Modification of the dual pathway model for binge eating

by

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The student author, whose presentation of the scholarship herein was approved by the program of study committee, is solely responsible for the content of this thesis. The Graduate College will ensure this thesis is globally accessible and will not permit alterations after a degree is conferred.

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# TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>LIST OF FIGURES</td>
<td>iii</td>
</tr>
<tr>
<td>LIST OF TABLES</td>
<td>iv</td>
</tr>
<tr>
<td>ABSTRACT</td>
<td>v</td>
</tr>
<tr>
<td>CHAPTER 1. INTRODUCTION</td>
<td>1</td>
</tr>
<tr>
<td>CHAPTER 2. LITERATURE REVIEW</td>
<td>10</td>
</tr>
<tr>
<td>CHAPTER 3. METHODS</td>
<td>30</td>
</tr>
<tr>
<td>CHAPTER 4. RESULTS</td>
<td>37</td>
</tr>
<tr>
<td>CHAPTER 5. DISCUSSION</td>
<td>50</td>
</tr>
<tr>
<td>REFERENCES</td>
<td>60</td>
</tr>
<tr>
<td>APPENDIX A: DEMOGRAPHIC INFORMATION</td>
<td>70</td>
</tr>
<tr>
<td>APPENDIX B: BODY DISSATISFACTION (PREDICTOR)</td>
<td>72</td>
</tr>
<tr>
<td>APPENDIX C: RESTRICTED EATING (MEDIATOR)</td>
<td>73</td>
</tr>
<tr>
<td>APPENDIX D: DIFFICULTIES IN EMOTION REGULATION (MEDIATOR)</td>
<td>75</td>
</tr>
<tr>
<td>APPENDIX E: SELF-COMPASSION (MODERATOR)</td>
<td>77</td>
</tr>
<tr>
<td>APPENDIX F: BINGE EATING (OUTCOME)</td>
<td>79</td>
</tr>
<tr>
<td>APPENDIX G: NEGATIVE AFFECT (MEDIATOR)</td>
<td>80</td>
</tr>
<tr>
<td>APPENDIX H: INSTITUTIONAL REVIEW BOARD APPROVAL FORM</td>
<td>81</td>
</tr>
</tbody>
</table>
## LIST OF FIGURES

<table>
<thead>
<tr>
<th>Figure</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Dual Pathway Model for binge eating.</td>
<td>3</td>
</tr>
<tr>
<td>2</td>
<td>Modified Dual Pathway Model for binge eating.</td>
<td>3</td>
</tr>
<tr>
<td>3</td>
<td>Hypothesized moderation effect of self-compassion on the association between body dissatisfaction and difficulties in emotion regulation.</td>
<td>8</td>
</tr>
<tr>
<td>4</td>
<td>Regression coefficients for the modified Dual Pathway Model for women, controlling for BMI.</td>
<td>47</td>
</tr>
<tr>
<td>5</td>
<td>Regression coefficients for the modified Dual Pathway Model for men, controlling for BMI.</td>
<td>47</td>
</tr>
<tr>
<td>6</td>
<td>Regression coefficients for the Dual Pathway Model for women, controlling for BMI.</td>
<td>48</td>
</tr>
<tr>
<td>7</td>
<td>Regression coefficients for the Dual Pathway Model for men, controlling for BMI.</td>
<td>48</td>
</tr>
<tr>
<td>8</td>
<td>The effect of body dissatisfaction on negative affect at lower versus higher levels of self-compassion.</td>
<td>49</td>
</tr>
</tbody>
</table>
### LIST OF TABLES

<table>
<thead>
<tr>
<th>Table</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Independent Samples T-Test Results for Women and Men.</td>
<td>38</td>
</tr>
<tr>
<td>2</td>
<td>Means, Standard Deviations, and Intercorrelations for Women.</td>
<td>41</td>
</tr>
<tr>
<td>3</td>
<td>Means, Standard Deviations, and Intercorrelations for Men.</td>
<td>42</td>
</tr>
<tr>
<td>4</td>
<td>Bootstrap Analyses of the Magnitude and Statistical Significance of Indirect Effects.</td>
<td>46</td>
</tr>
</tbody>
</table>
ABSTRACT

The present study tested a modification of the Dual Pathway Model describing the development of binge eating (Stice, 1994) with difficulties in emotion regulation as a mediator in the place of negative affect, as well as self-compassion as a moderator. A total of 440 undergraduate students attending a predominately White, Midwestern university completed an online survey. Due to significantly different mean differences on most variables, results were examined separately for women ($N = 230$) and men ($N = 205$). The moderation of self-compassion on the association between body dissatisfaction and difficulties in emotion regulation was tested using PROCESS (Hayes, 2013) and was found to be non-significant. Using path analysis, direct and indirect effects of body dissatisfaction, restricted eating, difficulties in emotion regulation, and binge eating were tested. A multiple-group analysis demonstrated gender differences for these relationships; in particular, the path from body dissatisfaction to restricted eating was significant for women but not for men. The mediation of body dissatisfaction to binge eating through restricted eating was not significant for either group. Restricted eating and difficulties in emotion regulation mediated the indirect effect of body dissatisfaction to binge eating only for women. The mediation of body dissatisfaction to binge eating through difficulties in emotion regulation was supported for women and men. Post-hoc analyses supported the moderation effect of self-compassion on the association between body dissatisfaction and negative affect for women only. Specifically, women with greater in self-compassion reported lower negative affect in the face of body dissatisfaction. Finally, post-hoc analyses examining the paths of the original Dual Pathway Model were conducted. Results showed only the mediation from body dissatisfaction to binge eating through negative affect was
supported, both for women and men. Limitations, contributions, future research directions, and implications were discussed.
CHAPTER 1. INTRODUCTION

Binge eating is the overconsumption of food within a discrete time period that occurs due to disinhibition (American Psychiatric Association, 2013). This behavior can include eating more rapidly than what is considered normal, feeling uncomfortably full, eating when not physically hungry, eating in isolation due to embarrassment, and feeling distressed about it afterward. Binge eating is a problem on college campuses. Lipson and Sonneville (2017) found in a survey across twelve college campuses that the prevalence rate for binge eating was 49% in women and 30% in men. These high rates of binge eating indicate that college students are an at-risk population who can benefit from early prevention, identification, and intervention for this disordered eating behavior.

Binge eating is related to low self-esteem, depression, substance abuse, self-harm, and suicide (Heatherton & Baumeister, 1991). The mental and physical health consequences associated with binge eating stress the importance of studying risk factors that can be associated with the development of this disordered eating behavior, as well as protective factors that may interrupt this trajectory. This study aimed to examine the relationships among body dissatisfaction, restricted eating, difficulties in emotion regulation, and binge eating, as well as the protective role of self-compassion.

Modification of Dual Pathway Model for Binge Eating

Body dissatisfaction is a state of awareness of the discrepancies between one’s body and an internalized ideal. Considering the enormous pressures to look certain ways and the salience of these messages in our society, body dissatisfaction is a predictor of eating disorders as people try to control the way their body looks or cope with the painful emotions related to body dissatisfaction (Stice & Shaw, 2002). Stice (1994) proposed a Dual Pathway Model that explains
the relationship between body dissatisfaction and binge eating. The temporal sequencing for risk factors in this model has been supported in a longitudinal study (Stice & Van Ryzin, 2019). The original model includes sociocultural influences on body dissatisfaction, however, this study focused on how body dissatisfaction is related to binge eating. Figure 1 is provided below for clarification.

The first pathway is through restricted eating, which can result in binge eating through two mechanisms. The first mechanism is that restricted eating mediates the relationship between body dissatisfaction and binge eating. Body dissatisfaction may drive individuals to diet, or restrict their eating, as a method of weight control (Figure 1, path A). Restricted eating may lead to binge eating through disinhibited eating (Figure 1, path B). This is because some who restrict their eating may engage in subsequent binge eating due to caloric deprivation. Those who restrict their eating may also binge eat due to the abstinence-violation effect (Stice, 2001). Essentially, one who lapses from a commitment such as restricted eating may then uncontrollably engage in the behavior they were originally trying to prevent (i.e., binge eating). The second mechanism is through the relationship between restricted eating and negative affect. Once again, individuals who experience body dissatisfaction may engage in restricted eating to control their weight (Figure 1, path A). They may then be more at risk to experience negative affect because they can be in a starvation state or are cognitively controlling their eating instead of listening to their physiological cues of hunger and satiety (Figure 1, path C). Finally, they may binge eat as a distraction or for comfort to cope with their experience of negative affect (Figure 1, path E).

The second pathway is through a mediational negative affect regulation pathway. Those who experience body dissatisfaction may experience negative affect because they are not measuring up to their ideal body (Figure 1, path D). Experiencing negative affect may result in
binge eating because eating may be a distraction from feeling painful emotions and food may be used as a comfort (Figure 1, path E).

![Diagram of Dual Pathway Model for binge eating](image1)

**Figure 1.** Dual Pathway Model for binge eating.

![Diagram of Modified Dual Pathway Model for binge eating](image2)

**Figure 2.** Modified Dual Pathway Model for binge eating.

The first hypothesis in the present study was that restricted eating partially mediates the relationship between body dissatisfaction and binge eating (Figure 1, paths A and B). More specifically, it was anticipated that there would be a positive association between body dissatisfaction and restricted eating (Figure 1, path A), and a positive association between
restricted eating and binge eating (Figure 1, path B). The rationale was that those who experience body dissatisfaction may restrict their eating to control their weight or appearance. However, food restriction may relate to feelings of hunger and they may turn to binge eating due to caloric deprivation, over-focusing on food, and loss of control eating after food deprivation (Polivy, 1996; Stice, 2001).

This study attempted to modify Stice’s model by proposing difficulties in emotion regulation in the place of negative affect to predict binge eating. The modified model is presented in Figure 2. Negative affect is the experience of negative emotions such as shame and fear (Watson, Clark, & Tellegen, 1988). This study made the argument that difficulties in regulating painful emotions in particular can result in binge eating. The rationale for this modification was that this study sought to explore how the experience of negative affect and its management were related to binge eating. For example, some who experience body dissatisfaction may become consumed by their negative emotions and have a difficult time concentrating on tasks, they may feel out of control, and they may criticize themselves for having painful emotions. As a result of their difficulties in regulating their emotions, they may turn to binge eating to distract or comfort themselves.

There is evidence that those who restrict their eating may have difficulty regulating their emotions. Those who diet can develop an obsession with food (Jones & Rogers, 2003). This preoccupation can prevent them from focusing on internal states. They may therefore ignore their experiences of emotions because thoughts of food dominate their minds. Indeed, those who diet may experience less awareness and understanding of their emotions and lack access to adaptive emotion regulation strategies (Lavender et al., 2015; Racine & Wildes, 2013). They may then engage in binge eating after experiencing difficulty in emotion regulation to alleviate themselves.
from their painful emotions. Thus, the second hypothesis of this study was to support the modification of the mechanism from body dissatisfaction to restricted eating (Figure 2, path A), to difficulties in emotion regulation (Figure 2, path C), and to binge eating (Figure 2, path E). Specifically, there would be a positive relationship between body dissatisfaction and restricted eating, a positive relationship between restricted eating and difficulties in emotion regulation, and a positive relationship between difficulties in emotion regulation and binge eating.

Body dissatisfaction can be associated with difficulties in emotion regulation. Those who experience body dissatisfaction may feel angry at themselves for failing to control how they look. They may experience this anger as dominating their mind and have trouble focusing on other things. Supporting this, Sim and Zeman (2005) found in a sample of teenage girls that body dissatisfaction was associated with symptoms of emotion dysregulation. Furthermore, Whiteside et al. (2007) found that greater difficulties in emotion regulation predicted binge eating in a large sample of undergraduates. In particular, difficulties identifying emotions and limited access to emotion regulation strategies were strong predictors. This provides support that those who have difficulties in emotion regulation may binge eat in response to painful feelings. Finally, Sim and Zeman evidenced that the relationship between body dissatisfaction and bulimic symptoms was partially mediated by emotion dysregulation variables for teenage girls. It is likely that difficulties in emotion regulation might be a mediator for the link between body dissatisfaction and binge eating for college students. Thus, the third hypothesis of this study was to support the modification of the pathway by which difficulties in emotion regulation mediates the relationship between body dissatisfaction and binge eating (Figure 2, paths D and E). In other words, there would be a positive relationship between body dissatisfaction and difficulties in emotion regulation, a positive relationship between difficulties in emotion regulation and binge eating.
Self-Compassion as a Moderator

Self-compassion theory refers to a process by which unpleasant emotions are held in awareness with “kindness, understanding, and a sense of shared humanity,” (Neff, 2003a, p. 92). The three components of self-compassion are: self-kindness rather than self-judgment, common humanity rather than isolation, and mindfulness rather than over-identification with one’s thoughts and feelings. In accordance with evidence that eating disorders are associated with difficulties in emotion regulation, extant research has found that those with eating disorders practice less self-compassion compared to non-clinical samples (Ferreira, Pinto-Gouveia, & Duarte, 2013). Interventions teaching women self-compassion in compassion-focused therapy have been used to treat anorexia nervosa, bulimia nervosa, binge eating disorder, and eating disorder not otherwise specified (Goss & Allan, 2010; Kelly & Carter, 2014).

The fourth hypothesis sought to expand on the modified Dual Pathway Model by adding self-compassion as a moderator. The fourth hypothesis was that self-compassion would moderate the positive association between body dissatisfaction and difficulties in emotion regulation (see Figure 2, path F). This positive relationship was hypothesized to be significantly stronger for those lower in self-compassion than for those higher in self-compassion. Those who are lower in self-compassion are predicted to have greater difficulties in emotion regulation in response to body dissatisfaction. Those who are lower in self-compassion may obsess about the flaws in their body and feel alone in their state of imperfection. Their fixation and isolation may let them feel angry and ashamed at themselves for feeling that way. They may also become overwhelmed by their painful emotions and feel out of control.

On the other side, this study predicted that those higher in self-compassion would be more likely to be protected from experiences of difficulties in emotion regulation in the face of
body dissatisfaction. Conceptually, those who are higher in self-compassion may be more likely to be tolerant of their imperfect bodies and be kinder towards themselves. They may also remind themselves that most people experience body dissatisfaction and feel less alone in their painful experiences. They may accept their bodies as they are. These practices may not completely eliminate, but serve to decrease the experience of overwhelming painful emotions and losing control over one’s emotions as a result of body dissatisfaction. Empirically, Adams and Leary (2007) conducted a self-compassion intervention for restricted eaters. They found that the intervention reduced self-criticism and negative affect. The authors concluded that the intervention helped participants reduce self-criticism, realize that everyone eats unhealthily, and not become overwhelmed by their feelings. Therefore, higher self-compassion can be helpful to decrease difficulties in emotion regulation when people are dissatisfied with their bodies. Albertson, Neff, and Dill-Shackleford (2015) tested the effects of a self-compassion meditation intervention. They found that the intervention reduced feelings of body dissatisfaction and body shame. Thus, higher self-compassion may be related to the decreased experience of painful emotions related to body dissatisfaction. Taken together, these studies provide support for conceptual reasons that self-compassion may serve as a protective factor that buffers the relationship between body dissatisfaction and difficulties in emotion regulation.
Figure 3. Hypothesized Moderation Effect of Self-Compassion on the Association Between Body Dissatisfaction and Difficulties in Emotion Regulation.

The Present Study

This study proposed three mediation hypotheses and one moderation hypothesis. The first hypothesis was that restricted eating would mediate the relationship between body dissatisfaction and binge eating (see Figure 1, paths A and B). The second hypothesis was that the relationship between body dissatisfaction and binge eating would be mediated by restricted eating and then difficulties in emotion regulation (see Figure 2, paths A, C, and E). The third hypothesis was that difficulties in emotion regulation would mediate the relationship between body dissatisfaction and binge eating (Figure 2, paths D and E).

The fourth hypothesis sought to expand on the modified model by supporting self-compassion as a moderator (Figure 2, path F). The fourth hypothesis was that self-compassion
would moderate the relationship between body dissatisfaction and difficulties in emotion regulation.

Although more research is being conducted in this area, a search through PsycINFO did not find any published articles related to self-compassion and body dissatisfaction in men. Men may experience body dissatisfaction differently from women. Women are at risk for body dissatisfaction due to sociocultural pressures to conform to a thin ideal, which is perpetuated by the media, peers, and family (Bessenoff, 2006; Thompson & Stice, 2001). Men also experience pressure to be thin, but also endorse a drive for muscularity (Fernandez & Pritchard, 2012; Morrison, Morrison, & Hopkins, 2003). Although experiences of body dissatisfaction may be different between women and men, body dissatisfaction is related to disordered eating behavior in both groups (Olivardia, Pope, Borowiecki, & Cohane, 2004; Striegel-Moore & Bulik, 2007). The Dual Pathway Model was originally proposed for women, however, it is also applicable to men (Mason & Lewis, 2015). Thus, this study sought to provide evidence of the modified model’s utility to men. For exploration purposes, a post hoc analysis examined whether the modified model invariantly applied to women and men. The dearth of research on the role of self-compassion as a protective factor for men indicates an area for further exploration, since men are also at risk for body dissatisfaction and may benefit from self-compassion interventions. Thus, this study aimed to explore the applicability of the modified Dual Pathway Model to women and men.
CHAPTER 2: LITERATURE REVIEW

This literature review begins with an overview of binge eating in college students. After that, a summary of the Dual Pathway Model for binge eating will be provided along with the present study’s modification. Next, the moderator of self-compassion will be explored. Finally, this review will conclude with a summary of the present study.

Binge Eating in College Students

Binge eating is an overconsumption of food within a discrete time period that is characterized by a loss of control (American Psychiatric Association, 2013). Binge eating is described as eating rapidly, feeling uncomfortably full, eating when not hungry, secretly eating due to embarrassment, and experiencing painful emotions such as guilt after overeating. Risk factors for binge eating include body dissatisfaction, perfectionism, low self-esteem, pressure to be thin, dieting, and impulse control difficulties (Stice, 2002). Binge eating is also associated with multiple adverse consequences such as decreased academic performance (Hoerr, Bokram, Lugo, Bivins, & Keast, 2002), low self-esteem, depression, substance abuse, self-harm, and suicide (Heatherton & Baumeister, 1991).

The median age for the onset of eating disorders ranges from 18-21 years, which is considered within the traditional college age range (Hudson, Hiripi, Pope, & Kessler, 2007). Indeed, college students exhibit high levels of binge eating (Lipson & Sonneville, 2017). College may be stressful time period due to academic pressures, social pressures to look a certain way, and feelings of ineffectiveness. College represents for many a time of transition to independence, however, increased pressures and competition can generate painful emotions that may be dealt with in different ways, including binge eating. Related to this, Striegel-Moore et al. (1989) found that 15% of women in a freshman college sample showed an onset of binge eating, and
disordered eating behaviors increased over time. College students particularly at risk for binge eating may include athletes due to intense pressures to look a certain way and sorority members as a result of group influences on appearance and eating behavior (Hoerr et al., 2002). Taken together, college students represent an at-risk group for binge eating due to the unique pressures they experience.

**Dual Pathway Model for Binge Eating**

There exist several theoretical models for the development of binge eating, however, the Dual Pathway Model is the most widely researched and supported (Holmes, Fuller-Tyszkiewicz, Skouteris, & Broadbent, 2015; Stice, 1994; Stice, 2001; Stice, Shaw, & Nemeroff, 1998). The Dual Pathway Model proposes sociocultural influences on body dissatisfaction, which is related to binge eating through two pathways. The first pathway to binge eating is through dieting, which may occur through two mechanisms (see Figure 1). Those who are dissatisfied with their bodies may diet in order to control their weight or shape (Figure 1, path A). The first mechanism is that eating restriction may result in binge eating or disinhibited eating due to the abstinence-violation effect (Figure 1, path B). The second mechanism is that dieting (i.e., restricted eating) may produce negative affect by promoting cognitive control over eating rather than following physiological cues, changing psychological functioning, or because of failures to reduce weight (Figure 1, path C). Negative affect is then related to binge eating, which is used as a coping mechanism (Figure 1, path E). The second pathway from body dissatisfaction to binge eating is a negative affect regulation pathway (see Figure 1, paths D and E). Body dissatisfaction produces negative affect due to the disparity between one’s actual and ideal bodies (Figure 1, path D). This negative affect can then result in binge eating, which is used as a distraction or comfort (Figure 1, path E).
The Dual Pathway Model was originated to explain binge eating in girls and women, however, it has also been used in studies of adolescent boys and men (Mason & Lewis, 2015; Ricciardelli & McCabe, 2001). Mason and Lewis (2015) found that in a comparison between men and women, higher BMI was associated with greater body shame in women and dietary restraint in men. The authors explain that since women are expected to conform to a thin ideal, having a larger body can produce feelings of shame. On the other hand, there was a relationship between higher BMI and body shame in men, yet men may restrict their eating for other reasons, such as becoming healthier or to shape their body to look more athletic. Stice and Van Ryzin (2019) recently supported the temporal sequencing for risk factors in the Dual Pathway Model. They found that pressure to be thin and thin-ideal internalization predicted body dissatisfaction, which in turn predicted restricted eating and negative affect, which in turn predicted binge eating. The individual components of the Dual Pathway Model are described in more detail below.

**Contributors to body dissatisfaction.** Body dissatisfaction is the “negative subjective evaluation of one’s physical body” (Stice & Shaw, 2002, p. 985). Body dissatisfaction can be thought of as a state resulting from awareness of the differences between one’s actual body and an internalized ideal. Body dissatisfaction is a predictor of eating disorders because people may engage in disordered eating behavior to control the way their bodies look or to cope with painful emotions associated with body dissatisfaction. Contributors to body dissatisfaction include sociocultural pressures to be thin from peers, media, and family, internalization of a thin or muscular ideal, and high adiposity (Blond, 2008; Grabe, Ward, & Hyde, 2008; McCreary & Sasse, 2001; Stice & Bearman, 2001; Stice & Shaw, 2002). Essentially, messages from others about how one’s body should look are internalized as one’s own beliefs. Women are expected to
conform to a thin ideal, while men endorse thinness and a drive for muscularity (Fernandez & Pritchard, 2012; Morrison, Morrison, & Hopkins, 2003). Stice and Shaw (2002) noted that greater adiposity is a risk factor for body dissatisfaction in girls because increased adiposity creates a deviation from the thin ideal. Higher adiposity is also associated with body dissatisfaction in boys (Presnell, Beardman, & Stice, 2004). Dissatisfaction with one’s body can result in painful emotions because one is not measuring up to how they think they should look and some may cope by engaging in disordered eating behavior.

Several instruments have been created to measure body dissatisfaction as a unidimensional or multidimensional construct. The present study used the Body-Esteem Scale for Adolescents and Adults (BESAA; Mendelson, Mendelson, & White, 2001). The BESAA is a multidimensional scale of body dissatisfaction that has three subscales: appearance, weight, and attribution. The appearance subscale assesses feelings about one’s overall appearance. The weight subscale measures satisfaction with one’s weight. The attribution subscale measures how one assumes others think about their appearance. Males overall have higher body esteem, supporting statistics that females are more dissatisfied with their bodies (Feingold & Mazzella, 1998).

The Body Parts Satisfaction Scale-Revised (BPSS-R; Petrie, Tripp, & Harvey, 2001) was considered for the present study. The BPSS-R measures satisfaction with individual body parts and provides a body dissatisfaction score for the face and body. The BESAA was chosen because it is a multidimensional measurement of body dissatisfaction. In particular, the satisfaction with weight component was important for this study due to its relationship with restricted eating (Stice, 2001). In summary, the BESAA was used to provide a more nuanced measurement of body dissatisfaction.
**Restricted eating.** Restricted eating, or dieting, can be a consequence of body dissatisfaction because this behavior is engaged in with the intention of controlling one’s shape or weight. Those who restrict their eating believe that doing so will prevent weight gain or promote weight loss. Unfortunately, dieting may paradoxically be associated with binge eating and weight gain (French & Jeffrey, 1994; Tiggeman, 2004). In a longitudinal study of the relationship between dieting and binge eating in a group of adolescents and young adults, Goldschmidt et al. (2011) found that dieters were more 2-3 times more likely to binge eat, and depression and low self-esteem increased this risk. Dieting is thought to contribute to binge eating due to starvation from caloric restriction and the abstinence-violation effect. First, those who starve themselves may binge eat to make up for caloric deprivation. Biologically, the body seeks to return to a non-starvation state. Second, breaking a diet can result in binge eating due to the abstinence-violation effect (AVE). Marlatt and Gordon (1985) proposed the AVE as a model of relapse in cigarette smokers. The two components of the AVE are a causal attribution for the lapse and an affective reaction to the attribution. Empirically, Grilo and Shiffman (1994) found that the repetition of an eating binge was related to greater internal, global, and uncontrollable causal attributions along with feelings of guilt. In other words, those who break a diet may criticize themselves, think rigidly, and feel overwhelmed with negative affect. As a result, they may then be more likely to binge eat.

The Restraint Scale (RS; Herman & Mack, 1975), the cognitive restraint subscale of the Three Factor Eating Questionnaire (TFEQ; Stunkard & Messick, 1985), and the restrained eating subscale of the Dutch Eating Behavior Questionnaire (DEBQ; van Strien, Frijters, Bergers, & Defares, 1986) are extensively used to measure restricted eating. However, there exist differences in the extent to which self-reports predict actual caloric restriction. For example,
Laessle, Tuschl, Kotthaus, and Pirke (1989) found that while all three measure motivation for restraint, the TFEQ and the DEBQ may be more applicable to assess risk for actual caloric restriction. Furthermore, the TFEQ and DEBQ may be more likely to assess actual and current dieting (Allison, Kalinsky, & Gorman, 1992; Lowe, 2003).

The present study used the cognitive restraint subscale of the Three Factor Eating Questionnaire (TFEQ; Stunkard & Messick, 1985). This subscale was developed as a unidimensional measure of restricted eating (Stunkard & Messick, 1985). However, since its inception, the factor structure of this subscale has been disputed. For instance, some analyses have presented a two-factor structure composed of flexible and rigid control (Shearin, Russ, Hull, Clarkin, and Smith, 1994; Westenhoefer, 1991). Other studies have found a three-factor structure consisting of emotional/cognitive concern for dieting, calorie knowledge, and behavioral dieting control (Ricciardelli & Williams, 1997). Despite the debate about the factor structure of the TFEQ, in a comparison among four measures of dietary restraint (DEBQ, TFEQ, the Revised Restraint Scale, and the Current Dieting Questionnaire), Williamson et al. (2004) found that changes only in TFEQ scores predicted caloric restriction. Furthermore, Zambrowicz et al. (2019) found a negative correlation \( r = -.60 \) between TFEQ restraint scores and actual caloric intake, providing the justification for the use of this measure.

**Negative affect.** Negative affect is a state of distress that can include anger, guilt, and fear (Watson, Clark, & Tellegen, 1988). Negative affect can be a consequence of body dissatisfaction because of one’s emotional response to the disparity between one’s own body and an internalized ideal. That is, those whose bodies don’t “measure up” may experience painful emotions as a consequence. Negative affect is hypothesized to be a predictor of binge eating because binge eating is used as a distraction or comfort to cope (Hawkins & Clement, 1984).
Indeed, Deaver, Miltenberger, Smyth, Meidinger, and Crosby (2003) found that negative affect preceded binge eating in a group of college students, which decreased during binge eating episodes.

The negative affect regulation model has received support from cross-sectional and laboratory studies. In contrast, a meta-analysis on ecological momentary assessments concluded that while negative affect indeed precedes binge eating, it may actually increase after binge eating periods (Haedt-Matt & Keel, 2011). A limitation of ecological momentary assessments is that it does not accurately assess negative affect during binge eating, therefore it does not assess the negative affect regulation model during binge eating periods. However, binge eating may result in subsequent experiences of negative affect (e.g., depression, anger, and shame) because of one’s self-criticism of their lack of control over their eating. Although evidence is mixed whether binge eating decreases negative affect during and after binges, negative affect is supported as a predictor of this behavior.

The Positive and Negative Affect Schedule (PANAS; Watson, Clark, & Tellegen, 1988) is a measure of positive (e.g., “excited,” “proud”) and negative (e.g., “upset,” “scared”) mood states. The present study used the negative affect scale. Negative affect was positively associated with depression and anxiety (Crawford & Henry, 2004), and binge eating (Deaver et al., 2003).

**Binge eating.** As mentioned earlier, binge eating is a common behavior in college students (Lipson & Sonneville, 2017). The transition to college may be a stressful experience for some students because they are away from home for the first time and are independently responsible for their lives and success. College also represents a place where there are high academic pressures as well as pressures from peers to look and act in certain ways. Together, all
of these new experiences may be overwhelming, and the negative affective consequences may be dealt with through binge eating.

The present study used the Eating Disorder Diagnostic Scale (EDDS; Stice, Telch, & Rizvi, 2000). The EDDS was designed to diagnose binge eating disorder, however, this study used it to indicate greater binge eating. As with many other disordered eating measures, the EDDS uses a variety of response formats, particularly dichotomous and frequency.

The Binge Eating Scale (BES; Gormally, Black, Daston, & Rardin, 1982) was considered for use in the present study. Construct validity for the BES was evidenced through factor analysis of cognitive factors related to dieting in a sample of overweight and obese adults. The validity of the BES was questioned by comparing its scores to scores on the Eating Disorder Examination (EDE; Cooper & Fairburn, 1987), the “gold standard” for diagnosing eating disorders (Greeno, Marcus, & Wing, 1995). About half of the sample identified as binge eaters by the BES were not identified by the EDE, leading the authors to hypothesize that the BES does not measure all constructs that determine binge eating. With this information, the present study used the EDDS because its construct validity was demonstrated by highly correlating with EDE scores.

**Modification of Dual Pathway Model**

While the Dual Pathway Model has been empirically supported, it remains to be determined how the specific experience of negative affect is related to binge eating. In particular, not all people who experience negative affect in relation to body dissatisfaction engage in binge eating. The present study proposed that rather than solely the experience of negative affect, difficulties in emotion regulation predicts binge eating. In addition, the present study sought to examine self-compassion as a protective factor against binge eating. Therefore, the present study aimed to modify the Dual Pathway Model (see Figure 2).
The first hypothesis of the present study was that restricted eating partially mediates the relationship between body dissatisfaction and binge eating (Figure 2, paths A and B), supporting findings reported by Stice and Shaw (2002). The predictor of restricted eating may only partially mediate this relationship because fasting, or induction of a starvation state, may better explain the association between caloric restraint and binge eating (Stice, Davis, Miller, & Marti, 2008). However, the aim of the present study was to study a more common eating behavior in a sample of college students. With this rationale, restricted eating was used for the first mediation hypothesis.

The present study proposed that instead of solely negative affect, difficulties in emotion regulation would be a predictor of binge eating. Gratz and Roemer (2004) conceptualized difficulties in emotion regulation to comprehensively describe emotion dysregulation and developed the Difficulties in Emotion Regulation Scale (DERS) to capture this construct. These two authors proposed that there are six dimensions for DERS: non-acceptance of emotional responses, difficulty engaging in goal-directed behavior, impulse control difficulties, lack of emotional awareness, limited access to emotion regulation strategies, and lack of emotional clarity. Non-acceptance of emotional responses refers to having negative secondary emotional responses or not accepting one’s primary emotional responses. Difficulty engaging in goal-directed behavior is having trouble concentrating on and completing tasks when experiencing negative emotions. Impulse control difficulties represent difficulties in controlling behavior when experiencing negative emotions. Lack of emotional awareness is the lack of attention to and lack of recognition of one’s negative emotions. Limited access to emotion regulation strategies refers to the belief that there is not much one can do to regulate their negative
emotions. Lack of emotional clarity is one’s deficit in knowing what emotions they are experiencing.

The DERS is a highly used and empirically-validated measure of emotion dysregulation (Fowler et al., 2014; Ritschel, Tone, Schoemann, & Lim, 2015). Greater difficulties in emotion regulation is associated with greater self-harm and intimate partner violence (Gratz & Roemer, 2004), eating disorders (Brockmeyer et al., 2014), depression, anxiety, somatization (Fowler et al., 2014) and symptoms of borderline personality disorder (Glenn & Klonsky, 2009).

The present study sought to elucidate how the experience of negative affect was related to binge eating. Specifically, this study aimed to explore how negative affect is dealt with (i.e., emotion regulation or dysregulation) in association with body dissatisfaction. Empirically, in a sample of obese adults with binge eating disorder, difficulties in emotion regulation was associated with disordered eating behavior over and above negative affect (Gianini, White, & Masheb, 2013). Therefore, solely the presence of negative affect may not fully explain the development of disordered eating symptoms. Instead, the ways that negative affect is regulated may provide a more complete picture.

**Restricted eating as a predictor of difficulties in emotion regulation.** Restricted eating is thought to be associated with negative affect in the original Dual Pathway Model because failures to reduce weight and the effects of starvation can influence mood (Stice, 2001). First, as mentioned before, dieting does not consistently lead to enduring weight loss and may even be associated with weight gain. A person’s continual desire to change their body by dieting but have ineffective efforts may lead to difficulties in emotion regulation because they feel overcome by painful emotions related to their failure. Second, a starvation state may be related to emotion dysregulation due to changes psychological functioning. To support this, Rowsell, MacDonald,
and Carter (2016) had results that patients with anorexia nervosa who completed a weight gain program reported fewer difficulties in emotion regulation. That is, once they regained their weight, they were more able to regulate their emotions. Haynos and Fruzzetti (2011) also noted that a starvation state is associated with impaired concentration and emotional vulnerability. Therefore, a starvation state from food restriction may be associated with difficulties in emotion regulation.

In addition, restricted eaters develop a preoccupation with food (Jones & Rogers, 2003; Polivy & Herman, 1985). Those who diet develop an obsession with food that dominates their thoughts, and they spend much energy denying their desires. This obsession may be related to difficulties in emotion regulation because they may become distracted from their experiences of emotions. For instance, if someone is focusing on food that they don’t allow themselves to have, they do not pay attention to their emotions or have trouble thinking about things other than food. There is evidence that those who restrict their eating may have difficulty regulating their emotions, for example, they may experience less awareness and understanding of their emotions and lack access to adaptive emotion regulation strategies (Lavender et al., 2015; Racine & Wildes, 2013). The directional relationship between restricted eating and emotion dysregulation is unclear. It is possible that restricted eating predicts difficulties in emotion regulation given the evidence above. It is also possible that difficulties in emotion regulation predicts restricted eating because restricted eating is another disordered eating behavior that can be used to as a maladaptive emotion regulation strategy. However, it is possible that restricted eating is a maintenance factor for difficulties in emotion regulation (Haynos & Fruzzetti, 2011). The present study predicted that restricted eating would predict difficulties in emotion regulation (Figure 2, path C).
Difficulties in emotion regulation as a predictor of binge eating. Emotion dysregulation is a core component of theories about disordered eating (Bydlowski et al., 2005). Emotions that may precipitate disordered eating may include anger, sadness, shame, and fear (Fox & Power, 2009). In a meta-analysis of experimental studies about emotion regulation and binge eating in obese people, Leehr et al. (2015) found that negative emotions trigger binge eating through impairment of self-regulation. That is, some who experience negative affect may be unable to regulate it adaptively and turn to binge eating. The authors also found that negative affect and the use of distraction were related to higher food intake. Finally, the authors evidenced preliminary support for the relief component (i.e., mood improvement) for binge eating.

Harrison, Sullivan, Tchanturia, and Treasure (2010) reported a large effect size for difficulties in emotion regulation in a sample of women with eating disorders, including bulimia nervosa, compared to healthy controls. Mallorquí-Bagué et al. (2018) supported these findings by elucidating that those with binge eating disorder had significantly higher scores of difficulties in emotion regulation than healthy controls. Interestingly, this study found that difficulties in emotion regulation was present among all eating disorders, but those who engaged in binge eating reported the highest levels of this construct. Finally, Whiteside et al. (2007) found that greater difficulties in emotion regulation predicted binge eating in a sample of college students. Particularly, limited access to emotion regulation strategies and lack of emotional clarity predicted more frequent binges. Thus, it was hypothesized that difficulties in emotion regulation would predict binge eating because those who experience emotion dysregulation may binge eat as a maladaptive emotion regulation strategy (Figure 2, path E).

Difficulties in emotion regulation as a mediator between body dissatisfaction, restricted eating, and binge eating. Considering the support above, the present study proposed
difficulties in emotion regulation in place of negative affect to predict binge eating. The present study hypothesized that difficulties in emotion regulation would mediate the relationship between body dissatisfaction, restricted eating, and binge eating. First, those who are dissatisfied with their bodies may restrict their eating in an attempt to control their weight (Figure 2, path A). They may think that they are too large or heavy, therefore by reducing their caloric intake, they can change their body to look like an internalized ideal. From there, restricted eating can be associated with difficulties in emotion regulation because of painful emotions resulting from failure to achieve target weight loss, emotional vulnerability from caloric deprivation, or preoccupation with food that distracts them from attention to their emotions (Figure 2, path C). Finally, difficulties in emotion regulation can be associated with binge eating due to several possible reasons. Those who experience difficulties in emotion regulation may feel overwhelmed with painful emotions and binge eat to distract themselves. They may also experience a lack of self-control or greater impulsivity related to their difficulties in emotion regulation and turn to binge eating (Figure 2, path E). Therefore, based on the above reasoning, the second mediation hypothesis was that the association between body dissatisfaction and binge eating could be mediated by restricted eating and then difficulties in emotion regulation (i.e., body dissatisfaction $\rightarrow$ restricted eating $\rightarrow$ difficulties in emotion regulation $\rightarrow$ binge eating; see Figure 2, paths A, C, and E).

**Body dissatisfaction as a predictor of difficulties in emotion regulation.** Body dissatisfaction can result in difficulties in emotion regulation through the induction of painful emotions when one’s body does not match an ideal. For instance, someone who feels ashamed of how they look may experience this shame as overwhelming and have difficulty concentrating on anything else besides their imperfect body. They may also feel angry at themselves because they
were unable to shape their body into an ideal shape or weight and blame themselves for this failure, prolonging the intensity of their body dissatisfaction.

In a sample of teenage girls, Sim and Zeman (2005) evidenced that body dissatisfaction was associated with negative emotionality ($r = .40$), poor emotional awareness ($r = .32$), and difficulty coping with negative emotions ($r = .29$). This relationship between body dissatisfaction and emotional dysregulation symptoms provided support for the hypothesized association between body dissatisfaction and difficulties in emotion regulation in the present study.

Furthermore, Dakanalis et al. (2015) found through structural equation modeling that body dissatisfaction was positively associated with emotion dysregulation in a sample of men ($r = .33$). Although causality was not established, these results also provided indirect support for the relationship between body dissatisfaction and difficulties in emotion regulation.

**Difficulties in emotion regulation as a mediator between body dissatisfaction and binge eating.** The present study proposed that difficulties in emotion regulation mediates the relationship between body dissatisfaction and binge eating. Those who are dissatisfied with their appearance may judge their imperfect body and cannot accept their dissatisfied feelings about their body. They may have difficulties in regulating their emotions, such as feeling overwhelmed with their painful thoughts and feelings in relation to their body, having difficulty focusing on things other than their painful feelings, or feeling angry at themselves for having painful feelings (Figure 2, path D). Moreover, these difficulties in regulating emotion may put them in the vulnerable situation to engage in binge eating for several reasons (Figure 2, path E). For example, binge eating might help them to distract from painful feelings and temporarily alleviate these feelings. Their engagement in binge eating might also be due to the lack of adaptive emotion regulation strategies available to them.
Sim and Zeman (2005) found in a study of teenage girls that the relationship between body dissatisfaction and bulimic symptoms was partially mediated by emotion regulation variables. Particularly, body dissatisfaction was associated with difficulties in identifying emotional states and poor coping with negative emotion, which in turn were related to bulimic behavior. The authors concluded that not just negative affect, but emotion regulation variables contribute to the relationship between body dissatisfaction and bulimic behavior. Although the results are from a sample of teenage girls, it follows that similar results are likely found in a sample of college students, who are expected to not particularly differ on body dissatisfaction and disordered eating.

This study provided indirect support that difficulties in emotion regulation might mediate the association between body dissatisfaction and binge eating. Thus, the third hypothesis in the present study proposed that difficulties in emotion regulation would mediate the association between body dissatisfaction and binge eating (Figure 2, paths D and E).

Self-Compassion as a Moderator

Self-compassion is a personal resource that may lessen the positive association between body dissatisfaction and difficulties in emotion regulation (Figure 2, path F). Self-compassion theory involves three components: painful emotions are dealt with kindness rather than criticism, are recognized as a part of the human experience rather than isolating, and are held in balanced awareness rather than over-identification (Neff, 2003a). Greater self-compassion is associated with decreased self-criticism, depression, rumination, thought suppression, and anxiety (Neff, Kirkpatrick, & Rude, 2007), greater life satisfaction and compassion for others (Neff & Germer, 2013), and decreased negative affect (Leary, Tate, Adams, Allen, & Hancock, 2007).
Neff (2003) developed the Self-Compassion Scale, a 21-item assessment of six components of self-compassion that are paired into two-factor models: self-kindness vs. self-judgment, common humanity vs. isolation, and mindfulness vs. over-identification. Self-kindness refers to practicing patience and tolerance in reaction to a perceived flaw or when experiencing painful feelings. This is in contrast to self-judgment, which is acting out self-criticism and punitiveness. Common humanity is the ability to recognize that one is not alone in their flaws and painful emotions since all humans experience these things. On the other hand, isolation refers to the experience of feeling alone in one’s suffering. Mindfulness is the practice of balanced awareness of one’s thoughts and feelings, whereas over-identification is allowing oneself to feel overwhelmed by painful emotions. When developing the Self-Compassion Scale, higher self-compassion was associated with lower depression and anxiety and greater life satisfaction (Neff, 2003). Women also reported lower self-compassion than men (Neff, 2003).

Interventions that can increase self-compassion include compassionate mind training, imagery building, Gestalt two-chair work, mindfulness-based stress reduction, dialectical behavioral therapy, and acceptance and commitment therapy (Barnard & Curry, 2011). Indeed, “third wave” cognitive-behavioral therapies composed of the latter three emphasize compassionate attitudes toward oneself. A “third wave” therapeutic approach known as compassion-focused therapy has been used to treat eating disorders (Goss & Allan, 2010). Compassion-focused therapy for eating disorders was developed from models of affect regulation and aims to work with shame, self-criticism, and pride. This approach targets three affect regulation systems. The first is threat detection and protection, the second is drive, vitality, and achievement, and the third is soothing and contentment. This theory posits that those who are unable to use the soothing system manage painful emotions by engaging in disordered eating
behavior. Thus, treatment involves psychoeducation, developing self-compassion, recovery, and maintenance. Through the practice of self-compassion, those who engage in disordered eating behavior are able to avoid self-blame, reduce self-criticism, and practice adaptive emotion regulation techniques to reduce this behavior.

**Self-compassion as a moderator between body dissatisfaction and difficulties in emotion regulation.** The present study proposed self-compassion as a buffer for the positive association between body dissatisfaction and difficulties in emotion regulation (Figure 2, path F). The rationale was that those higher in self-compassion may be protected from difficulties in emotion regulation because they might be able to be kind to themselves when they don’t “measure up,” they are able to remind themselves that everyone is dissatisfied with their bodies, and they might be able to prevent themselves from becoming overwhelmed by their emotions. Two self-compassion interventions are described below to support that self-compassion can be a moderator.

First, Adams and Leary (2007) examined the effects of a self-compassion intervention on the disinhibition effect in a sample of restrained eaters. The intervention involved a researcher delivering a scripted dialogue that included the three components of self-compassion to individual participants after they ate a doughnut. Participants were then allowed to break their diets by eating a desired amount of candies. Results were that self-compassion reduced self-criticism and negative affect after eating the doughnut, and the effects of the intervention were most effective for high restrictors. However, this intervention was not effective for those high in eating guilt.

Second, Albertson, Neff, and Dill-Shackleford (2015) examined the outcomes of a self-compassion meditation on body dissatisfaction. The treatment group listened to a 20-minute self-
compassion meditation every day for 3 weeks. Those who received the intervention reported lower body dissatisfaction and body shame and increased body appreciation, with medium effect sizes for all. The authors interpreted that the intervention facilitated less self-criticism, encouraged seeing the bigger picture, and increased mindfulness to allow participants to view their bodies with balance.

The above two empirical evidence provided support for the rationale of this moderation hypothesis. Self-compassion appears to reduce self-criticism and negative affect, which likely decreases difficulties in emotion regulation. Those who are able to practice self-compassion may be more accepting of their flawed bodies, have more awareness of their emotions, and practice an adaptive emotion regulation strategy. Therefore, those higher in self-compassion may have less difficulty to regulate their emotions in the face of body dissatisfaction.

**Applicability to Men**

Men may experience body dissatisfaction differently from women. Women are at risk for body dissatisfaction due to sociocultural pressures to conform to a thin ideal, which is perpetuated by the media, peers, and family (Bessenoff, 2006; Thompson & Stice, 2001). Men also experience pressure to be thin, but also endorse a drive for muscularity (Fernandez & Pritchard, 2012; Morrison, Morrison, & Hopkins, 2003). That is, men are expected to have lean bodies, but they are also pressured to conform to a muscular ideal that is characterized by well-defined arms and pectoral muscles. Compared to women, men may worry that they are not “big enough” (Morrison et al., 2003). Although experiences of body dissatisfaction may be different between women and men, body dissatisfaction is related to disordered eating behavior in both groups (Olivardia et al., 2004; Striegel-Moore & Bulik, 2007). The Dual Pathway Model was originally proposed for women, however, it is also applicable to men (Mason & Lewis, 2015).
Although eating disorders are generally thought of as women’s disorders, men are also at risk (Strother, Lemberg, Stanford, & Turberville, 2012). In a summary of the research, Weltzin et al. (2005) outline that men may be more likely than women to binge eat in response to body dissatisfaction, negative affect and restricted eating predict binge eating in women and men, and women and men respond similarly to treatment. However, men may be less likely to receive treatment for eating disorders in the first place.

A meta-analysis on sex differences in self-compassion revealed that men report greater self-compassion with a small effect size (Yarnell, et al., 2015). Another meta-analysis on the relationship between self-compassion and general psychopathology found that sex was not a moderator of the relationship (Macbeth & Gumley, 2012). That is, it appears that women and men both benefit from increased self-compassion. Although men may also be protected from psychopathology by an association with higher self-compassion, a search through PsycINFO did not find any studies related to self-compassion and body dissatisfaction in men.

Thus, this study sought to provide evidence of the modified model’s utility to men. For exploration purposes, a post hoc analysis examined whether the modified model invariantly applied to women and men. The dearth of research on the role of self-compassion as a protective factor for men indicated an area for further exploration, since men are also at risk for body dissatisfaction and may benefit from self-compassion interventions. Thus, this study aimed to explore the applicability of the modified Dual Pathway Model to women and men.

**Conclusion**

In summary, there were three goals for the present study. The first goal was to examine three mediation hypotheses in the modified Dual Pathway Model (see Figure 2). Specifically, the first mediation hypothesis was that the positive association between body dissatisfaction and
binge eating would be partially mediated by restricted eating (Figure 2, paths A and B). The second mediation hypothesis was that the association between body dissatisfaction and binge eating would be mediated by restricted eating first and then difficulties in emotion regulation (Figure 2, paths A, C, and E). The third mediation hypothesis was that the association between body dissatisfaction and binge eating would be mediated by difficulties in emotion regulation (Figure 2, paths D and E). The second goal was to examine the moderation effect of self-compassion. Specifically, it was hypothesized that self-compassion would moderate the association between body dissatisfaction and difficulties in emotion regulation (Figure 2, path F). The third goal was to examine whether the modified Dual Pathway Model would be invariant between women and men for exploratory purposes.
CHAPTER 3: METHODS

Power Analyses

Structural equation modeling requires large samples (Kline, 2011). A typical sample size for this method is about 200. Hatcher (1994) recommends at least 5 cases per parameter and Bentler and Chou (1995) preferred to have at least 10 per parameter. However, Kline (2011) recommends 10 cases per parameter at minimum for an adequate sample size, but 20 cases per parameter as ideal. In this study, the mediation hypotheses were examined in the path model through Mplus (Muthén & Muthén, 2010). In Mplus, a path model can be viewed as one observed variable for each latent variable. The factor loading for each path was fixed to 1 and the error term for each path was fixed to 0. Thus, the parameter to be estimated included variance for each latent variable (i.e., 4 variances for 4 latent variables), and paths among the 4 latent variables (i.e., 6 paths among 4 latent variables. According to this calculation, there were a maximum of 10 parameters to be estimated in the mediation model and a sample size between 100 (10 x 10 = 100) and 200 (10 x 20 = 200) was suggested to test the mediation hypothesis with four indicators.

For the moderation analysis, the present study aimed to obtain a small to medium effect size. In the G*Power program, a power analysis was set at a power of .80, an alpha level of .05, and a small (.02), medium (.15), and large (.35) effect size. Results indicated a sample of 395, 55, and 25 respective to each effect size. The present study estimated recruitment of 200 participants to detect a small to medium effect size.

Moreover, because participants were recruited from the psychology department’s undergraduate research pool, it was expected that 10-20% of these data would not be usable due to having a large number of missing data or failing to correctly respond to validity checking
items (e.g., “please answer ‘almost never’ for this question”). Given an estimate of 200 participants and 10-20% unusable data, a sample of 220-240 was advised to be collected. Finally, the present study aimed to examine invariance for the proposed model (see Figure 2) between women and men. With an estimate of 150 participants (between 100 and 200) per group and 10-20% unusable data, a sample of about 350 participants was suggested.

**Participants and Procedure**

This study was approved by the Iowa State University Institutional Review Board (see Appendix H). Participants were undergraduate students over the age of 18 in the Psychology Department’s undergraduate research pool at Iowa State University. Participants who met the requirements signed up for this study through two links separated by gender in the research pool. From there, they received a link to the online survey and signed an electronic informed consent form before filling out the survey. After completing the survey, participants entered their names and email addresses on a separate webpage to receive research credit.

A total of 500 individuals participated in this study. Eighteen out of these 500 did not complete any scales and were removed. Furthermore, there were 3 attention check items throughout the survey (e.g., “Please mark "true" or "false" for the following statement: one week has five days.”). Participants who answered any of the attention check items incorrectly were removed. Therefore, 40 participants who answered incorrectly one or more attention check items were removed. Finally, two participants who identified their ages as under 18 were removed. A final sample of 440 participants was used for the data analysis in this study.

Among 440 participants, 230 participants identified themselves as women, and 205 identified themselves as men. One identified as non-binary, 2 identified as genderqueer/gender non-conforming, 1 identified as other, and 1 did not respond this question. Participants’ ages
ranged from 18 to 31 ($M = 19.18$, $SD = 1.61$). Of these participants, 394 (89.55%) identified as White, 13 (2.95%) identified as African/African American/Black, 24 (5.45%) identified as Asian/Asian American/Pacific Islander, 22 (5%) identified as Hispanic/Latinx, 2 (0.45%) identified as Middle Eastern, 5 (1.14%) identified as American Indian/Alaska Native, 10 (2.27%) identified as multiracial, and 2 (0.45%) identified as other. BMIs ranged from 16.33 to 44.48 ($M = 24.10$, $SD = 4.46$).

**Measures**

*Body dissatisfaction.* The Body-Esteem Scale for Adolescents and Adults (BESAA; Mendelson, Mendelson, & White, 2001) is a 23-item measure of one’s satisfaction with their body and appearance (see Appendix B). The BES has three subscales: appearance (e.g., “I feel ashamed of how I look”), weight (e.g., “I am preoccupied with trying to change my body weight”), and attribution (e.g., “people my own age like my looks”). Items are rated on a scale from 0 (*never*) to 4 (*always*). The present study used the total score. Scores range from 0 to 92. Higher scores indicate greater dissatisfaction with one’s body. Mendelson et al. (2001) found coefficient alphas of .92 (appearance), .94 (weight), and .81 (attribution) in a sample of adolescents and college students. In this study, coefficient alphas were .93 for both women and men for the total scale. Construct validity was established by reporting positive correlations between global self-esteem and BE- Appearance, between actual weight and BE- Weight, and between social self- esteem and BE- Attribution in a sample of adolescents and college students (Mendelson et al., 2001).

*Restricted eating.* The cognitive restraint subscale of the Three Factor Eating Questionnaire (TFEQ-R; Stunkard & Messick, 1985) is a 21-item measure to assess restricted eating (see Appendix C). Sample items include, “I deliberately take small helpings as a means of
controlling my weight,” and “how often are you dieting in a conscious effort to control your weight?” Participants are asked to rate items in a variety of dichotomous (i.e., yes/no), Likert (e.g., 1 = not at all to 4 = very much), and frequency (e.g., 1 = rarely to 4 = always) formats. The present study used the total score. Scores range from 0 to 21. Higher scores indicate greater restricted eating. Coefficient alpha was .82 in a sample of college students (Gow, Trace, & Mazzeo, 2010). In this study, coefficient alphas were .84 for women and .81 for men. Construct validity for this subscale is evidenced through moderate ($r = .51$) to strong correlations ($r = .66$) with the restraint subscale of the Dutch Eating Behavior Questionnaire in young adult women (Laessle, Tuschl, Kotthaus, & Pirke, 1989) and undergraduate women and men (Allison, Kalinsky, & Gorman, 1992). Finally, the TFEQ-R in comparison to other measures of restricted eating predicts actual caloric restriction in overweight adults (Williamson et al., 2004) and adults with anorexia nervosa, bulimia nervosa, and without eating disorders (Zambrowicz, 2019).

**Difficulties in emotion regulation.** The Difficulties in Emotion Regulation Scale (DERS; Gratz & Roemer, 2004) is a 36-item measure that assesses difficulties in emotion regulation (see Appendix D). The DERS has six subscales: non-acceptance of emotional responses (e.g., “when I’m upset, I become angry with myself for feeling that way”), difficulty engaging in goal-directed behavior (e.g., “when I’m upset, I have difficulty thinking about anything else”), impulse control difficulties (e.g., when I’m upset, I feel out of control”), lack of emotional awareness (e.g., “when I’m upset, I take time to figure out what I’m really feeling”), limited access to emotion regulation strategies (e.g., “when I’m upset, it takes me a long time to feel better”), and lack of emotional clarity (e.g., “I have no idea how I’m feeling”). Items are rated on a scale from 1 (almost never) to 5 (almost always). The present study used the total score. Scores range from 36 to 180. Higher scores indicate greater difficulties in emotion
regulation. Coefficient alphas ranged from .79 to .92 in a large sample of college students (Whiteside et al., 2007). In this study, coefficient alphas were .95 for women and .94 for men. Construct validity was evidenced through a negative correlation between difficulties in emotion regulation and beliefs about one’s efficacy in altering negative moods and emotional expressivity, and a positive correlation between difficulties in emotion regulation and experiential avoidance in a sample of undergraduate students (Gratz & Roemer, 2004).

**Self-compassion.** The Self-Compassion Scale (SCS; Neff, 2003) is a 26-item measure of self-compassion (see Appendix E). The SCS includes the six dimensions of self-compassion: self-kindness (e.g., “I’m tolerant of my own flaws and inadequacies”), self-judgment (e.g., “when times are really difficult, I tend to be tough on myself”), common humanity (e.g., I try to see my failings as part of the human condition”), isolation (e.g., “when I’m feeling down, I tend to feel like most other people are probably happier than I am”), mindfulness (e.g., “when I fail at something important to me I try to keep things in perspective”), and over-identification (e.g., “when I fail at something important to me I become consumed by feelings of inadequacy”). Items are rated on a scale from 1 (almost never) to 5 (almost always). The present study used the total score. Scores range from 26 to 130. Higher scores indicate greater self-compassion. Coefficient alphas ranged from .77 to .81 in a sample of undergraduate students (Neff, 2003). In this study, coefficient alphas were .93 for women and .94 for men. Construct validity was evidenced through a negative correlation between self-compassion and self-criticism, and positive correlations of self-compassion with social connectedness and emotional intelligence in a sample of undergraduate students (Neff, 2003).

**Binge eating.** The binge eating disorder subscale from the Eating Disorder Diagnostic Scale (EDDS; Stice, Telch, & Rizvi, 2000) assesses DSM-IV diagnostic symptoms for binge
eating disorder (see Appendix F). Sample items include, “how many days per week on average over the past 6 months have you eaten an unusually large amount of food and experienced a loss of control?” and “during these periods of overeating and loss of control did you eat until you felt uncomfortably full?” Participants rate 9 items in a variety of dichotomous (i.e., yes/no) and frequency formats (i.e., how many days per week…). Scoring provides tentative diagnoses of full threshold and subthreshold binge eating disorder. The present study did not intend to diagnose participants with binge eating disorder. The present study used the total score. Scores range from 0 to 15. Higher scores indicate greater binge eating. Coefficient alpha was .77 for in a sample of undergraduate women and men (Lane & Szabó, 2013). In this study, coefficient alphas were .81 for women and .77 for men. Construct validity was established by positive correlations of binge eating scores with diagnoses of binge eating disorders through structured interviews (93% accuracy) as well as positive associations with scores of eating concern, weight concern, and shape concern on the Eating Disorder Examination, eating and weight preoccupations on the Yale-Brown-Cornell Eating Disorder Scale, and hunger and disinhibition on the Three-Factor Eating Questionnaire in a sample of adolescent girls and adult women (Stice et al., 2000). The EDDS has been used in samples of both women and men (Dunn, Larimer, & Neighbors, 2003; Whiteside et al., 2007).

**Negative affect.** The negative affect scale from the Positive and Negative Affect Schedule (PANAS; Watson, Clark, & Tellegen, 1988) measures negative mood states. Participants rate 10 mood descriptors (e.g. irritable, afraid) based on how they have felt in the past week. Items are rated on a scale from 1 (*very slight or not at all*) to 5 (*extremely*). The present study used the total score. Scores range from 10 to 50, with higher scores indicating greater negative affect. Coefficient alphas ranged from .84 to .87 in samples of undergraduate
college students (Watson, Clark, & Tellegen, 1988). In this study, coefficient alphas were .86 for women and .90 for men. Construct validity was supported through positive correlations with measures of distress, depressive symptoms, and anxiety (Watson, Clark, & Tellegen, 1988).

Demographic information and physical characteristics. Participants provided demographic information on their gender, age, race/ethnicity, sexual orientation, year in school, socioeconomic status, height, and weight. BMI was calculated with the formula: BMI = weight (lbs.) * 703 / height² (in.²).
CHAPTER 4: RESULTS

Data Analyses Plan

Preliminary analyses were conducted to examine mean differences between women and men through independent sample t-tests. PROCESS (Hayes, 2013) was used to examine the moderation effect of self-compassion on the association between body dissatisfaction and difficulties in emotion regulation. *Mplus* (Muthén & Muthén, 2010) was used to examine indirect effects. The mediations of (a) body dissatisfaction and binge eating through restricted eating, (b) body dissatisfaction and binge eating through restricted eating and then difficulties in emotion regulation, and (c) body dissatisfaction and binge eating through difficulties in emotion regulation were examined. All the above mediation and moderation analyses were conducted adjusting for BMI to control for participants’ body size in relation to the variables that were measured.

Preliminary Analyses

Missing data was analyzed and results indicated that the missing data was minimal, ranging from 0.05% (negative affect) to 1.63% (self-compassion). Therefore, the mean replacement method in SPSS was used for missing data at the item level. That is, missing items were replaced with a participant’s mean score for items they completed on the rest of the scale (Parent, 2013). After mean replacement, there was no missing data on all variables except BMI. Little’s MCAR test was then conducted at the scale level and a non-significant result indicated that data were missing at random, $\chi^2(6, N = 440) = 8.02, p = .24$.

Independent samples t-tests were conducted to examine mean differences between women and men. Based on the False Discovery Rate (FDR; Benjamini & Hochberg, 1995), results indicated significantly different mean values for all variables except restricted eating and
difficulties in emotion regulation (see Table 1). According to Cohen (1992), a Cohen’s D of 0.2 is a small effect size, 0.5 is a medium effect size, and 0.8 is a large effect size. Specifically, women reported significantly more body dissatisfaction than men with a medium effect size, $d = .70$. Women reported significantly more binge eating than men with a small effect size, $d = .37$. However, women reported significantly less self-compassion than men with a small effect size, $d = .25$. Finally, women reported significantly more negative affect than men with a small effect size, $d = .21$. Women and men did not significantly differ on restricted eating ($d = .18$) and difficulties in emotion regulation ($d = .13$).

Since four out of six variables showed mean differences between women and men, it was questioned whether the direct associations among variables would be different or not between women and men. If direct associations among variables are also different between women and men, it might be better to analyze this data by men and women separately, rather than together as the original plan.

Table 1

*Independent Samples T-Test Results for Women and Men*

<table>
<thead>
<tr>
<th>Variable</th>
<th>Women $M (SD)$</th>
<th>Men $M (SD)$</th>
<th>$t$-test</th>
<th>Effect Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Body Dissatisfaction</td>
<td>2.04 (0.62)</td>
<td>1.59 (0.66)</td>
<td>-7.24*</td>
<td>0.70</td>
</tr>
<tr>
<td>Restricted Eating</td>
<td>0.43 (0.23)</td>
<td>0.39 (0.21)</td>
<td>-1.97</td>
<td>0.18</td>
</tr>
<tr>
<td>Difficulties in Emotion Regulation</td>
<td>2.46 (0.65)</td>
<td>2.38 (0.62)</td>
<td>-1.35</td>
<td>0.13</td>
</tr>
<tr>
<td>Binge Eating</td>
<td>0.48 (0.42)</td>
<td>0.34 (0.34)</td>
<td>-3.69*</td>
<td>0.37</td>
</tr>
<tr>
<td>Self-Compassion</td>
<td>2.79 (0.69)</td>
<td>2.97 (0.74)</td>
<td>2.61*</td>
<td>0.25</td>
</tr>
<tr>
<td>Negative Affect</td>
<td>2.17 (0.71)</td>
<td>2.01 (0.79)</td>
<td>-2.25*</td>
<td>0.21</td>
</tr>
</tbody>
</table>

*Note. N = 230 for Women, N = 205 for Men. Based on False Discovery Rate (FDR), bolded numbers indicate significant results between women and men. $^*p < .01$. 
**Multiple-group analyses.** As described above, because there were mean differences between women and men in four out of six variables, paths in the hypothetical mediation model were first examined in a multiple group analysis. A multiple group analysis was conducted in *Mplus* (Muthén & Muthén, 2010) to examine whether each path in the mediation model was equivalent between women and men, controlling for BMI. One was the freely estimated model (i.e., freely estimated structural paths) and the other was the equally estimated model (i.e., constrained structural paths to be equal). The result for the freely estimated model was a perfect fit (i.e., $\chi^2(0, N = 435) = 0.00$, CFI = 1.0, SRMR = .00, RMSEA = .00) because it is a saturated model (i.e., examining every possible path in the mediation model). The result for the equally estimated model was $\chi^2(6, N = 435) = 19.78, p = .003$, CFI = .95, SRMR = .08, RMSEA = .10, CI [.06, .16]. A chi-square difference test was used to compare the two models, and a significant result, $\chi^2(6, N = 435) = 19.78, p = .003$, showed that structural paths were not invariant between women and men. Therefore, the modification indices from the equally estimated model were used to identify which paths contributed this difference. The path from body dissatisfaction to restricted eating was identified. Therefore, this path was set up to be freely estimated because its path coefficient was potentially different between women and men. After this path was freely estimated, the result was no longer significant, $\chi^2(5, N = 435) = 8.44, p = .13$, CFI = .99, SRMR = .05, RMSEA = .06, CI [.01, .12]. Specifically, the path from body dissatisfaction to restricted eating was significant for women ($b = .15, \beta = .40, p < .01$), but not significant for men ($b = .03, \beta = .09, p = .22$). Because of the differences in mean and the strength of the path between women and men, the rest of the analyses (i.e., correlations, moderation effects, mediation effects) were conducted by women and men separately.
For women (see Table 2), using Cohen’s (1992) recommendations for small (.10), medium (.30), and large (.50) effect sizes for correlations, body dissatisfaction was positively correlated with restricted eating, difficulties in emotion regulation, binge eating, and negative affect with a medium effect size. Body dissatisfaction was negatively correlated with self-compassion with a large effect size. Restricted eating was positively correlated with difficulties in emotion regulation with a medium effect size, and with binge eating and negative affect with a small effect size. Restricted eating was negatively correlated with self-compassion with a small effect size. Difficulties in emotion regulation was positively correlated with binge eating with a medium effect size. Difficulties in emotion regulation was negatively correlated with self-compassion and positively correlated with negative affect with a large effect size. Binge eating was negatively correlated with self-compassion and positively correlated with negative affect with a medium effect size. For men (see Table 3), body dissatisfaction was not significantly related to restricted eating. Body dissatisfaction was positively correlated with difficulties in emotion regulation, binge eating, and negative affect and negatively correlated with self-compassion with a medium effect size. Restricted eating was positively correlated with binge eating with a small effect size, but not significantly associated with difficulties in emotion regulation, self-compassion, and negative affect. Difficulties in emotion regulation was positively correlated with binge eating with a medium effect size. Difficulties in emotion regulation was negatively correlated with self-compassion and positively associated with negative affect with a large effect size. Binge eating was negatively correlated with self-compassion and positively correlated with negative affect with a medium effect size. Self-compassion was negatively correlated with negative affect with a large effect size.
Table 2

*Means, Standard Deviations, and Intercorrelations for Women*

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Body Dissatisfaction</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Restricted Eating</td>
<td>.36***</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Difficulties in Emotion</td>
<td>.49***</td>
<td>.31***</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Binge Eating</td>
<td>.49***</td>
<td>.28***</td>
<td>.44***</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Self-Compassion</td>
<td>-.54***</td>
<td>-.22***</td>
<td>-.74***</td>
<td>-.34***</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Negative Affect</td>
<td>.43***</td>
<td>.25***</td>
<td>.68***</td>
<td>.36***</td>
<td>-.55***</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. BMI</td>
<td>.47***</td>
<td>.10</td>
<td>.05</td>
<td>.26***</td>
<td>-.06</td>
<td>.01</td>
<td></td>
</tr>
</tbody>
</table>

*Mean*

|       | 2.04 | 0.43 | 2.46 | 0.48 | 2.79 | 2.17 | 23.95 |

*SD*

|       | 0.62 | 0.23 | 0.65 | 0.42 | 0.69 | 0.71 | 4.70  |

*Possible Range*

|       | 0-4  | 0-1  | 1-5  | 0-7  | 1-5  | 1-5  | NA    |

*Note.* $N = 230$, **$p < .001$.**
Table 3

*Means, Standard Deviations, and Intercorrelations for Men*

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Body Dissatisfaction</td>
<td>---</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Restricted Eating</td>
<td>.13</td>
<td>---</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Difficulties in Emotion Regulation</td>
<td>.45***</td>
<td>.05</td>
<td>---</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Binge Eating</td>
<td>.37***</td>
<td>.20**</td>
<td>.37***</td>
<td>---</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Self-Compassion</td>
<td>-.48***</td>
<td>-.01</td>
<td>-.71***</td>
<td>-.29***</td>
<td>---</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Negative Affect</td>
<td>.42***</td>
<td>.10</td>
<td>.67***</td>
<td>.31***</td>
<td>-.56***</td>
<td>---</td>
<td></td>
</tr>
<tr>
<td>7. BMI</td>
<td>.26***</td>
<td>.18*</td>
<td>.06</td>
<td>.33***</td>
<td>-.03</td>
<td>.04</td>
<td>---</td>
</tr>
<tr>
<td>Mean</td>
<td>1.59</td>
<td>0.39</td>
<td>2.38</td>
<td>0.34</td>
<td>2.97</td>
<td>2.01</td>
<td>23.89</td>
</tr>
<tr>
<td>SD</td>
<td>0.66</td>
<td>0.21</td>
<td>0.62</td>
<td>0.34</td>
<td>0.74</td>
<td>0.79</td>
<td>4.84</td>
</tr>
<tr>
<td>Possible Range</td>
<td>0-4</td>
<td>0-1</td>
<td>1-5</td>
<td>0-7</td>
<td>1-5</td>
<td>1-5</td>
<td>NA</td>
</tr>
</tbody>
</table>

*Note. N = 205, *p < .05, **p < .01, ***p < .001.*
Moderation Analyses

The moderation effect of self-compassion on the association between body dissatisfaction and difficulties in emotion regulation (Figure 2, path F) was examined for women and men controlling for BMI, separately, through Model 1 in PROCESS (Hayes, 2013). If the interaction between body dissatisfaction and self-compassion is significant, a significant moderation is evident. Results indicated that the moderation effect of self-compassion on the association between body dissatisfaction and difficulties in emotion regulation was not significant for women, $B = -0.05$, 95% CI [-.174, .065]. The moderation effect was also not significant for men, $B = -0.03$, 95% CI [-.148, .093]. As shown in the above correlation tables, self-compassion demonstrated a highly correlation with difficulties in emotion regulation ($r = -.74$ for women, $r = -.71$ for men).

Mediation Analyses

Because there were mean differences between women and men for all variables except restricted eating and difficulties in emotion regulation, mediation analyses were run separately by women and men. The mediation effects were examined through Mplus (Muthén & Muthén, 2010), controlling for BMI. A total of 10,000 bootstrap samples and a 95% CI were used for these calculations. If the 95% CI for the average estimates of these 10,000 indirect effects does not include 0, a statistically significant indirect effect at the .05 level is indicated (Shrout & Bolger, 2002).

For women, first of all, indirect effects indicated that the mediation from body dissatisfaction to binge eating through restricted eating was not significant (see the top row in Table 4). Specifically, as seen in Figure 4, the path from body dissatisfaction to restricted eating was significant, $B = .15$, 95% CI [.095, .200], but the path from restricted eating to binge eating
was not significant, $B = .17$, 95% CI [-.048, .387]. Next, the mediation from body dissatisfaction to binge eating through restricted eating and then difficulties in emotion regulation was significant (see the middle row in Table 4). Specifically, in Figure 4, the path from body dissatisfaction to restricted eating was significant, $B = .15$, 95% CI [.095, .200], the path from restricted eating to difficulties in emotion regulation was significant, $B = .39$, 95% CI [.002, .745], and the path from difficulties in emotion regulation to binge eating was also significant, $B = .18$, 95% CI [.100, .276]. Finally, the mediation from body dissatisfaction to binge eating through difficulties in emotion regulation was significant (see the bottom row in Table 4). The path from body dissatisfaction to difficulties in emotion regulation was significant, $B = .56$, 95% CI [.408, .705], and the path from difficulties in emotion regulation to binge eating was significant, $B = .18$, 95% CI [.100, .276] (see Figure 4).

For men, indirect effects indicated that the mediation from body dissatisfaction to binge eating through restricted eating was not significant (see the top row in Table 4). Specifically, as seen in Figure 5, the path from body dissatisfaction to restricted eating was not significant, $B = .03$, 95% CI [-.017, .072], and the path from restricted eating to binge eating was not significant, $B = .21$, 95% CI [-.010, .428]. Next, the mediation from body dissatisfaction to binge eating through restricted eating and then difficulties in emotion regulation was not significant (see the middle row in Table 4). Specifically, in Figure 5, the path from body dissatisfaction to restricted eating was not significant, $B = .03$, 95% CI [-.017, .072], the path from restricted eating to difficulties in emotion regulation was not significant, $B = -.01$, 95% CI [-.428, .384], and the path from difficulties in emotion regulation to binge eating was significant, $B = .15$, 95% CI [.076, .228]. Finally, the mediation from body dissatisfaction to binge eating through difficulties in emotion regulation was significant (see the bottom row in Table 4). Specifically, the path from
body dissatisfaction to difficulties in emotion regulation was significant, $B = .44$, 95% CI [.320, .566], and the path from difficulties in emotion regulation to binge eating was significant, $B = .15$, 95% CI [.076, .228] (see Figure 5).

**Post-Hoc Analyses**

The original Dual Pathway Model (Figure 1) was examined in order to explore whether the mediation paths of this original model (i.e., with negative affect, rather than difficulties in emotion regulation) worked with this data. These mediation effects were examined through Mplus, controlling for BMI. Results were that only the mediation from body dissatisfaction to binge eating through negative affect was significant, for both women ($\beta = .10, B = 0.07$, 95% CI [.025, .119]) and men ($\beta = .09, B = 0.05$, 95% CI [.014, .088]) (see Figures 6 and 7).

Next, the moderation effect of self-compassion on the association between body dissatisfaction and negative affect from the original Dual Pathway Model was examined, controlling for BMI, in PROCESS (Hayes, 2013). The moderation was significant for women ($B = -0.26$, 95% CI [-.415, -.099]) but not for men ($B = -0.12$, 95% CI [-.302, .057]). To see the nature of the interaction effect for women, PROCESS generated conditional effects at the mean and ±1 $SD$ from the mean. Since the moderation effect was significant for women, Figure 8 was plotted to illustrate the nature of this interaction. Results indicated that the positive association between body dissatisfaction and negative affect was significant for those with lower levels of self-compassion, $B = .45$, 95% CI [.262, .647]. However, the negative association between body dissatisfaction and negative affect was not significant for those with higher levels of self-compassion, $B = .10$, 95% CI [-.110, .308].
Table 4

Bootstrap Analyses of the Magnitude and Statistical Significance of Indirect Effects

<table>
<thead>
<tr>
<th>IV</th>
<th>Mediators</th>
<th>DV</th>
<th>$\beta$</th>
<th>$B$ mean indirect effect</th>
<th>$SE$</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>standardized indirect effect</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Women ($n = 230$)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Body Dissatisfaction</td>
<td>Restricted Eating</td>
<td>Binge Eating</td>
<td>.04</td>
<td>.03</td>
<td>.02</td>
<td>[-.006, .063]</td>
</tr>
<tr>
<td></td>
<td>Restricted Eating and Difficulties in Emotion Regulation</td>
<td>Binge Eating</td>
<td>.02</td>
<td>.01</td>
<td>.01</td>
<td>[.001, .026]</td>
</tr>
<tr>
<td></td>
<td>Difficulties in Emotion Regulation</td>
<td>Binge Eating</td>
<td>.15</td>
<td>.10</td>
<td>.03</td>
<td>[.049, .177]</td>
</tr>
<tr>
<td>Men ($n = 205$)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Body Dissatisfaction</td>
<td>Restricted Eating</td>
<td>Binge Eating</td>
<td>.01</td>
<td>.01</td>
<td>.01</td>
<td>[-.002, .025]</td>
</tr>
<tr>
<td></td>
<td>Restricted Eating and Difficulties in Emotion Regulation</td>
<td>Binge Eating</td>
<td>.00</td>
<td>.00</td>
<td>.01</td>
<td>[-.003, .002]</td>
</tr>
<tr>
<td></td>
<td>Difficulties in Emotion Regulation</td>
<td>Binge Eating</td>
<td>.13</td>
<td>.07</td>
<td>.02</td>
<td>[.036, .107]</td>
</tr>
</tbody>
</table>

**Note.** IV = Independent Variable; DV = Dependent Variable; SE = Standard Error; CI = Confidence Interval. Bold numbers indicate significance.

*These values are based on unstandardized path coefficients.*
Figure 4. Regression coefficients for the modified Dual Pathway Model for women, controlling for BMI. Values are in standardized path coefficients ($B$ represents unstandardized path coefficients).

* $p < .05$, ** $p < .01$, *** $p < .001$.

Figure 5. Regression coefficients for the modified Dual Pathway Model for men, controlling for BMI. Values are in standardized path coefficients ($B$ represents unstandardized path coefficients).

* $p < .05$, ** $p < .01$, *** $p < .001$. 
Figure 6. Regression coefficients for the Dual Pathway Model for women, controlling for BMI. Values are in standardized path coefficients ($B$ represents unstandardized path coefficients).

* $p < .05$, ** $p < .01$, *** $p < .001$.

Figure 7. Regression coefficients for the Dual Pathway Model for men, controlling for BMI. Values are in standardized path coefficients ($B$ represents unstandardized path coefficients).

* $p < .05$, ** $p < .01$, *** $p < .001$. 
Figure 8. The effect of body dissatisfaction on negative affect at lower versus higher levels of self-compassion.

*p < .05.
CHAPTER 6: DISCUSSION

This study sought to support three mediation hypotheses and one moderation hypothesis, as well as explore gender differences between women and men. Overall, difficulties in emotion regulation was a significant mediator in the modified Dual Pathway Model, although there were significant gender differences for these findings. Additionally, self-compassion was not found to moderate the relationship between body dissatisfaction and difficulties in emotion regulation.

The first hypothesis that restricted eating mediates the relationship between body dissatisfaction and binge eating was not supported for neither women nor men. For women and men, restricted eating was not significantly associated with binge eating. One possible reason might be due to the lower mean for binge eating in this sample, indicating a possible restriction of data and therefore affecting these results. However, women reported significantly more binge eating compared to men, consistent with previous findings comparing binge eating by gender in college students (Kelly-Weeder, Jennings, & Wolfe, 2012). The other possible reason might be that body dissatisfaction was significantly associated with restricted eating for women, but was not significant for men. This may be because men endorse a drive for muscularity as well as thinness (Morrison et al., 2003). Men in this sample may have been less likely to diet in response to body dissatisfaction because they may actually want to gain mass. Additionally, these results are also consistent with results found by Markey and Markey (2005). They indicated that men might be less likely to engage in restricted eating in response to body dissatisfaction compared to women. Instead, they indicated that women, regardless of BMI, engaged in dieting in order to achieve a thin ideal. On the other side, men in their sample had greater BMI and yet engaged in less restricted eating. Therefore, men may be less likely to restrict their food intake in response to body dissatisfaction due to different reasons to engage in these behaviors.
The modification of the Dual Pathway Model with difficulties in emotion regulation in place of negative affect was examined. The modification with difficulties in emotion regulation was proposed because body dissatisfaction and restricted eating may activate emotion dysregulation. The results of this study provide evidence for difficulties in emotion regulation as an important factor to examine in the development of binge eating, with important gender differences. The association between body dissatisfaction and binge eating was mediated by restricted eating and difficulties in emotion regulation, supporting the second hypothesis for women but not for men. The path from restricted eating to difficulties in emotion regulation was significant for women, but not for men. This indicates that restricted eating may play a role for women to experience difficulties in emotion regulation. For example, restricted eating could be associated with impaired concentration and emotional vulnerability due to changes in psychological functioning (Haynos & Fruzzetti, 2011). These changes in turn can be related to difficulties in emotion regulation such as impulse control difficulties and lack of emotional clarity. From there, women may engage in binge eating as a result of impaired impulse control and as an attempt to regulate their emotions. Conversely, restricted eating was not significantly associated with difficulties in emotion regulation for men. As mentioned earlier, men engage in less restricted eating than women (Markey & Markey, 2005), a finding that was also supported by this study with a small effect size. It may be possible that men do not engage in severe enough restricted eating to experience these changes in psychological functioning that are associated with difficulties in emotion regulation and binge eating.

The third hypothesis that difficulties in emotion regulation mediates the association between body dissatisfaction and binge eating was also supported by the results for women and men. Taken together, difficulties in emotion regulation appears to be relevant to the development
of binge eating by explaining how negative affect and painful emotions are dealt with. The path from body dissatisfaction to difficulties in emotion regulation was significant for women and men. Women and men who are dissatisfied with their bodies may feel secondary emotions (e.g., anger, frustration) that make it difficult to identify their primary emotions (e.g., shame, fear). Those who have difficulties regulating their emotions, such as not accepting their emotions and being confused about their emotions, may be more vulnerable to engaging in binge eating because they may use binge eating as a maladaptive emotion regulation strategy. That is, individuals who do not know adaptive emotion regulation strategies may use binge eating to cope with painful emotions (Whiteside et al., 2007). People who experience painful emotions may also have impaired impulse control, which is associated with turning to food to cope (Pivarunas & Conner, 2015). Therefore, it appears that not just the presence of negative affect as indicated by the original Dual Pathway Model of binge eating, but also how it is managed, is relevant to the development of binge eating. As indicated by this modification of the Dual Pathway Model for binge eating, difficulties identifying, accepting, and managing negative feelings can be associated with binge eating.

The hypothesis that self-compassion moderates the relationship between body dissatisfaction and difficulties in emotion regulation was not supported for neither women nor men. This result was likely found because of a high correlation between self-compassion and difficulties in emotion regulation for both women and men. This finding may imply that self-compassion can be used as an emotion regulation strategy (Trompetter, Kleine, & de Bohlmeijer, 2017), meaning that it could be redundant in the model with difficulties in emotion regulation.

Post-hoc analyses showed results that self-compassion did moderate the association between body dissatisfaction and negative affect for women. Specifically, the positive
association between body dissatisfaction and negative affect was significant for those with low levels of self-compassion, but was not significant for those with higher levels of self-compassion. It is possible that college women higher in self-compassion are more able to give themselves kind messages when they are dissatisfied with their bodies, making them less likely to feel negative emotions. A search through PsycINFO did not find an examination of the moderating effect of self-compassion in the Dual Pathway Model. This result indicates an important research direction to be explored. For instance, how can self-compassion be trained to reduce negative affect for women? Additionally, although men reported significantly higher self-compassion overall, the moderation effect was not salient for them. Future research could examine other moderators for this relationship for men.

The original Dual Pathway Model was examined in post-hoc analyses to determine whether the modified model was relevant to the development of binge eating in comparison. Results showed that only the mediation path from body dissatisfaction to binge eating through negative affect was significant for both women and men, echoing the results for the modified model that the mediation from body dissatisfaction to binge eating through difficulties in emotion regulation was significant for women and men. The two paths through restricted eating, (a) to binge eating, and (b) to negative affect and then binge eating were not supported. In other words, support for all mediational paths in the Dual Pathway Model for binge eating was not found with this sample, similar to some results from previous research (e.g., Ouwens, van Strien, van Leeuwe, & van der Staak, 2009). In comparison, the modified model found support for women with two mediational effects from body dissatisfaction to binge eating through (a) difficulties in emotion regulation, and (b) through restricted eating and then difficulties in emotion regulation. For men, the modified model found support for one mediation effect from
body dissatisfaction to binge eating through difficulties in emotion regulation. Therefore, it appears that difficulties in emotion regulation can be an important factor to explain how body dissatisfaction relates to binge eating in addition to negative affect.

Altogether, these results indicate that the Dual Pathway Model for binge eating may not fully explain how body dissatisfaction is related to binge eating. In particular, negative affect may not provide a complete picture. Difficulties in emotion regulation, which can explain how negative affect is managed, appears to be another factor to help explain how body dissatisfaction is related to binge eating. These results contribute to the literature about binge eating by supporting difficulties in emotion regulation was an important factor to consider. Women and men who have difficulties knowing and accepting their feelings in response to body dissatisfaction may be at risk for binge eating. Results from the multiple group analysis also suggest that restricted eating is a significant predictor of difficulties in emotion regulation for women but not men, supporting Lavender et al.’s (2015) summary that eating restriction is associated with difficulties in emotion regulation. These gender differences indicate that other factors may be more relevant for men’s development of binge eating. Finally, this study is the first of its kind (to the author’s knowledge) to examine the moderating effect of self-compassion on the relation between body dissatisfaction and negative affect. The finding that this moderation was significant for women but not for men suggests important clinical implications for protective factors in this association.

Limitations

There are several limitations to this study. First, there could be a self-select bias for participants who completed the survey. Students who are interested in the topic of body image may have been more likely to participate. Second, it may also be possible that students with high
levels of body dissatisfaction, restricted eating, and binge eating were less likely to sign up for
the study, limiting the range of results. This may be evident through the low mean for binge
eating in this sample. Future research should try to examine the modified model in a clinical
sample to explore the role of difficulties in emotion regulation for people with eating disorders.
Third, the measures in this study were self-report, so participants who feel shameful or distressed
about their restricted or binge eating behaviors may have been vulnerable to socially desirable
responding. Therefore, future studies can examine the social desirability and see whether results
are still the same after controlling for social desirability. Fourth, data were collected from a
predominately White, Midwestern university. The lack of racial diversity in this sample may
prevent these results from being generalized to other college students. For instance, empirical
results consistently report that African American women experience less body dissatisfaction and
endorse preference for larger bodies compared to women of other racial groups (Altabe et al.,
1998; Padgett & Biro, 2003). Shuttlesworth and Zotter (2011) found that African American
women with a stronger ethnic identity of valuing larger bodies were less likely to engage in
restricted eating, but more likely to engage in binge eating. Finally, this data is cross-sectional,
limiting the ability to identify causal relationships among the variables. Future research can
implement cross-lagged models to examine causal directional paths among variables.

Future Directions

Despite the limitations listed above, the current study indicates directions for future
research. First, the results indicate difficulties in emotion regulation as an area to further examine
in the development of binge eating. This study hypothesized and found support for a path from
restricted eating to difficulties in emotion regulation for women. It is still remains to be seen
whether difficulties in emotion regulation may predict, or even cause, restricted eating. Future
research can examine the directions of causality between these two variables using a cross-lagged model with longitudinal data.

Second, the result that the modified model was not invariant between women and men indicates further avenues to be explored for the development of binge eating in men. For example, men endorse different reasons for engaging in restricted and binge eating compared to women (Markey & Markey, 2005). The result that restricted eating was not a significant mediator for men provides opportunities to examine other mediators, given that the direct association between body dissatisfaction and binge eating was still significant. Other mediators such as substance use are worth examining (Strother et al., 2012; Tanofsky, Wilfley, Spurrell, Welch, & Brownell, 1997). For instance, it may be possible that men who use anabolic steroids to gain muscle mass are at risk for binge eating (Baum, 2006).

Since self-compassion was found not to significantly moderate the relationship between body dissatisfaction and difficulties in emotion regulation, it is important to investigate other potential protective factors of this relationship. The personality trait of positive affectivity may be related to increased emotion regulation abilities. Aspinwall (1998) summarized the role of positive affect in emotion regulation, in that it may facilitate information processing, including negative information, as well as impact decision making, for example, engaging in less risky behavior. Furthermore, Pollock, McCabe, Southard, and Ziegler-Hill (2016) found that the personality trait of negative affectivity was positively related to difficulties in emotion regulation. Therefore, it may be possible that positive affectivity (or the opposite of negative affectivity) may be related to increased information processing and goal-directed behavior, protecting individuals from emotion dysregulation.

**Implications for Practice**
These results have several implications for counseling work. First, these results indicated that the development of binge eating looks different for women and men. It is important for counselors to recognize these gender differences when assessing for binge eating. For instance, counselors can take measures to identify signs of emotion dysregulation with women who report that they are engaging in eating restriction, because these signs can indicate risk for binge eating. Second, because difficulties in emotion regulation was supported as a mediator, interventions teaching emotion regulation skills may be useful in treating binge eating. Clyne, Blampied, and Neville (2004) implemented an emotion regulation skills training for women with binge eating disorder. At follow-up, participants no longer met criteria for binge eating disorder; Therefore, it appears that emotion regulation skills such as emotion recognition, problem-solving, and stress management may help those who binge eat to manage their strong emotions. Learning new ways to work with emotions can therefore replace binge eating, which is used as a coping mechanism. Finally, self-compassion was found to not moderate the relationship between body dissatisfaction and difficulties in emotion regulation but did moderate the association between body dissatisfaction and negative affect for women. Since negative affect was also a significant mediator between body dissatisfaction and binge eating, the moderator of self-compassion may be an important protective factor for women who are dissatisfied with their bodies. Counselors can integrate self-compassion practices into their work with clients who identify as women and experience negative emotions related to evaluations of their bodies. Supporting this notion, Albertson, Neff, and Dill-Shackleford (2014) implemented a self-compassion intervention targeting body dissatisfaction for women. They found that those who received the intervention reported decreased body dissatisfaction and body shame. Therefore, it appears that teaching
those who are dissatisfied with their bodies to non-judgmentally accept their flaws and treat themselves more kindly may reduce the intensity of their suffering.

**Implications for Advocacy**

College men may benefit from advocacy efforts to spread awareness about the existence and development of binge eating for this group. For instance, outreach presentations can be given to student-athletes, fraternities, and student organizations. Since binge eating may be thought of as a “woman’s disorder,” men may benefit from knowledge that women and men can experience similar difficulties related to binge eating. These outreaches may normalize eating concerns men may have and reduce their shame for having a “woman’s disorder,” hopefully increasing their chances of seeking support. Additionally, college men can be made aware that if they have difficulty regulating their emotions in response to body dissatisfaction, they can be at risk for binge eating. Further advocacy can involve an interdisciplinary approach to spreading awareness about binge eating. For example, college counseling centers can partner with student health service providers to disseminate warning signs for binge eating (restricted eating and emotion dysregulation for women, emotion dysregulation for men). Staff members at college counseling centers can also provide trainings for staff members at student health services about binge eating that can occur for college women and men, as well as the risk factors. Finally, advocacy efforts can be made to hire an eating disorder specialist to supplement this interdisciplinary approach. Given that binge eating occurs on college campuses (Lipson & Sonneville, 2017), having an eating disorder specialist on campus can be instrumental in its treatment.

**Implications for Training/Education**

Educational efforts can be made during National Eating Disorders Awareness Week (the last week of February) to educate college students about the warning signs for binge eating. For
example, tables with brochures can be set up in public areas. Information may be given at a layperson level about risk factors and the role of emotion dysregulation in binge eating. College students can learn that if they have difficulty being aware of their emotions, accepting them, and managing them, they may feel the impulse to turn to food to cope. If they identify with these difficulties, they can be directed to health service providers as resources. Educational efforts can also train those who work with college students such as residential advisors to recognize risk factors for binge eating. Residential advisors can serve as trusted support systems and provide referral services for college students, therefore, they can play an important role in early identification for risk and referral. These results can also inform training opportunities for clinicians who work with clients reporting body dissatisfaction, restricted eating, and binge eating. Clinicians who work with these concerns can be taught to attend to signs of emotion dysregulation as risk factors for binge eating in their clients who identify as women and men, for example, lack of awareness about one’s feelings and not accepting feelings, over just the presence of negative feelings. Education about emotion regulation strategies clinicians can implement with their clients who report binge eating such as self-compassion may also be useful. However, self-compassion may be particularly useful for women. Finally, clinicians can be made aware that clients who identify as women and diet may be at a unique risk for emotion dysregulation, and subsequently, binge eating. Therefore, careful assessment of emotion dysregulation symptoms can be important when treating binge eating, along with setting a treatment goal of reducing dieting behavior in women.
REFERENCES


APPENDIX A

DEMOGRAPHIC INFORMATION

1. With what gender do you identify?
   1. Man
   2. Woman
   3. Non-binary
   4. Genderqueer/Gender Non-conforming
   5. Agender
   6. Other ____________

2. What is your age? ____________

3. What is your race/ethnicity? (Select all that apply)
   1 = White
   2 = African/African American/Black
   3 = Asian/Asian American/Pacific Islander
   4 = Hispanic/Latinx
   5 = Middle Eastern
   6 = American Indian or Alaska Native
   7 = Multiracial
   8 = Other ____________

4. What is your sexual orientation? (Select all that apply)
   1 = Heterosexual/Straight
   2 = Gay
   3 = Lesbian
   4 = Bisexual
   5 = Queer
   6 = Questioning
   7 = Pansexual
   8 = Prefer not to answer
   9 = Other ____________

5. Year in school:
   1 = Freshman
   2 = Sophomore
   3 = Junior
   4 = Senior
   5 = Graduate Student
6. What is your socioeconomic status?
   1 = Lower
   2 = Lower middle
   3 = Middle
   4 = Upper middle
   5 = Upper
   6 ____________

7. What is your height?
   Feet ___ Inches ___

8. What is your weight in pounds? ____________
APPENDIX B

PREDICTOR VARIABLE: BODY DISSATISFACTION

Body Esteem Scale for Adolescents and Adults (BESAA; Mendelson, Mendelson, & White, 2001)

Body Esteem Scale

Indicate how often you agree with the following statements ranging from “never” (0) to “always” (4). Circle the appropriate number beside each statement.

0 = Never 1 = Seldom 2 = Sometimes 3 = Often 4 = Always

1. I like what I look like in pictures.
2. Other people consider me good looking.
3. I’m proud of my body.
4. I am preoccupied with trying to change my body weight.
5. I think my appearance would help me get a job.
6. I like what I see when I look in the mirror.
7. There are lots of things I’d change about my looks if I could.
8. I am satisfied with my weight.
9. I wish I looked better.
10. I really like what I weigh.
11. I wish I looked like someone else.
12. People my own age like my looks.
13. My looks upset me.
14. I’m as nice looking as most people.
15. I’m pretty happy about the way I look.
16. I feel I weigh the right amount for my height.
17. I feel ashamed of how I look.
18. Weighing myself depresses me.
19. My weight makes me unhappy.
20. My looks help me to get dates.
21. I worry about the way I look.
22. I think I have a good body.
23. I’m looking as nice as I’d like to.
APPENDIX C

MEDIATOR VARIABLE: RESTRICTED EATING

Three-Factor Eating Questionnaire-Cognitive Restraint subscale (Stunkard & Messick, 1985)

Three-Factor Eating Questionnaire

Part I

1. When I have eaten my quota of calories, I am usually good about not eating any more. T F
2. I deliberately take small helpings as a means of controlling my weight. T F
3. Life is too short to worry about dieting. T F
4. I have a pretty good idea of the number of calories in common food. T F
5. While on a diet, if I eat food that is not allowed, I consciously eat less for a period of time to make up for it. T F
6. I enjoy eating too much to spoil it by counting calories or watching my weight. T F
7. I often stop eating when I am not really full as a conscious means of limiting the amount that I eat. T F
8. I consciously hold back at meals in order not to gain weight. T F
9. I eat anything I want, any time I want. T F
10. I count calories as a conscious means of controlling my weight. T F
11. I do not eat some foods because they make me fat. T F
12. I pay a great deal of attention to changes in my figure. T F

Part II

Directions: Please answer the following questions by circling the number above the response that is appropriate to you.

13. How often are you dieting in a conscious effort to control your weight?
   1 Rarely  2 Sometimes  3 Usually  4 Always
14. Would a weight fluctuation of 5 lbs. affect the way you live your life?
   1 Not at all  2 Slightly  3 Moderately  4 Very much
15. Do your feelings of guilt about overeating help you to control your food intake?
   1 Never  2 Rarely  3 Often  4 Always
16. How conscious are you of what you are eating?
   1 Not at all  2 Slightly  3 Moderately  4 Extremely
17. How frequently do you avoid “stocking up” on tempting foods?
18. How likely are you to shop for low calorie foods?
19. How likely are you to consciously eat slowly in order to cut down on how much you eat?
20. How likely are you to consciously eat less than you want?
21. On a scale of 0 to 5, where 0 means no restraint in eating (eating whatever you want, whenever you want it) and 5 means total restraint (constantly limiting food intake and never “giving in”), what number would you give yourself?

0 = Eat whatever you want, whenever you want it
1 = Usually eat whatever you want, whenever you want it
2 = Often eat whatever you want, whenever you want it
3 = Often limit food intake, but often “give in”
4 = Usually limit food intake, rarely “give in”
5 = Constantly limiting food intake, never “giving in”
APPENDIX D

MEDIATOR VARIABLE: DIFFICULTIES IN EMOTION REGULATION

Difficulties in Emotion Regulation Scale (DERS; Gratz & Roemer, 2004)

Difficulties in Emotion Regulation Scale (DERS)

Please indicate how often the following statements apply to you by writing the appropriate number from the scale below on the line beside each item.

<table>
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<tr>
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<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
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<tbody>
<tr>
<td></td>
<td>Almost Never (0-10%)</td>
<td>Sometimes (11-35%)</td>
<td>About half the time (36-65%)</td>
<td>Most of the time (66-90%)</td>
<td>Almost always (91-100%)</td>
</tr>
</tbody>
</table>

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 will 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 at myself for feeling that way.
22. When I’m upset, I know that I can find a way to eventually feel better.
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 at 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 behavior.
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 E

MODERATOR VARIABLE: SELF-COMPASSION

Self-Compassion Scale (SCS; Neff, 2003)

Self-Compassion Scale

HOW I TYPICALLY ACT TOWARDS MYSELF IN DIFFICULT TIMES

Please read each statement carefully before answering. Please indicate how often you behave in the stated manner, using the following scale:

<table>
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<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Almost Never</td>
<td>------</td>
<td>------</td>
<td>------</td>
<td>Almost Always</td>
</tr>
</tbody>
</table>

1. I’m disapproving and judgmental about my own flaws and inadequacies.
2. When I’m feeling down I tend to obsess and fixate on everything that’s wrong.
3. When things are going badly for me, I see the difficulties as part of life that everyone goes through.
4. When I think about my inadequacies, it tends to make me feel more separate and cut off from the rest of the world.
5. I try to be loving towards myself when I’m feeling emotional pain.
6. When I fail at something important to me I become consumed by feelings of inadequacy.
7. When I’m down, I remind myself that there are lots of other people in the world feeling like I am.
8. When times are really difficult, I tend to be tough on myself.
9. When something upsets me I try to keep my emotions in balance.
10. When I feel inadequate in some way, I try to remind myself that feelings of inadequacy are shared by most people.
11. I’m intolerant and impatient towards those aspects of my personality I don’t like.
12. When I’m going through a very hard time, I give myself the caring and tenderness I need.
13. When I’m feeling down, I tend to feel like most other people are probably happier than I am.
14. When something painful happens I try to take a balanced view of the situation.
15. I try to see my failings as part of the human condition
16. When I see aspects of myself that I don’t like, I get down on myself.
17. When I fail at something important to me I try to keep things in perspective.
18. When I’m really struggling, I tend to feel like other people must be having an easier time of it.
19. I’m kind to myself when I’m experiencing suffering.
20. When something upsets me I get carried away with my feelings.
21. I can be a bit cold-hearted towards myself when I’m experiencing suffering.
22. When I’m feeling down I try to approach my feelings with curiosity and openness.
23. I’m tolerant of my own flaws and inadequacies.
24. When something painful happens I tend to blow the incident out of proportion.
25. When I fail at something that’s important to me, I tend to feel alone in my failure.
26. I try to be understanding and patient towards those aspects of my personality I don’t like.
APPENDIX F

OUTCOME VARIABLE: BINGE EATING

Eating Disorder Diagnostic Scale-Binge Eating Disorder subscale (EDDS; Stice, Telch, & Rizvi, 2000)

EATING SCREEN
Please carefully complete all questions.

1. During the past 6 months have there been times when you felt you have eaten what other people would regard as an unusually large amount of food (e.g., a quart of ice cream) given the circumstances? YES NO

2. During the times when you ate an unusually large amount of food, did you experience a loss of control (feel like you couldn’t stop eating or control what or how much you were eating)? YES NO

3. How many DAYS per week on average over the past 6 MONTHS have you eaten an unusually large amount of food and experienced a loss of control? 0 1 2 3 4 5 6 7

During these episodes of overeating and loss of control did you…

4. Eat much more rapidly than normal? YES NO

5. Eat until you felt uncomfortably full? YES NO

6. Eat large amounts of food when you didn’t feel physically hungry? YES NO

7. Eat alone because you were embarrassed by how much you were eating? YES NO

8. Feel disgusted with yourself, depressed, or very guilty after overeating? YES NO

9. Feel very upset about your uncontrollable overeating or resulting weight gain? YES NO
APPENDIX G

MEDIATOR VARIABLE: NEGATIVE AFFECT

Positive and Negative Affect Schedule-Negative Affect scale (PANAS; Watson, Clark, & Tellegen, 1988)

**PANAS**

**Instructions:** The following 10 questions describe different feelings and emotions. Read each item and then mark the appropriate answer. Indicate to what extent you feel like this in the past week. Use the following scale to record your answers.

<table>
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<th>4</th>
<th>5</th>
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</thead>
<tbody>
<tr>
<td>1.</td>
<td>Irritable</td>
<td>A Little</td>
<td>Moderately</td>
<td>Quite a bit</td>
<td>Extremely</td>
</tr>
<tr>
<td>2.</td>
<td>Distressed</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>Ashamed</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td>Upset</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td>Nervous</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6.</td>
<td>Guilty</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7.</td>
<td>Scared</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8.</td>
<td>Hostile</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9.</td>
<td>Jittery</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10.</td>
<td>Afraid</td>
<td></td>
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APPENDIX H

INSTITUTIONAL REVIEW BOARD APPROVAL FORM

Date: 06/21/2019
To: Davelle Cheng
From: Office for Responsible Research
Title: A Study on How You Feel About Your Body
IRB ID: 19-301
Submission Type: Initial Submission
Exemption Date: 06/21/2019

The project referenced above has been declared exempt from most requirements of the human subject protections regulations as described in 45 CFR 46.104 or 21 CFR 56.104 because it meets the following federal requirements for exemption:

2018 - 2 (i): Research that only includes interactions involving educational tests (cognitive, diagnostic, aptitude, achievement), survey procedures, interview procedures, or observation of public behavior (including visual or auditory recording) when the information obtained is recorded by the investigator in such a manner that the identity of the human subjects cannot readily be ascertained, directly or through identifiers linked to the subjects.

The determination of exemption means that:

- You do not need to submit an application for continuing review. Instead, you will receive a request for a brief status update every three years. The status update is intended to verify that the study is still ongoing.
- You must carry out the research as described in the IRB application. Review by IRB staff is required prior to implementing modifications that may change the exempt status of the research. In general, review is required for any modifications to the research procedures (e.g., method of data collection, nature or scope of information to be collected, nature or duration of behavioral interventions, use of deception, etc.), any change in privacy or confidentiality protections, modifications that result in the inclusion of participants from vulnerable populations, removing plans for informing participants about the study, any change that may increase the risk or discomfort to participants, and/or any change such that the revised procedures do not fall into one or more of the regulatory exemption categories. The purpose of review is to determine if the project still meets the federal criteria for exemption.
- All changes to key personnel must receive prior approval.
- Promptly inform the IRB of any addition of or change in federal funding for this study. Approval of the protocol referenced above applies only to funding sources that are specifically identified in the corresponding IRB application.
Detailed information about requirements for submitting modifications for exempt research can be found on our [website](#). For modifications that require prior approval, an amendment to the most recent IRB application must be submitted in IRBManager. A determination of exemption or approval from the IRB must be granted before implementing the proposed changes.

Non-exempt research is subject to many regulatory requirements that must be addressed prior to implementation of the study. Conducting non-exempt research without IRB review and approval may constitute non-compliance with federal regulations and/or academic misconduct according to ISU policy.

Additionally:

- All research involving human participants must be submitted for IRB review. Only the IRB or its designees may make the determination of exemption, even if you conduct a study in the future that is exactly like this study.

- Please inform the IRB if the Principal Investigator and/or Supervising Investigator end their role or involvement with the project with sufficient time to allow an alternate PI/Supervising Investigator to assume oversight responsibility. Projects must have an eligible PI to remain open.

- Immediately inform the IRB of (1) all serious and/or unexpected adverse experiences involving risks to subjects or others; and (2) any other unanticipated problems involving risks to subjects or others.

- Approval from other entities may also be needed. For example, access to data from private records (e.g., student, medical, or employment records, etc.) that are protected by FERPA, HIPAA or other confidentiality policies requires permission from the holders of those records. Similarly, for research conducted in institutions other than ISU (e.g., schools, other colleges or universities, medical facilities, companies, etc.), investigators must obtain permission from the institution(s) as required by their policies. An IRB determination of exemption in no way implies or guarantees that permission from these other entities will be granted.

- Your research study may be subject to post-approval monitoring by Iowa State University’s Office for Responsible Research. In some cases, it may also be subject to formal audit or inspection by federal agencies and study sponsors.

- Upon completion of the project, transfer of IRB oversight to another IRB, or departure of the PI and/or Supervising Investigator, please initiate a Project Closure in IRBManager to officially close the project. For information on instances when a study may be closed, please refer to the [IRB Study Closure Policy](#).

Please don’t hesitate to contact us if you have questions or concerns at 515-294-4566 or [IRB@iastate.edu](mailto:IRB@iastate.edu).