals. In a qualitative study that interviewed bariatric surgeons, researchers found three themes that emerged that indicated sub-optimal WLS outcomes (Ward & Ogden, 2019). These themes included underlying psychosocial issues, poor adherence to postoperative treatment recommendations, and patient nondisclosure. In terms of psychosocial issues, the surgeons gave examples of individuals with preexisting psychological conditions that hindered their ability to cope with changes after the surgery. Poor adherence to postoperative treatment recommendations included these psychosocial challenges in which some patients could not adhere to their diet, given inability to cope with the changes brought about by WLS. Lastly, sub-optimal WLS outcomes according to these physicians, was associated with nondisclosure of health history to their doctors. For example, not disclosing a history of eating disorders, substance use, or other mental health concerns contributed to suboptimal outcomes (Ward & Ogden, 2019).

### **Causes of Obesity**

Obesity is a heterogeneous condition, and its etiology can be conceptualized through a biopsychosocial framework. Although each biopsychosocial factor alone makes a significant contribution to the condition of obesity, the combination of factors across the developmental trajectory of an individual's lifetime is critical. Nonetheless a brief review of these factors will be provided for context in the current paper (for a more comprehensive review of the etiology of obesity see Kadouh & Acosta, 2017.)

### **Biological Factors**

The main biological factors involved stem from brain regions and hormones. Several areas located in the hypothalamus are associated with hunger and satiety (Heisler, 2017). In addition to these specific regions of the hypothalamus, this area of the brain is also associated



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with regulation of leptin levels, a hormone that is responsible for hunger cues. Through biochemical processes, leptin is released from the hypothalamus once the brain receives signals associated with depleted energy reserves. This process seems to be moderated through the amount of adipose tissue (conglomeration of fat cells) an individual has on their body (Heisler, 2017). Adipose tissue serves as “energy reserves” throughout the body, so in effect, the more adipose tissue, the more opportunities for these cells to register depletion to the hypothalamus.

Ghrelin, produced in the stomach, is another important hormone in obtaining satiety (Heisler, 2017). After finishing a meal, ghrelin is released in the stomach, and interacts with the hypothalamus through the vagus nerve. This interaction serves as a cue that the stomach is full, and directs an individual to stop eating (Heisler, 2017). Individuals who are obese may have issues regulating this system of hunger and satiety, as receptors for ghrelin may be impacted when an individual continues to eat after these satiety cues have been released by the stomach (Heisler, 2017).

It is suggested that approximately 97 different alleles exist within the human genome that may be responsible for a genetic predisposition to obesity (Moon et al., 2017). These genes are thought to not necessarily be a cause of obesity but rather influence the predisposition for obesity (Moon et al., 2017). Moon and colleagues (2017) found that individuals who have more alleles associated with obesity tend to experience greater detrimental effects of a sedentary lifestyle than those without the genetic predisposition. In addition, those with a greater number of predisposing alleles tend to benefit more from physical activity than those without the alleles. This is because physical activity can often regulate leptin levels, thus decreasing hunger cues received from hypothalamus (Moon et al., 2017). In addition, these individuals who have more alleles

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associated with obesity, also have a higher predisposition for increased levels of adipose tissue, or fat storage (Moon et al., 2017).

### **Psychological Factors**

Many studies have focused on psychological predictors of obesity, or specific eating disorders (i.e., Binge Eating Disorder) or patterns. Those who have binge eating disorder eat more than what most people would eat in a short period of time, have difficulty controlling themselves during a binge (ie. inability to stop eating) and feeling markedly distressed both during and after a binge takes place (ie. feeling guilty or eating alone to not allow others to see how much they are consuming) (Berkman et al., 2015).

In one meta-analysis, authors looked to uncover associations between adverse life experiences, obesity, and binge eating disorder (Palmisano et al., 2016). Adverse life experiences, also called Adverse Childhood Experiences or ACEs, are traumatic experiences that occur during childhood. For example, this could be experiencing abuse such as physical, emotional, or sexual abuse, as well as emotional or physical neglect. Adverse life experiences according to the meta-analysis conducted by Palmisano and colleagues showed that there was an increased risk for obesity and binge eating disorder across 70 studies (2016). Their findings suggest that those who have binge eating disorder frequently also have symptoms of PTSD associated with adverse life experiences. In addition, the studies reviewed showed an association with increased HPA-axis activation, as well as increased cortisol levels contributing to a stress response. It was hypothesized that individuals who have binge eating disorder may utilize bingeing as a coping mechanism for the increased levels of arousal or anxiety brought about by overactive HPA activity and cortisol production (Palmisano et al., 2016). Obesity may come

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secondary to binge eating disorder in some individuals, and it is important to look at both together in order to conceptualize obesity in a biopsychosocial framework.

The hypothalamic–pituitary–adrenal axis (HPA axis) is a vital component for understanding the emotional aspects of eating (van Strien, 2018). This area of the nervous and endocrine systems is associated with emotional regulation and may become dysregulated in response to traumatic events or stressors in one’s life. Typically, when one is stressed hunger cues are dampened in response to a survival situation. However, according to van Strien, when some individuals are stressed in response to a traumatic/stressful event, this can have a “reverse effect” and cause increased levels of hunger (van Strien, 2018). Furthermore, van Strien suggests that this dampening of HPA activity is common among those with Binge Eating Disorder and is what ultimately drives the need to consume large amounts of food in one sitting (van Strien, 2018).

For instance, there is a robust literature on the construct of emotional eating. Emotional eating was defined as a behavioral response involving eating food after perceived negative emotionality (Canetti et al., 2009). Several studies have found that patterns of emotional eating are associated with obesity and struggles to lose weight and maintain a healthy BMI (Konttinen, 2020; Palmisano, Innamorati, & Vanderlinden, 2016; van Strien, 2018). Experiencing negative emotions is linked to eating calorically dense, and palatable foods such as sweets, or fatty savory foods in some individuals with obesity. Researchers suggest that those who experience patterns of emotional eating do so in response to negative emotions and stress (Konttinen, 2020). Individual differences such as previous learning experiences, adverse childhood experiences, prolonged stress, and HPA and cortisol activation levels may also play a role in contributing to or maintaining obesity as a disease (Konttinen, 2020).

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In order to fully understand emotional eating, however, one must also examine how personality and psychological distress impact emotional eating. Neuroticism, a personality predisposition that has been linked to psychopathology and psychological distress has been found to directly link to emotional eating behaviors and thus to obesity (Canetti et al., 2009). This same study also found an association between low conscientiousness, feelings of inadequacy and interpersonal difficulties, and binge eating (Canetti et al., 2009). In other words, individuals with lower neurotic tendencies and lower levels of emotional eating tended to be able to stick with their lifestyle and diet modifications better than those who scored higher in those areas of personality and behavior (Canetti et al., 2009).

In a meta-analysis of nine studies, it was found that those who scored higher in terms of conscientiousness (ability to self-regulate, maintain orderliness, and abide by social norms) had lower levels of obesity (Jokela et al., 2012). As suggested by both Canetti et al (2009) and Jokela et al (2012), another study concluded with similar results suggesting that those with obesity tend to have higher levels of neuroticism and lower levels of conscientiousness (Vainik et al. 2019).

Self esteem, and body image in obese patients may also play a role in the maintenance of the disease and also WLS outcomes. A 2014 study conducted by Lent, Napolitano, &, Wood, found higher levels of internalized weight bias in preoperative WLS patients who then showed lower levels of weight loss at 12 month follow up, and an increase in depressive symptoms both before and after surgery. Internalized weight bias was conceptualized by stigma, or negative beliefs about the self, surrounding negative stereotypes associated with being overweight or obese (Lent et al., 2014). The study found that those who have higher levels of internalized weight bias preoperatively are also at an increased risk for binge eating as a means to cope with the depressive symptoms, thus contributing to less weight loss (Lent et al., 2014). In this same

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study, it was found that lower self esteem was associated with less weight loss, higher levels of depression, and higher amounts of binge eating behavior. In other words, the more a patient believes negative stigma surrounding being overweight or obese, the more difficult it is for them to lose or maintain weight loss.

### **Sociocultural Factors**

Studies have suggested that obesity can be related to environmental factors such as the abundance of fast food in the area in which an individual lives relative to the amount of grocery stores and gyms (Cohen-Cole & Fletcher, 2008). Researchers have identified “food deserts” where healthy food is difficult or impossible to find and “food swamps” where there are a limited number of healthy food options, coupled with excessive amounts of high caloric food options, such as many fast food restaurants (Cooksey-Stowers et al., 2017). Cooksey-Stowers and colleagues (2017) found a greater association between food swamps and obesity.

When the availability of food sources is coupled with the time it takes for people to prepare food a healthy diet may be an issue for individuals who both work and have other duties, such as caregiving (Cohen-Cole & Fletcher, 2008). Although people may have more access to healthier options within food swamps, people often choose the unhealthier option based on convenience, familiarity, and affordability (Cooksey-Stowers et al., 2017). As such, people who live in areas that have a high density of fast-food options, who also work long hours, and have other household responsibilities, may be at greater risk for obesity.

Additionally, non-white individuals have a higher incidence of obesity as compared to white individuals, and this may have to do with “food deserts” and “food swamps” in cities with lower SES (Cooksey-Stowers et al., 2017). In relation to racial minorities, cities that have a higher population of non-white residents have more fast-food restaurants than cities with a

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greater number of white residents, suggesting that those in the food industry target specific places when building franchises (Cooksey-Stowers et al., 2017). Comparing family level data, a study by Assari and colleagues (2018) showed that the link between SES (as measured by income to needs ratio) and obesity was stronger among families of color compared to white families.

An additional cultural variable to consider is social norms. Although highly debated in the scientific community, Christakis & Fowler found that obesity can “spread” throughout social networks (2007). This study found that having a close friend or family member of the same sex who is also overweight or obese can “normalize” this health concern and make it more likely for others within their social circle to become overweight or obese (Christakis & Fowler, 2007). The data used in this study were datasets pulled from the Framingham Heart Study, which began data collection in 1948 and continues today. This study is highly debated because it does not take into account genetic and psychological factors that may have influenced results (Cooksey-Stowers et al., 2017). However, one can imagine the normalization of obesity within a social network, on some level, influencing obesity rates within that social network.

### **Spousal Social Support for Behavioral Change**

The literature has documented social support being key in achieving behavioral change goals and managing health conditions. Social support is especially important in terms of cardiovascular disease outcomes, and incidence of cancer (Reblin & Uchino, 2008). Social support can also be imperative in terms of mental health consequences and behavior change goals (Cornelius et al., 2018).

Prescriptive support, as described by Cornelius, Getten, Lenz, and colleagues (2018), is a form of social support characterized by positive reinforcement, modeling, and encouragement.

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This type of support has been shown to be beneficial to those looking to lose weight, in terms of BMI reduction. Conversely, social control, as defined as criticizing eating habits, restricting food, and making straightforward requests about losing weight, seem to have the opposite effect on weight loss (Cornelius et al., 2018).

Relational Regulation Theory (RRT), as outlined by Lakey and Orehek (2011), suggests that people tend to regulate their affect, behavior, and cognitions through shared activities and conversations about stressful life events. They provide descriptions of social support: perceived and enacted support. Enacted social support is defined by concrete behaviors that suggest support (Lakey & Orehek, 2011). For example, verbalizing words of encouragement, doing tasks to alleviate stress of the other partner, or physical affection in times of distress. However, perceived support tends to be more influential in measuring closeness in a relationship (Lakey & Orehek, 2011). Perceived support is defined by how the recipient of the supportive behavior evaluates that behavior in terms of helpfulness during times of distress. According to RRT, perceived support can be influenced by personality traits and attachment (Lakey & Orehek, 2011).

This suggests that not all supportive behaviors are seen as supportive by every person. The type of support behavior, the influence it has on the relationship itself, and the consequence to that behavior may be different for all couples based upon their specific dyadic relationship. Other studies have attempted to break down the parts of RRT in terms of Big 5 Personality Traits and attachment in order to understand how perceived support affects relationships (Lakey & Orehek, 2011).

### **Couples and Obesity**

Intimate relationships appear to play a role in various disease/health outcomes and many studies have shown the importance of partner support in terms of managing chronic disease (Kiecolt-Glaser, 2001). In a more recent article by Kiecolt-Glaser and Wilson (2017) it was

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found that health issues affect relationship satisfaction, but the relationship itself can affect health outcomes as well. This bidirectional nature of health problems and relationship satisfaction makes treatment of relationship problems essential for health promotion (Kiecolt-Glaser & Wilson, 2017). Specifically, researchers in this study looked at marital discord being associated with depression and sleep issues, both associated with increased risk for obesity (Kiecolt-Glaser & Wilson, 2017).

According to Burman and Margolian, relationship satisfaction and health problems exist within an interactional perspective (1992). Models of marriage and health also highlight that stressors, perceived support, and coping strategies may have an impact, both positively or negatively, on the link between relationship functioning and health (Burman & Margolian, 1992). Moreover, marital factors such as marital status, marital quality, and marital interaction affect health status and vice versa. For instance, it is well documented in the literature that married people live longer (Dupre et al., 2009; Kaplan & Kronick, 2006). A meta-analysis conducted by Robles showed that married couples with higher marital quality, or higher levels of relationship satisfaction, had better health across all outcome categories (2014). It is suggested that this is because married couples in happy relationships tend to adopt more health promoting behaviors, such as healthier diets and exercise. Furthermore, satisfactory marriages may be health promoting for psychosocial reasons as individuals feel comfortable disclosing thoughts and feelings to their partner, as well as having built in social support (Robles, 2014).

Convergence of behavior between spouses has also been looked at in the literature. For example, research conducted by Kiecolt-Glaser & Wilson showed that when health promoting behaviors are adopted by one couple member, it is more likely that the other couple member will also adopt these behaviors (2017). This is also true of diseases brought about by convergence of



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behavior. It was found that for certain diseases, the spouses of the affected partner had a 70% increased risk in likelihood of also having the same illness (Hippisley et al., 2002).

In terms of couples and obesity, specifically, there is often a focus on peripheral medical issues associated with obesity (e.g., coronary artery disease, infertility) and not pure weight itself. Nonetheless, even with limited data on US samples, research does suggest an effect of mutual obesity in couples (Cobb et al., 2016). Ledyard and Morrison suggested a triangulation model to conceptualize the effect of obesity on couples' relationships based on their qualitative work (2008). In this model, weight problems are said to be the "third leg" of the dyadic couple relationship. Obesity can either create conflict within a relationship, or serve as a common enemy, thus uniting the couple further (Ledyard & Morrison, 2008). This study also identified unique ways that obesity impacted the quality of a couple's relationship (e.g., sexual intimacy, fear and control issues, communication disruption) (Ledyard & Morrison, 2008).

Not only does obesity affect relationship satisfaction, but the relationship itself can affect obesity as well. A longitudinal study found that as one partner's BMI increased over time, their partner's BMI also increased. Specifically, if one partner was not obese at baseline, and their partner was, obesity risk for the nonobese partner nearly doubled (Cobb et al., 2016). This same trend applies to couples regardless of baseline obesity status as well. Couples who transition from dating to cohabitating or marriage are more likely to become obese, and this effect becomes more apparent after living together for 2 or more years (The & Gordon-Larsen, 2009). It is suggested that a shared environment between partners, as well as convergence of health defeating behaviors may explain this phenomenon (The & Gordon-Larsen, 2009).

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### **Couples and WLS**

As has been demonstrated with the literature above, WLS is becoming a more readily available treatment that has the potential to impact the biological factors associated with obesity, and when paired with the potential for couples' relationships to impact both the psychological and social factors of obesity it seems logical to examine WLS and couples. Enhancing our understanding of how couples' dynamics impact the required ongoing behavioral modification and management needed for success of WLS. Understanding the effect this behavior change has on relationships could be utilized clinically in post-surgical intervention for couples where one person is electing to receive WLS. If couples are more equipped to understand what effect this surgery and subsequent behavior modification plan could have on their dynamic, there may be less strain on the relationships. In addition, the relationship itself could be utilized to support behavior modification programs post WLS.

Two factors that emerged in a qualitative study surrounding couples where one partner received WLS were 1) heightened communication surrounding health behaviors and 2) changes in intimacy (Kluever et al., 2014). Couples in this study were able to speak to both the positive and negative aspects of WLS on their relationship. In dyads where couple members had more positive changes in their relationship following WLS, the member who had received the surgery felt supported and respected by the partner who had not received the surgery. Researchers hypothesized that the partner who had received the surgery in these dyads was less apt to pressure the other partner to also lose weight, and in turn, the partner who had not received the surgery viewed their partner's weight as neutral (i.e., they supported and respected their partner's autonomy) (Kluever et al., 2014). In couples where mixed attributions were made toward WLS, the partner who received the surgery often wished that the partner who had not received the

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surgery shared their weight loss journey more deeply, in the sense that they wanted their partner to make all the changes that they had made. In turn, the partner who did not receive the surgery wished that their partner did not take their newly implemented health behaviors so seriously (Kluever et al., 2014).

In couples that had negative attributions toward WLS, researchers found that a power dynamic was often at play. The partner who had received the surgery had more negative opinions about how the surgery affected the relationship, as opposed to their partner who had not received the surgery. The partner who had received the surgery often felt pressured to lose weight, and that they did not live up to their partner's standards even after the surgery. For couples who had more negative attributions associated with the surgery, the individual who received the surgery often lost less weight than those who had more positive attributions (Kluever et al., 2014). It is hypothesized that when pressure is applied to individuals making health related changes, specifically by their romantic partner, it can contribute to that individual not feeling appropriately supported in making behavior changes (Kluever et al., 2014).

In another study, partners who have received WLS and had a lower BMI at follow-up tended to have higher levels of relationship satisfaction, better communication within their relationship, and an increased ability to discuss the positive aspects of obesity in their relationship (Ferryby et al., 2019). It is suggested that these changes occur as the partner who received the surgery often felt less discouragement from their romantic partner, thus opening the door for greater communication and intimacy between partners. Not only did these couples have greater relationship satisfaction, the partner who received the surgery also had a lower BMI than other individuals in the study who felt a greater sense of discouragement from their partner, and less relationship satisfaction (Ferryby et al., 2019). Individuals who had lost more weight and had

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higher levels of relationship satisfaction were more likely to recognize the positive aspects of obesity within their relationship. In other words, for couples where one partner had successfully lost weight following WLS, both partners were able to attribute obesity as something that brought them closer as a couple. It's hypothesized that the couple was then more equipped to make the subsequent changes to find other activities to create closeness, such as health promoting behaviors (Ferriby et al., 2019)

However, it should be noted that marital quality, or relationship satisfaction, has been found to decrease following WLS for many couples (Ferriby et al., 2015). Across several studies, researchers discovered that women in heterosexual relationships begin to experience greater levels of extraversion and assertiveness than prior to WLS. Women who have received WLS sometimes begin to lose interest in their husbands due to these changes. Husbands, on the other hand, begin to experience feelings of isolation and loss of control over their relationship (Ferriby et al., 2015). Conversely, sexual satisfaction and sexual frequency often increases post WLS as patients feel more attractive and confident after losing weight. It is hypothesized that in couples where one partner has received WLS, sexual contact begins to take the place of emotional intimacy, as new psychosocial dyadic challenges are brought about following surgery (Ferriby et al., 2015).

For example, researchers attempted to discover how WLS impacts the male perspective in regard to romantic relationships in a sample of patients who had undergone WLS (Moore & Cooper, 2016). This study showed that obesity can serve to redirect attention from other problems within the context of a romantic relationship (Moore & Cooper, 2016). Citing Harkaway (1986), this study suggests that any attempt to remove the problem of obesity from a relationship can create resistance and failure. This is because the problem of obesity is often used

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to mask more emotionally based problems within an intimate relationship (Moore & Cooper, 2016).

### **Attachment, Ambivalence, and Couples**

This idea of obesity masking emotional turmoil in a romantic relationship is consistent with a study conducted by Pratt, Blak, Ferriby, and colleagues (2016). In this study, researchers found that individuals with high avoidant tendencies display more uncontrolled eating patterns. In addition, this study found that although males are more prone to avoidant emotional patterns, they also display a significant amount of anxious distress in terms of close social relationships. Researchers hypothesized that the combination of both high avoidance and high anxiety contribute to elevated BMI in those looking to receive bariatric surgery (Pratt, et al. 2016).

Understanding attachment is imperative to understanding couple dynamics, especially in WLS populations as the potential for relationships to impact WLS outcomes and overall health as reviewed above. Adult attachment is described as insecure (avoidant and anxious) or secure. Avoidant attachment is described as overt independence and people with this attachment orientation tend to avoid negative self-attributions, or weaknesses, through being overly self-reliant (Leung et al., 2019). Anxious attachment is described as having difficulties regulating emotions while in the presence of another person where rejection or abandonment is perceived (Leung et al., 2019). These attachment styles are created through early developmental experiences with caregivers and stay relatively unchanged throughout a person's life (Bowlby, 1988). Attachment styles are thought to eventually impact adult romantic relationships, as they are the way that humans relate to other humans in the context of themselves (Fonagy et al., 2002). Attachment is important for affect and behavior regulation, as well as the formation for the sense of self (Fonagy et al., 2002).

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Not only is attachment important for understanding relationships, affect and behavior regulation, and the formation for the self, but it is also important for health outcomes. It is important to note that insecure attachment has been linked to affect and behavior regulation in individuals with diabetes, chronic pain, hepatitis C, and obesity (Ciechanowski et al., 2006; Pfeifer et al., 2018; Sockalingam et al., 2013; Nancarrow et al., 2018). Insecure attachment styles have also been found to be important in understanding psychopathology, and more specifically eating disorders (Tasca & Balfour, 2014). Studies conducted that look specifically at WLS patients from the lense of attachment style, tend to focus on pre-operative data (Shakory et al., 2015; Taube-Schiff et al., 2015). In previous studies examining attachment in pre-operative WLS patients it was found that individuals have increased levels of attachment anxiety, binge eating behavior, and emotional dysregulation (Shakory et al., 2015; Taube-Schiff et al., 2015).

Studies have found mixed results when conceptualizing WLS outcomes from an attachment perspective. A 2019 study focusing on 3-year postoperative outcomes following WLS found a significant association between avoidant attachment and binge eating (Leung et al.). It appears that the literature shows more attachment anxiety in preoperative samples, and more attachment avoidance in postoperative samples. Both attachment anxiety and attachment avoidance have been associated with binge eating behavior (Leung et al., 2019; Shakory et al., 2015; Taube-Schiff et al., 2015).

Although more traditional models focus on avoidance and anxiety, individuals in intimate relationships may feel two different ways toward the emotional intimacy associated with the relationship. Specifically, individuals may want to have close intimate connections with their partner but may have some negative beliefs surrounding these intimate connections. This ambivalence, or feeling two different ways simultaneously, about a given thought, feeling, or

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behavior is a unique dimension in attachment research and has yet to be fully examined in the literature. Exploring ambivalence in couples would ultimately help in understanding dynamics of the relationship or health related outcomes. Specifically, behavior change, such as that required in weight loss, may contribute to feelings of ambivalence itself and this may carry over to or be generated from ambivalence in one's relationship (Lahey & Orehek, 2011).

### **Conclusions and Hypotheses**

Obesity is a global health crisis which is caused by several biopsychosocial factors. WLS has been one treatment option for individuals who are overweight or obese. WLS is a tool that requires behaviorally based health changes. As reviewed above, social support, particularly from one's romantic relationship partner, can be key in either promoting or undermining health behavior change. Moreover, changes in a couple's relationship post WLS have been noted in the literature. Attachment, however, may be a key variable that has yet to be fully explored in the research on postoperative WLS patients and their romantic partners. Newer constructs such as attachment ambivalence may be imperative to understand this population in terms of behavior change and romantic relationship dynamics. It is clear that we need to study couple dynamics in terms of attachment and ambivalence within the context of WLS in order to better target interventions may occur in a clinical setting. Based on the literature reviewed above it is hypothesized:

### **Hypotheses**

For individuals who have had WLS

- 1) Body image/self esteem and relationship variables (i.e., relationship and sexual satisfaction) will be negatively associated with one another.

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- 2) Attachment insecurity, as characterized by anxiety, and avoidance, will be negatively associated with relationship satisfaction, sexual satisfaction, and body image/self esteem
  - a) The association between attachment ambivalence to relationship variables and body image will be explored.
- 3) The combination of attachment and relationship variables will significantly predict body image/self esteem in individuals who have had WLS.

For couples where at least one couple member had WLS

- 4) Significant positive correlations between couples will be observed on both relationship variables and attachment.
- 5) Attachment avoidance, anxiety, and ambivalence in the partner of an individual who had WLS will be associated with body image for the individual who had WLS
  - a) The association between relationship variables and body image will be explored for the individual who received WLS.



## Chapter II

### Methods

#### Participants

An a priori power analysis using established effect sizes from the current literature suggests that 200 participants would be sufficient for this study. Participants were recruited from several main streams: (1) online advertisements through social media (Facebook groups for people who have had WLS) for the study (2) advertisements for the study with local WLS programs, and (3) The University of Michigan Health Research online data collection system. These advertisements included a direct link to the study measures in Qualtrics. All data collection occurred online utilizing Qualtrics. Study eligibility criteria included: age of 18+, English speaking, current involvement in a cohabitating romantic relationship of at least two years, and the participant, their spouse, or both have had bariatric surgery within the last two years.

In total there were 680 individuals who started the online survey. Of these individuals, 3 did not provide consent to participate, 21 participants did not provide data beyond demographics, 5 participants completed less than 75% of the survey and all of these data sets were deleted. Of the remaining 651, thirty-nine individuals completed the survey in less than 162 seconds and were deleted. This was based on a conservative estimate approach outlined by Haung and colleagues, (2012).

Of the 612 individuals, 14 did not provide the couple's code. Within this group, 6 indicated that they had not had WLS in the last two years and without a couple's code these

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individuals would not be eligible to participate (at the individual level) and were subsequently deleted. At the individual level, 30 did not receive WLS within the past 2 years and were not eligible to participate, therefore their data was deleted. Two hundred and seventy-nine individuals (those without partner data available) were then utilized for this study.

Forty-four individuals responded multiple times within the couple's data set (i.e., more than 2, indicating that they either completed the survey more than 2 times or were part of a polyamorous relationship.) As this is a study identifying effects of dyadic relationships, individuals with unique codes that appeared more than twice were deleted. This left a total of 250 individuals that had a partner also complete the survey (or 125 couples.) Data for couples were then identified using the unique codes that couples provided (see procedure).

For the purposes of this study and data analyses individuals who have had weight loss surgery and their romantic partners were included. Individuals are those couple members who had weight loss surgery within the last two years regardless of partner participation. In total there were 529 individuals. There were 47 individuals who were also identified as partners who had not received WLS. A partner is someone whose spouse/significant other had weight loss surgery. Demographic information for individuals who had WLS and their partners can be found in Table 1.

### Measures

**Demographics.** Participants were asked their gender identity, age, ethnicity/race, highest level of education, marriage status, number of children, and income level.

**Attachment.** *Experiences in Close Relationship Scale-Short Form (ECR-S; Wei et al., 2007).* This self report measure is designed to assess attachment in terms of both anxious and avoidant attachment. The 12 items are rated on a 7-point Likert scale. The ECR-S was originally

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developed using other attachment measures not specific to romantic relationships, but has been frequently used with romantic dyads (Callaci, Peloquin, & Barry, et al., 2020). This scale is specifically designed to understand adult attachment styles in terms of romantic relationships (Wei et al., 2007). Alpha for anxious attachment was .414 and alpha for avoidant attachment was .499. Alpha for the whole measure for the current study was .859.

***Inventory of Interpersonal Ambivalence Short Form (IIA ;Siefert, 2015).*** This self-report measure is used to assess mixed feelings about close relationships. The 8 items are rated in terms of a 4-point Likert scale. Specifically, these mixed feelings can be conceptualized as “interpersonal ambivalence” or a fearful-avoidant attachment style. Interpersonal ambivalence can be further defined as the simultaneous desire to develop and avoid close interpersonal relationships (Siefert, 2015). Alpha for the current study was .792.

***Relationship Satisfaction. Relationship Assessment Scale (RAS; Hendrick, 1988).*** This measure is a brief measure of global relationship satisfaction. It consists of seven items, each rated on a 5-point Likert scale. It is indicated for individuals in a romantic relationship, and is correlated with measures associated with love, sexual attitudes, self-disclosure, commitment, and investment in a relationship (Hendrick, 1988). Alpha for the current study was .574.

***Sexual Satisfaction. Sexual Satisfaction Scale (SSS; Theiss, 2011)*** This measure is used to measure one’s satisfaction with their sexual relationship, and their romantic partner as a sexual partner. It consists of six items, rated on a 6-point Likert scale. This measure has been used in dyadic couples research exploring sexual satisfaction as it relates to different outcome variables such as communication and spousal support (Mallory, 2022; Shakespeare-Finch & Obst, 2011). Alpha for the current study was .644.

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**Self Esteem.** *Rosenberg Self Esteem Scale (Rosenberg, 1965)*. This measure was developed to measure global self-worth by measuring both positive and negative feelings about the self. This scale has also been associated with levels of depression or anxiety when the participant shows lower levels of self esteem. This is a 10-item scale, and items are rated using a 4-point Likert scale. Alpha for the current study was .666.

**Body Image.** *Evolving Self View After Bariatric Surgery (ESV; Perdue, et al. 2020)*. This measure was developed to examine post-operative psychosocial adjustment among bariatric surgery patients. The ESV showcases the participant's view as 'I-obese' or 'I-ex-obese'. The I-obese orientation are those who receive a higher score on the measure indicating that they still view themselves as an obese person after WLS. The I-ex-obese orientation are those that receive a lower score on the measure indicating that they have adjusted their body image to reflect the changes following WLS. The measure consists of 25 questions formatted on a 6-point Likert scale. Originally, this measure was only used on women, but can be expanded to include men as well (ESV; Perdue, et al. 2020). As this is a new instrument, validity, internal consistency, and factor analysis will be established with future research. Alpha for the current study was .923.

### **Procedure**

Participants were recruited for the study as described above. All participants, regardless of recruitment stream, were eligible to enter a raffle for a \$50 Amazon gift card once both partners completed the survey. This gift card was awarded to one couple for every twenty couples that completed the survey. Participants were given the Qualtrics link via the social media outlet or advertisement for this study. They could then self-direct to the study for completion. When the participant entered the survey via Qualtrics they were presented with an informed consent. Participants were instructed to read through the consent and provide consent by clicking

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the “I Consent” button at the bottom of the page. If a participant did not consent, they were not allowed to continue with the study measures.

At the conclusion of the study measures, participants were reminded that their partner needed to participate as well to be entered into the gift card raffle with the following instructions:

“Please provide the MONTH and DATE of the OLDEST partner's birthdate, followed by the MONTH and DATE of the YOUNGEST partner's birth date. No slashes or dashes. For example, if the oldest partner's birthdate is 6/17/1969 and the youngest partner's birthdate is 11/28/1969 their unique code would be 06171128.

This will be used to link your partner's data to your data.”

Email addresses for follow up partner participation were also collected. Only one email address was collected per couple (the partner that completed the study first). After providing a unique code, participants were instructed to provide their email address with the following prompt:

“Please provide your email address. This will be used to issue payment should you win the raffle. This will also be used to send a survey to you to forward to your partner for completion.”

It should be noted that the participant and partner surveys were identical, with one exception. Each participant was asked if they had undergone weight loss surgery. If they have not they were not shown the questions associated with bariatric surgery completion (i.e., Evolving Self View After Bariatric Surgery). For couple level data this allows for inclusion of couples where both may have had surgery. If neither individual from the couple (linked through a unique identifier) had WLS within the last two years, the data was discarded as the couple was not eligible.

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The only identifying information that participants provided was their email address (for the raffle for a \$50 Amazon gift card and follow up reminders for their partner's participation.) At the conclusion of the study participants were then debriefed (see Appendix B) and thanked for their time and participation.

To remind participants to have their partners participate they were sent regular email reminders. The email to remind a partner to participate read:

“Thank you for completing the Weight of Connection survey. As a reminder, participation is only counted once BOTH partners have completed the study. Please forward this email with this link: \_\_\_\_\_ to your partner for completion. Once both partners have completed the survey, the couple is then eligible for the raffle for a \$50 Amazon gift card.

Your unique code is: xxxxxxxx

If you have any questions or concerns, please feel free to reply to this email.

Thank you,

Weight of Connection Study Team”

The study team then sent reminders according to the timeline in Table 5 (see appendix). If a partner did not participate by attempt 4 it was then assumed the partner did not wish to participate and no further contact was made.

## Chapter III

### Results

Prior to any data analysis data were checked for normalcy and screened for outliers. These analyses showed that there were several variables that had univariate outliers. Multivariate outlier analysis was conducted using mahalanobis distance with seven degrees of freedom and a chi square critical value at .01 of 18.48. This analysis showed that there were 17 multivariate outliers, one of which was also one of the univariate outliers. The multivariate outliers were deleted for analysis; however, the univariate outliers were retained as distributions were not significantly skewed and maintaining sample size was a priority. Data cleaning resulted in 512 individuals and 119 couples for analysis. Means and standard deviation for variables (individuals) can be found in Table 2. It should be noted that given the sample size a significance value of .01 was chosen for the study to correct for Type 1 error.

The next step of data analysis was to examine potential effects of demographic variables on study outcome variables. There was a significant effect for gender where women showed higher levels of attachment anxiety compared to men ( $t(462) = -2.847, p < .01; M = 26.01 (SD = 4.402)$  and  $M = 24.83 (SD = 4.402)$ ), respectively. The remainder of the study variables did not show a significant gender difference.

Given the age distribution, the age variable was dichotomized into two categories (ages 18-30 and 31 and above). An independent samples t-test was conducted with age and the study variables and results showed that there was a significant difference between age groups. Younger individuals showed more attachment avoidance ( $t(453) = 2.650, p < .01; M = 22.72, SD = 4.127$ )

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and  $M = 21.59, SD = 5.011$ ), respectively)) more attachment ambivalence ( $t(453) = 6.123, p < .01; M = 3.50 (SD = .574)$  and  $M = 3.17 (SD = .555)$ , respectively)) less sexual satisfaction ( $t(453) = -3.636, p < .01; M = 3.65 (SD = .585)$  and  $M = 3.87 (SD = .677)$ , respectively)) less self esteem ( $t(453) = 3.505, p < .01; M = 24.13 (SD = 2.963)$  and  $M = 23.11 (SD = 3.182)$ , respectively)) and less body image concerns ( $t(453) = -4.474, p < .01; M = 78.97 (SD = 18.025)$  and  $M = 86.47 (SD = 16.951)$ , respectively)) compared to those over 31 years of age. Attachment anxiety was approaching a significant difference between age groups where younger individuals trended toward less attachment anxiety ( $t(453) = -2.372, p = .018; M = 24.93 (SD = 4.874)$  and  $M = 25.95 (SD = 3.949)$ , respectively)). Relationship satisfaction also was approaching a significant difference in terms of age where younger individuals trended toward less relationship satisfaction than those over 31 years of age ( $t(453) = -2.488, p = .013; M = 22.67 (SD = 3.325)$  and  $M = 23.51 (SD = 3.794)$ , respectively)).

Similar to age, the race/ethnicity variable needed to be recorded due to sample distribution, resulting in a comparison between those participants who identified as white/Caucasian and those who identified as a different race/ethnicity. Independent samples *t*-tests were conducted between these groups and results showed that there were no significant differences by race/ethnicity.

Given the education distribution, education level was broken down into 4 categories for analysis (some high school, high school, some college/trade/associate degree, or bachelor's degree or higher.) A one-way ANOVA was conducted with education level and the study variables. Results showed that there was a significant difference at the  $p < .01$  level between education level for anxiety ( $F(3, 461) = 9.639, p < .001$ ), avoidance ( $F(3, 461) = 7.588, p < .001$ ), relationship satisfaction ( $F(3, 461) = 6.100, p < .001$ ), and sexual satisfaction ( $F(3, 461)$



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= 6.126,  $p < .001$ .) Post-hoc analysis utilizing Tukey's HSD test for multiple comparisons found that the mean value for attachment anxiety was significantly different between the groups that had some high school and some college/associates/trade ( $p = .004$ , 95% C.I. = [-5.22, -.74]) and between high school and some college/associates/trade ( $p < .001$ , 95% C.I. = [-5.31, -1.46]). The mean value for attachment anxiety was approaching significance for associates degree and bachelor's degree or higher ( $p = .011$ , 95% C.I. = [.23, .253]). The mean value for attachment avoidance was significantly different between high school and bachelor's degree or higher ( $p < .001$ , 95% C.I. = [1.06, 4.91]), and was approaching significance between some high school and bachelor's degree or higher ( $p = .015$ , 95% C.I. = [.37, 4.85]). The rest of the education levels showed no significant difference in mean values for attachment avoidance. The mean value for relationship satisfaction was significantly different between high school and some college/associates/trade ( $p < .001$ , 95% C.I. = [-3.82, -.74]), and between high school and bachelors degree or higher ( $p = .01$ , 95% C.I. = [-3.34, -.32]). The rest of the education levels showed no significant difference in mean values for relationship satisfaction. Lastly the mean value for sexual satisfaction was significantly different between high school and some college/associates/trade ( $p < .001$ , 95% C.I. = [-.66, -.12]) and between high school and bachelors degree or higher ( $p = .004$ , 95% C.I. = [-.63, -.09]). The rest of the education levels showed no significant differences in mean values for sexual satisfaction.

For income, a Pearson correlation was conducted to see if income level was associated with education level, as well as the other study variables. Results showed that income and education level were positively associated with one another ( $r(463) = .442$ ,  $p < .001$ ). In addition, income was negatively correlated with attachment avoidance and self esteem ( $r(463) = -.152$ ,  $p$

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< .001,  $r(463) = -.128$ ,  $p < .001$ ), respectively.) Income was not significantly associated with any other variables.

Marital status was analyzed utilizing an independent t-test for differences between groups (married or not married) and the study variables. There was a significant difference for anxiety where married individuals showed more attachment anxiety, ( $t(439) = 6.027$ ,  $p < .01$ ;  $M = 25.98$  ( $SD = 4.460$ ) and  $M = 22.72$  ( $SD = 3.829$ ), respectively), more relationship satisfaction ( $t(439) = 4.200$ ,  $p < .01$ ;  $M = 23.36$  ( $SD = 3.577$ ) and  $M = 21.51$  ( $SD = 3.404$ ), respectively), more sexual satisfaction ( $t(439) = 4.759$ ,  $p < .01$ ;  $M = 3.80$  ( $SD = .626$ ) and  $M = 3.43$  ( $SD = .609$ ), respectively), and higher self esteem ( $t(439) = -2.660$ ,  $p < .01$ ;  $M = 23.60$  ( $SD = 3.056$ ) and  $M = 24.59$  ( $SD = 2.862$ ), respectively.) The remainder of the study variables did not show significant differences due to marital status.

Due to the distribution of the number of children, the number of children was dichotomized into categories (no children, or 1 or more children). An independent sample t-test was conducted with the number of children and the study variables. Results showed significant differences for all study variables where individuals without children showed less attachment anxiety ( $t(396) = -2.917$ ,  $p < .01$ ;  $M = 24.71$  ( $SD = 5.036$ ) and  $M = 26.05$  ( $SD = 3.707$ ), respectively) more attachment avoidance ( $t(396) = 3.709$ ,  $p < .01$ ;  $M = 22.95$  ( $SD = 4.044$ ) and  $M = 21.26$  ( $SD = 5.136$ ), respectively) more attachment ambivalence ( $t(396) = 5.611$ ,  $p < .01$ ;  $M = 3.52$  ( $SD = .574$ ) and  $M = 3.20$  ( $SD = .568$ ), respectively.) Individuals without children also showed less relationship satisfaction ( $t(396) = -3.981$ ,  $p < .01$ ;  $M = 22.44$  ( $SD = 3.364$ ) and  $M = 23.88$  ( $SD = 3.814$ ), respectively) less sexual satisfaction ( $t(396) = -5.024$ ,  $p < .01$ ;  $M = 3.62$  ( $SD = .542$ ) and  $M = 3.92$  ( $SD = .679$ ), respectively) less self esteem ( $t(396) = 5.717$ ,  $p < .01$ ;  $M =$

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= 24.49 (SD= 2.975) and M= 22.73 (SD = 3.117), respectively)) and less body image concerns (( $t(396) = -3.614, p < .01$ ; M = 79.15 (SD= 18.379) and M= 85.80 (SD = 17.833), respectively.))

To test the first study hypothesis, (the association between body image/self esteem and relationship variables) a Pearson correlation was conducted (see Table 2 for correlations). Results showed, as expected, a negative association between relationship satisfaction and body image, ( $r(463) = -.257, p < .001$ ), as well as a negative association between sexual satisfaction and body image, ( $r(463) = -.153, p < .001$ .) In addition, results showed a negative association between both relationship satisfaction and sexual satisfaction to self esteem, (( $r(463) = -.481, p < .001$ ), ( $r(463) = -.486, p < .001$ ), respectively.))

To test the second hypothesis (the association between attachment insecurity, as characterized by anxiety, avoidance, and ambivalence in relation to relationship variables, body image, and self esteem) a Pearson correlation was conducted (see Table 2 for correlations). Attachment anxiety, avoidance, and ambivalence were examined together. Results showed a positive association between attachment anxiety and attachment ambivalence ( $r(463) = .130, p < .01$ ). Attachment avoidance and attachment ambivalence showed a positive association ( $r(463) = .392, p < .001$ ). There were no significant associations between attachment anxiety and attachment avoidance.

Anxiety, relationship variables, body image, and self esteem were examined. Results showed a positive association between attachment anxiety and relationship satisfaction, ( $r(463) = .205, p < .001$ ). There was also a significant positive association between attachment anxiety and sexual satisfaction ( $r(463) = .183, p < .001$ ). A significant positive association between attachment anxiety and body image was observed ( $r(463) = .135, p = .004$ ), but no significant associations between attachment anxiety and self esteem.

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Findings for attachment avoidance with the above variables showed mixed results. There was a negative association between attachment avoidance and relationship satisfaction, ( $r(463) = -.624, p < .001$ ), as well as a negative association between attachment avoidance and sexual satisfaction ( $r(463) = -.531, p < .001$ ). Attachment avoidance had a positive association with self esteem, ( $r(463) = .606, p < .001$ ), and a positive association with body image, ( $r(463) = .277, p < .001$ ).

In terms of attachment ambivalence there were also mixed findings. Results showed a negative association between attachment ambivalence and relationship satisfaction, ( $r(463) = -.274, p < .001$ ), as well as a negative association between attachment ambivalence and sexual satisfaction ( $r(463) = -.238, p < .001$ ). There was a positive association between attachment ambivalence and self esteem, ( $r(463) = .376, p < .001$ ), and a positive association between attachment ambivalence and body image ( $r(463) = .124, p = .007$ ).

A linear regression model was used to test the third hypothesis (the combination of attachment variables, and relationship variables will predict body image.) All predictors were entered into the model simultaneously. The results of the regression can be seen in Table 3. Overall, the combination of variables accounted for a significant portion of the variance in body image, ( $F(6,458) = 9.957, p < .001, R^2 = .115$ ). The individual predictors were examined further and found that only attachment anxiety ( $\beta = .167, p < .001$ ) and relationship satisfaction ( $\beta = -.217, p < .001$ ) were significant predictors for body image. The results produced identical significant predictors so for ease of interpretation the findings for the first model will be presented (see Table 3). As can be seen the only significant predictors of body image were attachment anxiety, and relationship satisfaction. Examination of the partial correlations provides a measure of unique association between each predictor and the dependent variable and

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when squared presents the percentage of total variance accounted for by that predictor. As can be seen the partial correlation between attachment anxiety and body image was .162, accounting for 2.6% of variance in body image. The partial correlation between relationship satisfaction and body image was -.155, and accounted for 2.2% of the variance in body image.

For hypothesis four (examining correlations between couples on attachment and relationship variables) a Pearson correlation between partners was conducted. Significant correlations were found between partners on variables associated with attachment and relationship variables (see Table 4). Attachment anxiety, attachment ambivalence, and relationship satisfaction were found to be positively associated with one another between partners (( $r(236) = .212, p < .001$ ), ( $r(236) = .283, p < .001$ ), ( $r(236) = .187, p < .01$ ), respectively.) Attachment avoidance in one partner was negatively associated with relationship satisfaction in the other partner ( $r(236) = -.181, p < .01$ ). Attachment avoidance in one partner was approaching a statistically significant negative correlation with sexual satisfaction in the other partner ( $r(236) = -.155, p = .017$ ). Attachment ambivalence from one partner was negatively associated with both relationship and sexual satisfaction in the other partner (( $r(236) = -.223, p < .001$ ) ( $r(236) = -.237, p < .001$ ), respectively.)

For hypothesis five (examining the role of relationship variables and attachment from one partner to body image of the partner who had WLS) the potential statistical effects of non-independence of data the Actor Partner Interaction Model (Cook & Kenny, 2005) was utilized to examine the effects of an individual's variables and their partner's variables in predicting WLS outcomes. It should be noted that prior to the APIM analysis all predictor variables were grand mean centered and with one error variance component per couple. Three separate models were

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run to examine the role of attachment on body image, one for anxiety, attachment, and ambivalence.

These results show that there were significant effects for an individual's own attachment on their body image, when examining avoidance ( $F(151.923, 1) = 50.898, p < .001$ ; Estimate = 1.525,  $p < .001$ ) and ambivalence ( $F(154.350, 1) = 13.192, p > .001$ ; Estimate = -7.785,  $p < .001$ ) but no significant findings suggesting that the partner's attachment style affects the body image of the partner who had received WLS. It should be noted that there was a trend for a partner effect when taking both couple members' into account ( $F(154.826, 1) = 3.016, p = .084$ ). A similar approach was taken where two separate models were run, one for relationship satisfaction and one for sexual satisfaction. Similar to attachment, the only significant effects were for the individual and not their partner. This was the case for relationship satisfaction ( $F(154.971, 1) = 34.799, p < .001$ ; Estimate = -1.818,  $p < .001$ ) and sexual satisfaction ( $F(148.878, 1) = 20.083, p < .001$ ; Estimate = -8.044,  $p < .001$ ).

## **Chapter IV**

### **Discussion**

Obesity is a complex biopsychosocial disease whose prevalence rates are rising across the globe. WLS is an option that allows for individuals with obesity to regain control over their weight and diet however this surgery requires lifestyle changes and support. Given that spouses are often the main source of social support in an individual's life, it is important to examine relationship factors that may affect outcomes of WLS. Other studies have sought to understand the importance of spousal support in terms of behavioral modifications after WLS, but there is a paucity of research on examining the importance of relationship and attachment variables. In this study, data were collected from both individuals who received WLS, and their romantic partners in order to understand both individual level associations to various relationship dynamic and attachment variables as well as the reciprocal.

Demographic characteristics showed associations to some study variables. Albeit not the main study hypotheses, these results showed that gender was associated with more attachment anxiety, where women experienced more attachment anxiety than men. This is consistent with findings of the general population that suggest that women tend to experience more attachment anxiety than men.

Age was also associated with several of the study variables where younger individuals (less than 31 years of age) were associated with more attachment avoidance, attachment ambivalence, and lower self esteem. Younger age was also associated with less sexual satisfaction and less body image concerns. It could be that due to their developmental age,

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younger individuals experience more ambivalence and less sexual satisfaction within their relationships. Younger individuals may still be discovering what they do and do not desire out of a romantic relationship in terms of closeness and sexuality. Lower self esteem being associated with younger age could be due to younger individuals still being in the process of self discovery. Less body image concerns being associated with younger age could be explained by social standards of beauty being more inline with younger bodies, regardless of size. A study has shown similar results in regard to body image of older adults suggesting that ageism does play a role in older adults having more body image concerns (Bergman, 2022).

Education level showed significant differences for various study variables including attachment anxiety, attachment avoidance, relationship and sexual satisfaction. As income level increased, self esteem increased and attachment avoidance decreased. Income and education were also associated with one another. Given that education can lead to higher paying occupations, it makes sense that these two variables would be linked. Those with more financial security may be able to connect with their partner in more intimate ways than those who may struggle financially to meet basic needs. Indeed, a study found lower income couples showed greater fluctuations in marital satisfaction and more discordance between spouses in low-income couples (Jackson et al., 2017). Self esteem, however, was negatively associated with income level suggesting that individuals who make more money view themselves more positively. Being married was associated with greater attachment anxiety, more relationship and sexual satisfaction, and higher self esteem. Being married could perhaps contribute to greater satisfaction potentially through variables such as commitment. There is a strong research foundation in commitment and its role in relationship satisfaction (Amato, 2007). Higher self esteem being associated with marriage could be explained by feeling better about oneself



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because another person chose them for life. It could also be that those who are married have greater social support from their partner, thus increasing levels of self esteem. Attachment anxiety may then be associated with being married as attachment anxiety is associated with fears of abandonment. Once married, it could be that those who experience greater levels of attachment anxiety feel nervous regarding their partner leaving them and ending the marriage. This could be especially true following WLS, as new lifestyle changes occur.

Number of children produced significant differences across all study variables. Individuals without children had less attachment anxiety, more attachment avoidance, more attachment ambivalence, less relationship and sexual satisfaction, lower self esteem, and less body image concerns compared to those with one or more children. Having children produces a lot of other struggles associated with relationships. These findings make sense given that having children creates more time spent away from one's romantic partner while focusing on being a parent. This can explain the decreased levels of relationship and sexual satisfaction for those who have one or more children (Kowal, et al., 2021). In addition, this line of thought could also produce more attachment insecurity (avoidance and anxiety), as partners may be less likely to build connection or intimacy with their partner while having to work through the difficulties of parenting.

After having children, it may be difficult for parents to continue to make healthy food choices, and they may be more likely to eat what they serve their children, thus contributing to less body image satisfaction (Laroche et al., 2013). It could also be that for women who have had children, their bodies may be different than they were prior to having children, which could create feelings associated with poor body image. One or more children was associated with less

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self esteem, which could be explained by individuals being more unsure of themselves due to the demands of parenthood.

### **Hypothesis 1**

The results for hypothesis 1 show that as expected, relationship variables are important for outcomes of WLS in terms of self esteem and body image. A negative relationship between relationship satisfaction and body image was found suggesting that as relationship satisfaction increased, body image concerns decreased. It could be that when individuals feel satisfied with their romantic relationship, they feel more accepted in their bodies. This is also true for sexual satisfaction, as results have shown that individuals with greater sexual satisfaction within their relationship, have less body image concerns. Perhaps feeling as if their partner meets their needs sexually, they are more likely to feel confident with their bodies as a result. Conversely, having greater sexual satisfaction may contribute to feeling more comfortable with one's body. These findings are consistent with a study conducted by van den Brink et al., (2018) where relationship satisfaction and sexual satisfaction were found to be associated with a more positive body image.

Both relationship satisfaction and sexual satisfaction produced a negative association with self esteem. This suggests that as self esteem concerns increase, relationship and sexual satisfaction decreases. This is consistent with previous findings that suggest that when individuals feel seen and heard within the context of their romantic relationship, self esteem can increase as a result (Tackett, et al., 2013). If an individual views their relationship as unsatisfactory due to breakdown in communication and validation, they are more likely to have lower self esteem. Additionally, it has been found that individuals with lower self esteem may rate their relationship as unsatisfactory as it may be difficult for them to trust how their partner appraises them (Sciangula & Morry, 2009).

### **Hypothesis 2**

The results for hypothesis 2 show that the construct of attachment is important for understanding psychosocial outcomes following WLS for individuals in romantic relationships. Findings suggest that although attachment anxiety is associated with increased ambivalence about one's romantic relationship, increased relationship and sexual satisfaction, and an increase in body image concerns. Attachment anxiety, however, was found to have no significant association with self-esteem.

It seems that those who have higher levels of anxious attachment have more feelings of uncertainty surrounding closeness within their relationship as evidenced by the positive association with attachment ambivalence (Mikulincer et al., 2010). However, anxious attachment was associated with relationship and sexual satisfaction suggesting that even though they may be unsure about closeness in a relationship, they still view their relationship and sexual behavior with their partner to be satisfactory. A previous study has shown that individuals with higher levels of anxious attachment do have greater relationship satisfaction than those with avoidant attachment (Molero et al., 2017). Individuals with higher levels of anxious attachment may have more anxiety surrounding emotional intimacy with their partners, and this could be why ambivalence and attachment anxiety were associated with one another (Mikulincer et al., 2010). Individuals with higher levels of anxious attachment may be content with their relationships how they are, even if they are unsure about closeness. It could be that those with higher levels of anxious attachment fear abandonment if they allow themselves to open up emotionally with their partner (Leung et al., 2019).

Anxious attachment was also associated with more body image concerns, suggesting that perhaps those who are anxious within their relationships, are also hyper aware about their body

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image (Cash et al., 2004). In addition, given the questions on the measure for body image, it could be that anxious attached individuals had not met their own expectations regarding their body image following WLS. These findings are in line with research that suggests that individuals with higher anxious attachment have more difficulty with behavioral adherence following WLS (Aarts et al., 2015).

Attachment avoidance was found to be associated with higher ambivalence, with less relationship and sexual satisfaction, lower self esteem, and more body image concerns. It could be that those who have higher levels of avoidant attachment feel unsure about connecting with their partner on a deeper level, as evidenced by the positive association between avoidant attachment and ambivalence. These conflicting feelings about connection could then contribute to those with higher levels of avoidant attachment to withdraw more from their partners, as those with avoidant attachments are more likely to be uncomfortable with emotional material (Leung et al., 2019). For example, for those with WLS, it could be that those with higher avoidant tendencies could feel uncomfortable discussing the struggles they experience following the surgery (Pratt, et al. 2016). This withdrawing from their partner could then contribute to decreased levels of relationship and sexual satisfaction, as they are not receiving the emotional connection that they do desire on some level.

Avoidant attachment was also associated with lower self esteem, which is consistent with previous research suggesting that those who are more avoidant tend to experience decreased levels of emotional intelligence which then could be associated with lower self esteem (Doinita, 2015). Conversely, another study found that individuals with higher levels of avoidant attachment also are more likely to engage in emotional dampening, and self esteem tends to be a mediator for this process (Goodall, 2015). In other words, those with higher levels of avoidant

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attachment, and lower self esteem, tend to not express emotions as openly due to negative beliefs about themselves in conjunction with their attachment orientation.

Lastly, avoidant attachment was also associated with more body image concerns suggesting that these individuals may still be aware of struggles they experienced while obese. It could also be that given the nature of the questions for the body image measure, these individuals may have had more of a difficult time adopting a healthier lifestyle following WLS. Perhaps those with higher levels of avoidant attachment experience more difficulty when confronted with new challenges during their weight loss, and instead of being able to confront those challenges by seeking external guidance, they were more likely to be opposed to doing so (Leung et al., 2019).

Attachment ambivalence was found to be associated with less relationship satisfaction, less sexual satisfaction, lower self esteem, and more body image concerns. Those with higher levels of attachment ambivalence may have more difficulty creating a feeling of closeness with their partner, as they are frequently unsure about doing so. This could be a reason as to why attachment ambivalence was associated with less relationship and sexual satisfaction, as relationships tend to thrive when emotional and physical intimacy is a part of partner interactions. This is consistent with findings suggesting that in terms of dyadic ambivalence, where couples who have greater levels of ambivalence over emotional expression, have less relationship satisfaction overall (Ben-Ari & Lavee, 2011).

Similar to avoidant attachment, attachment ambivalence was associated with lower self esteem, and more body image concerns. It could also be that those with more attachment ambivalence also experience ambivalence when it comes to their beliefs regarding themselves. Those with more attachment ambivalence could still view themselves as obese following WLS,

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and therefore experience lower self esteem as a result. As previous research has not been conducted involving attachment ambivalence in a population of individuals who have received WLS, further research should be conducted in order to discern if this is a consistent finding.

### **Hypothesis 3**

Although all variables accounted for a significant amount of the variance for body image, surprisingly, relationship satisfaction and attachment anxiety were the only significant predictors for body image. These findings suggest that those with higher levels of relationship satisfaction actually view their body image more positively than those who have less relationship satisfaction. It could be that those in a satisfactory relationship view their bodies more positively because they receive more affirmation from their partner regarding how their body looks. It could also be, consistent with models of couples and health (Kiecolt-Glaser & Wilson, 2017; Robles, 2014) that satisfying intimate relationships can help to create change in terms of adopting new health behaviors. Those who rate their relationship as more satisfactory may have also experienced positive support from their partner during and after WLS, contributing to more weight loss and a better overall body image. Perhaps those who view their relationship more positively have grown together both during and after the WLS process, allowing them to create a more satisfying relationship dynamic (Ferriby et al., 2019; Kluever et al., 2014). This may be explained by the Dyadic Coping model as proposed by Bodenmann (2005) that suggests that those who are in satisfying romantic relationships view each other's stressors as their own stressor, which unites the couple further. This shared coping then contributes to more relationship satisfaction, as the couple tackles life's obstacles together (Bodenmann, 2005).

Higher attachment anxiety significantly predicting a poorer body image was expected, given that those with attachment anxiety often experience strong reactions to perceived

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abandonment. It could be that those who have anxious attachments may be hyper aware of their body, and then use this hyper awareness of flaws to make a case for why their partner may leave them. It could also be that those with poor body image, may then feel anxious about their partner leaving them due to how they see their own body. Overall, it appears that attachment anxiety is a better predictor for body image in terms of attachment other attachment dimensions (such as attachment avoidance, or attachment ambivalence.) This is conflicting with current research that has suggested that those who receive WLS tend to have greater attachment avoidance after the surgery, and more attachment anxiety before the surgery (Leung et al., 2019; Shakory et al., 2015; Taube-Schiff et al., 2015).

### **Hypothesis 4**

The results for hypothesis four suggest that some attachment and relationship variables between couples are positively associated with one another. It was found that attachment anxiety, attachment ambivalence, and relationship satisfaction were positively associated with one another between couple members. These findings suggest that within couples where one or both individuals have received WLS, both members report similar levels of attachment anxiety, attachment ambivalence, and relationship satisfaction. This is similar to prior research suggesting that couples tend to coregulate their attachment orientation to match the attachment orientation of the other partner (Hudson et al., 2014). The finding of relationship satisfaction being correlated between couple members could be explained by the Dyadic Coping model (Bodenmann, 2005). More specifically, in a population of couples where one or both partners received WLS, individuals in this study could feel closer to their partner following WLS due to the challenges they have overcome as a couple as a result of the surgery, thus uniting the couple further and increasing relationship satisfaction at the couple level (Bodenmann, 2005).

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Although not initially hypothesized, results also suggest that both attachment avoidance and attachment ambivalence from one partner was associated with less relationship satisfaction in the other partner. This finding was also found in terms of individual level data, suggesting that attachment avoidance and attachment ambivalence does negatively affect relationship satisfaction for both the individual, as well as their partner. This has been discussed in other studies in terms of attachment within couples. It has been hypothesized that the activation of attachment systems contributes to how couples deal with conflict, and more conflict within relationships erodes relationship satisfaction (Feeney & Fitzgerald, 2019). It could be that those who have higher levels of avoidant attachment avoid conflict all together creating distance between members and contributes to less relationship satisfaction. Conversely, those with ambivalent attachment could want to deal with conflict within their relationship but feel conflicting feelings about doing so. Addressing conflict following WLS is imperative, as couples must work together to overcome new challenges surrounding behavior modification. Additionally, attachment avoidance in one partner was approaching a significant negative association with sexual satisfaction for the other partner, and attachment ambivalence was found to be negatively associated with sexual satisfaction in the other partner. Similar results were found in a study examining attachment and sexual satisfaction, where avoidance in one partner was associated with decreased sexual satisfaction in the other partner (Butzer & Campbell, 2008).

### **Hypothesis 5**

It was hypothesized that partner relationship variables (sexual satisfaction and relationship satisfaction) would predict body image for the individual who had undergone WLS. Using a statistical approach that accounted for dyadic non-independence showed that there were



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not any significant partner effects on body image. Although these analyses could also be run with self esteem, these constructs were quite discriminant in other analyses and thus may not be as critical to WLS outcomes as hypothesized. Based on these analyses, this hypothesis is not supported as there were no significant associations between partner relationship variables and individual body image. Again, individual perception of relationship and sexual satisfaction appear to be more important for understanding body image in individuals who have received WLS.

### **Limitations**

This study was completed online, therefore there was no way to verify WLS status. Participants self-reported their eligibility for the study, as well as their answers to the survey questions. In addition, couples' information was obtained through emailing the initially participating partner, and asking them to send their partner the link to the survey. There was no way to guarantee that the partner was the one who completed the survey, as opposed to the partner who initially participated.

This study was cross sectional, and therefore was a look at individuals and their partners perceptions of their relationship, attachment orientation, self esteem, and body image during one instance in time and causal statements cannot be made.

This study did not collect any health or weight data. It may be useful in future studies to collect weight data (ie. starting weight, and current weight) to understand the complexities of body image and self esteem. Having weight data could aid in understanding if self esteem and body image are connected to one another. It could also help in identifying changes in relationship and sexual satisfaction following WLS. Questions regarding duration of the relationship were not asked, and may be useful to know in future studies. In addition, the self esteem measure utilized

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for this study was from 1965 and may no longer be a reliable measure for self esteem in the year 2022. It could also be that this self esteem measure may not be as useful for a population of individuals who received WLS.

### **Strengths**

This study did have a large sample size of 119 couples and 512 individuals (465 who had WLS). Many studies focused on outcomes following WLS and attachment only looked at individual level data, and very few, if any, looked at couple level data. Having data on both partners provided a richer understanding of the complexities associated with relationship variables, attachment, self esteem, and body image. Lastly, this study was the first study to examine attachment ambivalence within couples where one or both partners received WLS.

### **Clinical Implications/Future Research**

According to the results of this study WLS programs should focus on individual variables associated with attachment orientations. For example, providing Attachment-Based Therapy following WLS could help to alleviate some issues associated with body image. Although according to the results of this study, individual variables seem to be more important for outcomes, such as body image, after WLS, relationship-oriented therapy may be useful as well. Given that results indicated that relationship satisfaction may mediate the association between attachment ambivalence and attachment avoidance to body image, couples therapy may be a useful approach following WLS for those who are in a romantic relationship.

In terms of Attachment-Based Therapy, individuals could explore their attachment orientation and learn how these orientations shape their body image. Individuals could also benefit from understanding how attachment has played a role in coping strategies (ie. emotional or binge eating behaviors). Given that lower self esteem was found to be associated with both

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avoidant attachment and attachment ambivalence, addressing self esteem may be useful in clinical settings following WLS. Partners could play a role in this discovery and learn ways to address these issues should they arise after WLS, as well as how to provide support in terms of attachment needs. Individuals could also address their ambivalence toward their body image, and ambivalence within their relationships to conceptualize these conflicting feelings.

**List of Tables**

**Table 1**

*Demographics of Participants*

	Frequency	Percent
<b>Gender</b>		
Male	259	50.6
Female	252	49.2
<b>Age</b>		
18-30	292	57.0
31-45	209	40.8
46-60	11	2.1
<b>Race</b>		
White	392	76.6
Black	86	16.8
Latino	6	1.2
Asian	5	1.0
Native American	10	2.0
Hawaiian/Pacific	6	1.2
Middle Eastern	5	1.0
<b>Education</b>		
Some high school	30	5.9
High school diploma	43	8.4
Some college/Associates	198	38.7
Bachelor	155	30.3
Master	51	10.0
Doctorate	32	6.3
Trade	3	0.6
<b>Marital Status</b>		
Married	402	78.5
Not Married	82	16.0
<b>Number of Children</b>		
None	242	47.3
1	197	38.5
2-4	65	12.7
More than 4	4	0.8

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### Income

Less than 25k	7	1.4
26-50k	116	22.7
51-99k	177	34.6
100-200k	164	32.0
More than 200k	48	9.4

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Note: N = 512; Both individuals who have received WLS and their partners

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**Table 2**

*Descriptive Statistics and Correlations for Study Variables*

	Mean	SD	Anx	Avoidance	Ambiv	Rel Sat	Sex Sat	I-Obese	Self Est
Anx	25.40	4.52	-						
Avoid	22.23	4.56	.076	-					
Ambiv	3.37	.59	.130*	.392*	-				
Rel Sat	23.03	3.57	.205*	-.624*	-.274*	-			
Sex Sat	3.74	.63	.183*	-.531*	-.238*	.622*	-		
I-Obese	81.99	17.98	.135*	.277*	.124*	-.257*	-.153*	-	
Self Est	23.73	3.09	-.041	.606*	.376*	-.481*	-.486*	.202*	-

Note: N = 465 Abbreviations \* = <0.01

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**Table 3**

*Regression Results for I-Obese Measure as Dependent*

Variable	Partial	$\beta$	SEB	Beta	t	F	R <sup>2</sup>
Model						9.957**	.115
Anxiety	.162	.666	.190	.167	3.513**		
Avoidance	.085	.481	.264	.122	1.823		
Ambiv	-.016	-.504	1.511	-.016	-.334		
Rel Sat	-.155	-1.097	.326	-.217	-3.363**		
Sex Sat	.031	1.112	1.684	.040	.669		
Self Esteem	.045	.327	.399	.056	.967		

Note: N = 465, \*\* indicates  $p < .001$ .  $\beta$  represents unstandardized beta, SEB represents coefficient standard error, and Beta represents standardized coefficients beta.

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**Table 4**

*Correlations for Couple Level Data for Attachment and Relationship Variables*

<i>Partner 1</i>	Anx	Avoidance	Ambiv	Rel Sat	Sex Sat
<i>Partner 2</i>					
Anx	.212**	-	-	-	-
Avoid	-.066	.015	-	-	-
Ambiv	.065	.192*	.283**	-	-
Rel Sat	.005	-.181*	-.223**	.187*	-
Sex Sat	.001	-.155	-.237**	.112	.056

Note: N = 512 \*\* indicates  $p < .001$  \* indicates  $p < .01$



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**Table 5**

*Timeline for Partner Participation following Individual Participation*

Attempt 1 at Partner B Participation	1 week after Partner A Participation
Attempt 2 at Partner B Participation	3 weeks after Partner A Participation
Attempt 3 at Partner B Participation	6 weeks after Partner A Participation
Attempt 4 at Partner B Participation	8 weeks after Partner A Participation

**List of Appendices**

**Appendix A: Demographics**

1 What gender do you identify as?

- Male
- Female
- Non-binary / third gender

2 What is your age?

- 18-30
- 31-45
- 46-60
- 61+

3 Please specify your ethnicity/race

- White or Caucasian
- Black or African American
- Latino or Hispanic
- Asian
- Native American
- Native Hawaiian or Pacific Islander
- Middle Eastern or Arab American
- Two or more
- Other

4 What is the highest level of education you have completed?

- Some high school
- High school
- Some college or Associate's degree
- Bachelor's degree
- Master's degree

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Doctorate or higher

- Trade or Vocational school

5 Are you married?

- Yes
- No (2)

6 How many children do you have?

- None
- 1
- 2-4
- More than 4

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### Appendix B: Experiences in Close Relationships (ECR-RS)

1 It helps to turn to my romantic partner in times of need.

- Strongly Disagree
- Disagree
- Slightly Disagree
- Neutral
- Slightly Agree
- Agree
- Strongly Agree

2 I need a lot of reassurance that I am loved by my partner.

- Strongly Disagree
- Disagree
- Slightly Disagree
- Neutral
- Slightly Agree
- Agree
- Strongly Agree

3 I want to get close to my partner, but I keep pulling back.

- Strongly Disagree
- Disagree
- Slightly Disagree
- Neutral
- Slightly Agree
- Agree
- Strongly Agree

4 I find that my partner doesn't want to get as close as I would like.

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- Strongly Disagree
- Disagree
- Slightly Disagree
- Neutral
- Slightly Agree
- Agree
- Strongly Agree

5 I turn to my partner for many things, including comfort and reassurance.

- Strongly Disagree
- Disagree
- Slightly Disagree
- Neutral
- Slightly Agree
- Agree
- Strongly Agree

6 My desire to be very close sometimes scares people away.

- Strongly Disagree
- Disagree
- Slightly Disagree
- Neutral
- Slightly Agree
- Agree
- Strongly agree

7 I try to avoid getting too close to my partner.

- Strongly Disagree
- Disagree
- Slightly Disagree
- Neutral

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- Slightly Agree
- Agree
- Strongly Agree

8 I don't worry about being abandoned.

- Strongly Disagree
- Disagree
- Slightly Disagree
- Neutral
- Slightly Agree
- Agree
- Strongly Agree

9 I usually discuss my problems and concerns with my partner.

- Strongly Disagree
- Disagree
- Slightly Disagree
- Neutral
- Slightly Agree
- Agree
- Strongly Agree

10 I get frustrated if my romantic partner is not available when I need them.

- Strongly Disagree
- Disagree
- Slightly Disagree
- Neutral
- Slightly Agree
- Agree
- Strongly Agree

## THE WEIGHT OF CONNECTION

11 I am nervous when my partner gets too close to me.

- Strongly Disagree
- Disagree
- Slightly Disagree
- Neutral
- Slightly Agree
- Agree
- Strongly Agree

12 I worry that a romantic partner won't care about me as much as I care about them.

- Strongly Disagree
- Disagree
- Slightly Disagree
- Neutral
- Slightly Agree
- Agree
- Strongly Agree

## THE WEIGHT OF CONNECTION

### **Appendix C: Inventory of Interpersonal Ambivalence Short Form (IIA)**

1 I want to talk about my feelings with others, but I find that I keep my feelings bottled up inside.

- False, Not True
- Slightly true
- Mainly true
- Very true

2 I'd like to form connections with others, but I find myself withdrawing before a connection is made.

- False, Not True
- Slightly true
- Mainly true
- Very true

3 I want to depend on others, but I don't because I fear others will let me down if I rely on them.

- False, Not True
- Slightly true
- Mainly true
- Very true

4 I have very mixed feelings about connecting with others.

- False, Not True
- Slightly true
- Mainly true
- Very true

5 I want to have close relationships; at the same time, the idea of letting others into my life is very scary.

- False, Not True
- Slightly true
- Mainly true
- Very true



## THE WEIGHT OF CONNECTION

6 I'd like closeness with others, but something holds me back from putting myself out there.

- False, Not True
- Slightly true
- Mainly true
- Very true

7 I believe I need others, but I avoid close relationships because I think people will ultimately let me down.

- False, Not True
- Slightly true
- Mainly true
- Very true

8 I've generally kept others at a distance despite knowing I want close relationships.

- False, Not True
- Slightly true
- Mainly true
- Very true

9 I have a lot of strong positive and strong negative feelings about close relationships.

- False, Not True
- Slightly true
- Mainly true
- Very true

## THE WEIGHT OF CONNECTION

### Appendix D: Relationship Assessment Scale

1 How well does your partner meet your needs?

- Poorly
- Slightly Poor
- Average
- Slightly Well
- Extremely Well

2 In general, how satisfied are you with your relationship?

- Unsatisfied
- Somewhat Unsatisfied
- Average
- Somewhat Satisfied
- Extremely Satisfied

3 How good is your relationship compared to most?

- Poor
- Somewhat Poor
- Average
- Good
- Excellent

4 How often do you wish you hadn't gotten in this relationship?

- Never
- Sometimes
- Average
- Most of the time
- Very often

5 To what extent has your relationship met your original expectations?

- Hardly at all

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- Not very much
- Average
- Mostly
- Completely

6 How much do you love your partner?

- Not much
- Somewhat
- Average
- Quite a bit
- Completely

7 How many problems are there in your relationship?

- Very Few
- Few
- Average
- Many
- Very Many

## THE WEIGHT OF CONNECTION

### Appendix E: Sexual Satisfaction Scale (SSS)

1 My partner and I have a fulfilling sexual relationship.

- Strongly Disagree
- Disagree
- Somewhat Disagree
- Somewhat Agree
- Agree
- Strongly Agree

2 I find the sexual contact I have with my partner to be satisfying.

- Strongly Disagree
- Disagree
- Somewhat Disagree
- Somewhat Agree
- Agree
- Strongly Agree

3 My partner always makes sure that I achieve orgasm.

- Strongly Disagree
- Disagree
- Somewhat Disagree
- Somewhat Agree
- Agree
- Strongly Agree

4 I am content with the sexual aspect of our relationship.

- Strongly Disagree
- Disagree
- Somewhat Disagree
- Somewhat Agree

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- Agree
- Strongly Agree

5 There are parts of our sexual relationship that need improvement.

- Strongly Disagree
- Disagree
- Somewhat Disagree
- Somewhat Agree
- Agree
- Strongly Agree

6 I am generally dissatisfied with our sexual relationship.

- Strongly Disagree
- Disagree
- Somewhat Disagree
- Somewhat Agree
- Agree
- Strongly Agree

## THE WEIGHT OF CONNECTION

### Appendix F: Rosenberg Self Esteem Scale (RSE)

1 On the whole, I am satisfied with myself.

- Strongly Agree
- Agree
- Disagree
- Strongly Disagree

2 At times I think I am no good at all.

- Strongly Agree
- Agree
- Disagree
- Strongly Disagree

3 I feel that I have a number of good qualities.

- Strongly Agree
- Agree
- Disagree
- Strongly Disagree

4 I am able to do things as well as most other people.

- Strongly Agree
- Agree
- Disagree
- Strongly Disagree

5 I feel I do not have much to be proud of.

- Strongly Agree
- Agree
- Disagree
- Strongly Disagree

## THE WEIGHT OF CONNECTION

6 I certainly feel useless at times.

- Strongly Agree
- Agree
- Disagree
- Strongly Disagree

7 I feel that I'm a person of worth.

- Strongly Agree
- Agree
- Disagree
- Strongly Disagree

8 I wish I could have more respect for myself.

- Strongly Agree
- Agree
- Disagree
- Strongly Disagree

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

- Strongly Agree
- Agree
- Disagree
- Strongly Disagree

10 I take a positive attitude toward myself.

- Strongly Agree
- Agree
- Disagree
- Strongly Disagree

**Appendix G: Weight Loss Surgery Identifier Question**

Have you received weight loss surgery within the past 2 years?

- Yes
- No



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### Appendix H: Evolving Self View After Bariatric Surgery (ESV)

1 Today, I think about myself as if I were still the weight I was before surgery.

- Strongly Disagree
- Disagree
- Somewhat Disagree
- Somewhat Agree
- Agree
- Strongly Agree

2 I have difficulty recognizing myself in a mirror or reflection in a window.

- Strongly Disagree
- Disagree
- Somewhat Disagree
- Somewhat Agree
- Agree
- Strongly Agree

3 I have difficulty recognizing my lighter weight self in photographs or videos.

- Strongly Disagree
- Disagree
- Somewhat Disagree
- Somewhat Agree
- Agree
- Strongly Agree

4 Who I am on the outside, is not the same as who I am on the inside.

- Strongly Disagree
- Disagree
- Somewhat Disagree

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- Somewhat Agree
- Agree
- Strongly Agree

5 I feel sad about losing my previous, fatter self.

- Strongly Disagree
- Disagree
- Somewhat Disagree
- Somewhat Agree
- Agree
- Strongly Agree

6 When I look at myself in a mirror, the person I see is not really who I am

- Strongly Disagree
- Disagree
- Somewhat Disagree
- Somewhat Agree
- Agree
- Strongly Agree

7 My thinner self battles with my fatter self.

- Strongly Disagree
- Disagree
- Somewhat Disagree
- Somewhat Agree
- Agree
- Strongly Agree

8 My body is the center of my attention even though I have lost weight.

- Strongly Disagree
- Disagree
- Somewhat Disagree

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- Somewhat Agree
- Agree
- Strongly Agree

9 Today, I behave as if I were the same weight that I was before surgery.

- Strongly Disagree
- Disagree
- Somewhat Disagree
- Somewhat Agree
- Agree
- Strongly Agree

10 It is hard to get used to shopping for clothes for my new lower weight.

- Strongly Disagree
- Disagree
- Somewhat Disagree
- Somewhat Agree
- Agree
- Strongly Agree

11 I still turn sideways to pass through doors, turnstiles, or crowded areas as if I were my fatter self.

- Strongly Disagree
- Disagree
- Somewhat Disagree
- Somewhat Agree
- Agree
- Strongly Agree

12 I prefer to eat alone where no one can see me.

- Strongly Disagree
- Disagree

## THE WEIGHT OF CONNECTION

- Somewhat Disagree
- Somewhat Agree
- Agree
- Strongly Agree

13 I don't like to try new activities for health and recreation even though I am thinner.

- Strongly Disagree
- Disagree
- Somewhat Disagree
- Somewhat Agree
- Agree
- Strongly Agree

14 My thinner body fits into the world like my fatter body used to.

- Strongly Disagree
- Disagree
- Somewhat Disagree
- Somewhat Agree
- Agree
- Strongly Agree

15 In my mind, I can still 'feel' my fatter self when I move.

- Strongly Disagree
- Disagree
- Somewhat Disagree
- Somewhat Agree
- Agree
- Strongly Agree

16 I have difficulty acting like a thinner person acts.

- Strongly Disagree
- Disagree

## THE WEIGHT OF CONNECTION

- Somewhat Disagree
- Somewhat Agree
- Agree
- Strongly Agree

17 Today, I relate to others as if I were the same weight that I was before surgery.

- Strongly Disagree
- Disagree
- Somewhat Disagree
- Somewhat Agree
- Agree
- Strongly Agree

18 People compliment me on my appearance but I have trouble believing them.

- Strongly Disagree
- Disagree
- Somewhat Disagree
- Somewhat Agree
- Agree
- Strongly Agree

19 Losing weight has not made it easier to interact with others.

- Strongly Disagree
- Disagree
- Somewhat Disagree
- Somewhat Agree
- Agree
- Strongly Agree

20 Conversations about weight make me uncomfortable.

- Strongly Disagree
- Disagree

## THE WEIGHT OF CONNECTION

- Somewhat Disagree
- Somewhat Agree
- Agree
- Strongly Agree

21 When I get to know people, I feel that I need to share my weight loss story.

- Strongly Disagree
- Disagree
- Somewhat Disagree
- Somewhat Agree
- Agree
- Strongly Agree

22 I prefer to be with new friends, rather than old friends who knew me before my weight loss.

- Strongly Disagree
- Disagree
- Somewhat Disagree
- Somewhat Agree
- Agree
- Strongly Agree

23 I feel less powerful in my thinner body.

- Strongly Disagree
- Disagree
- Somewhat Disagree
- Somewhat Agree
- Agree
- Strongly Agree

24 People still think of me as being a fat person.

- Strongly Disagree

## THE WEIGHT OF CONNECTION

- Disagree
- Somewhat Disagree
- Somewhat Agree
- Agree
- Strongly Agree

25 Being a thinner person is harder than I thought it would be.

- Strongly Disagree
- Disagree
- Somewhat Disagree
- Somewhat Agree
- Agree
- Strongly Agree

**Appendix I: Couple Unique Code and Email Address**

Please provide the MONTH and DATE of the OLDEST partner's birthdate, followed by the MONTH and DATE of the YOUNGEST partner's birthdate. No slashes or dashes.

*For example, if the oldest partner's birthdate is 6/17/1969 and the youngest partner's birthdate is 11/28/1969 their unique code would be 06171128. This will be used to link your partner's data to your data.*

---

Please provide your email address. This will be used to issue payment should you win the raffle. This will also be used to send a survey to you to forward to your partner for completion.

---



## Appendix J: Consent Form

### 1 THE WEIGHT OF CONNECTION

**Principal Investigator:** Rachel M. Routin, BA University of Michigan- Dearborn

**Faculty Advisor:** Michelle Leonard, PhD LP University of Michigan- Dearborn

**Purpose of the Research and Procedures:** You are invited to participate in a research study about weight loss surgery (WLS) outcomes such as weight loss and body image satisfaction. In addition, this study seeks to examine romantic relationship satisfaction for those who have undergone WLS. This study looks to examine the effects of weight loss surgery and behavioral modification as it relates to couples romantic relationships. This study also looks to examine a possible relationship between attachment style, relationship satisfaction, and weight loss. This survey will take approximately 20 minutes to complete. If you agree to be part of the research study, you will be asked to complete a survey asking questions about demographics, relationship satisfaction, sexual satisfaction, body image, attachment style, and self esteem. Both you and your partner should participate in order to be considered for full study participation, and entry into a raffle for a \$50 Amazon gift card. However, if only one partner participates your data will still be used, and you will be unable to participate in the raffle.

#### **Benefits of Participation**

We anticipate that some benefits of the research may include information to help guide further research, as well as treatment for individuals in romantic relationships who have received weight loss surgery (WLS). There are perhaps some issues that come up specifically for those who are in a romantic relationship and receive WLS and this study seeks to identify these issues.

#### **Risks and discomforts:**

A potential risk of participation includes experiencing an emotional reaction to the questions, which may make you feel uncomfortable. Although this may be unlikely, we have included a list of support resources at the end of this survey.

#### **Compensation**

Completion of this study by both partners allows eligibility for entry into a raffle for a \$50 Amazon gift card. Participating in this study is completely voluntary. Even if you decide to participate now, you may change your mind and stop at any time. You may choose not to answer any question, or discontinue with the survey for any reason. We will protect the confidentiality of your research records by ensuring that all data is held in an encrypted personal laptop. Only the PI of this study along with the faculty advisor will have access to this data. Information collected in this project may be shared with other researchers, but we will not share any information that could identify you.

**If you have questions about this research study, please contact Rachel M. Routin [weightofconnection@gmail.com](mailto:weightofconnection@gmail.com) or Michelle Leonard, Faculty Advisor at [mtleon@umich.edu](mailto:mtleon@umich.edu).** The Health Sciences and Behavioral Sciences Institutional Review Board

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(IRB) at the University of Michigan has determined that this research poses no more than minimal risk and is exempt from ongoing IRB oversight. Research Application Number: HUM00205633

I consent to participate

- I consent
- I do not consent

**Appendix K: Debriefing**



Without individuals like yourself, advances in health care may not be made.

Thank you for your interest or participation in the Weight of Connection research study. We hope that by exploring how couples are managing their relationships after weight loss surgery, we can best strengthen relationships and keep both individuals and couples healthy and happy.

This sheet is provided as a reminder that should your participation in this project lead to a desire to seek additional services, you may contact any of the agencies listed below.

Psychological Services

US National Suicide Prevention Lifeline

Call 1-800-273-TALK (8255); En Español 1-888-628-9454

Crisis Text Line: Text "HELLO" to 741741

Canada Suicide Prevention 1-833-456-4566



Canadian crisis Text: Text message to 45645

Substance Use Services

SAMHSA National Helpline

Confidential free help, from public health agencies, to find substance use treatment and information. 1-800-662-4357

Appendix L: Study Flier



Have you, your partner, or both of you had Weight Loss Surgery (WLS)?

How has this life change impacted your relationship?

How has WLS impacted your health goals?

## The Weight of Connection Study

We want to hear from you! Researchers are seeking to understand how romantic relationship dynamics can influence weight loss goals after Weight Loss Surgery (WLS).

**Inclusion Criteria:**

- 1) Must be 18+
- 2) Must speak English
- 3) Must have had Weight Loss Surgery (WLS) within the past 2 years.
- 4) Must be in a cohabitating romantic relationship of at least 2 years.

Please contact Rachel Routin at [weightofconnection@gmail.com](mailto:weightofconnection@gmail.com) to participate!

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