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Emotion Regulation and Eating: An Evaluation of the Relationship Between Difficulties in
Emotion Regulation and Eating Patterns in Obese Patients Seeking Bariatric Surgery

A dissertation

presented to

the faculty of the Department of Psychology

East Tennessee State University

In partial fulfillment

of the requirements for the degree

Doctor of Philosophy in Psychology, concentration in Clinical Psychology

by

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August 2017

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Keywords: bariatric surgery, emotion regulation, problematic eating, emotional eating

ABSTRACT

Emotion Regulation and Eating: An Evaluation of the Relationship Between Difficulties in Emotion Regulation and Eating Patterns in Obese Patients Seeking Bariatric Surgery

by

Brittany Victoria Williams

Obesity is a major health epidemic, impacting many people worldwide. Bariatric surgery is a common treatment for severe obesity and generally leads to improved overall health, remission of comorbid disease, and improved quality of life. Despite positive postsurgical results, many patients regain some to most of their weight following the procedure. Guidelines for presurgical psychological assessments have been developed to assist healthcare professionals in predicting outcomes for patients. Previous studies have focused on the impact of psychological illness on surgical outcomes, with mixed results. The current study aimed to assess the influence that difficulties in emotion regulation has on eating patterns in bariatric surgery patients. A total of 144 patients seeking bariatric surgery were included in the study. Results indicated no difference in severity of eating patterns among restricted, emotional, and external eating; though difficulties in emotion regulation was only significantly related to emotional ($r = .427, p < .001$) and external ($r = .275, p < .001$) eating patterns. Regression analyses indicated significant models for the impact of difficulties in emotion regulation on emotional ($R^2 = .254, F(5, 135) = 9.180, p < .001$) and external ($R^2 = .094, F(5, 135) = 2.811, p = .019$) eating. Specific predictors of emotional eating were discussed. Outcomes of this study highlight the importance of considering difficulties in emotion regulation in bariatric surgery patients due to the impact emotional dysregulation may have on eating patterns.

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CHAPTER 1

INTRODUCTION

Each year in the United States, one in five deaths is attributable to obesity-related problems (Masters et al., 2013). Obesity is defined as the accumulation of excess body fat that adversely impacts one's overall health and wellbeing, commonly measured by body mass index (BMI), which is calculated using measurements of height and weight (World Health Organization, 2015). Generally, those with a BMI of 30 or greater are considered obese and those with a BMI of 40 or more are considered morbidly obese. Rates of obesity have risen and continue to rise, suggesting that the obesity epidemic is an ongoing problem and prompting several studies concerning prevention and treatment of obesity (Ogden et al., 2006). A recent national study of obesity rates in the United States found that 35.1% of people are obese and 6.4% are morbidly obese (Fryar, Carroll, & Ogden, 2014). Morbid obesity, characterized by having a body mass index (BMI) of 40 or greater, has received greater attention over the last few decades given the increased risk of developing other health related problems and mortality. Obesity is considered one of the most preventable health problems in the country, specifically due to the reciprocal relationship between obesity and comorbid medical conditions. Many health care professionals and researchers have attempted to better understand the development and maintenance of obesity in light of these relationships. Weight loss surgery, also called bariatric and metabolic surgery, has become increasingly common as a solution for morbid obesity as well as remission of diabetes and other obesity related-health concerns. Despite an increase in the number of bariatric surgeries performed annually, patients who choose surgery as a treatment for their obesity can face several postoperative physical complications and may even regain much of their weight.

This dissertation will explore the literature on emotion and the development and maintenance of obesity, particularly in the context of deficits in self-regulation of emotion and reported eating in response to external and emotional cues. Theoretical understandings of the development and maintenance of obesity will be discussed, followed by a review of current recommendations for weight loss and management in overweight and obese individuals. A discussion of bariatric surgery as a treatment for morbid obesity, complications that arise from surgery, and current recommendations for individuals undergoing surgery will follow. A review of the literature concerning emotionality and bariatric surgery suggests a limited understanding of the role that emotion may play in the development and maintenance of morbid obesity and its impact on bariatric surgery outcomes. The relationship between emotion regulation difficulty and weight regain following surgery will also be considered in light of the research concerning emotion and bariatric surgery.

Following a review of the literature, measures of emotion regulation and problematic eating behaviors found in bariatric surgery candidates will be described. Statistical analyses will examine hypothesized connections between these constructs. A discussion of the findings and suggestions for future research will follow.

The Development and Maintenance of Obesity

Obesity is a multifaceted issue, with diverse theories proposed describing its development and maintenance. At its most basic level, obesity results from overconsumption of energy and reduced expenditure of energy; however, why humans over-consume and experience reduced energy expenditure is related to several biological, social, and emotional factors. For example, a person's genetic makeup has a significant impact on the body's response to food and retention of excess fat (O'Rourke, 2015). Many studies have focused specifically on hormone deficiencies

related to obesity – particularly leptin, a hormone that signals to the brain when the body is satiated, and ghrelin, a hormone that signals when the body is hungry. These hormones, along with one’s metabolism, work within the body’s homeostatic energy circuit to maintain a healthy weight (Jéquier & Tappy, 1999; Stice, Figlewicz, Godness, Levine, & Pratt, 2013). Resistance to leptin can lead to an inability to detect fullness and thus overeating for some individuals (Pan, Guo, & Su, 2014), and history of dieting can change the natural relationships within this circuitry, altering the brain and body’s response to food (Jéquier & Tappy, 1999; Stice et al, 2013). Other biological underpinnings suggest that chronic high caloric intake alone leads to excess fat storage as well as increased size and number of adipose cells. This increase may also contribute to problems with weight loss and ultimately maintain obesity (Spiegelman & Flier, 2001).

Along with biological underpinnings, the obesity epidemic may be explained by Social Cognitive Theory, which suggests that one’s behavior is influenced by thoughts, emotions, and observations of others’ behaviors (Bandura, 1986). Sociocultural expectations of food consumption and media have a particularly powerful impact on the development and maintenance of obesity (Bowen & Grunberg, 1987; Mastin, Campo, & Askelson, 2008). Cultural norms strongly influence eating behavior, as society prescribes when to eat (e.g., three meals a day) and how much to eat (e.g., acceptable to overeat during Thanksgiving), and often encourages sedentary behavior (e.g., screen entertainment, jobs that require long hours of sitting) linked with overeating. Similarly, advertisements for unhealthy foods largely outnumber those for healthier food choices and sway personal food choices and motivation for eating (Forman & Butryn, 2015). Herman, Roth, and Polivy (2003) identified three ways in which individuals eat in social environments, through: 1) social facilitation, 2) impression management, and 3)

conformity or modeling. Social facilitation of eating refers to the fact that people tend to eat more in the presence of others than they would alone (Hetherington, Anderson, Norton, & Newson, 2006). In contrast, impression management refers to how individuals trying to make a positive impression in social environments will often eat less than others (Young, Mizzau, Mai, Sirisegaram, & Wilson, 2009). And lastly, research has demonstrated that people eat more or less depending on how much those around them are eating, either conforming to or modeling for others (Robinson, Thomas, Aveyard, & Higgs, 2014). Thus, it is clear that eating has a strong social component and seems to contribute to overeating that may lead to obesity.

Eating in Response to Emotion

Emotional eating, or eating in response to emotional cues, has also been widely studied as a hypothesized contributor to obesity (Byrne, 2002; Faith, Allison, & Geliebter, 1997; Ganley, 1989). Relevant literature indicates that people may consume food in response to negative affect rather than physiological hunger cues (Macht & Simons, 2011). Negative emotions, such as depression, anxiety, anger, loneliness, and boredom, are most often associated with emotional eating (Crockett, Myhre, & Rokke, 2015; Ganley, 1989; Nguyen-Rodriguez, Unger, & Spruijt-Metz, 2009; Schneider, Appelhans, Whited, Oleski, & Pagoto, 2010), though some studies propose that individuals may also eat in response to positive emotions, particularly in the presence of other social cues (e.g., during a celebration or community gathering; Polivy & Pliner, 2015). Several psychological disorders involve negative emotional experiences (e.g., depression, anxiety, borderline personality disorder), though how these emotions impact one's relationship with food can vary significantly among individuals with these disorders (Adam, & Epel, 2007; American Psychiatric Association, 2013). For example, patients with depression often experience changes in appetite that may lead to either substantial weight loss or gain. In contrast,

individuals diagnosed with borderline personality disorder (BPD), often co-morbid with bulimia and binge eating, may eat more impulsively, leading to weight gain or fluctuations in weight. Treatments for those with BPD who eat impulsively focus specifically on the self-regulating function of eating and aim to teach alternative methods to regulate emotional states (Dialectical Behavior Therapy for Eating Disorders [DBT-ED]; Lenz, Taylor, Fleming, & Serman, 2014; Safer, Telch, & Chen, 2009). Thus, for both depression and BPD, food may be used to soothe an emotional need, but having either diagnosis does not presume problematic eating behavior or specifically denote the type of problematic eating exhibited. Overall, the relationship between obesity and mental illness has been well researched and indicates higher rates of psychological disorders in persons with obesity compared to healthy weight individuals, and a key diagnostic feature of many of these disorders involves deficits in the regulation of emotional experiences (Miller & de Zwaan, 2014; Reed, 2015).

So why is it important to consider eating in response to negative emotions and emotional instability in the context of obesity? Theories of self-regulation more broadly propose that deficits in the self-regulatory system can lead to significant problems in everyday functioning. Self-regulation is a natural process through which one exercises control over the self to reach a goal or need (Vohs & Baumeister, 2011). However, development of normal self-regulatory abilities can be thwarted by environmental (e.g., history of abuse) and personal (e.g., motivation) factors, leading to problems in everyday functioning. Emotion regulation refers specifically to personal attempts to adjust emotional experiences to reach emotional homeostasis (Koole, Van Dillen, & Sheppes, 2011). The body's natural attempts to regulate emotions can similarly be thwarted by environmental (e.g., social norms for displaying emotion) and personal (e.g., avoidance of emotion) factors. Research proposes that eating can become a function of emotional

regulation, eating to “feel better” or reach homeostasis, rather than to address a physiological need, particularly in the case of obesity (Herman & Polivy, 2011). Eating in response to an emotional need can be both adaptive (e.g., eating a piece of chocolate when upset) and maladaptive (e.g., eating two dozen donuts impulsively in reaction to strong emotional experiences). Thus, research considering the relationships among negative emotions, emotional instability, regulation of emotion, and eating behavior in the context of obesity seems to be of particular importance to further understand the development and maintenance of this problem.

Eating is generally a highly-regulated behavior that is necessary for daily survival. Most simply, individuals eat in response to hunger cues. However, individuals are also capable of overriding this process by consciously disrupting physiologically-driven patterns of food consumption (Herman & Polivy, 2011). For example, when dieting, though an individual notices an internal hunger cue, he or she may not respond to that cue based on a pre-determined number of target calories to facilitate weight loss. Emotional eating can also thwart the biologically-regulated process of eating, as eating in response to emotional cues is not dependent on hunger but oftentimes occurs despite satiation (Herman & Polivy, 2011). Specifically, an individual’s inability to regulate emotional states impacts other self-regulatory systems and his or her relationship with food. Eating in response to negative affect may also be reinforced through the consumption of foods that are sweet or high in fat, reducing cortisol levels and resulting in a decrease in perceived stress (Konttinen, Mannisto, Sarlio-Lahteenkorva, Silventoinen, & Haukkata, 2010). Eating when experiencing stress or other negative emotions is also a socially encouraged behavior, as oftentimes friends or family may offer food to “comfort” their loved ones (e.g., foods high in fat and sugar are often served at funerals). In southern culture, food is even referred to as “comfort food,” further reinforcing the powerful and anticipated impact that

food can have on one's emotional state. From a self-regulation standpoint, these foods help a person regulate uncomfortable or distressing emotional states, and the return to homeostasis may serve an adaptive, albeit temporary, function. However, using food to regulate emotional states can also become maladaptive, particularly if eating is an individual's only method for dealing with adverse emotional experiences, or if it precipitates health problems (Spoor, Bekker, Van Strien, & van Heck, 2007).

Emotional eating is extremely common within the context of obesity. A literature review conducted by Ganley (1989) concluded that in all studies of morbid obesity, 60-90% of participants reported eating in response to negative emotions such as anger, sadness, and boredom. Ganley's review also indicated that the majority of participants reported episodic overconsumption, particularly in the presence of negative emotional arousal. One early study examined four different emotional eating patterns: 1) eating in response to nonspecific emotional tension, 2) eating with the belief that food would help compensate for intolerable life situations, 3) eating to ward off symptoms of an underlying emotional disorder, and 4) eating due to an addiction or craving for food (Hamburger, 1957). Another eating pattern identified in the literature is that of binge eating, or lack of control over eating and significant overconsumption of calories in a short period of time (American Psychiatric Association, 2013). This pattern is also common in obese individuals, and research has demonstrated a clear link between binge eating and emotionality (Loro & Orleans, 1981; Marcus, Wing, & Lamparski, 1985). These patterns of eating in obese individuals are still researched in the context of emotional instability, impulsivity, alexithymia, and food addiction.

Neuroticism, often referred to in the clinical literature as emotional instability, is a common personality characteristic found in obese patients (Ellickson-Larew, Naragon-Gainey, &

Watson, 2013). Researchers have speculated that emotional instability may lead to maladaptive eating patterns that contribute to significant weight gain in some individuals (Cassin & von Ranson, 2005). Similarly, studies examining impulsivity in the context of obesity also suggest a relationship between emotion and behavior. Impulsivity, or acting in response to emotion or impulse rather than deliberate thought, is most commonly linked with binge eating behaviors in obesity (Iacovino, Powers, & Oltmanns, 2014). Binge eating is a problematic eating behavior with significant implications for weight and overall health. In contrast to behaving in response to salient emotional experiences, an inability to recognize or label emotions (i.e., alexithymia) is also common in obese individuals and has been shown to contribute to problematic eating behavior (Larsen, van Strien, Eisinga, & Engels, 2006).

Over the past decade, several studies have suggested that individuals may be chemically addicted to food, similar to those who are addicted to drugs or alcohol, and that food addiction could be a significant contributor to the development and maintenance of obesity. These studies suggest that cravings for food are represented similarly in the brain to cravings for illicit substances, particularly among obese individuals (Gearhardt et al., 2011). Researchers suggest that food addiction is more common in individuals than might be expected. Approximately 20% of people in the United States could be diagnosed with food addiction as measured through the Food Addiction Scale, and that this percentage is higher in individuals who are overweight or obese (Pursey, Stanwell, Gearhardt, Collins, & Burrows, 2014).

Emotional instability, impulsivity, and alexithymia are all associated with deficits in emotion regulation (Gratz & Roemer, 2004). Research evaluating the relationship between emotion regulation deficits and obesity posits that obesity is maintained by a perpetual avoidance of negative emotional experiences. This avoidance is often complicated by a lack of strategies to

appropriately regulate emotions (Zeeck, Stelzer, Linster, Joos, & Hartmann, 2011). Avoidance of emotions and lack of strategies to help regulate emotional experiences found in persons with obesity is similar to patterns found in individuals with diagnosable eating disorders (Gianini, White, & Masheb, 2013). Heatherton and Baumeister (1991) suggest that one's need to avoid strong emotional experiences results in behavioral disinhibition or difficulty with emotion regulation, which ultimately leads to maladaptive ways of coping, such as overeating. Research suggests that learning adaptive emotion regulation strategies may help decrease emotional eating in many individuals who are obese (Glisenti & Strodl, 2012; Pidgeon, Lacota, & Champion, 2012).

Treatments for Obesity

In response to what is now referred to as the obesity epidemic, a range of options have been proposed for weight loss with the hope of decreasing deaths associated with obesity and its comorbid health problems. These methods include dietary changes, behavior modification, exercise, medication, and surgery (National Institutes of Health, 2012). In 2014, the American Heart Association, the American College of Cardiology, and the Obesity Society updated and streamlined treatment recommendations for overweight and obese individuals to help primary care physicians (PCPs) address these issues with their patients (Jensen et al., 2014). They jointly created an algorithm proposing that for overweight and obese individuals with a BMI between 25 and 39, PCPs should recommend dietary changes individualized to the client's needs as part of a comprehensive weight loss program that includes education about physiological energy expenditure, physical exercise programs, and potential medications to aid in weight loss. For those with a BMI of 40 or greater, or 35 or greater with a comorbid medical condition (e.g.,

cardiovascular disease, type 2 diabetes), PCPs should recommend bariatric surgery if all other attempts at weight loss have failed (Jensen et al., 2014).

Creating an Energy Deficit

Creating an energy deficit is one of the main contributors to weight loss, regardless of the type of diet an individual chooses. An energy deficit can be created through diet and exercise over an extended period of time. Dietary change for weight loss and maintenance varies greatly depending on the individual's needs and motivation. PCPs may recommend restricting caloric intake to 1,200-1,800 kcal per day, depending on the client's gender and with the guidance of a PCP or nutrition specialist. For individuals with comorbidities, such as type 2 diabetes (T2D) or cardiovascular disease (CVD), diets may be adjusted (Jensen et al., 2014). Physical exercise can also aid in creating an energy deficit, and research has shown that the combination of diet and exercise also leads to better overall health (Tate, Jeffery, Sherwood, & Wing, 2007). The use of medications may be recommended for individuals who have been unsuccessful at creating an energy deficit through diet and exercise alone. Weight loss medications tend to reduce hunger and aid in maintaining dietary goals in conjunction with diet and exercise (NIH, 2012).

Lifestyle Intervention

Exercise as a lifestyle intervention may not singly lead to successful weight loss, though studies have demonstrated that regular exercise reduces the risk of CVD and T2D and contributes to the energy deficit needed for weight loss (Jensen et al., 2014). Similarly, other behavioral interventions can be helpful and may include daily monitoring of health behaviors, contingency management, and creating realistic short-term goals for weight loss. Lifestyle interventions are often introduced through the assistance of a behavioral health provider or through self-help and online weight loss and health management programs (Jensen et al., 2014).

Even a modest amount of weight loss (around 5%) can lead to reduction in CVD and T2D (Jensen et al., 2014). Despite how much a patient desires to lose, even a modest weight loss should be encouraged by providers to reduce complications from obesity and the development of other comorbid medical conditions. In contrast to the positive results for those who lose weight, unfortunately most individuals regain at least some of their weight following participation in a comprehensive weight loss program (Jensen et al., 2014). Comprehensive weight loss programs aim to not only provide individualized advice for diet and exercise, but also to teach and reinforce long-term health habits. In general, the body's weight regulation system reacts strongly in response to food deprivation or restriction and naturally works to refuel and restore depleted nutrients. This reaction to dieting increases metabolism and causes an increasing sense of hunger over time until nutritional homeostasis or metabolic set-point is reached. This internal system may be the primary reason why diets fail and why weight regain is common, even following a comprehensive weight loss program or surgery (Schwartz et al., 2003)

Bariatric Surgery as a Solution for Morbid Obesity

Bariatric surgery has become one of the most commonly used treatments for morbid obesity in the United States today. Researchers and providers alike have argued that simply creating an energy deficit using dietary modification and increased exercise often fails for morbidly obese individuals and does not sufficiently impact comorbid health conditions (Jensen et al., 2014; Reinhold, 1994). Changes in the metabolic system are difficult to overcome through diet and exercise alone, and adjusting one's metabolic set-point can be helpful in weight loss as well as the reduction of obesity related disease (American Society for Metabolic and Bariatric Surgery, 2013). Because morbidly obese individuals are at higher medical risk than obese and overweight individuals, surgical procedures have been prioritized over other methods of weight

reduction to decrease medical risk in conjunction with continued lifestyle modification and diet (Jensen et al., 2014). The inherent risks of such invasive procedures (e.g., re-operation, infection, or death) are viewed as acceptable compared to the risks of continued health related comorbidities. Further, bariatric surgery, as compared to conventional weight loss treatments, has provided significant positive outcomes including weight loss, remission of comorbid disease, and increased overall health-related quality of life following surgery (Buchwald et al., 2004; Colquitt, Pickett, Loveman, & Frampton, 2014).

Methods of bariatric surgery. There are several surgical procedures available to successfully aid weight loss for morbidly obese individuals. The majority of research focuses on Laparoscopic Adjustable Gastric Banding (LAGB), Roux-en-Y Gastric Bypass (RYGB), Laparoscopic Sleeve Gastrectomy (LSG), and Biliopancreatic Diversion with Duodenal Switch (BPD/DS). LAGB is one of the most empirically studied bariatric procedures, though is used less frequently today. This procedure involves the surgical insertion of an elastic silicone ring around the top portion of the stomach. Embedded on the inside of the ring is a small balloon that is accessed through a port just beneath the skin. This balloon can be adjusted by inserting or removing fluid, thus making the process of reducing the size of the stomach adjustable and impermanent. LAGB has been commonly used with individuals who have a BMI between 30 and 40. Research on the LAGB procedure has shown that the insertion of the adjustable banding leads to successful initial and sustained weight loss, very low rates of mortality, and few operative complications (Angrisani et al., 2013; Garb, Welch, Zagarins, Kuhn, & Romanelli, 2009; O'Brien, MacDonald, Anderson, Brennan, & Brown, 2013; O'Brien, McPhail, Chaston, & Dixon, 2006). However, from 2008 to 2011, the use of LAGB decreased from 42.3% of bariatric procedures to 17.8% (Buchwald & Oien, 2011). Today, only 9.5% of bariatric procedures use the

LAGB method (ASMBS, 2015). Longer-term surgical complications, rates of re-operation, and less overall weight loss compared to other procedures have led to LAGB's decline in popularity (Shen, Zhang, Bi, & Yin, 2015; Tice, Karliner, Walsh, Petersen, & Feldman, 2008).

The oldest and perhaps most commonly used bariatric surgery procedure is RYGB. This procedure involves creating a smaller stomach pouch, generally the size of an egg, and attaching this pouch to the middle section of the small intestine, bypassing the remainder of the stomach and the upper small intestine. The stomach and small intestine normally absorb nutrients and calories from food, so bypassing a large majority of these internal organs results in weight loss and overall metabolic change. About one-quarter (26.8%) of bariatric surgeries in the United States are RYGB (ASMBS, 2015). Empirical evaluation has favored RYGB over other procedures in terms of overall weight loss and resolution of comorbidities, with consistently low mortality rates (Tice et al., 2008). Some suggest that after three years there are no differences in overall weight loss among procedures, though many of these studies lack sufficient numbers for follow-up, reflecting a major limitation in our understanding of long-term surgical outcomes (O'Brien, McPhail, Chaston, & Dixon, 2006). A recent study evaluating the overall long term health impact of RYGB reported that patients sustained around 50% excess weight loss up to twelve years following surgery (median 9.3 postoperative years; Wood et al., 2016). Similarly, a significant and sustained decrease in diabetes, hypertension, and dyslipidemia treatments were found in these patients post operatively as well (Wood et al., 2016).

More recently, LSG has become a more common treatment for severe obesity, with around 51% of all bariatric procedures using LSG (ASMBS, 2015). This procedure involves removing 75-85% of the stomach, where the remaining portion of the stomach is referred to as the sleeve. LSG requires a maximum of only two hours' time and is a lower risk procedure

(ASMBS, 2013). Because LSG is a relatively new method compared to other bariatric procedures, there is little long-term outcome research, though from the studies available, LSG seems to be similarly effective compared to RYGB and is a favored treatment for many patients (ASMBS, 2015; Brethauer & Schauer, 2015; Colquitt et al., 2014; Trastulli et al., 2013).

Another procedure described within the bariatric surgery literature is BPD/DS. This procedure is primarily used for patients with a BMI of 50 or greater and limited success with other weight loss treatments. BPD/DS involves removing part of the stomach and attaching the remaining part to the lower small intestine. This procedure causes a number of long-term health consequences due to the lack of nutrient absorption. Patients must take vitamin and mineral supplements for the remainder of their lives and usually require longer term follow up with a bariatric provider. This procedure is often performed when the patient's weight is causing serious health problems and a higher post-operative weight loss is medically indicated (Colquitt et al., 2014).

Bariatric surgery has been shown as an effective treatment for morbid obesity, regardless of procedure type (Colquitt et al., 2014; Jensen et al., 2014). However, as is true of all weight loss efforts, weight regain is common among bariatric surgery patients and is an important focus in the current literature on post-surgical outcomes. Broadly, some weight regain is expected following surgery, though significant regain or total weight regain in the years following surgery has also been reported. For example, 11-31% of patients may experience weight regain or insufficient weight loss following surgery (Sheppard et al., 2013). Researchers estimate that about 20% of all bariatric surgery patients regain all their weight and that with this weight regain, comorbidities also return (Benotti & Forse, 1995). Substantial weight regain has been attributed to some problems associated with emotional regulation deficits in some research

(Budak & Thomas, 2009; Kofman, Lent, & Swencionis, 2010). In one study, patients reported that the surgery did not fix their emotional dependency on food, leading to “cheating” on the strict diet prescribed following bariatric surgery (Ogden, Avenell, & Ellis, 2011).

Psychological Problems in the Morbidly Obese Bariatric Surgery Population

Patients who are morbidly obese not only suffer from comorbid physical disorders but also experience a wide range of psychological problems. Mood disorders, anxiety, substance abuse and eating disorders, as well as personality disorders, are significantly higher in obese individuals as compared to normal weight individuals (Miller & de Zwaan, 2014; Simon et al., 2006). As part of the bariatric surgery process, most patients are required to complete a psychological evaluation that screens for any psychological contraindications for surgery. The literature suggests that bariatric surgery patients with uncontrolled severe psychopathology, active alcohol or drug abuse, severe intellectual disability, or a poor understanding of the surgical procedure are to be denied bariatric surgery (Bauchowitz et al., 2005). Contraindications for surgery based on psychological disorders most frequently include severe depression, personality disorders, bipolar disorder, and schizophrenia (Miller & de Zwaan, 2014); however, the literature concerning whether or not an individual is successful following bariatric surgery despite the presence of a psychological disorder is mixed, providing evaluators with confusing information regarding recommendations for bariatric surgery from a psychological perspective (Sockalingam, Hawa, Wnuk, Strimas, & Kennedy, 2011).

For example, some have shown that successful weight loss and a decrease in depressive symptoms are evident in many bariatric surgery patients, even if patients experienced significant depression prior to surgery (Herpertz, Kielmann, Wolf, Hebebrand, & Senf, 2004; Herpertz et al., 2003). Conversely, research also describes increased rates of suicidal ideation and newly

developed symptoms of depression post-surgery (Tindle et al., 2010). Long-term follow-up of patients diagnosed with bipolar disorder approved for bariatric surgery similarly found that among patients with managed symptoms of bipolar disorder, outcomes were similar to other patients who did not present with a psychological disorder (Ahmed, Warton, Schaefer, Shen, & McIntyre, 2013); however, patients are often denied bariatric surgery based on their diagnosis alone (Walfish, Vance, & Fabricatore, 2007).

Emotional Dysregulation in Bariatric Surgery Patients

Empirical research detailing psychological needs of bariatric surgery patients involves studying the impact of specific psychiatric diagnoses (e.g., depression, bipolar disorder) on surgical outcomes (e.g., quality of life, weight loss); however, the presence of any diagnosis differentially affects individuals and their daily experience. For example, someone with depression may experience a lack of appetite and thus lose a significant amount of weight. On the other hand, some who are depressed may use food to help manage their strong negative emotions and find that they are quickly gaining weight. Both, though diagnosed with depression, experience regulation of emotions in two different ways, perhaps explaining variance in surgical outcomes based on psychological diagnoses alone.

A common characteristic of mood-related disorders that are contraindicated for surgery – specifically depression, eating disorders, bipolar disorder, and borderline personality disorder – is the inability to effectively regulate emotional experiences (APA, 2013). Yet there is a lack of understanding concerning the effect of emotional dysregulation in bariatric surgery patients. Difficulty with emotion regulation has been more extensively researched in obesity, as people who experience emotional dysregulation often report problematic eating behaviors that may lead to obesity (Herman & Polivy, 2011). The impact of emotion regulation difficulties in the

bariatric surgery patient remains unclear. Studies assessing emotion and emotion regulation in bariatric surgery patients propose three key characteristics associated with obesity and eating patterns: 1) emotional instability, 2) impulsivity, and 3) alexithymia (Beck, Mehlsen, & Støving, 2012; Claes et al., 2013; Dahl et al., 2012; Gratz & Roemer, 2004; Marechal, Loas, Legrand, & Corcos, 2009; Sansone et al., 2008; Zijlstra et al., 2012). These three characteristics are common features related to emotional dysregulation, though our understanding of these within the bariatric surgery population is limited. A recent study by Baldofski et al (2016) evaluated the impact that weight bias internalization has on non-normative eating patterns in prebariatric surgery patients. These researchers found that patients who displayed weight bias internalization were more likely engaging in problematic eating behaviors if they also experienced difficulties in emotion regulation. This study begins to point toward the specific importance that emotional dysregulation may play on eating patterns in bariatric surgery patients, though continued research on this impact is needed to inform clinical intervention prior to and following bariatric surgery.

The biosocial theory of emotional dysregulation suggests that a biological predisposition to experiencing strong emotions and experiential learning from an invalidating environment contributes to the development of an ineffective and sometimes maladaptive style of understanding and regulating one's internal emotional experiences (Linehan, 1993). This style may lead to the use of limited or unhealthy strategies to temporarily soothe emotional needs. As previously stated, deficits in emotional regulation are associated with and contribute to maladaptive behaviors, including problematic eating behaviors (Herman & Polivy, 2011; Safer, et al., 2009). These problematic eating behaviors could be used to soothe or avoid adverse emotions, thus temporarily relieving strong negative emotional experiences. If one is unable to

effectively and functionally regulate emotional experiences, one could overeat in a way that leads to or maintains obesity (see Fig. 1).

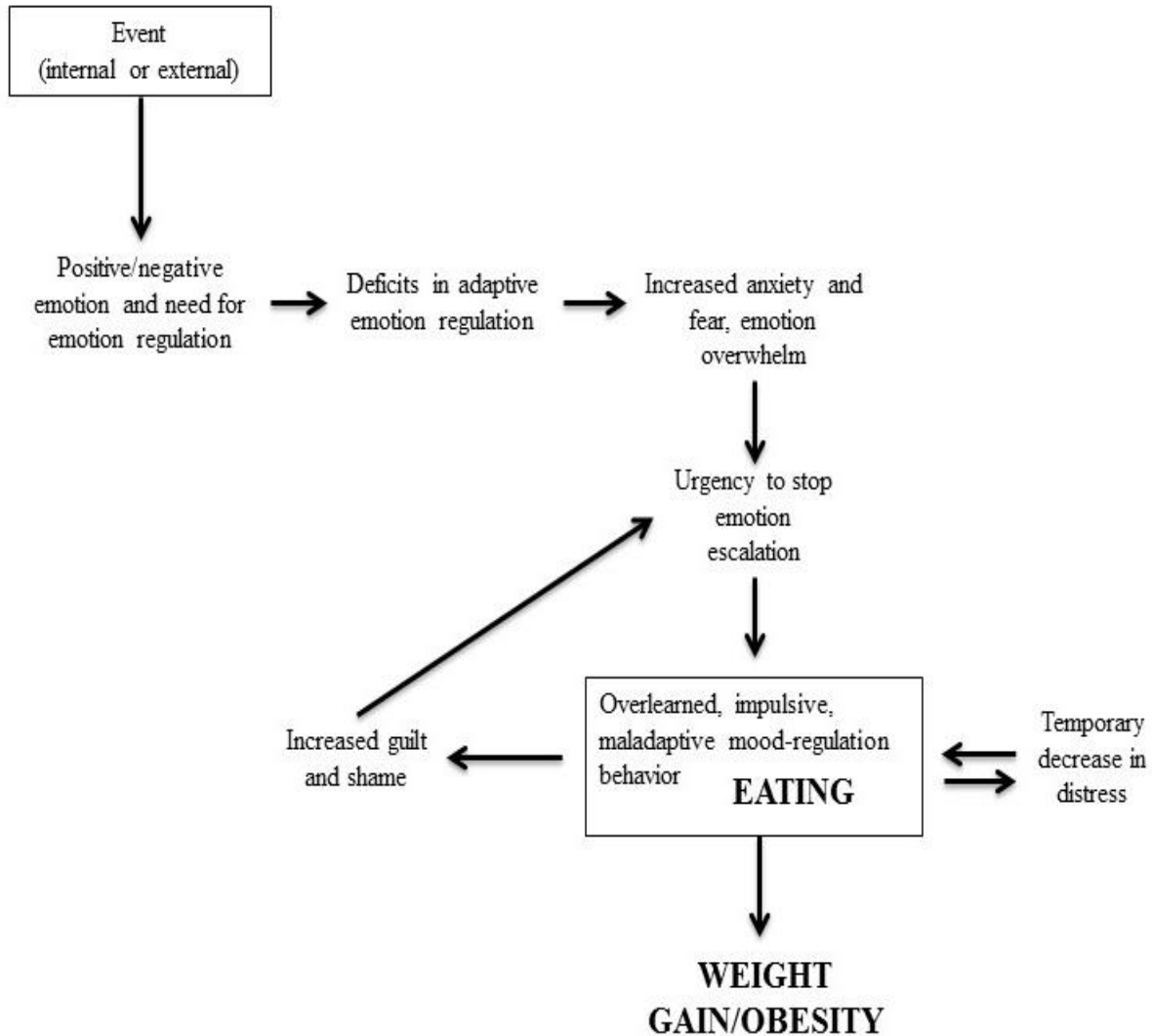


Figure 1. Development and maintenance of obesity and morbid obesity from difficulty in regulating emotional experiences (adapted from Safer et al., 2009)

Based upon knowledge of the development and maintenance of obesity, as well as theories of emotional dysregulation, emotional eating, and problematic eating behaviors, it is assumed that some people with morbid obesity and who overeat may also experience severe deficits in emotion regulation (Baldofski et al., 2016; Zijlstra et al., 2012), though consideration

of these factors is lacking within the obesity literature, and specifically within bariatric surgery patient populations. These patterns may impact those who elect to have bariatric surgery as a treatment for morbid obesity, as surgery itself does not provide patients with effective skills to manage negative emotionality. Of note, surgical intervention will not correct pre-existing difficulties with emotion regulation; nor will it address emotionality that occurs following initial weight loss and resulting lifestyle changes. These factors, singly or in combination, could lead to postoperative weight regain.

Purpose and Hypotheses

The current study is guided by the following empirical questions: 1) Is there a connection between difficulties in emotion regulation and problematic eating behaviors in bariatric surgery patients; and 2) if so, does emotional dysregulation predict problematic eating patterns that may contribute to the development and maintenance of obesity? The purpose of this study is to investigate the relationship between difficulties in emotion regulation and problematic eating patterns, specifically in a bariatric surgery-seeking sample. This study contributes to the needed body of literature on emotion, eating, and morbid obesity by investigating the impact that difficulties with emotion regulation have on eating patterns in this sample. These findings may inform clinical decision-making during psychological evaluations and treatment for bariatric surgery patients and contribute to post-surgical weight planning. I will consider the following hypotheses:

Hypothesis 1: The mean level of self-reported emotional and external eating patterns will be significantly higher than restricted eating patterns.

Studies that examine eating behaviors in morbidly obese patients seeking bariatric surgery have identified two main eating behaviors that include external and emotional eating

(Zijlstra et al., 2012). These findings are consistent with etiological literature that describes social and emotional theories of the development and maintenance of obesity, where it is hypothesized that people overeat considering their environment and emotional functioning. These patterns should also exist in the present sample of patients seeking bariatric surgery.

Hypothesis 2: A significant and positive relationship exists between difficulty with emotion regulation and emotional and external eating patterns in patients seeking bariatric surgery.

The relationship between emotional dysregulation and emotional eating patterns in bariatric surgery patients has been suggested by the empirical connection between alexithymia, emotional instability, impulsivity, and eating (Baldofski et al., 2016; Beck et al., 2012; Claes et al., 2013; Dahl et al., 2012; Marechal et al., 2009; Sansone et al., 2008; Zijlstra et al., 2012). Similarly, a connection between external eating patterns and difficulty with emotion regulation in bariatric surgery patients has been demonstrated in previous, albeit limited, research (Zijlstra et al., 2012). Thus, a significant relationship should exist between difficulties in emotion regulation and the presence of both emotional and external eating patterns in the current sample.

Hypothesis 3: Difficulty with regulating emotional experiences is significantly associated with problematic eating behaviors, particularly emotional and external eating, beyond what is explained by possible covariates, such as gender and SES.

Research has demonstrated that emotional dysregulation is associated with problematic eating behaviors, regardless of BMI (Lafrance Robinson, Kosmerly, Mansfield-Green, & Lafrance, 2013). Similarly, my own preliminary research in this area suggests a relationship between BMI and emotional dysregulation, as the higher one's BMI, the more difficulty a person has in regulating emotional experiences (Williams & Stinson, 2013, November). Understanding

how difficulties in emotion regulation specifically relates to eating behaviors, considering one's BMI, will be important in further understanding these relationships.

Hypothesis 4: Specific facets of difficulties in emotion regulation are differentially associated with external and emotional eating patterns in morbidly obese patients seeking bariatric surgery. More specifically a lack of strategies, nonacceptance of emotional experiences, impulsivity, and lack of clarity of emotions are associated with emotional eating patterns and lack of strategies and impulsivity are associated with external eating patterns.

Theories explaining emotional and external eating patterns that lead to the development of obesity suggest differing factors contributing to why individuals participate in these eating behaviors. For example, individuals who overeat in response to strong or negative emotional experiences may use food to soothe such emotions (Herman & Polivy, 2011), whereas individuals who eat according to availability of food or social influences may be eating impulsively or without much thought (Herman et al., 2003; Jasinska et al., 2012). Similarly, people who have limited strategies to manage emotions may be more likely to eat in response to emotional or external cues because eating may be their only approach to effectively regulate emotions (Glisenti & Strodl, 2012; Pidgeon et al., 2012). Thus, different facets of emotion regulation should differentially impact these two eating patterns.

CHAPTER 2

METHODS

Participants

Participants were recruited from three different private surgical practices in eastern Tennessee at the beginning of the bariatric surgery process, often called the consultation stage. During this stage of bariatric surgery, patients schedule an initial office visit to learn more about bariatric procedures and the necessary lifestyle changes preceding and following surgery. Each patient who elected to participate in the study was given an opportunity to enter a drawing to win an Apple iPad mini following the completion of data collection. Funding for the iPad was received through the ETSU Research Development Committee's Small Grants Program and associated with the research advisor overseeing the current research project. The completion of all measures took approximately 10 minutes. Data collection occurred between November 11, 2015 and May 4, 2016, or for roughly six months. All patients seeking bariatric surgery during the consultation stage who were 18 years of age or older and with a BMI of 35 or greater were eligible for inclusion in the study. Participants who did not provide enough information to calculate their BMI were excluded from the study. Initial G*power analysis suggested that at least 90 participants were needed for a medium effect size and to achieve high power. More participants were included to insure numbers above 90 in the total sample for analysis, as it was anticipated that some participants might neglect to complete all measures. All procedures were approved by the ETSU Institutional Review Board.

During the initial visit with their surgeon, participants were given the surveys for the present study by the office staff, along with other paperwork patients are required to complete for their medical consultation. The surveys were placed in a separate envelope that included an

informed consent document, provided cover sheet, research surveys, and an additional sheet of paper collecting contact information for each participant to enter the iPad drawing. This additional contact information was kept separately from the collected survey data and stored in an envelope to ensure participant anonymity. Contact information sheets were shredded following the drawing and delivery of the iPad to the randomly selected participant. Study participants were asked to review and sign the informed consent document, verifying their agreement to participate in the study. Within the informed consent document, participants were made aware that the survey was minimally invasive and that the information gathered during the study would not be included in their medical record. The office staff collected the surveys and put them in a designated place in the front office to be picked up by the researcher at a later date. Following the completion of data collection, all participants' names and contact information were pooled and one participant was randomly selected to receive the iPad.

In total, 169 bariatric surgery-seeking patients completed surveys and were eligible for the iPad drawing. A total of 22 participant surveys were excluded from final analyses due to missing information, and three participant data sets were deleted as outliers on one instrument (i.e., the Difficulties in Emotion Regulation Scale; DERS). These deletions left 144 participants for analysis. Each of the three sites reported varying volume of patients interested in bariatric surgery, which is reflected in the data ($n_{\text{site1}}=105$, $n_{\text{site2}}=30$, $n_{\text{site3}}=9$). Of the 144 remaining participants, the majority was female (83.2%) and Caucasian (90.1%), with a mean age of 45.9 years and mean BMI of 47.5. This sample approximates national statistics for bariatric surgery patient demographics, primarily that most patients interested in bariatric surgery are female (80%) and Caucasian (60%) with a mean age of around 43 years (Fuchs et al., 2015; Pratt, Learn, Hughes, Clark, Warthen, & Pories, 2009). The majority of participants within the current sample

had an annual income that fell within the \$0 to \$49,999 range (88.1%) suggesting that mostly low- to middle-income patients were seeking bariatric surgery during the study time frame. Participants were not equally distributed among sites where most participants came from one single site ($n_{\text{site1}}=105$; $n_{\text{site2}}=30$; $n_{\text{site3}}=9$). Mean scores on the DERS, all six subscales, and eating behaviors measured through the DEBQ were calculated. Participants scored a mean total DERS score of 66.1, with variability of mean scores across subscales (nonaccept = 11.7; goals = 11.6; impulse = 9.6; aware = 12.9; strategies = 13.8; clarity = 8.6). Mean scores for subscales of the DEBQ were also variable (restrained = 29.7; emotional = 36.8; external = 31.0). Mean scores collected on all measures of difficulties in emotion regulation were slightly lower than original data measured with a college student population (Gratz and Roemer, 2004) The DERS has not been previously used in morbidly obese bariatric surgery populations. Mean scores collected for subscales of the DEBQ matched mean scores on original evaluation of these eating patterns (van Strien, Frijters, Bergers, & Defares, 1986)

Measures

Demographic Information

Demographic information was collected to better understand the sample and gather additional information regarding participants' weight. Participants were asked to provide their current weight and height to calculate BMI. Each participant's BMI was calculated by multiplying their weight in pounds by 703, and then dividing that number by the individual's height in inches squared. They were also asked to provide information regarding their age, race, gender, and socioeconomic status based on their household income within the last year.

Difficulties in Emotion Regulation Scale

The Difficulties in Emotion Regulation Scale (DERS) is a 36-item self-report measure that identifies ways in which one regulates negative emotional experiences (Gratz & Roemer, 2004; see Appendix A). There are six subscales within the DERS that include the following: 1) nonacceptance of emotions (NONACCEPT), 2) inability to participate in goal directed behavior when distressed (GOALS), 3) trouble utilizing effective regulation strategies (STRATEGIES), 4) lack of emotional awareness (AWARE), 5) lack of emotional clarity (CLARITY), and 6) lack of impulse control (IMPULSE). Each item is scored on a 5-point Likert scale ranging from 1 (almost never) to 5 (almost always). Higher scores indicate greater difficulty in regulating emotional experiences. Several studies have utilized the DERS as a measure of emotional dysregulation; initial research by Gratz and Roemer (2004) produced adequate to good internal consistencies for all subscales, with $\alpha > 0.80$ across all identified subscales.

Dutch Eating Behavior Questionnaire

The Dutch Eating Behavior Questionnaire (DEBQ) is a 33-item self-report scale that measures different eating behaviors (van Strien et al., 1986; see Appendix B). This instrument identifies three subscales for restrained, emotional, and external eating patterns. Respondents rate items on a 5-point Likert scale ranging from 1 (never) to 5 (very often). Higher scores on each subscale indicate higher levels of restricted, emotional, or external eating patterns. Initial research on the DEBQ demonstrated high internal consistency with α 's ranging from 0.80 to 0.95 across subscales (van Strien, Frijters, Bergers, & Defares, 1986).

Statistical Analysis

First, to ensure consistency across research sites, data describing patterns of difficulty in emotion regulation and eating patterns were compared across groups. A one-way ANOVA was

conducted based on mean scores from the DERS and different DEBQ subscales from each site. Results suggest no significant differences between sites on these measures. Thus, site location was not included as a possible covariate in the final analyses.

To test the first hypothesis – that the mean level of self-reported emotional and external eating patterns will be significantly higher than restricted eating patterns – a within-subjects ANOVA was used to compare mean scores on the DEBQ subscales. Because each subscale on the DEBQ utilizes a different number of questions (restrained = 10, emotional = 13, and external = 10), scores for these subscales were converted into z-scores to control for variable means.

To test the second hypothesis – that a significant and positive relationship exists between difficulty in emotion regulation and emotional and external eating patterns in bariatric surgery seeking patients – a correlational analysis between the DERS and external and emotional subscales of DEBQ was conducted using the Pearson correlation coefficient (r). A correlational analysis between restricted eating patterns and the DERS was also conducted because means for self-reported restricted eating patterns were not significantly different compared to emotional and external eating in the current sample.

In preparation for analyzing the third hypothesis – that difficulty in the regulation of emotional experiences is significantly associated with emotional and external eating beyond what is explained by possible covariates, such as gender and SES – intercorrelations between included measures (i.e., eating behavior, difficulties with emotion regulation, different facets of difficulties in emotion regulation) were assessed. BMI was not included due to the restricted range of BMI among bariatric surgery seeking patients. The relationship between the DERS and external and emotional eating patterns, measured by the DEBQ, was analyzed to test the third hypothesis. Multiple linear regression analysis (Enter method) assisted in determining whether

difficulties in emotion regulation was significantly related to eating behavior in the current sample, controlling for possible covariates.

Lastly, the fourth hypothesis – that different facets of difficulties in emotion regulation are differentially associated with external and emotional eating patterns in morbidly obese patients seeking bariatric surgery and more specifically that a lack of strategies, nonacceptance of emotional experiences, impulsivity, and lack of clarity of emotions are associated with emotional eating patterns and lack of strategies and impulsivity are associated with external eating patterns – was tested by analyzing the connection between the different subscales of the DERS and both external and emotional eating patterns identified in using the DEBQ. Multiple linear regression analyses (Enter method) were used to examine these relationships. For each regression analysis facets of the DERS that may theoretically impact either emotional eating or external eating were chosen as independent variables to be entered into the analysis (Anestis, Selby, Fink, & Joiner, 2007; Baldofski et al., 2016; Beck et al., 2012; Evers, Stok, & de Ridder, 2010; Marechal et al., 2009; Taitz, 2012; Zijlstra et al., 2012). In analyzing the relationship between difficulties in emotion regulation and emotional eating patterns, nonacceptance of emotional experiences, impulsivity, lack of effective strategies, and lack of clarity of emotions were included as variables. These were entered into the regression model based on the strength of the correlation with the outcome, further described below. Similarly, lack of effective strategies and impulsivity were entered into the regression model assessing the relationship between these facets of emotion regulation and external eating patterns and were ordered based on correlational data. Each analysis also controlled for possible covariates, specifically those that were significantly related to outcomes in the previous analysis for the third hypothesis. Multicollinearity diagnostics were used to determine whether the results of the regression

analysis could be interpreted since some subscale measures were significantly correlated with one another.

CHAPTER 3

RESULTS

Hypothesis 1

All scales used in this study demonstrated high internal consistencies reflecting previous findings from original studies validating each scale, except for clarity of emotions, a DERS subscale, which demonstrated a medium internal consistency. Comparisons between validity of measures used in the current study and the original studies, as well as descriptive statistics for each scale, are reported in Table 1. A one-way within-subjects ANOVA analyzed standardized mean differences between three eating patterns measured in the DEBQ, restrainedZ ($M=.009$, $SD=1.01$) emotionalZ ($M=-.025$, $SD=.998$), and externalZ ($M=-.021$, $SD=.983$). Mauchly's test indicated that the assumption of sphericity had been violated, $\chi^2(2) = 62.912$, $p < .001$; therefore, degrees of freedom were corrected using Greenhouse-Geisser estimates of sphericity ($\epsilon = .73$). The results show that there was no significant effect of response category on individual response patterns, $F(1.473, 210.616) = .056$, $p = .898$. These results indicate no significant mean differences among eating pattern responses in patients seeking bariatric surgery.

Table 1

Descriptive statistics and comparisons to original study data for internal consistency for the DERS, DERS subscales, and DEBQ subscales

Measure	Mean	Range	SD	α	α from original study
DERS Total	67.69	36-141	20.62	.94	.80
Nonaccept	12.07	6-30	5.47	.90	.85
Goals	11.85	5-25	4.96	.87	.89
Impulse	9.93	6-26	4.21	.82	.86
Awareness	12.95	6-25	4.38	.78	.80
Clarity	8.78	5-21	3.11	.68	.84
Strategies	14.22	8-34	5.68	.85	.88
DEBQ Subscales					
Restrained	29.58	13-50	7.15	.89	.95
Emotional	37.09	13-65	13.09	.97	.94
External	31.20	10-49	8.08	.92	.80

Hypothesis 2

Bivariate correlations were calculated to explore the strength and direction of relationships between eating patterns and difficulties in emotion regulation, including subscale measures from the DERS. Results are further reported in Table 2. A positive and significant relationship between the DERS and both emotional ($r = .427, p < .001$) and external ($r = .275, p < .001$) eating patterns emerged. As there was not a significant relationship between restrained eating and difficulty in emotion regulation ($r = .128, p = .122$), this measure was excluded from further analysis on the relationship between difficulty in emotion regulation and eating patterns.

Table 2

Summary of Intercorrelations for Scores on the DERS, DERS Subscales: Nonaccept, Goals, Impulse, Awareness, Strategies, Clarity, DEBQ Subscales: Restrained, Emotional, External, and BMI

Measure	1	2	3	4	5	6	7	8	9	10	11
1. DERS	.	.732***	.668***	.792***	.603***	.831***	.610***	-.102	.429***	.254**	-.097
2. Nonaccept	.732***	.	.442***	.567***	.367***	.592***	.392***	.087	.410***	.188*	-.048
3. Goals	.669***	.442***	.	.612***	.354***	.649***	.384***	-.160	.329***	.269**	-.063
4. Impulse	.792***	.567***	.612***	.	.434***	.775***	.451***	-.126	.321***	.185*	-.042
5. Awareness	.603***	.367***	.354***	.434***	.	.489***	.548***	-.166*	.183*	.119	-.089
6. Strategies	.831***	.592***	.649***	.775***	.489***	.	.474***	-.124	.425***	.288***	-.086
7. Clarity	.610***	.392***	.384***	.451***	.548***	.474***	.	-.055	.243**	.033	-.064
8. Restrained	-.102	.087	-.160	-.126	-.166*	-.124	-.055	.	-.063	-.240**	-.096
9. Emotional	.429***	.410***	.329***	.321***	.183*	.425***	.243**	-.063	.	.627***	-.056
10. External	.254**	.188*	.269**	.185*	.119	.288***	.033	-.240**	.627***	.	-.098
11. BMI	-.097	-.048	-.063	-.042	-.089	-.086	-.064	-.096	-.056	-.098	.

Note. $n = 144$. * $p < .05$, ** $p < .01$, *** $p < .001$

Hypothesis 3

In testing the third hypothesis, two multiple linear regressions were run to analyze the relationship between difficulties in emotion regulation and both emotional and external eating patterns. Potential covariates, specifically gender and SES, were also included in the analysis, as previous research has demonstrated a relationship among these variables and eating behaviors in this population. BMI was not included in analysis due to its restricted range in this sample. Results are reported in Table 3. The first regression analysis examined relationships among the DERS, gender, SES, and emotional eating patterns, yielding a significant regression model of emotional eating behavior ($R^2 = .254$, $F(5, 135) = 9.180$, $p < .001$). Only two independent variables were significantly related to emotional eating patterns: DERS, $\beta = .420$, $p < .001$; and middle-high income, $\beta = .248$, $p = .002$. The second regression analysis examined relationships among the DERS, gender, SES, and external eating patterns, also yielding a significant model external eating behavior ($R^2 = .094$, $F(5, 135) = 2.811$, $p = .019$). The DERS was the only variable significantly related to external eating patterns in the model ($\beta = .266$, $p = .002$).

Table 3

Multiple Regression Analysis Predicting Emotional and External Eating Patterns from Difficulties in Emotion Regulation, Gender, and SES

Outcome	Predictor	R ²	F	β	95% CI
Emotional Eating		.254	9.180***		
	DERS			.420***	[.195, .408]
	Gender			.144	[-.458, 10.433]
	Low-Middle			.132	[-.660, 7.636]
	Middle-High			.248**	[3.799, 17.129]
	High			-.030	[-20.326, 13.813]
External Eating		.094	2.811*		
	DERS			.266**	[.045, .186]
	Gender			-.380	[-4.321, 2.930]
	Low-Middle			.111	[-.989, 4.534]
	Middle-High			.143	[-.798, 8.077]
	High			-.038	[-13.894, 8.835]

Note. $n = 140$. * $p < .05$, ** $p < .01$, *** $p < .001$

Hypothesis 4

For the final hypothesis, two linear regressions assisted with understanding the relationships among differing components of difficulties with emotion regulation and emotional and external eating patterns. Results are reported in Table 4.

Table 4

Regression Analyses Predicting Emotional and External Eating Patterns from DERS Subscale Measures and Possible Covariates

Outcome	Predictor	R ²	F	β	95% CI
Emotional Eating		.258	9.471***		
	Strategies			.374**	[.330, 1.610]
	Nonacceptance			.219*	[.081, 1.068]
	Impulsivity			-.107	[-1.197, .453]
	Clarity			.025	[-.655, .877]
	Middle-High (SES)			.200**	[2.211, 14.738]
External Eating		.087	6.701**		
	Strategies			.363**	[.176, .974]
	Impulsivity			-.096	[-.736, .330]

Note. $n = 141$; $n = 143$. * $p < .05$, ** $p < .01$, *** $p < .001$.

For the first analysis, facets of difficulty in emotion regulation that were theoretically associated with emotional eating were entered into the model in the following order based on strength of correlation to the outcome and theoretical understanding of the relationship between emotional dysregulation and emotional eating: 1) lack of effective strategies, 2) nonacceptance of emotional experiences, 3) impulsivity, and 4) lack of clarity of emotions. Correlational results between the DERS subscales and eating behaviors are reported in Table 2. Middle high income was also retained as a covariate in the regression model for emotional eating. The results yielded a significant model: $R^2 = .258$, $F(5, 136) = 9.471$, $p < .001$. Only lack of effective strategies (strategies, $\beta = .374$, $p = .003$), nonacceptance of emotions (nonaccept, $\beta = .219$, $p = .023$), and

middle-high income ($\beta = .200, p = .008$) were significant. Multicollinearity diagnostics were run to evaluate significant relationships among subscale measures of the DERS. Results suggest no issues with multicollinearity within the regression model (e.g., tolerance above .1 and VIF below 10).

For the second regression analysis, which examined the relationships between difficulties with emotion regulation and external eating behavior, subscales of the DERS were entered in the following order based on correlational results with external eating behavior and theoretical understanding of the relationship between emotional dysregulation and external eating: 1) lack of effective strategies, and 2) impulsivity. Results of the second regression analysis yielded a significant model ($R^2 = .087, F(2, 141) = 6.701, p = .002$). Only lack of effective strategies was significantly associated with external eating patterns in the model ($\beta = .363, p = .005$).

Multicollinearity diagnostics were run to evaluate significant relationships among subscale measures of the DERS in the second regression analysis as well. Results suggest no issues with multicollinearity within the regression model (e.g., tolerance above .1 and VIF below 10).

CHAPTER 4

DISCUSSION

Obesity is a serious worldwide health concern, and bariatric surgery procedures have become more common in the treatment of morbid obesity, with significant positive outcomes (Buchwald et al., 2004; Colquitt et al., 2014; Jensen et al., 2014). Despite extensive literature regarding the role of psychological disorders as potential predictors of bariatric surgery outcomes, results are mixed regarding the impact of these disorders on post-surgical outcomes such as sustained weight loss and onset or maintenance of mental health issues (Miller & de Zwaan, 2014). A lack of conclusive findings suggests that the presence of a psychological disorder may not be a straightforward indicator of problematic outcomes for bariatric surgery patients, though these disorders are screened as potential predictors for poor outcomes in pre-surgical psychological evaluations. Many of these disorders (i.e., depression, bipolar disorder, borderline personality disorder) include elements of emotional dysregulation, though little research has considered or attended to emotional dysregulation in bariatric surgery patients (Williams & Stinson, 2016). With varied literature on emotional eating in obesity (Byrne, 2002; Faith et al., 1997; Ganley, 1989), as well as the relationship between emotional dysregulation and problematic eating behaviors (Anestis et al., 2007; Herman & Polivy, 2011; Linehan, 1993), further exploration of emotional dysregulation in morbidly obese bariatric surgery-seeking patients is warranted.

The current study aimed to measure the relationship between difficulties with emotion regulation and eating behaviors in a bariatric surgery-seeking sample. Previous research and the current proposed model for eating in the presence of emotional content were used to address unanswered questions regarding the relationships between difficulty in emotion regulation and

problematic eating patterns that are often seen in obesity. Eating patterns thought to be associated with obesity in this sample included both emotional and external eating, as previous studies have concluded (Zijlstra et al., 2012). However, results yielded no significant differences between reports of restrained, emotional, and external eating patterns in this sample of bariatric patients. These results indicate that participants responded to questions in each category in a similar manner and did not score eating patterns more positively or more negatively compared to other problematic eating styles. These findings contrast previous literature, in that it was expected that participants would respond in a way that suggests more severity of emotional and external eating patterns as compared to restrained eating patterns in the bariatric surgery seeking population (Zijlstra et al., 2012). The prevalence of restrained eating within the context of emotion regulation does not fit within the model for the development and maintenance of obesity presented in Figure 1. Restrained eating presumably requires an increase in control and planning, which may be lacking in eating patterns characterized by emotion-related eating pathology that is qualitatively more emotional and impulsive.

Still, these findings are understandable considering the context in which patients were asked to respond to survey questions. National referral standards for the treatment of obesity recommend bariatric surgery for patients following significant efforts to lose weight with diet and exercise (Jensen et al., 2014). Thus, many patients who seek bariatric surgery have historically participated in numerous diets that restrict eating patterns, and they may even be restricting eating behavior while seeking consultation for bariatric surgery as a possible alternative treatment for morbid obesity. Patients may also be primed to respond positively to both problematic and diet related eating behavior questions that would demonstrate their need for bariatric surgery and prove that they have attempted to lose weight through restrictive measures,

despite continued struggle with patterns of emotional and external eating. Relatedly, one common requirement for bariatric surgery is a 5% weight loss prior to operation. Thus, patients may diet prior to initial consultation with a medical provider, already knowing this stipulation. This may be especially true if the patient has spoken with another patient who has previously gone through the bariatric surgery process.

Despite no statistical difference among eating response patterns, results yielded a positive and significant relationship between difficulties in emotion regulation and only external and emotional eating patterns within the current sample. These results confirm the second hypothesis and represent a connection between emotional dysregulation and eating styles that are inherently impulsive and emotional compared to inhibited eating behaviors. These findings also confirm the overall model used to explain the development and maintenance of obesity from an emotion regulation perspective (see Fig. 1). Studies exploring the relationship between emotional dysregulation and non-normative eating patterns demonstrate a connection between difficulties in regulating emotions and eating in response to negative emotions as well as eating in response to external cues even in the absence of physiological hunger (Anestis et al., 2007; Baldofski et al., 2016; Evers et al., 2010). Results of the current study confirm previous findings within a morbidly obese bariatric surgery-seeking sample. This hints at a relationship linking eating and psychological factors as compared to physical covariates. Among bariatric surgery seeking patients, it is essential to further understand these relationships, especially considering the physical nature of bariatric surgery as a treatment of morbid obesity, which does not address psychological factors underlying eating behavior or obesity itself. Looking back at the suggested model (Fig. 1), many patterns tied to emotional eating are reinforced by cognitive, biological, and emotional factors. For example, a person may turn to foods high in fat and sugar to reduce

overall perceived stress, which is reinforcing and continues the problematic eating cycle. These factors are not impacted by physical changes to the stomach caused by bariatric surgery. Thus, since emotional dysregulation seems to be related to problematic eating behaviors, specifically emotional and external eating patterns, and these patterns contribute to the maintenance of obesity, surgical solutions for obesity may not provide long-term solutions for patients who participate in emotional and/or external eating.

Further, regression analyses indicated that both emotional and external eating patterns were associated with difficulties with emotion regulation amongst pre-bariatric surgery patients. Baldofski et al. (2016) found similar results through examining the mediating effect of emotional dysregulation on the relationship between weight bias internalization and eating disorder psychopathology in bariatric surgery seeking individuals. In this recent study, the relationship between one's internalized bias of weight and pathological eating behavior was fully mediated by emotional dysregulation. Thus, results from the current study provide further support for the relationship between problematic eating patterns and emotional dysregulation in bariatric surgery seeking patients. However, screening for indicators of emotional dysregulation has not been recommended for presurgical psychological evaluations, and no known studies have explored the impact of emotional dysregulation on post-operative eating behaviors and weight regain. Thus, the current study adds to the empirical literature suggesting that not only are difficulties in emotion regulation related to problematic eating behaviors in the obese population, but also that these difficulties may precede and predict these problematic eating practices. It is possible therefore that difficulties with emotion regulation also have implications for post-operative outcomes like continued patterns of emotion-based eating habits and weight regain.

In assessing this relationship more closely, results partly confirmed the fourth hypothesis, which emphasized the relationship between specific emotion regulation difficulties and eating patterns. First, both a lack of effective strategies and an inability to accept emotions were significantly related to emotional eating patterns in the current sample. Impulsivity and lack of clarity were not related. The significance of lack of effective strategies here corresponds with previous models for the maintenance of eating patterns that may lead to obesity (e.g., Fig. 1). For example, when individuals lack effective ways to manage strong emotions, they may use immediately-available strategies that slightly decrease the intensity of emotions in the short run, though they are not a lasting solution and thus require frequent repetition to continue regulating these strong emotions. Eating in response to emotions down regulates physiological sensations associated with strong emotional experiences by reducing overall cortisol levels and is thus a reinforced strategy for regulation. However, when eating is the only or preferred strategy used, and the regulation of emotion requires frequent or longer episodes of eating, this strategy becomes problematic.

Similarly, the relationship nonacceptance of emotional experiences revealed here corresponds with the model of development and maintenance of obesity and overlaps with lack of effective strategies for emotion regulation. Specifically, results suggest that individuals who avoid or are unwilling to experience strong emotional experiences are more likely to eat when experiencing strong emotions, potentially to further avoid or rid themselves of emotional arousal. Other research has demonstrated that avoidance of emotional experiences can lead to maladaptive behaviors, including problematic eating, and researchers have theorized that this may be due to the dysregulating experience of ignoring a natural response (e.g., an emotion) to a

stimulus, particularly when further attention or response is needed (e.g., emotion regulation; Lillis & Hayes, 2008; Taitz, 2012).

Unexpectedly, the relationship between measured difficulties with emotion regulation and emotional eating was additionally impacted by middle high income, despite few participants reporting this level of SES (10.6%). Low SES has been associated with poor outcomes following surgery, though few studies have evaluated other confounding factors associated with low SES that may also impact poor outcomes (Renquist et al., 1996). These studies speculate that lack of appropriate resources to healthy food choices and lack of exercise likely contribute to poorer outcomes in this population (Reidpath, Burns, Garrard, Mahoney, & Townsend, 2002). Other studies have suggested there is no connection between low SES and poor outcomes, and these patients should not be refused bariatric surgery based on SES alone (Durkin, Bloomston, Murr, & Rosemurgy, 1999). In regards to middle high income and emotional eating patterns, no known studies have specifically evaluated the relationship between these two constructs; however, researchers have speculated that social stigma against obesity in the middle to high SES, particularly in females, increases emotional and psychological factors associated with obesity, including emotional eating (Ganley, 1989; Leon, 1982; Spitzer & Rodin, 1981). Though culturally supported to some extent, people who participate in emotional eating often do so in secret. Clinically, this secretive behavior associated with emotional eating supports the idea that social stigma against weight in people who are categorized by middle or high SES may impact eating patterns. Secretive behavior common in emotional eating cycles can be further supported by the model proposed in this study for the development and maintenance of obesity from an emotional perspective (Fig. 1). Increased guilt and shame associated with overeating may contribute to eating alone and may reinforce this maladaptive pattern. Future studies should aim

to assess these patterns to have a better understanding of the impact that SES may have on eating patterns and obesity, particularly in bariatric surgery populations.

In addition to its relationship to patterns of emotional eating, a lack of emotion regulation strategies also contributed to external eating patterns in the current analysis. Thus, a self-reported pattern of eating in response to external cues, or when food is immediately available, was uniquely affected by the person's ability to use effective strategies in response to strong emotions. A combination of environmental (i.e., availability of food) and lack of effective coping strategies may be relevant here. For example, patients who more habitually or repetitively eat because food is readily available may be at increased risk for weight regain following surgery, again because behavioral eating patterns may not be addressed prior to the procedure. These findings support the overall model suggested for the development and maintenance of obesity (Fig. 1), and if not properly addressed in bariatric surgery patients, could cause continued maintenance of obesity; however, many bariatric surgery programs across the country provide behavioral education about the intense diet restrictions required of bariatric surgery patients. Thus, through these programs, patients may become more planful in their choices to eat, rather than simply eating in response to environmental cues or availability. This type of mindless eating may be more associated with lack of strategies prior to enrolling in a bariatric surgery program rather than following the procedure, though additional research on the effect of lack of strategies on post-surgical eating appears warranted and may better guide post-operative interventions for these patients. Evaluating the needed level of education about the expected diet change, as well as patient follow up, also may be important in providing patients needed services to improve weight loss and other health outcomes.

These findings on specific difficulties in emotion regulation and their impact on eating patterns have significant implications for psychotherapeutic treatments for bariatric surgery patients. Bariatric surgery is a physical solution for the multifaceted issues of obesity, reducing overall food intake and impacting metabolic absorption. Such a solution does little to address emotional distress or alter maladaptive coping strategies, so that patients may be at continued risk for weight regain due to behavioral and emotional prompts for eating. Similarly, physical change to the stomach's size does not assist patients with effectively experiencing and accepting uncomfortable emotional experiences; nor does it change their food-related behaviors. Supplemental treatments for emotional dysregulation and emotional coping may be beneficial for those patients who eat in response to emotional cues and may break into the cycle of emotionally related eating patterns that seems to contribute to the development and maintenance of obesity (Fig. 1). Research suggests that learning adaptive emotion regulation strategies may help decrease emotional eating in many individuals who are obese and thus these strategies may help patients after bariatric surgery to prevent significant weight regain (Glisenti & Strodl, 2012; Pidgeon et al., 2012).

Further examining deficits in emotion regulation and understanding their effect on different problematic eating behaviors may facilitate identification of specific interventions to help patients develop more adaptive ways of coping with strong emotional experiences. Specifically, treatments that focus on emotional regulation, such as DBT, may be beneficial for patients with high levels emotional distress and who use maladaptive coping to function. Other treatments that focus on present moment awareness and reducing avoidant behaviors, such as Acceptance and Commitment Therapy (ACT) may also be helpful for these patients. Both therapy models include mindfulness as a core intervention strategy, which may be helpful for

these patients. Clinical definitions of mindfulness generally include paying attention to or purposefully observing the present moment in a nonjudgmental way (Hayes & Smith, 2005; Linehan, 1993). Skills to enhance present awareness and planful behavior could counteract impulsive, non-aware, and emotionally driven behaviors like emotional and external eating. Research has verified many psychological benefits following the practice of mindfulness (Hayes, Follette, & Linehan, 2004). Bariatric surgery programs that offer education about planful eating in the context of new post-surgical dietary restrictions benefit their patients by teaching them how to be more mindful of their food choices. However, a major component emphasizing emotional process and regulation is often missing in these programs, and mindfulness as an added intervention may improve overall post-surgical success and reduce weight regain and reemergence of comorbid disease.

Limitations and Future Directions

The current study explored the relationship between difficulties with emotion regulation and problem eating behaviors in bariatric surgery seeking patients. Preliminary significant findings have potential implications for intervention with patients undergoing bariatric surgery. Despite the importance of these findings, some study limitations should be considered. The study design presented in this dissertation is restricted to self-report measures completed in the participants' selected physician's waiting room. This represents two potential problems. First, positive impression management should be considered in light of patients filling out surveys at their physician's office. Despite clear instruction that survey results would not impact their surgeon's decision to perform surgery and would not be included in their medical chart, participants may have felt uncomfortable answering honestly. Also, because participants completed surveys in a public space that remained uncontrolled by this researcher, participant

distractibility and lack of privacy in the immediate surroundings, despite being provided a cover sheet, should be considered when interpreting findings. Further, the self-report nature of the information may reflect participants' perceptions and biases regarding their emotion regulation abilities and eating behaviors rather than the objective reality of these constructs.

Additionally, this study, focused on eating behaviors and difficulty in emotion regulation, only used one measure for each construct. Previous research involving bariatric surgery patients has utilized the DEBQ as a standard measure of differing eating patterns often found in obese populations. Though that standard was retained in the current analysis, other measures of eating patterns exist, and future studies should aim to include these measures to substantiate construct validity. Regarding difficulty with emotion regulation, other measures that similarly assess for difficulties in emotion regulation do not exist, reflecting an overall limitation of the field. Other measures of emotional dysregulation focus specifically on cognitive components of emotionality (e.g., Cognitive Emotion Regulation Questionnaire, Garnefski & Kraaij, 2007), though this was not of importance in the current study and would not have helped demonstrate construct validity.

The study findings also reflected current self-reported behaviors in patients who are seeking bariatric surgery as a treatment for morbid obesity. Data were not collected that would identify which patients continued in the process toward surgery or who completed surgery. Thus, the results of this study should not be generalized to patients who have had surgery or have been approved for surgery. Future studies should aim to assess differences between patients who have bariatric surgery versus those who opt out in light of difficulties with emotion and dietary restrictions associated with bariatric surgery. Differentiating between these two groups may be specifically important to determine if there are significant characterological differences between morbidly obese patients who follow through with surgery and those who choose not to or are

identified as poor candidates for surgery. Similarly, research should consider post-surgical data, perhaps specifically related to how difficulties in emotion regulation impact eating behavior, post-surgical compliance, and weight regain in the years following surgery.

Research comparing the current findings to a community sample of matched control participants is also needed. Specifically, these might be patients who are not morbidly obese though seeking surgical solutions for weight loss as well also those who are morbidly obese but who are not interested or actively seeking consultation for bariatric surgery. Further understanding differences between bariatric surgery patients and those who are morbidly obese but not enrolled in a surgical option for weight loss may provide additional information about these individuals and their emotionality.

This study builds our empirical knowledge regarding the impact of difficulties in emotion regulation on eating patterns in patients seeking bariatric surgery, with implications for post-operative success in maintaining dietary restrictions and preventing weight regain. Bariatric surgery as a physical solution for obesity, does not in itself change emotional and social reasons for eating. Difficulties with emotion regulation would likely persist over time unless addressed through skills-based interventions designed to teach adaptive management of emotions. These difficulties in emotion regulation seem to have a significant relationship with the development and maintenance of obesity (Fig. 1). Thus, it can be expected that patients who present with significant difficulty in emotion regulation will continue to have difficulty despite surgical intervention and subsequent weight loss. A more nuanced understanding of how difficulties in emotion regulation impact eating behaviors and influence post-operative success will be necessary to provide informed treatment for these patients.

Conclusions

The results of the current study fill an important gap in the literature showing that difficulties in emotion regulation are associated with problematic eating behavior among morbidly obese bariatric surgery seeking patients. Previous studies have specifically focused on the impact that emotionally based psychological disorders, such as depression, bipolar disorder, and borderline personality disorder, have on post-surgical outcomes. Mixed empirical results suggest that a diagnosis alone does not help predict outcomes for these patients. Additionally, few studies have examined the relationship among emotional dysregulation, eating behavior, and outcomes for bariatric surgery patients. To date, only one study has demonstrated that emotional dysregulation is associated with non-normative eating patterns in bariatric surgery seeking patients (Baldofski et al., 2016). The current study takes a more nuanced approach in evaluating which components of difficulty with emotion regulation are specifically related to problematic emotional and external eating patterns. These results have implications for clinical intervention prior to and following bariatric surgery.

As bariatric surgery becomes increasingly popular as a treatment for morbid obesity, early recognition of emotional and behavioral patterns in these patients that may impact postsurgical outcomes becomes even more important in the context of the obesity epidemic. The goal of bariatric surgery is to improve health outcomes through significant weight loss and reduction of disease comorbidities, though several individuals regain all their weight in the years following surgery and experience recurrence of medical comorbidities. This study begins to support early intervention and ongoing support for emotional and behavioral factors often associated with obesity, which may reduce the number of bariatric surgery patients who experience significant weight regain following surgery. Further research should focus on

evaluating the impact of these interventions on improving surgical outcomes and reducing obesity numbers in the United States and worldwide.

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APPENDICES

Appendix A. *Difficulties in Emotion Regulation Scale (DERS)*

Please respond to the following statements according to the provided scale:

		Almost Never	Some- times	Half the Time	Most of the Time	Almost Always
1.	I am clear about my feelings.					
2.	I pay attention to how I feel.					
3.	I experience my emotions as overwhelming and out of control.					
4.	I have no idea how I am feeling.					
5.	I have difficulty making sense out of my feelings.					
6.	I am attentive to my feelings.					
7.	I know exactly how I am feeling.					
8.	I care about what I am feeling.					
9.	I am confused about how I feel.					
10.	When I'm upset, I acknowledge my emotions.					
11.	When I'm upset, I become angry with myself for feeling that way.					
12.	When I'm upset, I become embarrassed for feeling that way.					
13.	When I'm upset, I have difficulty getting work done.					
14.	When I'm upset, I become out of control.					
15.	When I'm upset, I believe that I will remain that way for a long time.					
16.	When I'm upset, I believe that I'll end up feeling very depressed.					
17.	When I'm upset, I believe that my feelings are valid and important.					
18.	When I'm upset, I have difficulty focusing on other things.					
19.	When I'm upset, I feel out of control.					
20.	When I'm upset, I can still get things done.					
21.	When I'm upset, I feel ashamed with myself for feeling that way.					

22.	When I'm upset, I know that I can find a way to eventually feel better.					
		Almost Never	Some- times	Half the Time	Most of the Time	Almost Always
23.	When I'm upset, I feel like I am weak.					
24.	When I'm upset, I feel like I can remain in control of my behaviors.					
25.	When I'm upset, I feel guilty for feeling that way.					
26.	When I'm upset, I have difficulty concentrating.					
27.	When I'm upset, I have difficulty controlling my behaviors.					
28.	When I'm upset, I believe there is nothing I can do to make myself feel better.					
29.	When I'm upset, I become irritated with myself for feeling that way.					
30.	When I'm upset, I start to feel very bad about myself.					
31.	When I'm upset, I believe that wallowing in it is all I can do.					
32.	When I'm upset, I lose control over my behaviors.					
33.	When I'm upset, I have difficulty thinking about anything else.					
34.	When I'm upset, I take time to figure out what I'm really feeling.					
35.	When I'm upset, it takes me a long time to feel better.					
36.	When I'm upset, my emotions feel overwhelming.					

Appendix B. Dutch Eating Behavior Questionnaire (DEBQ)

Please answer the following questions according to the provided scale:

		Never	Seldom	Some- times	Often	Very Often
1.	If you have put on weight, do you eat less than you usually do?					
2.	Do you try to eat less at mealtimes than you would like to eat?					
3.	How often do you refuse food or drink offered because you are concerned about your weight?					
4.	Do you watch exactly what you eat?					
5.	Do you deliberately eat foods that are slimming?					
6.	When you have eaten too much, do you eat less than usual for the following days?					
7.	Do you deliberately eat less in order not to become heavier?					
8.	How often do you try not to eat between meals because you are watching your weight?					
9.	How often in the evening do you try not to eat because you are watching your weight?					
10.	Do you take into account your weight with what you eat?					
11.	Do you have the desire to eat when you are irritated?					
12.	Do you have a desire to eat when you have nothing to do?					
13.	Do you have a desire to eat when you are depressed or discouraged?					
14.	Do you have a desire to eat when you are feeling lonely?					
15.	Do you have a desire to eat when somebody lets you down?					
16.	Do you have a desire to eat when you are cross?					
17.	Do you have a desire to eat when you are approaching something unpleasant to happen?					
18.	Do you get the desire to eat when you are anxious, worried, or tense?					
19.	Do you have a desire to eat when things are going against you or when things have gone wrong?					
20.	Do you have a desire to eat when you are frightened?					
21.	Do you have a desire to eat when you are disappointed?					

		Never	Seldom	Some- times	Often	Very Often
22.	Do you have a desire to eat when you are emotionally upset?					
23.	Do you have a desire to eat when you are bored or restless?					
24.	If food tastes good to you, do you eat more than usual?					
25.	If food smells and looks good, do you eat more than usual?					
26.	If you see or smell something delicious do you have a desire to eat it?					
27.	If you have something delicious to eat, do you eat it straight away?					
28.	If you walk past the baker do you have the desire to buy something delicious?					
29.	If you walk past a snack bar or a café, do you have the desire to buy something delicious?					
30.	If you see others eating, do you also have the desire to eat?					
31.	Can you resist eating delicious foods?					
32.	Do you eat more than usual, when you see others eating?					
33.	When preparing a meal are you inclined to eat something?					

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