Does what you think you feel, impact what you actually eat? : an examination of alexithymia, interoceptive awareness, and loss of control eating in young women

Lisa Marie Anderson
University at Albany, State University of New York, lmanderson@albany.edu
Does What You Think You Feel, Impact What You Actually Eat? An Examination of Alexithymia, Interoceptive Awareness, and Loss of Control Eating in Young Women

by

Lisa Marie Anderson

A Dissertation
Submitted to the University at Albany, State University of New York
in Partial Fulfillment of the Requirements for the Degree of
Doctor of Philosophy

College of Arts & Sciences
Department of Psychology

2017
# Table of Contents

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>List of figures</td>
<td>iv</td>
</tr>
<tr>
<td>List of tables</td>
<td>v</td>
</tr>
<tr>
<td>Abstract</td>
<td>vi</td>
</tr>
<tr>
<td>Acknowledgements</td>
<td>viii</td>
</tr>
<tr>
<td>Introduction</td>
<td>1</td>
</tr>
<tr>
<td>Literature review</td>
<td>3</td>
</tr>
<tr>
<td>Loss of control and binge eating</td>
<td>3</td>
</tr>
<tr>
<td>Affect regulation models of binge eating</td>
<td>5</td>
</tr>
<tr>
<td>Emotional awareness, affect regulation, and eating pathology</td>
<td>7</td>
</tr>
<tr>
<td>Alexithymia</td>
<td>8</td>
</tr>
<tr>
<td>Interoceptive awareness</td>
<td>14</td>
</tr>
<tr>
<td>The current study</td>
<td>24</td>
</tr>
<tr>
<td>Specific aims and hypotheses</td>
<td>25</td>
</tr>
<tr>
<td>Methods</td>
<td>27</td>
</tr>
<tr>
<td>Participants</td>
<td>27</td>
</tr>
<tr>
<td>Procedure</td>
<td>29</td>
</tr>
<tr>
<td>Measures</td>
<td>35</td>
</tr>
<tr>
<td>Data analytic strategy</td>
<td>42</td>
</tr>
<tr>
<td>Results</td>
<td>48</td>
</tr>
<tr>
<td>Discussion</td>
<td>58</td>
</tr>
</tbody>
</table>
Alexithymia, interoceptive awareness, and difficulties in emotion regulation: exploring associations in women with LOC eating……………………………………………….. 58
Negative mood and food intake in young women with and without LOC eating……… 60
Pre-meal to post-meal negative mood in young women with and without LOC eating.. 64
Future directions………………………………………………………………………………. 66
Strengths and limitations……………………………………………………………………. 67
Summary and conclusions…………………………………………………………………… 69
References…………………………………………………………………………………….. 71
Appendices…………………………………………………………………………………… 102

A. Flyer and online recruitment text
B. Pre-screening survey consent form
C. Study consent form
D. Participant height/weight verification form
E. Visual analog scales
F. Bogus taste test protocol
G. Taste test food items and presentation of food
H. Taste test rating form
I. Debriefing protocol
J. Emergency contact form
<table>
<thead>
<tr>
<th>Figure</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Figure 1</td>
<td>Schedule of Study Assessments</td>
<td>90</td>
</tr>
<tr>
<td>Figure 2</td>
<td>Visual Analog Scale Ratings of Subjective Negative Mood States Over Time</td>
<td>91</td>
</tr>
</tbody>
</table>
List of Tables

Table 1. Trait Level Mood- And Affect-Related Variables Among Participants with and without LOC Eating……………………………………………………………………………… 92
Table 2. Eating-Related Variables in LOC and HC Groups………………………………. 93
Table 3. Bivariate correlations of demographic and psychosocial variables of interest in LOC and HC groups……………………………………………………………………….. 94
Table 4. Descriptive Statistics for Demographic, Psychosocial, and Pre-meal Variables of Interest per Group………………………………………………………………………………… 96
Table 5. Multivariate Analysis of Variance: Emotion Regulation and Emotional Awareness Variables Between LOC and HC Groups…………………………………………………………….. 99
Table 6. Means and Standard Deviations of Food Intake in LOC and HC Groups, per Mood Induction Condition ………………………………………………………………………... 100
Table 7. Main effects and interactions of predictor variables on negative mood states from Time 1 to Time 3………………………………………………………………………………... 101
ABSTRACT OF THE DISSERTATION

Does What You Think You Feel, Impact What You Actually Eat? An Examination of Alexithymia, Interoceptive Processes, and Loss of Control Eating Among Young Women

Lisa Marie Anderson

Affect regulation theories posit that loss of control (LOC) and binge eating are maintained via an emotion regulation process, through which eating relieves negative affect and aversive mood states. LOC has been identified as a key binge eating characteristic associated with psychopathology and poor psychological outcomes. As such, maladaptive emotion regulation has been identified as a central risk factor for binge eating, as theories posit that individuals binge eat in response to negative mood states. However, empirical studies testing the link between induced negative mood and subsequent food intake in people with LOC and binge eating have yielded inconsistent findings. Currently, additional work is needed to better clarify relations between negative affect, emotion regulation, and LOC eating. For example, few studies testing the relation between negative affect and eating among individuals with LOC or binge eating have examined individual difference factors that may increase risk for LOC eating concerns. To address this need, the current study utilized a multimethod experimental design to examine food intake and negative mood in women with and without LOC eating. To extend prior research, the current work also evaluated associations between LOC eating and alexithymia and interoceptive awareness – constructs associated with poor emotion regulation. In the current study, women with LOC eating (n = 64) and healthy comparison women without LOC eating (n = 64) completed a bogus taste test meal following a negative or neutral mood induction. Contrary to what would be expected by the affect regulation theory, food intake did not differ between participant groups or mood induction conditions. Across the full sample, negative mood
significantly decreased from pre-meal to post-meal time points, indicating significant mood repair in all participants. As expected, women with LOC reported greater negative mood states than healthy comparison participants, regardless of mood induction. However, mood induction did not interact with LOC eating status, conflicting with the affect regulation model. Finally, alexithymia and interoceptive awareness did not influence food intake or negative mood trajectories, suggesting more work is needed to evaluate individual differences with theoretical links to emotional experience and affect regulation. Overall, current findings offer little support for the affect regulation model in young women endorsing LOC eating, and indicate additional research is needed to better understand key factors and processes that may maintain LOC and binge eating.
Acknowledgements

First and foremost, I would like to acknowledge my advisor and committee chair, Drew Anderson, for his mentorship, encouragement, and support over the past five years. Without his enthusiasm for exposure therapy, tasers, donuts, good coffee, sriracha and Tony’s spice stuff, and with his extreme distaste for the word, “aforementioned” (I think this means I’ve now achieved the ultimate Drew Anderson’s grad student goal!) the past 5 years would have been much less entertaining – a key factor to surviving the process of graduate school.

I am also grateful to James Boswell and Julia Hormes for their support and insight provided throughout the course of this project, as well as their mentorship outside of this dissertation, ranging from experiences in classes, to collaborations on research projects, to offering advice for early career development. In fact, I am grateful to the Psychology faculty at the University at Albany – particularly, Mitch Earleywine, Elana Gordis, and Bob McCaffrey – for always being available and willing to offer support and advice whenever it was needed, over the course of my graduate school training.

The completion of this dissertation would also not have been possible without the undergraduate research assistants who ran this study remarkably well, on an almost daily basis for the last 1.5-2 years, or without my fellow lab members, Joe Donahue, who was my free housing whenever a trip back to Albany during the midst of internship was necessary, and Christina Scharmer, who religiously bought grapes and supplies for this study every week.

I am also grateful to have been part of the best grad school cohort. My career would never have been the same without them. In particular, I owe a thousand thanks to my work wife, Erin Reilly, for being a constant friend through all of our years of awesomeness.
I want to thank my family and Greg, for years of never-ending support. In particular, I need to thank Greg for being my strongest supporter over the last few years. I would never have expected my graduate career to have included watching someone I care about battle cancer on a daily basis. Somehow, through it all, he remained the kindest, most supportive person to have along with me on this crazy journey, while he was going through something a thousand times harder.

Lastly, I am grateful for the support provided by the University at Albany Benevolent Fund and the Blanchard Dissertation Award – each of which provided funding for study supplies and participant remuneration. Completion of this dissertation project would not have been feasible without such generous support.
Chapter 1: Introduction

Binge eating, generally defined as the consumption of unusually large amounts of food accompanied by sense of loss of control (LOC) over eating, is a maladaptive behavior often observed in individuals struggling with clinical and subclinical levels of eating pathology. Identified as a common symptom across eating disorder diagnoses within the current *Diagnostic and Statistical Manual of Mental Disorders* (DSM-5; American Psychiatric Association; APA, 2013), binge episodes have been associated with psychological comorbidity (Bulik, Sullivan, & Kendler, 2002; Grilo, White, & Masheb, 2009) and poor physiological outcomes including obesity and medical complications (Bulik et al., 2002; Mitchell, 2015). Given elevated rates of comorbid medical and psychological problems, binge eating represents a clinically significant disordered eating behavior of interest to researchers and clinicians alike.

Etiological models of binge eating often highlight negative affect and emotion regulation as key risk and maintenance factors for binge-type eating, ranging from emotional eating to LOC eating to objective binge episodes consistent with bulimia nervosa and binge eating disorder diagnoses (i.e., Heatherton & Baumeister, 1991; Polivy & Herman, 1985; Stice, 2001). In particular, the affect regulation model for binge eating posits that eating alleviates negative mood states, thereby providing negative reinforcement for engaging in binge eating behaviors (e.g., Polivy & Herman, 1985; Polivy & Herman, 1993). Therefore, in accordance with the affect regulation model, emotionally-driven binge eating occurs in response to elevated negative affect, and may become a conditioned response to heightened negative mood.

To date, the affect regulation theory for binge eating is a well-accepted model in both clinical and research fields. However, while some evidence from naturalistic and experimental studies support the idea that negative mood precedes increased food intake in adults who binge
eat (see Haedt-Matt & Keel, 2011; Cardi, Leppanen, & Treasure, 2015 for meta-analytic reviews), mixed findings from studies testing the relation between eating and subsequent mood improvement suggest more investigation is needed to better understand the complicated links between negative mood, affect regulation, and eating behaviors among individuals who struggle with binge-type eating pathology. In particular, work is needed to address gaps within the literature, which fail to account for individual difference factors that may influence emotion regulatory processes for individuals at risk for binge eating. Noting this, the current investigation sought to evaluate the roles of alexithymia and interoceptive awareness in LOC eating, as these two constructs are believed to influence emotional awareness and emotion regulation across various forms of psychopathology (e.g., Nowakowski, McFarlane, & Cassin, 2013).

Overall, this study sought to fill several key gaps within the literature, including (1) use of multimethod laboratory study design, (2) examination of theoretical individual factors related to emotion regulation and, possibly, LOC and binge eating behaviors, and (3) testing of the affect regulation model in a sample of young women within an age range at increased risk for developing and maintaining eating disorders. To do so, the current work will (a) introduce and define key constructs, concepts, and theories related to the affect regulation model for LOC and binge eating, (b) provide a review of the literature relevant to the current investigation, (c) present study rationale, design, and findings; and (d) discuss the current results in relation to prior research, while also providing suggestions for future work and efforts to elucidate factors and processes that may influence the development and maintenance of binge and LOC eating pathology.
Chapter 2: Literature Review

Loss of Control and Binge Eating

Binge eating behaviors can prove to be distressing and problematic for individuals with and without full-threshold eating disorder diagnoses. An objective binge episode, as defined by the DSM-5 (APA, 2013) entails consuming significantly more food in a discrete period of time (e.g., 2 hours), accompanied by LOC during the eating episode. Individuals who engage in objective binge episodes at least once per week, for a minimum of three months typically meet criteria for a full-threshold eating disorder diagnosis such as binge eating disorder (BED) or bulimia nervosa (BN). For a BED or BN diagnosis, individuals must also endorse at least three binge eating characteristics during “typical” binge episodes. Binge eating characteristics described in the diagnostic criteria for various eating disorders may include (1) eating much more rapidly than normal, (2) eating until feeling uncomfortably full, (3) eating large amounts of food when not feeling physically hungry, (4) eating alone because of feeling embarrassed by how much one is eating, and/or (5) feeling disgusted with oneself, depressed, or very guilty afterwards.

To meet criteria for binge eating disorder or bulimia nervosa, an individual must endorse objective binge episodes. However, many individuals who demonstrate subthreshold levels of eating pathology often report subthreshold eating disorder symptomatology, including subjective binge episodes. In these, individuals often report LOC and distress surrounding eating episodes that are not objectively large. LOC eating episodes are not necessarily associated with objectively large amounts of food consumption; rather, LOC refers to the sense of loss of control over various factors associated with binge eating, ranging, ranging from control over amount of food, pace of eating, etc., and is often accompanied by elevated distress.
It is important to note that, while many individuals with eating disorder diagnoses engage in problematic binge eating episodes, individuals who do not meet the DSM-5 defined thresholds for eating disorders may still engage in sub-threshold binge eating. For example, individuals may experience a binge episode less than once per week over a course of three months, or report a sense of LOC without consuming an objectively large amount of food. Notably, LOC episodes appear associated with equivalent levels of psychological distress and impairment, as compared to objective binge episodes – eating episodes during which individuals consume an objectively large caloric intake (Niego, Pratt, & Agras, 1997; Mond, Latner, Hay, Owen, & Rodgers, 2010). Therefore, subclinical or subjective binge eating episodes that lack particular characteristics necessary for full-threshold diagnosis remain problematic and distressing.

To date, strong emotion states and external factors have been linked with binge and LOC eating (e.g., Pollert et al., 2013). However, the specific nature of the links between emotion states, external cues or contextual factors, and binge/LOC behaviors is not fully understood, leading researchers and clinicians to seek greater understanding of both clinical and subclinical levels of LOC and binge eating behaviors. Given that LOC eating has been shown to demonstrate stronger links between eating pathology and comorbid psychopathology outcomes than objective food intake size (Vannucci et al., 2013), the current study will focus on individuals who engage in LOC eating, rather than limiting this study to examination of individuals who endorse objective eating episodes. Moreover, given that LOC eating is prevalent across clinical and subclinical populations, this study examines LOC eating within young women– a demographic group with elevated eating disorder risk (e.g., Luce, Crowther, & Pole, 2008; Mond, Hay, Rodgers, & Owen, 2006).


**Affect Regulation Models of Binge Eating**

Affect regulation models for binge eating generally posit that negative mood states influence the development and maintenance of dysfunctional eating behaviors, such that binge eating alleviates feelings of anxiety and other negative mood states. One frequently-cited etiological model for binge eating suggests that binge eating reduces negative affect states, thereby providing negative reinforcement for binge eating behaviors (Polivy & Herman, 1985). Similar work posits that binge eating is motivated by a desire to escape aversive states of self-awareness and associated emotional distress (escape theory; Heatherton & Baumeister, 1991). Altogether, emotion dysregulation is often identified as a core maintenance factor for individuals with eating disorders who engage in mood-modulating behaviors due to an inability to cope with or adaptively regulate negative affect or mood states (Fairburn, Cooper, & Shafran, 2003; Haynos & Fruzetti, 2011; Lavender, Wonderlich, Engel, Gordon, Kaye, & Mitchell, 2015; Stice, 2001). Altogether, the mechanism by which negative affect or aversive self-awareness states are alleviated may slightly differ; however, a common thread underlying many etiological models of eating pathology is the supposition that binge eating behaviors function as a form of emotion regulation.

Several studies have yielded results consistent with etiological models, supporting the theory that increases in negative affect precede binge eating, as many naturalistic studies (i.e., ecological momentary assessment or EMA studies) indicate that increased negative affect tends to precede binge eating episodes across clinical and nonclinical populations (e.g., Agras & Telch, 1998; Berg et al., 2012; Munsch, Meyer, Quartier, & Wilhelm, 2012; Ranzenhofer et al., 2013). Such findings suggest that elevated negative affect and subsequent mood repair are commonly associated with binge eating among clinical samples of individuals with binge eating disorder.
(BED) (e.g., Munsch et al., 2012). This pattern was also reported in studies examining these relations among individuals with other eating disorder diagnoses (Berg et al., 2013; Smyth et al., 2007), and appears to apply to patterns between negative mood and eating behaviors in non-clinical samples (Berg et al., 2014). Thus, noted in several reviews, prior study has demonstrated somewhat robust evidence for increased negative mood to precipitate binge eating (Haedt-Matt & Keel, 2011; Leehr, Krohmer, Schag, Dresler, Zipfel, & Giel, 2015).

In contrast, some research contradicts the theory underlying affect regulation models. For instance, naturalistic research employing EMA methods to evaluate temporal links between mood and eating disorder behaviors has demonstrated that negative affect oftentimes increases following binge eating behavior (e.g., Engel et al., 2013). Furthermore, meta-analytic reviews of studies testing the affect regulation model have yet to strongly support the theory that engaging in binge eating mitigates negative affect or aversive mood states (Haedt-Matt & Keel, 2011; Leehr et al., 2015). Thus, it is yet uncertain whether affect regulation models adequately explain the function of binge eating or its correlates (i.e., LOC eating or emotional eating).

Research suggests that binge episodes and emotional eating behaviors may be associated with emotional vulnerability and deficits in emotion regulation skills (Gianini, White, & Masheb, 2013; Whiteside, Chen, Neighbors, Hunter, Lo, & Larimer, 2007). Across clinical and nonclinical samples binge eating has been associated with a lack of responding to internal cues (i.e., hunger/satiety cues), as well as an increased tendency to eat in response to external or emotional cues (i.e., plate size or strong emotions) (e.g., Kittel, Baruhardt, & Hilbert, 2015; Nowakowski et al., 2013). Noting these tendencies, theoretical and empirical efforts have sought to identify internal processes that appear to be altered in individuals who binge eat.
To date, discrepant findings have yielded only partial support for the affect regulation model, indicating research is still needed to evaluate the link between negative affect and subsequent eating behaviors. Additional research efforts must consider individual difference factors that may influence association between emotion dysregulation and binge eating behavior. In particular, efforts must be made to better elucidate and understand factors that may influence risk for engaging in binge eating as a form of emotion regulation. While many emotion-related constructs have been hypothesized to influence the development and maintenance of binge eating as an emotion regulation behavior, the current investigation targeted two constructs that have been linked to deficits in emotion regulation, but remain relatively understudied in the field of eating pathology – alexithymia and interoceptive awareness.

**Emotional Awareness, Affect Regulation, and Eating Pathology**

Predominant theories of emotions posit that the perception of bodily signals and internal states not only impacts one’s sensitivity to physical, internal sensations, but also directly affects emotional experiences (e.g., Damasio, 1994, 1999; James, 1884; Schachter & Singer, 1962). Indeed, very early theories of emotion suggested somatic and visceral sensations influence subjective emotion states and experiences, thus, also positing that emotive stimuli automatically influence somatic or internal physical reactions (e.g., fear/anxiety-inducing stimuli may influence heart rate or body temperature) (James, 1884). Given this, James also posited that the perception of such physical states and sensations influences subsequent emotional experiences and reactions. More recent theories (i.e., somatic marker theory) posit that visceral states evoke specific emotional states, which subsequently influence cognition, decision-making, and behavior (Damasio, 1994, 1999). Consistent with basic emotion theories, more recent empirical work indicates that individual differences in the perception of emotion and arousal may influence
the development and maintenance of disordered eating and related psychopathology. In particular, deficits in emotional and interoceptive awareness appear strongly linked with increase eating pathology and emotion dysregulation (e.g., Merwin, Zucker, Lacy, & Elliott, 2010). Altogether, theoretical and empirical work suggests that the process of feeling and recognizing emotions is closely linked to perceptions of internal, bodily reactions or sensations.

Further evaluation of hypothetical risk and maintenance factors such as interoception and alexithymia may prove useful in evaluating etiological models for eating pathology. The following sections will introduce, define, and discuss related constructs, including alexithymia and interoceptive awareness. Each construct will be discussed in relation to eating pathology, with a particular emphasis on links between each construct and binge eating behaviors.

**Alexithymia**

First described in the 1970s as a construct representative of deficits in emotional awareness and emotion processing (Sifneos, 1973), alexithymia has since been linked with increased risk for various forms of psychopathology and has garnered increased interest within clinical psychology. Accordingly, definitions for the construct have been expanded and refined, with some variation across investigative efforts. For example, alexithymia has been identified as a trait-like style of language and cognitions characterized by a deficit in emotional processing, or a lack of affect regulation (e.g., Taylor, Bagby, & Parker, 2003). More generally, the definition of the construct has expanded to include the tendency to demonstrate difficulty identifying feelings, distinguishing between emotional feelings and bodily sensations of emotional arousal, and verbally describing emotion states. Perhaps due to lowered awareness of emotional cues and, thus, lessened ability to identify emotion states, individuals endorsing elevated alexithymia often demonstrate a concrete cognitive style focused on the external environment, with apparent
deficits in attending to internal sensations and emotional experiences (see Nowakowski et al., 2013 for review). Finally, some researchers have suggested that alexithymia may represent a general impairment in one’s capacity to consciously experience and regulate strong emotional states and feelings, given significant deficits in accurately identifying, processing, and interpreting emotional stimuli, (e.g., Lane, Sechrest, Reidel, Shapiro, & Kaszniak, 2000; Luminet, Vermeulen, Demaret, Taylor, & Bagby, 2006). For this reason, it seems likely that elevated alexithymia may represent a vulnerability factor for psychopathologies characterized by maladaptive emotion regulation, given that alexithymia has been associated with poor emotion regulation. Given that binge eating behaviors are hypothesized to modulate negative affect, it seems prudent to further investigate the relation between alexithymia and binge eating outcomes among individuals at risk for eating disorders.

**Alexithymia, eating disorders, and binge eating.** When studied in relation to disordered eating attitudes and behaviors, cross-sectional studies generally demonstrate that individuals with eating disorders report significantly higher levels of alexithymia, as compared to healthy controls. Indeed, studies comparing individuals with various eating disorders to healthy control participants consistently suggest that a significantly greater proportion of individuals with eating disorders are alexithymic, as compared to healthy controls (Abbate-Daga, Quaranta, Marzola, Amianto, & Fassino, 2015; Beales & Dolton, 2000; Bourke, Taylor, Parker, & Bagby, 1992; Eizaguirre, de Cabezón, de Alda, Olariaga, & Juaniz, 2004; Jimerson, Wolfe, Franko, Covino, & Sifneos, 1994; Lulé et al., 2014; Montebarocci, Codispoti, Surcinelli, Franzoni, Baldaro, & Rossi 2006; Rastam, Gillberg, Gillberg, & Johansson, 1997). When examined in greater detail, differences in alexithymia between individuals with and without eating disorders are most often related to difficulties with emotion identification, describing emotion states, and differentiating
between emotional feelings and physical/bodily sensations (Cochrane, Brewerton, Wilson, & Hodges, 1993; Eizaguirre et al., 2004; Harrison, Sullivan, Tchanturia, & Treasure, 2009; Montebarocci et al., 2006; Schmidt, Jiwany, & Treasure, 1993). Consistent with these findings, a recent review of studies examining the relations between alexithymia and eating pathology concluded that individuals with eating disorders consistently struggle with identifying and describing emotional states and experiences (Nowakowski et al., 2013). Given that research indicates greater alexithymia severity relates to greater eating pathology severity, as well as greater deficits in emotion regulation, it seems important to evaluate the relation between alexithymia and affect-regulatory, disordered eating behaviors such as binge eating or LOC eating behaviors.

**Alexithymia and binge eating psychopathology.** Because the characteristic profile of individuals with eating pathology often includes an inability to accurately describe feelings and discriminate between emotions and bodily sensations, alexithymia may inherently relate to affect regulation models of binge eating. Indeed, alexithymia appears strongly correlated with binge eating across clinical eating disorder diagnoses and within nonclinical samples. Several studies have suggested alexithymia positively relates to binge eating disorder symptom severity, with greater alexithymia correlating with more severe binge eating psychopathology (Carano et al., 2006; Pinaquy, Chabrol, Simon, Louvet, & Barbe, 2003; Wheeler, Greiner, & Boulton, 2005; Zeeck, Stelzer, Linster, Joos, & Hartmann, 2011). Group differences have been noted in studies comparing level of alexithymia in individuals with binge eating disorder and healthy controls, such that individuals who met criteria for full-threshold binge eating disorder diagnoses reported greater alexithymia than healthy controls (e.g., Pinaquay et al., 2003; Zeeck et al., 2011).
Additional evidence suggests binge eating may evince unique relations with alexithymic deficits, over and above other problematic eating behaviors (i.e., overeating episodes). For example, when studied in individuals with binge eating disorder, non-binge-eating obese individuals, and normal-weight controls following brief emotion inductions, individuals with binge eating disorder reported greater alexithymia and stronger desire to eat following negative mood inductions than participants in the non-binge-eating obese and normal-weight control groups (Zeeck et al., 2011). Such findings suggest that alexithymia may demonstrate particular associations with binge eating symptomatology, as compared to eating behaviors that are not associated with eating disorders. This coincides with a recent review of cognitive and affective risk factors for binge eating disorder, which suggested that individuals with more severe binge eating behaviors and symptomatology demonstrate more severe alexithymia and greater emotional deficits than individuals who do not endorse binge eating pathology (Kittel et al., 2015). Altogether, evidence suggests alexithymia may present a clinically-relevant construct within the context of binge eating.

To date, a small number of studies of alexithymia in eating disorder samples have evaluated the link between alexithymic characteristics and specific eating disorder profiles. Findings, thus far, have been mixed. For instance, two investigations found that alexithymia scores differed between individuals who engaged in binge eating and those who did not (Rozenstein, Latzer, Stein, & Eviatar, 2011; Wheeler et al., 2005). In one study, researchers compared alexithymia scores for female individuals with full-threshold anorexia nervosa or bulimia nervosa to scores for healthy sibling probands and healthy control subjects. Results suggested that, after controlling for depressive symptoms, individuals who engaged in binge eating behaviors (e.g., individuals in the bulimia nervosa or anorexia nervosa – binge/purge type
diagnostic groups) were more likely to report elevated alexithymia scores than their non-binge-endorsing counterparts, suggesting alexithymia may be particularly relevant to binge eating pathology - particularly when comparing individuals endorsing binge eating symptomatology, to non-binge, overweight and healthy control individuals who deny engaging in binge eating symptomatology (Rozenstein et al., 2011).

Studies comparing levels of alexithymia within clinical samples of individuals with various eating disorder diagnoses yield less conclusive results than those presented by Rozenstein et al. (2011). For example, Wheeler and colleagues (2005), after evaluating findings that alexithymia more strongly correlated with binge eating disorder, as compared to anorexia or bulimia nervosa, drew similar conclusions that elevated alexithymia may be particularly relevant to binge eating-related psychopathology. However, contrasting results suggest that, after controlling for anxiety and depressive symptoms, no alexithymic differences emerge between individuals with full-threshold eating disorder diagnoses who endorse binge eating and those who do not (e.g., Eizaquirre et al., 2004). Given the inconsistent findings reported and limited number of studies conducted in binge eating samples, additional research is clearly needed before drawing any definite conclusions about the relation between alexithymia and binge eating. However, given that Rozenstein and colleagues’ study demonstrated clear alexithymic differences between individuals with and without binge eating pathology, it is possible that elevated levels of alexithymia may be more useful for distinguishing between individuals with and without binge eating pathology.

**Alexithymia and binge eating in nonclinical samples.** Consistent with affect regulation models, various research groups have postulated that individuals with eating disorders are vulnerable to engaging in emotionally-motivated overeating and binge eating due to emotion
regulation deficits, including a lack of ability to identify and adaptively react to emotion states (Sim & Zeman, 2006; Wiser & Telch, 1999). Indeed, studies conducted among individuals endorsing subclinical levels of eating pathology generally suggest that difficulties identifying and describing emotions positively relate to elevated disordered eating attitudes and behaviors. When comparing individuals from nonclinical samples, researchers have found that individuals who engage in disordered eating behaviors often report significantly higher levels of alexithymia, as compared to healthy comparison participants (De Berardis et al., 2007; De Berardis et al., 2009; Fukunisi, 1998; Hayaki, 2009; Karukivi et al., 2010; Kiyotaki & Yokoyama, 2006; Laquatra & Clopton, 1994; Markey & Vander Wal, 2007; Quinton & Wagner, 2005; Ridout, Thom, & Wallis, 2010; Sasai, Tanaka, & Hisimoto, 2010). Altogether, research in nonclinical samples and among individuals demonstrating subclinical levels of eating pathology support the hypothesis that higher alexithymia is associated with greater eating pathology. Although a growing number of studies has evaluated the relations between general or overarching measures of self-reported eating pathology, few investigations have tested the relation between alexithymia and overt eating behaviors or disordered eating symptoms. Even fewer studies have examined the specific associations between alexithymia and binge eating. At this time, the author is aware of one study that examined the links between alexithymia and emotionally-motivated binge eating. In their study, researchers tested correlations between alexithymia and self-reported binge eating behaviors in a sample of 326 obese adults who either endorsed engaging in subclinical emotional overeating behaviors or met DSM criteria for full-threshold binge eating disorder diagnosis (Gianini et al., 2013). Examination of the associations between emotion regulation, emotional eating, and other disordered eating behaviors revealed that difficulties in identifying and appropriately reacting to emotion states – all components of
alexithymia – were significantly correlated with greater emotional eating throughout the sample. Altogether, research in subclinical and nonclinical samples has indicated that individuals who engage in binge eating along with other forms of disordered eating are more likely to demonstrate elevated alexithymia scores and emotion dysregulation. In particular, those who endorse binge eating often report deficits in the ability to identify emotions, discriminate between emotions and physical feelings, and labeling or describing emotion.

Hypothetically, affective instability and lack of emotional clarity (i.e., ability to distinguish between specific negative emotions) associated with alexithymia may decrease an individual’s ability to distinguish between aversive mood states, while increasing one’s propensity to engage in affect regulation strategies (i.e., binge eating) in response to increased negative affect. This modulatory role of alexithymia would coincide with the existing affect regulation models for binge eating. Unfortunately, there are few studies, to date, that have directly evaluated whether severity level of alexithymia influences caloric consumption in response to negative mood among individuals who binge eat to individuals who do not binge eat. Within the context of the affect regulation model of binge eating, alexithymia may present a potential variable of interest, as an increased tendency for emotional instability and lack of clarity may correlate with an individual’s likelihood to engage in maladaptive emotion regulation behaviors (i.e., binge eating) following aversive mood states. However, research is first needed to determine whether elevated levels of alexithymia relates to one’s propensity to engage in mood-induced overeating or binge eating episodes among individuals at risk for binge eating.

**Interoceptive Awareness**

Interoceptive awareness, defined as “the ability… to discriminate between sensations and feelings, and between sensations of hunger and satiety” (Fassino et al., 2004, p.169), represents
the ability to perceive and discriminate between bodily states and emotion states. Although not the focus of the current study, interoceptive sensitivity, a construct similar to interoceptive awareness, is often discussed and sometime used interchangeably within the is often conceptualized as the ability to accurately detect and react to bodily sensations. To date, the terms interoceptive awareness and interoceptive sensitivity have been used somewhat inconsistently throughout the eating disorder literature, and across other areas of psychopathology research. Generally, both interoceptive awareness and sensitivity constructs are associated with emotional experience, processing of emotional stimuli, and processing of internal visceral and emotional states within an individual. Thus, interoceptive awareness and interoceptive sensitivity are each commonly measured based on performance on heartbeat perception tasks, which provide objective measurement of an individual’s ability to perceive his or her own heartbeat (i.e., Critchley, Wiens, Rothstein, Öhlman, & Dolan, 2004; Herbert, Pollatos, & Schandry, 2007). Within the eating disorders literature, interoceptive awareness is the term more commonly used to describe the ability to perceive somatic sensations. Therefore, throughout the current review, most past literature refers to ‘interoceptive awareness’. However, a brief description of interoceptive sensitivity was warranted, as some studies discuss interoceptive sensitivity, rather than awareness.

Often, interoceptive awareness is assessed using self-report instruments or behavioral tests (i.e., heart beat perception tasks) that allow for evaluation of differences between somatic and emotional states. Most often studied via heart beat detection tasks in the context of anxiety and other emotional disorders, and only recently examined in relation to eating-related outcomes, interoceptive awareness has been linked with the ability to detect internal sensations in non-cardiac bodily functions, including gastrointestinal pressure and stomach distension (Whitehead
& Drescher, 1980). This evidence, which suggests interoceptive awareness relates to both heart rate and gastric sensations, presents the possibility that there may be an inherent link between altered interoceptive processes and disordered eating behaviors.

**Interoceptive awareness and affect regulation.** Past and current theories suggest that interoceptive processes influence emotion states and subsequent behaviors (i.e., Damasio, 1994; James, 1884; Prinz, 2004). Recently, interoceptive awareness deficits have been posited as key neurobiological risk factors for eating disorders (e.g., Kaye, Wierenga, Bailer, Simmons, & Bischoff-Grethe, 2013). Theories that implicate interoceptive awareness as a key factor in emotional awareness and regulation processes generally hypothesized that individuals who perceive bodily signals with a high level of accuracy also experience emotions more intensely. Consistent with this theory, various studies have demonstrated a link between elevated interoceptive awareness and heightened emotional arousal and experience (i.e., Barrett et al., 2004; Critchley et al., 2004; Ferguson & Katkin, 1996; Katkin, Wiens, & Öhman, 2001). Other researchers have found that interoceptive awareness is positively related to more “intense” processing of emotionally-arousing stimuli in healthy adults, such that individuals who demonstrate elevated interoceptive awareness on heartbeat perception tasks tend to report stronger emotion/mood perceived, as compared to individuals with decreased interoceptive awareness (Herbert et al., 2007). Additionally, higher levels of interoceptive awareness have been associated with increased activation of cortical areas associated with emotion processing, emotional reactivity, and integration of interoceptive and emotional signals in healthy adults, providing further evidence of links between interoceptive awareness and perceived emotional experience (Craig, 2002, 2004, 2009; Pollatos, Schandry, Auer, & Kaufman, 2007).
Additional research suggests that changes in interoceptive awareness may mediate the association between anxiety and the intensity of experienced unpleasant feelings such that individuals who demonstrate increased interoceptive awareness also report increased unpleasant feelings, as compared to individuals who do not report increased interoceptive awareness (Pollatos, Traut-Mattausch, Schroeder, & Schandry, 2007). Conversely, decreased interoceptive awareness appears to correlate with elevated levels of alexithymia, suggesting an inverse association between the two constructs as well as indicating that interoceptive awareness is linked to the degree of emotional arousal and strength of emotional experiences (Herbert, Herbert, & Pollatos, 2011).

Noting the positive correlations between interoceptive awareness, emotional awareness, and general emotion processing, some researchers have evaluated the links between interoceptive awareness and emotion regulation. For example, researchers evaluated the links between interoceptive awareness and emotion regulation skills in a sample of 28 healthy adult participants who received and completed training in an emotion regulatory skill – cognitive reappraisal (Füstos, Gramann, Herbert, & Pollatos, 2012). Following cognitive reappraisal strategy training, participants were asked to view a series of unpleasant images as part of a negative mood induction paradigm. Following the mood induction, participants were asked to attempt to down-regulate their negative emotions and level of arousal, using reappraisal skills. Altogether, individuals who were more successful at regulating their emotional response following the negative mood induction also demonstrated higher levels of interoceptive awareness and sensitivity, suggesting that the ability to accurately identify and distinguish between bodily sensations and emotion states may aid in the modulation of negative mood states. Altogether, such findings indicate that elevated levels of interoceptive awareness may benefit individuals at
risk for developing emotion-dysregulation-related psychopathology such as binge eating. However, Füstos et al (2012) results were limited to healthy adults who received cognitive reappraisal training. Given that many individuals may not receive training in emotion regulation skills such as cognitive reappraisal, and may instead employ maladaptive emotion regulatory behaviors to modulate negative mood states, additional research is needed to assess the relation between interoceptive awareness and emotion regulation among individuals have not received training in emotion regulation skills. Overall, considering affect regulation theories for binge eating, which posit that binge eating functions to modulate negative affect states and experiences, it seems likely that altered interoceptive processes impact an individual’s vulnerability to developing and maintaining problematic binge eating behaviors.

**Interoceptive awareness and eating pathology.** Originally noted by Bruch (1962, 1973), a primary characteristic among individuals with eating disorders includes a deficit in the ability to distinguish and describe physical and emotional feelings. Indeed, it is generally agreed that individuals who engage in disordered eating behaviors exhibit deficits in interoceptive processes, including the ability to identify and appropriately respond to sensations such as hunger or fullness, emotion states, or other internal sensations. Dating back to Bruch’s original observation that eating disorders may be characterized by interoceptive deficits, research has generally acknowledged an association between decrements in interoceptive processes and eating pathology. Presently, researchers in the eating disorders field have begun to show increasing interest in interoceptive awareness and interoceptive dysfunction, as recent theoretical models highlight interoceptive dysfunction (i.e., deficits in interoceptive awareness) as a potential vulnerability or maintaining factor for eating pathology (Kaye, Wierenga, Bailer, Simmons, & Bischoff-Grethe, 2013; Khalsa, Craske, Li, Vangala, Strober, & Feusner, 2015).
Initial research suggests that individuals who suffer from eating disorders demonstrate trait-like interoceptive dysregulation that may have some bearing on the presentation, development, and maintenance of some of their symptoms (Klabunde, Acheson, Boutelle, Matthews, & Kaye, 2013). For example, it is possible that poor interoceptive abilities, combined with deficits in emotion regulation skills may increase vulnerability to engage in maladaptive emotion regulation efforts. For some, this behavior may be caloric restriction; for others, perhaps emotional eating or binge eating. Across diagnoses, individuals who meet full-threshold criteria for an eating disorder frequently report lower levels of interoceptive awareness compared to non-eating disordered controls (Fassino et al., 2004; Herbert & Pollatos, 2012; Lilenfeld, Wonderlich, Riso, Crosby & Mitchell, 2006; Pollatos et al., 2008). However, research thus far has been limited to cross sectional studies, limiting the ability to conclude the exact nature between interoceptive deficits and eating pathology.

To date, no prospective studies have evaluated the role of interoceptive deficits and possible link to the development of disordered behaviors. However, new research suggests this hypothetical development and maintenance of disordered eating behaviors may be feasible and logical. For example, in one study highlighting the role of interoceptive awareness, individuals with anorexia nervosa exhibited an increased tendency for poor discrimination and over-estimation of interoceptive sensations during times of higher anxiety (i.e., mealtimes) (Khalsa et al., 2015). Although this study was conducted in a narrow sample of patients with anorexia nervosa, the findings may hold important implications for other eating disorders, as this research suggests there may be an underlying, trait-level vulnerability to display marked disturbances in interoceptive processes across individuals with eating disorders.
**Interoceptive awareness and binge eating pathology.** A potential connection to binge eating pathology may be found when examining a common affect regulation theory (escape theory; Heatherton & Baumeister, 1991), which posits that individuals engage in binge eating in an effort to engage in a dissociative state, rather than remain self-aware of an aversive or stressful state. This theory contains an intrinsic assumption that individuals who binge eat may demonstrate altered interoceptive sensitivity, or an altered ability to detect and respond to bodily sensations and cues. Although not specific to individuals with binge eating, research comparing individuals with and without eating disorders suggests disordered eating may be associated with increased tendency to display heightened negative reactivity to general interoceptive signals (Merwin et al., 2010; Pollatos et al., 2008; Schmidt & Treasure, 2006), as well as display elevated negative reactivity to eating-related somatic cues, such as fullness or hunger (Holsen et al., 2012; Khalsa et al., 2015; Merwin et al., 2010; Pollatos et al. 2008; Schmidt & Treasure, 2006).

Altogether, data supported the hypothesis that interoceptive sensitivity is linked to emotion dysregulation and emotion-motivated disordered eating behavior in treatment-seeking individuals with eating disorders. However, less work has examined specific associations between interoceptive processes and binge eating behaviors. This presents a significant gap within the literature, considering that the affect regulation theory of binge eating posits that individuals may utilize binge eating to modulate negative affect states. Given the paucity of research regarding the link between interoception deficits and binge eating pathology, future work must continue to examine aspects of interoceptive sensitivity and its relation to emotion regulation skill deficits (e.g., non-acceptance of emotional responses) and binge eating - a mechanism which individuals may use to mitigate negative mood states.
To date, several therapeutic eating styles and eating disorder interventions exist which appear to overlap with the theory that binge eating behaviors may stem from deficits in interoceptive processes. For example, intuitive eating and mindfulness-based eating approaches are grounded in the theory that individuals who engage in problematic eating patterns (e.g., emotional eating, external eating) struggle to accurately identify and appropriately respond to hunger or satiety cues, and may benefit from attending to internal appetitive cues, as well as learning to distinguish emotional or external cues from physiological cues (Kristeller, & Wolever, 2010; Tribole & Resch, 1995). Empirical study of intuitive eating, mindful eating, and similar, sensory-based eating approaches suggest that increasing interoceptive awareness and sensitivity is associated with lower body mass index (BMI) and lower rates of binge eating behaviors (e.g., Brown et al., 2010; Craighead, 2006; Gravel et al., 2014; Kristeller & Wolever, 2010). Although these studies have not explicitly assessed the relations between interoceptive awareness, emotion regulation, and overt eating behaviors within these samples, preliminary evidence suggests targeting and increasing interoceptive awareness may confer benefit for those struggling with binge-type eating behaviors.

**Interoceptive awareness and binge eating in nonclinical samples.**

**Interoception, hunger, and satiety.** Research suggests that an individual’s level of interoceptive awareness may be linked to the ability to accurately monitor internal sensations including hunger and fullness. For example, one recent study instructed healthy adult participants to drink water to a point of fullness, following a 4-hour fast (Herbert et al., 2012). After reaching a subjective point of fullness, participants completed a heartbeat monitoring task to assess individual differences in interoceptive awareness. Heartbeat detection accuracy accounted for approximately 25% of variability in the amount of water consumed to reach a point of “fullness”.

Notably, healthy individuals who demonstrated higher levels of interoceptive awareness drank significantly less water than individuals who demonstrated lower levels of interoceptive awareness. This suggests that, although perception of fullness/satiety is likely influenced by other factors, individual differences in interoceptive processes contribute to internal satiety cues and overall consumption.

**Interoception, weight, and eating behaviors.** It has been suggested that differences in body weight status and eating behaviors may be linked with differences in interoceptive processes. Prospective research conducted in children suggests alteration in interoceptive processes follow the onset of maladaptive eating behaviors and over-consumption patterns in childhood (Koch & Pollatos, 2014). Specifically, Koch and Pollatos (2014) measured interoceptive sensitivity among a large cohort of children (6-11 years old) who were normal weight and overweight, using a heart rate perception task administered at two time points, one year apart. Results indicated that overweight youth demonstrated lower levels of interoceptive sensitivity than normal weight children; however, overweight youth first endorsed emotional eating and eating in response to external, rather than internal cues (i.e., hunger), and later demonstrated decreased interoceptive sensitivity performance on a heart rate perception task. This pattern was not found among normal weight children or youth who did not endorse emotional or external eating behaviors, suggesting that first engaging in emotional or externally-driven eating may lead to altered interoceptive processes. Although additional work is needed to evaluate whether the development of poor interoceptive functioning influences the development of maladaptive eating behaviors (i.e., full-threshold binge episodes) later in adulthood, this research may be used to inform future examination of temporal associations between maladaptive eating styles and interoceptive deficits in both obese and normal weight youth.
Among adults, research suggests that higher body mass is associated with lower interoceptive sensitivity, such that BMI is negatively correlated with the ability to detect internal cues among healthy weight, non-eating disordered individuals (Herbert et al., 2012). Furthermore, research suggests that normal weight and overweight/obese, non-treatment seeking individuals who report lower levels of interoceptive awareness are more likely to engage in emotional eating behaviors, as compared to their counterparts who endorsed higher levels of interoceptive awareness (Larsen, van Strien, Eisinga, & Engels, 2006; van Strien & Ouwens, 2007). Apart from the prospective work conducted by Koch and Pollatos (2014), interoceptive awareness in nonclinical samples has only been examined in cross-sectional and correlational study designs. Thus, it is currently difficult to conclude directionality between factors such as BMI, emotional eating onset, and/or interoceptive dysfunction.

It is possible that additional factors explain the link between interoceptive deficits and weight outcomes. For example, Herbert, Blechert, Hautzinger, Matthias, and Herbert (2013) evaluated the association between BMI, interoceptive sensitivity, negative appraisal of interoceptive signals, and intuitive eating characteristics (i.e., eating for physical rather than emotional reasons) in college females, and noted that BMI was negatively related to level of interoceptive sensitivity and the intuitive eating construct, “eating for physical rather than emotional reasons”. This evidence coincided with prior studies of the association between BMI and interoceptive sensitivity (e.g., Herbert et al., 2012; Herbert & Pollatos, 2014). Similar to effects noted in clinical samples, negative appraisal of interoceptive signals (e.g., interpreting interoceptive cues as “bad” or aversive) was positively associated with BMI and negatively associated eating for physical reasons rather than emotional reasons, suggesting that an individual’s appraisal and reaction to interoceptive signals and related emotion states may
present a unique risk factor for emotional eating patterns that might lead to greater weight gain, which may lead to subsequent risk for unhealthy weight control efforts and eating behaviors.

**The Current Study**

In concert with affect regulation theories, various studies that used mood-induction paradigms have shown that negative emotion states are common antecedents to binge eating behaviors. While this theoretical model is well-known, less evidence exists to conclude binge eating truly functions to regulate negative emotion states. Additionally, few studies using well-controlled, in-lab manipulations have used *both* mood induction and feeding paradigms to evaluate eating in response to negative emotion states. Moreover, no studies have yet investigated whether individual difference factors, alexithymia and interoceptive awareness, influence food intake in response to negative emotions. The potential effects that alexithymia and interoceptive processes may have on emotion-driven eating behavior are worthy of study, as research is still needed to identify factors that may predispose an individual to engage in LOC eating as a form of emotion regulation. Further evaluation of individual difference factors that may influence LOC eating should inform prevention and intervention efforts seeking to better target factors that increase risk for LOC and binge eating. Finally, the current study sought to evaluate the affect regulation model in young women who endorsed LOC eating. In addition, this investigation tested the effects of alexithymia and interoceptive awareness—constructs hypothesized to influence emotional awareness and emotion regulation—on negative mood states over the course of a bogus test meal. Specific aims and hypothesis are presented, below.
Specific aims and hypotheses.

**Aim I.** Evaluate whether women who engage in LOC eating differ from healthy comparison women on measures of alexithymia, emotion regulation difficulties, and interoceptive awareness.

**Hypothesis I.** Given that emotion regulation difficulties positively correlate with elevated alexithymia (e.g., greater deficits in identifying and distinguishing between emotion states) and low levels of interoceptive awareness (e.g., greater difficulties in accurately identifying internal, physiological sensations often related to emotional experiences), women who endorsed LOC eating were hypothesized to report significantly greater difficulties regulating emotions, significantly greater levels of alexithymia, and significantly lower levels of interoceptive awareness, as compared to healthy comparison women who denied current LOC eating and other eating disorder symptomatology.

**Aim II.** Determine whether women with LOC eating consume greater amounts of food in response to an elevated negative mood state.

**Hypothesis II.** Controlling for alexithymia and interoceptive awareness, women who endorsed LOC eating were expected to consume more food, in both caloric energy (kilocalories) and volume eaten (grams), following the negative mood induction, as compared to amount of food consumed following the neutral mood induction.

**Aim III.** Evaluate whether women who endorse LOC eating consume greater amounts of food in response to elevated negative mood state, as compared to healthy comparison women without LOC eating.

**Hypothesis III.** Controlling for alexithymia and interoceptive awareness, between-group comparisons of test meal consumption between women who endorsed LOC eating and those who
denied current LOC and other eating pathology were expected to yield the following findings: (1) women who endorsed LOC eating would consume more food – in both caloric and volumetric consumption – following the negative mood induction, as compared to the neutral mood condition, while women in the healthy comparison group would not consume significantly different amounts of food across mood conditions; and (2) women who endorsed LOC eating would consume more food than healthy comparison participants, across mood conditions.

**Aim IV.** Determine whether women who endorse LOC eating demonstrate significantly different trends in negative mood states over the course of a bogus test meal, following negative and neutral mood inductions, as compared to healthy comparison women.

**Hypothesis IV.** Consistent with the affect regulation model, women endorsing LOC eating were expected to demonstrate a significantly different trend in in mood states over time, as compared to women in the HC group. Specifically, women endorsing LOC eating were expected to demonstrate significant decreases in negative mood states, across pre-meal to post-test meal time points (Time 1 through Time 3, respectively). Healthy comparison women were expected to report smaller decreases in negative mood states over time. Eating-related mood modulation was not anticipated for neutral mood induction conditions; therefore, significant group differences in mood states over time were not anticipated within the neutral mood condition.

Finally, alexithymia and interoceptive awareness were expected to demonstrate significant effects on negative mood states experienced over the course of the test meal, such that individuals with greater alexithymia and lower interoceptive awareness report higher pre-meal negative mood states, and greater decreases in negative mood over the course of the meal. This effect was hypothesized to be strongest for women with LOC eating in the negative mood induction condition. Overall, women endorsing LOC were anticipated to demonstrate a
significant improvement in mood, following the negative mood induction and throughout the test meal, as compared to LOC women in the neutral mood induction condition and as compared to women in the HC group (regardless of condition).

Chapter 3: Methods

Participants

Participants included 128 women between the ages of 18 and 29 years old who met inclusion/exclusion criteria for one of two groups: (1) women who endorsed binge eating with LOC and (2) healthy comparison women who denied current LOC eating. Participants were recruited via flyer postings at local establishments in the city of Albany, New York (e.g., coffee shops, libraries, local colleges), and via online postings in the website for the University at Albany, State University of New York Psychology department research pool. Recruitment took place between December 2015 and May 2017.

Inclusion/exclusion criteria. Participants were eligible for the current study if their BMI$_{self-report}$ was at or above 17.5, thus excluding individuals who may have met a low weight criterion for anorexia nervosa. Participants eligible for the LOC group were required to endorse at least one objectively large eating episode accompanied by a sense of LOC per week, over the past 3 months at the time of screening completion. HC group criteria required that participants not report any history of LOC eating. Because several variables of interest in the current study have been shown to co-vary with body mass, HC participants were eligible if their BMI$_{self-report}$ matched with a LOC participant ethnicity and body mass (+/- 1 BMI unit). All participants were required to fluently read and write in English, to effectively complete the mood induction procedure that required reading of Velten statements presented on computer screen (see Robinson et al., 2012 for protocol; Velten, 1968 for statements).
Because the current study sought to evaluate LOC eating in a nonclinical sample of young women, individuals who endorsed compensatory eating disorder behaviors, including vomiting, excessive or driven exercise, laxative or diuretics use on the pre-study screening were not eligible for the study, thus, excluding individuals who may have met DSM-5 diagnostic criteria for bulimia nervosa. Individuals were also excluded if they had been diagnosed with anorexia nervosa or bulimia nervosa, had received prior treatment for an eating disorder, were currently taking medications associated with appetite enhancing or inhibiting effects, had medical conditions that affected appetite, or required specific dietary restrictions that limited consumption of test meal foods. Pre-study screening participants were also ineligible for the current study if they endorsed active psychotic symptoms or current suicidal ideation. Finally, individuals were excluded from the study if they were unable or unwilling to complete a 3-hour fasting period used to control for baseline differences in hunger/satiety levels. Given that many of the variables of interest to the study have exhibited significant gender differences in prior research (i.e., negative mood, emotion regulation difficulties, interoceptive awareness, alexithymia), the current study recruited female participants, increasing experimental control within the study.

G*Power *a priori* power analysis indicated that, for a study design with four groups (binge eating/negative mood; binge eating/neutral mood; healthy controls/negative mood; healthy controls/neutral mood) over three time points, Time 1 (post-negative mood induction/pre-taste-test), Time 2 (end-of-taste-test), and Time 3 (end-of-session), at least 122 participants were needed to detect medium effects (.25) when assessing differences in food intake between experimental conditions.
**Procedure**

All study protocol and procedures were approved by the University at Albany, State University of New York Institutional Review Board.

**Recruitment.** Interested individuals were recruited via an online posting on the University’s Psychology Department research pool website. Psychology course participants were offered extra credit for participation. Flyers were also hung throughout local community establishments (e.g., coffee shops, local libraries) and local college campuses, to recruit women ages 18+ who were not enrolled in Psychology courses at the University. Both Psychology course online postings and community-based recruitment flyers contained text stating that study participants would be eligible to enter a drawing for one of three (3) fifty-dollar ($50.00) amazon.com gift cards (see Appendix A for flyer and online recruitment text). Interested individuals were instructed to contact the research team via a secure email account or via the secure research laboratory telephone line for further information about participation in the “taste test” study. Altogether, 560 individuals contacted the researcher with interest in participation. Of these individuals, 128 met eligibility criteria, attended, and completed the in-laboratory study visit. Overall participant flow for the study is described in further detail in the Results section.

**Pre-study eligibility screening procedure.** After completing an informed consent to participate in a pre-study eligibility screening survey, interested individuals completed self-report screening measures via a surveymonkey.com online survey that assessed self-reported anthropometric and demographic data used to determine eligibility for the bogus taste test (see Appendix B for screening consent form; Figure 1 for a complete schedule of assessments). Screening participants also completed questionnaire items from the Eating Disorder Diagnostic Scale for DSM-5, a revised version of the original EDDS (Stice et al., 2000), which has been
used in other research (e.g., Sysko et al., 2015). EDDS-5 binge eating item responses were used to assess for frequency of binge episodes with LOC eating and other disordered eating behaviors over the past 3 months. This information was used to assess criteria for LOC eating or HC group status assignment.

Screening measures also assessed for participant self-reported ability and willingness to fast for three consecutive hours, to establish whether participants could safely refrain from food or drink intake for three hours prior to the appointment. Participants were informed that this 3-hour fast was required to control for baseline hunger level prior to participants’ bogus taste test meal. Participants also verified dietary restrictions and limitations to ensure participants would be able to consume food presented in the multi-item test meal. Altogether, no pre-study screening participants reported inability or unwillingness to complete a 3-hour fasting period; individuals who reported dietary restrictions that would limit participation in the taste test were excluded from the current study.

Individuals who met screening criteria were invited to the University at Albany, State University of New York Weight and Eating Disorders Research Laboratory to participate in the bogus taste test study appointment. Altogether, 128 women scheduled and attended a single study appointment in the laboratory. At the time of an appointment with the research team, eligible individuals were reminded of study eligibility criteria, and were informed a researcher would verify fasting completion prior to beginning their study appointment. All eligible individuals were informed that the study aimed to evaluate the association between emotions and senses involved in eating and taste perception. Deception was used for this study description to ensure the “taste test” meal provided an unbiased measure of emotion-induced consumption; therefore, screening participants were not informed food intake would be measured during the
study. After conclusion of the data collection period, participants were sent an email containing a full debriefing and study description explaining the use of deception. Participants were given the option to respond to the researcher with a request to withdraw their data from the study at this point; no participants opted to withdraw their data.

**Laboratory visit.** Study participants attended one 90-minute appointment in the University at Albany, State University of New York Weight and Eating Disorders Research Laboratory. All study appointments, which included a negative or neutral mood induction and multi-item bogus taste test, were scheduled on weekdays between the hours of 11:00 AM and 2:00PM or 4:00 PM and 6:00 PM, to control for time of day and coincide with “typical” lunch or dinner mealtimes.

Prior to beginning the appointment, participants provided informed consent (see Appendix C for study consent form). As part of the consent process, a research assistant reviewed eligibility criteria for the current study, and verbally verified completion of the 3-hour fasting period prior to the in-lab appointment. Participants who indicated they had not completed the fasting period were rescheduled and reminded of the 3-hour fast eligibility requirement for study participation. Altogether, three participants were rescheduled due to failing to complete the 3-hour fasting period; all three indicated they had forgotten about the fasting eligibility requirement and verbally confirmed completing the fasting period on their rescheduled appointment date. Research assistants running the participants through study protocols were blinded to participant LOC or HC group status.

**Assessment of baseline and trait psychosocial variables.** After completing informed consent, researchers measured and recorded participant height and weight (Appendix D). Participants completed an online battery of self-report measures using surveymonkey.com.
Questionnaires administered at this time included the Eating Disorder Examination-Questionnaire, and assessed constructs conceptualized as stable or trait-like in nature, including trait negative affect and trait anxiety (see Figure 1 for list and administration schedule of questionnaires). Questionnaires required approximately 10 minutes to complete.

**Mental Tracking Method (MTM) heart rate perception task.** After the assessments of psychosocial variables, participants completed the Mental Tracking Method (MTM) – a heart rate perception task commonly used in psychopathology research to assess levels of interoceptive awareness (Herbert et al., 2007; Herbert et al., 2010; Pollatos et al., 2007; Schandry, 1981). This portion of the study was completed prior to the experimental mood induction and test meal procedures.

**Repeated measures: Visual analog scales (VAS).** After completing the MTM heart beat perception task, participants completed a 100mm visual analogue scale (VAS) for the following items: hunger, fullness, urge to eat, urge to binge, and mood states (see Appendix E). To assess momentary hunger and mood states, participants were instructed to follow the following instruction when completing each VAS, “Please think about how you feel RIGHT NOW. Please use the lines to rate how you feel at the moment.” VAS measures were anchored at “0 – Not at all” and “10 – Extremely.” VAS measures were administered four total times, 10 minutes apart over the course of the study, beginning prior to mood induction.

Time 0 VAS assessments provided a pre-mood induction measure of hunger and mood states, and were used to conduct two procedural checks: (1) ensure baseline hunger levels were adequate to mitigate potential floor effects and, thus, reduce potential for limited food consumption due to lack or low levels of hunger, and (2) conduct a manipulation check for
negative and neutral mood induction procedures. Altogether, this task took less than 2 minutes to complete.

Time 1 VAS measured post-mood induction/pre-meal negative mood states. Time 2 VAS measured mid-meal negative mood states. Time 3 VAS measured post-meal negative mood states. Repeated VAS measures were used to assess change in negative mood states over time. Time 1 ratings were also used in a manipulation check for the mood induction. Ratings were also used to establish pre-meal consumption mood, hunger, fullness, urge to eat, and urge to binge ratings for subsequent analyses.

Experimental mood induction protocol. After providing Time 0 VAS ratings, participants completed a standardized, computerized mood induction task validated by Robinson and colleagues’ (2012) mood induction procedure. Using randomized block design procedures, BMI self-report and ethnicity-matched participants were assigned to either a negative or neutral mood induction condition. This randomization approach was selected to ensure group characteristics were roughly equal, between LOC and HC groups, as well as between negative and neutral mood induction conditions. Altogether, the four Group X Mood Condition assignments into which participants were assigned included: (1) LOC x negative mood condition; (2) LOC x neutral mood condition; (3) HC x negative mood condition; and (4) HC x neutral mood condition.

Negative and neutral mood inductions were completed using a 10-minute, validated computer-based procedure, which employs commonly used mood induction techniques including standardized audio stimuli and Velten Technique (see Robinson et al., 2012 for full procedure). The mood induction protocol was selected based on prior research conducted across several
independent research labs demonstrating successful induction of negative mood states in healthy adults, while requiring minimal experimenter intervention (Robinson et al., 2012).

**Multi-item “taste test” meal paradigm.** After completing Time 1 VAS measures, participants were seated in a separate portion of the room where the multi-item meal was arranged for the bogus taste test (see appendices F and G for taste test protocol, foods, and food presentation). All food items were presented in white plastic bowls (6” diameter); bowls were filled completely. Participants were instructed to complete taste test measures assessing food characteristics and sensory qualities such as taste, texture, salty, sweet ratings (Appendix H). Participants were allotted 10 minutes to complete taste test measures using a range of high-calorie and low-calorie foods (i.e., chocolate, chips, fruit).

Consistent with past test meal protocols completed in this research laboratory (e.g., Shapiro & Anderson, 2005), participants were asked to remain seated at the table with the test meal food for 10 minutes to allow the researcher to score taste test forms. Researchers informed participants the food would remain available, and to “feel free to eat as little or as much as you like” during this 10-minute duration. During the 10-minute taste test duration, participants were left alone in the room to reduce potential researcher influence on consumption. At the end of the 10-minute test meal, participants were informed that the researcher needed to score the taste test rating forms. During this time, participants were asked to complete a second online survey via surveymonkey.com assessing additional trait variables, including measures of alexithymia and difficulties of emotion regulation. As was done for the taste test period, participants were left alone in the room for this 10-minute duration.

Following the 10-minute “scoring” duration, participants completed a fourth set of VAS measures. Once completed, the researcher informed participants they had completed the study
protocol, and conducted a brief funnel debriefing procedure (Appendix I). Finally, participants were provided local counseling and emergency contact information (Appendix J), and encouraged to ask questions or discuss concerns before leaving the laboratory. After participants finished and left the lab, the researcher measured and recorded the remaining food to calculate the amount of food consumption (in kilocalories and grams) following the mood induction.

**Measures**

**Pre-study screening measures.**

*Eating Disorder Diagnostic Scale (EDDS, Stice, Telch, & Rizvi, 2000).* The EDDS updated for the DSM-5 diagnostic criteria was used in the screening process to evaluate eating disorder behaviors consistent with binge eating pathology. Based on the original EDDS measure designed to reflect DSM-IV-TR eating disorder diagnostic criteria (Stice, Telch, & Rizvi, 2000), the EDDS-5 reflects an updated version of the brief, 22-item measure of eating pathology (Stice et al., 2000). Although no validation studies have yet evaluated psychometric properties of the EDDS-5, psychometric data supported the use of the original EDDS for assessing eating disorder symptomatology, demonstrating good content validity and convergent validity (mean kappa = .83), internal consistency (alpha = .89), and test-retest reliability (r = .87) (Krabbenborg et al., 2012; Stice et al., 2000). In the current study, the EDDS-5 was used as a screening tool, as it allowed for the identification of subthreshold and full-threshold eating disorder diagnoses, while also providing a thorough assessment of binge eating characteristics, including LOC eating, and affective, cognitive and behavioral correlates. Because the EDDS-5 was solely used for screening purposes, data for screening items will be presented in the current manuscript; however, this measure was not used in statistical analyses.
Beck Depression Inventory-II (BDI-II; Beck, Steer, & Brown, 1996). The BDI-II is a commonly-used 21-item self-report, multiple choice measure designed to assess depressive symptoms. Items are rated on a 4-point scale, ranging from “0” to “3”, and a total depressive symptom severity score is generated from summing the item scores for the total scale. Ratings are designed to assess severity of each item; the maximum total score is 63. Established severity cut-points are provided in the BDI-II manual, and specify that scores above 20 indicate moderate depression; scores above 29 indicate severe depression. The BDI-II is a revised version of the original BDI (Beck & Steer, 1993); psychometric evaluation concluded that the BDI-II has a strong reliability and a stronger factorial validity than the original BDI (Dozois, Dobson, & Ahnberg, 1998). Evaluation of the BDI-II using college students has indicated strong psychometrics, including a good concurrent and criterion validity, sensitive severity cut scores, and high test-retest reliability (Sprinkle et al., 2002; Storch, Roberti, & Roth, 2004). The BDI-II was used to screen for current, clinically-severe levels of depression and current suicidal ideation – exclusion criteria for the current study.

Demographics form. A basic demographics form was administered during the screening process, and assessed variables including self-reported height (inches), weight (pounds), gender, age, and ethnicity. Several items also assessed eating disorder diagnostic and treatment history, as well as general psychiatric and medical history. Participants were also asked to identify known or potential food allergies or dietary restrictions. Altogether, this information was used to screen for eligibility. Self-reported height and weight was used to compute body mass index (BMI$^\text{Verified}$; kg/m$^2$), which was used along with self-reported ethnicity to identify demographic matches between participants in the LOC and HC groups.

Laboratory study measures.
**Food intake.** As often done in feeding laboratory studies, food intake – the primary outcome variable in analyses – was assessed using two metrics: total volume consumed (grams) and total energy consumed (kilocalories). Total consumption for both grams and kilocalories was determined by computing the difference between total food presented at the start of the taste test meal and the remaining amount at the end of the study session. Consumption was calculated in total weight (grams) consumed as well as total energy (kilocalories) consumed. Food was weighed on an Acculab Electronic Balance digital scale (0.1g precision) before and after participants completed the multi-item taste test meal. Remaining food items from the participant’s plate (e.g., placed on plate, but not eaten) were weighed individually and included in consumption calculations.

**Anthropometric measures.** Standardized measurement procedures were implemented to assess participant height and weight. Participants were asked to remove shoes and any additional clothing (e.g., jackets, sweatshirts). Weight (total pounds) was measured using a calibrated scale; height (total inches) was measured using a standard stadiometer. This information was used to compute BMI data, based on Centers for Disease Control and Prevention recommendations (Centers for Disease Control and Prevention, 2016).

**Mental Tracking Method (MTM; Schandry, 1981).** The current study assessed interoceptive awareness using the Mental Tracking Method (MTM) – a method employing a heart rate perception task designed and commonly used to assess the construct in generally healthy adults (Schandry, 1981). The MTM consists of four intervals of 25, 35, 45, and 55 seconds during which participants counted their heart beats, separated by 30-second resting periods. Participants were instructed to refrain from physically take their pulse or attempt other methods that might influence the detection of heartbeat. Consistent with MTM methodology, a
start and stop cue was used to signal the beginning and end of the heart beat counting phases. Following stop signals, participants were asked to verbally report the number of counted heartbeats. Participant-reported heart rate estimates were recorded by the researcher after each counting phase. During all trials, heart rate variability data was recorded using a heart rate monitor worn by participants during the in-lab appointment. Heart rate data was recorded and saved using emWave, a publicly available heart rate variability biofeedback recording device. Participants were not informed of the length of counting phases and were given feedback regarding the quality of their performance.

As presented by Schandry (1981) and used by other research teams (e.g., Pollatos et al., 2007, 2008), interoceptive awareness scores were calculated using the following equation:

\[
(1/4)\sum\[\text{perceived heartbeats}/(\text{actual heartbeats} - \text{perceived heartbeats})]\]

Scores range between 0 to 1, with 1 indicating higher interoceptive awareness, and 0 indicating lower interoceptive awareness.

**Difficulties in Emotion Regulation Scale (DERS; Gratz & Roemer, 2004).** The DERS is a 36-item self-report instrument that was used to evaluate emotion regulation difficulties in the current study. Participants rated how often item statements such as, “I feel at ease with my emotions”. Items are rated from “1 – almost never (0-10%)” to “5 – almost always (91-100%).” Altogether, the DERS produces a total composite score and six subscales that assess specific domains of emotion regulation difficulties. Scores on the DERS generally correlate with behavioral tendencies and psychopathologies that are theoretically associated by deficits in emotion regulation. When administered in college samples, the DERS has demonstrated strong psychometric properties, including high internal consistency, and construct validity (Gratz & Roemer, 2004).
**Eating Disorder Examination-Questionnaire (EDE-Q; Fairburn & Beglin, 2008).** The EDE-Q is a self-report assessment of eating disorder symptomatology, and was used to generate a global, or average, symptom score. Derived from the Eating Disorder Examination interview (Fairburn & Cooper, 1993), the EDE-Q requires participants to recall disordered eating attitudes and behaviors from the past 28 days; scores can be used to compute four subscales, including eating concern, shape concern, weight concern, and restraint, along with a global score for disordered eating. Psychometric evidence suggests good reliability and validity for this measure (see Berg, Peterson, Frazier, & Crow, 2012 for review). The current study used the EDE-Q global score to evaluate participants’ overall level of eating disorder symptomatology. Individual EDE-Q items were also used to assess LOC eating frequency and other binge eating characteristics to evaluate current LOC and binge eating symptoms among study participants.

**Modified Food Cravings Questionnaire (FCQ; Nijs, Franken, & Muris, 2007; modified version based on Cepeda-Benito, Gleaves, Williams & Erath, 2000).** The FCQ is a self-report, 15-item questionnaire with state and trait versions that assess general desires or urges to consume food at a given moment (state version) as well as habitual tendencies to desire to consume a specific food (trait version). The FCQ state version was used in the current study to assess current urges to consume a specific food. Items on the FCQ state version included items such as, “I have an intense desire to eat one or more specific foods.”, “I know I’m going to keep on thinking about [one or more specific foods] until I actually have it.” Item responses range from strongly disagree to strongly agree, with higher scores indicating stronger state cravings, with psychometric work suggesting the state version reliably distinguishes between state and trait cravings reported by adults (Nijs et al., 2007).
Positive and Negative Affect Schedule – Extended Version (PANAS-X; Watson & Clark, 1994). The PANAS-X is a self-report measure that captures subjective ratings of affect, including specific subscales (i.e. sadness, guilt). The PANAS-X was used in the current study for descriptive analyses examining baseline psychosocial and affective trait variables. Psychometric evaluation suggests that this scale demonstrates good convergent validity and internal consistency (Watson & Clark, 1992). Trait levels of negative affect (“how do you generally feel”) were assessed using the PANAS-X negative affect subscales (fear, hostility, guilt, sadness).

Revised Restraint Scale (RRS; Herman & Polivy, 1980). The RRS is a 10-item scale that has been frequently used to assess cognitive restraint. RRS items are rated on a 4 to 5 point Likert scale, with a maximum total score of 35. The RRS consists of two subscales: (a) weight fluctuation (WF; assessing history of weight fluctuation) and (b) concern with dieting (CD; assessing the attitudes towards dieting). The RRS also generates a total score, which provides an overall measure of cognitive restraint. The scale demonstrates strong psychometric characteristics, including good reliability and validity (Gorman & Allison, 1995). Because prior research suggests cognitive restraint may impact test meal consumption, RRS total scores were used to assess cognitive restraint as a potential covariate in the current study.

Similarity Rating Items. Two single item measures were administered to assess participant self-reported craving tendencies in the current study. The items included: (1) the similarity of the bogus taste test meal to that of a “typical” snack, meal, binge, or other eating episode, and (2) the similarity of the foods presented to types of foods typically craved by the participant, using the descriptors: “These are the foods I typically crave,” “These are not the foods I typically crave,” and “I don’t typically have cravings or particular foods that I crave.”
Items were administered at the end of the battery of questionnaires completed during the 10-minute “waiting period”, while participants were still seated at the table, to assess for similarity between typically desired foods and presence of potential craving of the presented foods. Responses for these items were examined for descriptive purposes; they were not used to test aims or hypotheses in the study.

*Toronto Alexithymia Scale – 20 (TAS-20; Bagby, Parker, & Taylor, 1994).* The TAS-20 is a widely used self-report measure of alexithymia, and consists of 20 items that assess three domains: (1) difficulties identifying feelings and differentiating between feelings and bodily sensations; (2) difficulties describing feelings; (3) externally-oriented thinking (e.g., “I prefer to just let things happen rather than to understand why they turned out that way.”). Items are rated on a 5-point Likert scale, with items ranging from “1 – strongly disagree” to “5 – Strongly agree”. A total continuous score can be computed by summing all item scores, the measure provides a severity cut-off point of 61; individuals scoring 61 or higher on the TAS-20 can be classified as alexithymic. Psychometric properties for the TAS-20 appear acceptable, with adequate convergent and concurrent validity, and good internal consistency for the overall scale (Bagby et al., 1994). The TAS-20 total score was used to assess alexithymia in the current sample.

*Taste Rating Forms.* For each type of food, participants were asked to rate various aspects of the food (e.g., sweet, salty, texture, liking of food). Each aspect was rated on scale of 1 to 10. Given that the purpose of the taste rating forms was to convince participants that the purpose of the study was to assess taste perceptions, the ratings were not used in the current study.
**Visual Analogue Scales (VAS).** Hunger, fullness, urge to eat, urge to binge, and negative and positive mood states were assessed using VAS measures of various emotions and internal states. VAS measures were 100 millimeters, a standard length for such instruments, and were anchored at “0 – not at all” to “100 – extremely”. Participants were instructed to respond to the VAS prompt, “How are you feeling right now?” Mood items assessed with VAS measures included ratings of negative mood states and positive mood states. Hunger/satiety items assessed hunger, fullness, urge to eat, and urge to binge.

**Data Analytic Strategy**

Data were double-entered and analyzed using SPSS 24.0 for Windows. Statistical significance for all tests was set at $p<.05$.

**Preliminary analyses.** Data were screened for univariate and multivariate outliers, as well as violations of normality and homogeneity assumptions prior to analyses. The primary outcome measure, total food consumption (in kilocalories, grams), was screened for extreme outliers, per LOC/HC group. Extreme outliers were defined as values greater than 3 standard deviations from their respective group means, prior to analyses. All other variables of interest were examined for outliers and problematic skewness ($>2.5$) and kurtosis ($>7$), prior to analyses. Graphical representation and statistical tests including Box’s M, Levene’s test, and Mauchley’s test were examined to evaluate assumptions of normality, sphericity, homogeneity of variance-covariance matrices, linearity, and multicollinearity. Preliminary analyses were also conducted to assess for patterns of missingness in measures. When appropriate to analytic approach, variables were mean centered (e.g., prior to examining linear mixed models).

**Descriptive analyses.**
Demographic and anthropometric variables in LOC and HC participants. Descriptive analyses were conducted to examine demographic and anthropometric variables including participant age, body mass index, and race/ethnicity within the current sample. Independent samples t-tests were used to assess participant age and BMI\textsubscript{verified} within each the LOC and HC groups. Chi-Square tests were used to assess participant race/ethnicity distribution across groups and conditions.

Group comparisons of trait mood- and affect-related variables. Multivariate analysis of variance (MANOVA), was used to evaluate LOC and HC group differences on trait-level, affective measures. Constructs examined included the BDI-II Scale total score, STAI trait anxiety score; and PANAS-X global negative affect scale scores.

Group comparisons of eating pathology between LOC and HC participants. MANOVA was used to assess LOC and HC group differences in measures of eating-related variables, including the EDE-Q Restraint, Eating Concern, Weight Concern, and Shape Concern subscales, RRS total score, and FQC total score.

Correlations between baseline psychosocial measures, pre-meal variables of interest, and test meal consumption for LOC and HC participants. LOC and HC group-specific, Pearson-product bivariate correlations were used to test associations between participant test meal consumption (in kilocalories and in grams), demographic variables, and psychosocial variables including age; BMI\textsubscript{verified}; BDI-II; DERS total score; EDE-Q Eating Concern, Restraint, Shape Concern, and Weight Concern subscales; MTM Interoceptive Awareness score; PANAS-X negative affect scales; STAI trait anxiety; TAS-20 total score; and RRS total score. Correlations also examined associations between participant test meal consumption, pre-meal
FCQ, and pre-meal (Time 1) VAS measures of state mood, hunger, fullness, urge to eat, and urge to binge.

**Procedural check.** Means, and standard deviations for pre-mood induction and pre-meal VAS fullness rating scores were examined to ensure no participants endorsed feeling completely full prior to participating in the bogus taste test paradigm. Independent samples t-tests were used to compare pre-mood induction and pre-meal VAS fullness ratings between LOC and HC group participants.

**Manipulation checks.** Paired t-tests were used to compare pre-mood-induction and post-mood-induction VAS assessments to conduct a manipulation check for mood induction procedures. Altogether, negative mood states were expected to significantly increase for individuals in the negative mood induction condition; significant differences were not expected for pre-induction and post-induction measures of negative mood states among individuals in the neutral mood induction condition.

Controlling for LOC group status, an ANCOVA was conducted to confirm whether women experienced significantly greater negative mood states following the negative mood induction procedure, as compared to the neutral film. Post-induction, subjective negative mood state ratings, which were measured using VASs administered immediately following the mood induction procedure, were entered as dependent variables. Mood induction condition (negative and neutral) was entered as the independent variable in the model.

**Primary Analyses.** Analyses specific to each hypothesis tested in the current study are outlined, in order, below.

**Hypothesis I.** Given that emotion regulation difficulties positively correlate with elevated alexithymia (e.g., greater deficits in identifying and distinguishing between emotion states) and
low levels of interoceptive awareness (e.g., greater difficulties in accurately identifying internal, physiological sensations often related to emotional experiences), women who endorsed LOC eating were hypothesized to report significantly greater difficulties regulating emotions, significantly greater levels of alexithymia, and significantly lower levels of interoceptive awareness, as compared to healthy comparison women who denied current LOC eating and other eating disorder symptomatology.

A multivariate analysis of variance (MANOVA) was conducted to compare women who endorsed LOC eating to healthy comparison participants on the following measures: Difficulties in Emotion Regulation Scale total score, Toronto Alexithymia Scale Total Score, and the Mental Tracking Method measure of Interoceptive Awareness.

**Hypothesis II.** Controlling for alexithymia and interoceptive awareness, women who endorsed LOC eating were expected to consume more food, in both caloric energy (kilocalories) and volume eaten (grams), following the negative mood induction, as compared to amount of food consumed following the neutral mood induction.

An analysis of covariance (ANCOVA) was conducted within the LOC group to compare test meal consumption in the negative and neutral mood conditions. Individual ANCOVA models were conducted for test meal consumption measured by caloric consumption (in kilocalories) and by volumetric consumption (in grams). Within each ANCOVA model, food intake was designated as the dependent variable, mood condition as the independent variable, and pre-meal negative affect, pre-meal craving, and BMI\text{verified} were entered as covariates.

**Hypothesis III.** Controlling for alexithymia and interoceptive awareness, between-group comparisons of test meal consumption between women who endorsed LOC eating and those who denied current LOC and other eating pathology were expected to yield the following findings:
(1) women who endorsed LOC eating would consume more food – in both caloric and volumetric consumption – following the negative mood induction, as compared to the neutral mood condition, while women in the healthy comparison group would not consume significantly different amounts of food across mood conditions; and (2) women who endorsed LOC eating would consume more food than healthy comparison participants, across mood conditions.

A 2x2 ANCOVA was conducted to test the interaction of LOC eating status (Group) and mood induction condition. Food intake was identified as the dependent variable in the model; mood induction condition and participant group state were entered as the independent variable. BMIVerified, cognitive restraint, and pre-meal assessments of state craving and state negative affect were entered as theoretical covariates.

**Hypothesis IV.** Consistent with the affect regulation model, women endorsing LOC eating were expected to demonstrate a significantly different trend in mood states over time, as compared to women in the HC group. Specifically, women endorsing LOC eating were expected to demonstrate significant decreases in negative mood states, across pre-meal to post-test meal time points (Time 1 through Time 3, respectively). Healthy comparison women were expected to report smaller decreases in negative mood states over time. Eating-related mood modulation was not anticipated for neutral mood induction conditions; therefore, significant group differences in mood states over time were not anticipated within the neutral mood condition.

Finally, alexithymia and interoceptive awareness were expected to demonstrate significant effects on negative mood states experienced over the course of the test meal, such that individuals with greater alexithymia and lower interoceptive awareness report higher pre-meal negative mood states, and greater decreases in negative mood over the course of the meal. This
effect was hypothesized to be strongest for women with LOC eating in the negative mood induction condition. Overall, women endorsing LOC were anticipated to demonstrate a significant improvement in mood, following the negative mood induction and throughout the test meal, as compared to LOC women in the neutral mood induction condition and as compared to women in the HC group (regardless of condition).

The current study used linear mixed model analyses to evaluate between-group differences in respect to the trends in negative mood states over the course of a test meal, following negative or neutral mood induction. Analyses examined whether women who endorsed LOC eating evinced distinct changes in negative mood states over the course of a bogus test meal following a negative or neutral mood induction, as compared to HC participants. Analyses of negative emotion states over the course of the test meal was assessed using two-level linear mixed models, with ratings of negative mood states represented at level 1 and participants represented at level 2. This approach was used to account for non-independence of repeated measures within a single participant, and allows for individual participants to contribute different numbers of repeated measures to the analysis. In the current analyses, data from participants were combined to estimate average slopes of negative mood states before and after bogus test meal consumption for each individual. Random effects were used for intercept and slope, and an autoregressive (AR1) covariance parameter was applied in the models assessed.

Each linear mixed model was conducted to examine the effects of Group (HC, LOC participants), Mood Condition (Negative, Neutral), and the linear effect of Time on negative mood states. Two additional models were conducted to evaluate whether inclusion of main and interaction effects for alexithymia and interoceptive awareness significantly improved model fit for the trend in negative mood states. Predictor variables were centered prior to conducting linear
mixed models. For the current analyses, the post-mood induction/pre-meal assessment time point was designated as Time 0. Group and Mood Condition were dummy coded, such that neutral mood condition = 0 and healthy comparison group membership = 0. The first step in testing the linear mixed models involved testing the empty unconditional means model with no predictors, to assess for variability in the dependent measure (variability in intercepts). In the second step, time was added into the model with its corresponding random effect, to assess for variability in slopes. Predictors – Group and Mood Condition - were then added to the model to account for variability in intercepts and slopes. Finally, alexithymia was added to the linear mixed model to assess whether level of alexithymia accounted for significant variance and improved model fit (-2 Log Likelihood used for Chi-square test of independence). This was step was repeated in a separate model that included interoceptive awareness to assess for the effect of this construct on participant mood. Because 3 time points of interest were collected, the linear function (time prior to and following the meal) was assessed, as it reflected the rate of change in negative mood states prior to and following the bogus test meal. Analyses were based on all available data. Missing data were not imputed.

Results

Participant Flow

Between December 2015 and May 2017, 539 potential participants contacted the researcher with interest in the current study. All were sent an online pre-study screening survey; 311 responded to the survey. Reasons for exclusion based on the pre-study screen were: endorsement of compensatory behaviors – laxative use, diuretics use, vomiting, other purging behaviors (n = 30), BMI_self-report less than 17.5 (n = 12), use of excluded medications or recent change in psychotropic medication dose (n = 2), diagnosis of an excluded psychiatric condition
(e.g., bipolar disorder, schizophrenia, \( n = 1 \)), age outside the specified age range for the study (\( n = 5 \)), prior or current diagnosis of AN or BN, or receipt of eating disorder treatment (\( n = 5 \)), self-reported medical issues or dietary restrictions that would limit participation in the taste test study (\( n = 10 \)). Sixty-five prospective participants declined interest in the study or did not respond to attempts at contact following the online screen. Finally, 53 endorsed LOC eating but did not meet the frequency criteria for LOC eating for the LOC group, and did not meet criteria for the HC group. The remaining 128 participants completed the bogus test meal protocol.

**Descriptive Analyses**

**Demographic and anthropometric variables in LOC and HC participants.**

Participant characteristics were examined across groups and conditions. This sample included women who self-identified as Caucasian (\( n = 70 \)), Asian American (\( n = 18 \)), Hispanic (\( n = 16 \)), African American (\( n = 14 \)), and Multiracial/Other (\( n = 10 \)). Given that participants in LOC and HC groups were matched prior to group assignment and randomization to mood induction condition, based on pre-screening self-report ethnicity, no significant differences emerged for race/ethnicity across groups, \( \chi^2 (2, N = 128) = 0, p = 1 \). Independent samples t-tests comparing LOC and HC participants revealed no significant group differences on Age, \( M = 19.3 \pm 1.9 \) years; \( t(126) = -1.18, p = .24 \); BMI_{self-report}, \( M = 23.5 \pm 3.8 \); \( t(126) = .33, p = .74 \); or BMI_{verified}, \( M = 23.9 \pm 4.1 \); \( t(126) = -.40, p = .69 \).

Participant dyads (consisting of one individual who endorsed LOC and one who denied any current or past eating disorder pathology matched on self-reported race/ethnicity and BMI_{self-report}) were randomly assigned across mood induction condition; therefore, Chi-square independence tests of Race/Ethnicity X Mood Condition yielded no significant difference in race/ethnicity across mood induction conditions, \( \chi^2 (2, N = 128) = 5.37, p = .25 \). Therefore,
participants of specific racial/ethnic backgrounds were not more likely to have been assigned to a particular mood induction condition than others. Independent samples t-test used to assess BMI values across mood induction conditions revealed no significant differences in researcher-verified BMI across negative mood induction condition, $M = 23.7 ± 3.9$, and neutral mood condition, $M = 24.2 ± 4.4$; $t(126) = -.65, p = .52$.

Altogether, no significant differences in demographic or anthropometric variables emerged between groups or across mood induction conditions, in the current sample.

**Eating-related variables assessed pre- and post-study.**

Item-level analysis of the EDDS-5 binge eating characteristics items used to assess LOC and binge eating characteristics at time of the pre-study screen, indicated that individuals in the LOC group endorsed approximately $5.2 ± 1.2$ objective binge episodes (eating an objectively large amount of food, accompanied by LOC), per week, for the 3 months prior to completing the pre-study screening. Within the healthy comparison group, no individuals endorsed consuming objectively large amounts of food with LOC. Healthy comparison participants endorsed consuming an objectively large amount of food without LOC approximately 3 times per week.

Examination of similarity ratings between “typical” types of eating episodes and the bogus taste test eating experience indicated that 81% ($n = 52$) of women in the HC group found that the bogus test meal was most similar to a snacking episode. Seventy-eight percent ($n = 50$) of women in the LOC group indicated that the bogus taste test meal was most similar to a snacking situation; 11% ($n = 7$) of women in the LOC group indicated the bogus taste test meal was most similar to a “typical” meal.

**Group comparisons of trait affect-related variables.** The full MANOVA model assessing group differences in trait affect measures was significant, indicating LOC and HC
participants differed in measures of trait-level mood and affect related variables, $F(4, 118) = 8.14, p < .001$, indicating significantly different group profiles of trait affect measures. See Table 1 for full MANOVA results.

**Group comparisons of eating pathology between LOC and HC participants.**

Regarding group differences in eating pathology between LOC and HC participants, the full MANOVA model was significant, $F(4, 118) = 8.14, p < .001$, indicating significant differences in EDE-Q subscales – Eating Concern, Restraint, Shape Concern, Weight Concern - between LOC and HC group participants. See Table 2 for full MANOVA model, group means, and standard deviations.

**Correlations between baseline psychosocial measures, pre-meal variables of interest, and test meal consumption for LOC and HC participants.** Pearson-product bivariate correlations revealed few significant correlations between test meal consumption, psychosocial variables of interest in LOC and HC groups, respectively. In the LOC group, participants endorsed statistically significant positive correlations between DERS total score and caloric intake (kCals), $r = .30, p = .02$, and volumetric intake (g), $r = .30, p = .03$. No other variables were significantly correlated with food intake within the LOC group. In the HC group, no baseline or pre-meal variables were associated with test meal intake variables. See Tables 3 and 4 for correlations and descriptive data for demographic and psychosocial variables of interest.

**Procedural Check**

Examination of baseline VAS subjective fullness rating scores indicated that participants endorsed feeling completely full prior to participating in the bogus taste test, with VAS subjective fullness ratings ranging from 0 to 8.8, on a scale of “0 – not full at all” to “10 – extremely full.” Independent samples t-tests yielded no statistically significant differences
between pre-meal VAS fullness ratings in LOC participants, $M = 1.74 \pm 1.75$, as compared to HC participants, $M = 1.65 \pm 1.75$, $t(125) = -0.28, p = .78$.

Evaluation of baseline VAS subjective hunger rating scores indicated no participants endorsed a complete lack of hunger prior to participating in the bogus taste test, with VAS subjective hunger ratings ranging from 1 to 10, on a scale of “0 – not hungry at all” to “10 – extremely hungry.” Independent samples t-tests yielded no statistically significant differences in pre-meal VAS hunger ratings between LOC participants, $M = 6.62 \pm 2.11$, and HC participants, $M = 6.47 \pm 2.33$, $t(125) = -0.39, p = .70$. Altogether, no participants endorsed a complete lack of hunger or feeling completely full prior to bogus taste test participation.

**Manipulation Checks**

Paired t-test results comparing mood states for participants in the negative mood induction condition indicated negative mood VAS ratings significantly increased from the pre-mood-induction, $M = 2.27 \pm 1.91$, to post-mood-induction, $M = 4.90 \pm 2.78$, for LOC participants in the negative mood induction condition, $t(29) = -6.50, p < .001$. HC participants also reported significant increases in negative mood states between pre-mood-induction, $M = 1.85 \pm 1.70$, and post-mood-induction, $M = 4.60 \pm 1.77$, in the negative mood induction condition, $t(30) = -5.59, p < .001$.

Paired t-test comparing mood states among LOC participants in the neutral mood induction condition yielded no statistically significant differences between negative mood VAS ratings in the pre-mood-induction, $M = 3.06 \pm 2.46$, and post-mood-induction, $M = 3.46 \pm 2.95$, $t(32) = -1.30, p = .20$. HC participants did not report statistically significant differences in negative mood VAS ratings between pre-mood-induction, $M = 1.60 \pm 1.82$, and post-mood-induction, $M = 1.73 \pm 1.90$, in the negative mood induction condition, $t(31) = -.45, p = .65$. 
Controlling for LOC group status, the ANVOCA model evaluating differences in negative mood states across mood induction conditions yielded a significant overall model effect, $F(2, 123) = 12.70, p < .001, \eta^2_p = .17$. A significant main effect for mood condition emerged, $F(1, 123) = 20.91, p < .001$, indicating that women experienced significantly greater negative mood states following the negative mood induction procedure, $M = 4.75 \pm 2.75$, as compared to the neutral mood induction procedure, $M = 2.61 \pm 2.62$. Altogether, ANCOVA results indicated that negative mood states were significantly greater for both LOC and HC participants in the negative mood induction condition, as compared to the neutral mood induction condition.

**Primary Aims**

**Aim I. Evaluate whether women who engage in LOC eating differ from healthy comparison women on measures of alexithymia, emotion regulation difficulties, and interoceptive awareness.** MANOVA results examining measures of emotion-regulation and emotional-awareness-related constructs revealed a significant effect of LOC group status, suggesting that participants in the LOC group reported significantly different profiles across measures of emotion regulation and emotional awareness difficulties than individuals in the HC group, Wilks’ $\Lambda = .92, F(3, 104) = 2.97, p = .04, \eta^2_p = .08$ (see Table 5 for full MANOVA model). Planned, follow-up univariate contrasts revealed a significant group effect on difficulties in emotion regulation, $F(1, 106) = 6.51, p = .01, \eta^2_p = .06$, such that LOC participants reported greater difficulties in emotion regulation, $M = 73.14 \pm 21.68$, than HC group participants, $M = 67.65 \pm 25.37$. Univariate contrasts also evinced a significant main effect of group on alexithymia scores, $F(1, 106) = 4.59, p = .04, \eta^2_p = .04$, indicating LOC group participants endorsed greater alexithymia scores, $M = 51.40 \pm 13.08$, as compared to HC group participants,
LOC and HC group participants did not demonstrate significant differences on interoceptive awareness measured by the Mental Tracking Method, $F(1, 106) = 2.00, p = .16, \eta^2_p = .02$. Altogether, women who endorsed LOC eating within the past 3 months endorsed greater difficulties with emotion regulation and higher levels of alexithymia, as compared to women who denied past or current LOC or other eating disorder symptoms.

**Aim II. Determine whether women with LOC eating consume greater amounts of food in response to an elevated negative mood state.** After controlling for theoretical covariates alexithymia and interoceptive awareness, while also accounting for BMI\textsubscript{verified}, Cognitive Restraint, Pre-meal Negative Affect, and Pre-meal Craving states in the LOC group, the overall ANCOVA model examining differences in caloric food intake across Mood Condition was not significant, $F(7, 45) = .75, p = .63, \eta^2_p = .10$. Results indicated no significant main effect of Mood Condition emerged in the ANCOVA model for food intake (in grams), $F(1, 45) = .83, p = .37, \eta^2_p = .02$. No significant effects emerged in the ANCOVA model for covariates, including Alexithymia, $F(1, 45) = .26, p = .61, \eta^2_p = .006$, Interoceptive Awareness, $F(1, 45) = 1.59, p = .21, \eta^2_p = .03$, BMI\textsubscript{verified}, $F(1, 45) = 1.62, p = .21, \eta^2_p = .04$, Cognitive Restraint, $F(1, 45) = .36, p = .55, \eta^2_p = .008$, Pre-meal Negative Affect, $F(1, 45) = .29, p = .59, \eta^2_p = .006$, or Pre-meal Craving, $F(1, 45) = .04, p = .84, \eta^2_p < .001$.

The overall ANCOVA model examining differences in volumetric food intake (in grams) across mood induction conditions was not significant, $F(7, 45) = .94, p = .48, \eta^2_p = .13$, after controlling for theoretical covariates alexithymia and interoceptive awareness, and baseline assessments of BMI\textsubscript{verified}, Cognitive Restraint, Pre-meal Negative Affect, and Pre-meal Craving in the LOC group. Similar to the ANCOVA model for food intake in kilocalories, no significant main effect of Mood Condition emerged in the ANCOVA model for food intake (in grams), $F(1,
45) = 1.33, \( p = .25, \eta_p^2 = .03 \). No significant effects emerged in the ANCOVA model for covariates, including Alexithymia, \( F(1, 45) = .08, p = .79, \eta_p^2 = .002 \), Interoceptive Awareness, \( F(1, 45) = 1.43, p = .24, \eta_p^2 = .03 \), BMI\text{Verified}, \( F(1, 45) = 2.14, p = .15, \eta_p^2 = .05 \), Cognitive Restraint, \( F(1, 45) = .55, p = .46, \eta_p^2 = .01 \), Pre-meal Negative Affect, \( F(1, 45) = 1.09, p = .30, \eta_p^2 = .02 \), or Pre-meal Craving, \( F(1, 45) = .13, p = .73, \eta_p^2 < .003 \).

Altogether, results indicate that neither caloric intake nor volumetric food intake did not differ across mood induction conditions among women who endorsed LOC eating. Moreover, alexithymia and interoceptive awareness did not emerge as significant covariates within the models examining overall food intake across LOC eating status following negative or neutral mood induction.

**Aim III. Evaluate whether women who endorse LOC eating consume greater amounts of food in response to elevated negative mood state, as compared to healthy comparison women without LOC eating.** Results from the 2x2 ANCOVA (Group X Mood Condition) evaluating the effects of LOC eating status and mood induction condition on caloric test meal intake revealed no statistically significant differences in caloric consumption after controlling for covariates, \( F(9, 95) = .59, p = .78, \eta_p^2 = .05 \). The interaction effect for Group X Mood Condition was not significant, \( F(1, 95) < .001, p = .99, \eta_p^2 < .001 \). Main effects were not significant for Group, \( F(1, 96) = .12, p = .73, \eta_p^2 = .001 \), or Mood Condition, \( F(1, 95) = .90, p = .35, \eta_p^2 = .01 \). No significant effects were noted for covariates, Alexithymia, \( F(1, 95) = .84, p = .36, \eta_p^2 = .01 \), and Interoceptive Awareness, \( F(1, 95) = 1.126, p = .29, \eta_p^2 = .01 \), BMI\text{Verified}, \( F(1, 95) = .94, p = .34, \eta_p^2 = .01 \), Cognitive Restraint, \( F(1, 95) = .17, p = .68, \eta_p^2 = .002 \), pre-meal negative affect, \( F(1, 95) = .003, p = .96, \eta_p^2 < .001 \), or Pre-meal craving, \( F(1, 95) = .94, p = .33, \eta_p^2 = .01 \). Altogether, results indicated no significant differences in caloric consumption across
experimental conditions after controlling for covariates. Moreover, theoretical covariates of interest – alexithymia and interoceptive awareness – did not demonstrate significant effects on food intake within the current sample (See Table 6 for means and standard deviations for each Group X Mood Condition).

Results from the 2x2 ANCOVA conducted to test the interaction effect of Group and Mood Condition on volume-based test meal intake revealed no statistically significant differences in the total volume (total grams) consumed after controlling for covariates, $F(9, 95) = .52, p = .86, \eta^2_p = .05$. The interaction effect for Group X Mood Condition was not significant, $F(1, 95) < .02, p = .88, \eta^2_p < .001$. Main effects were not significant for Group, $F(1, 96) = .33, p = .56, \eta^2_p = .01$, or Mood Condition, $F(1, 95) = .90, p = .35, \eta^2_p = .004$. No significant effects were noted for covariates, Alexithymia, $F(1, 95) = .60, p = .44, \eta^2_p = .006$, and Interoceptive Awareness, $F(1, 95) = .36, p = .55, \eta^2_p = .004$, BMI$_{\text{Verified}}$, $F(1, 95) = .28, p = .60, \eta^2_p = .003$, Cognitive Restraint, $F(1, 95) = .001, p = .98, \eta^2_p = .003$, Pre-meal negative affect, $F(1, 95) = .07, p = .80, \eta^2_p = .001$, or Pre-meal craving, $F(1, 95) = 1.69, p = .20, \eta^2_p = .02$. Altogether, results indicated no significant differences in total food intake (in grams) across experimental conditions (see Table 6 for means and standard deviations for each Group X Mood Condition).

Aim IV. Determine whether women who endorse LOC eating demonstrate significantly different trends in negative mood states over the course of a bogus test meal, following negative and neutral mood inductions, as compared to healthy comparison women. As described in the analytic plan, linear mixed models were conducted to examine the main effects and interactions of Group, Mood Condition, and Time on negative mood. Results from the unconditioned model and the model including linear time effect with fixed slope and
random intercept indicated significant variability in intercepts and slopes for negative mood ratings.

Results from the final model with a linear Time effect allowing for random slopes and random intercepts significantly improved model fit, and demonstrated that negative mood decreased over the course of the bogus test meal, $b = -.39$, 95% CI [-.75, -.03]. A significant Time X Mood Condition interaction effect also emerged, suggesting trends in negative mood states were significantly different between mood induction conditions, over time, $b = -1.23$, 95% CI [-1.75, -.71]. Participants in negative and neutral mood induction conditions reported significantly different trends in negative mood states over the course of the meal, such that women in the negative mood induction condition reported greater decreases in negative mood than those assigned to the neutral mood condition (see Figure 2). Significant main effects for Group, $b = 1.56$, 95% CI [.62, 2.51], and Mood Condition, $b = 2.45$, 95% CI [1.49, 3.41], also emerged in the model, as negative mood states differed between women in LOC and HC groups, as well as between negative and neutral mood induction conditions. No other effects were significant within the model (see Table 7).

Shown in Table 6, examination of intercept and slope variance for random effects in the model, revealed significant variance in intercepts, as pre-meal negative mood states significantly varied at the post-mood induction, pre-meal assessment time point. Nonsignificant variance in slopes across participants suggested that individuals did not vary in their rate of linear change in mood state over the course of the test meal. Finally, covariance statistics were not statistically significant, indicating individuals with higher pre-meal negative mood states did not demonstrate significantly different rates of mood change than individuals with lower pre-meal negative mood states.
Inclusion of alexithymia as a predictor in the model did not improve model fit. Similarly, addition of interoceptive awareness within the model did not contribute to improved model fit. Because the inclusion of these constructs did not improve model fit, the model presented in Table 6 presents the best-fit model, excluding the effects of alexithymia or interoceptive awareness.

**Chapter 4: Discussion**

The current study tested the affect regulation model for LOC eating, in efforts to evaluate factors hypothesized to influence LOC and binge eating behaviors in a sample of college-age women. Specifically, this investigation examined the relation between negative mood and eating behavior in young women with and without LOC eating concerns. Given that prior studies of the affect regulation model infrequently account for theoretical covariates and binge eating correlates linked with emotion regulatory processes or behaviors believed to function as modulators of negative emotion states (i.e., LOC or binge eating), the current study also sought to evaluate associations between LOC eating and alexithymia, and interoceptive awareness – constructs central to emotional awareness and, subsequently, emotion regulation. Results, implications, limitations, and future directions are presented in the following section.

**Alexithymia, Interoceptive Awareness, and Difficulties in Emotion Regulation: Exploring Associations in Women with LOC Eating**

LOC and HC group differences were evident in the current sample for measures of emotion regulation and emotional awareness. However, these differences were only observed for measures assessing difficulties with emotion regulation and alexithymia. No significant differences in interoceptive awareness were observed between LOC and HC groups. Therefore, findings partially support hypotheses that women in the LOC group would endorse significant
differences across these constructs. When compared to HC group participants, women who endorsed LOC eating behaviors endorsed significantly higher levels of emotion regulation difficulties and alexithymia – a finding that coincides with patterns expected based on past literature (CITE). However, results indicated that when compared to women who denied current or past engagement in any eating disorder symptomatology, women who endorsed LOC eating did not differ on interoceptive awareness. This result was unexpected, as prior research has suggested deficits in interoceptive awareness are associated with increased levels of eating pathology in both subclinical and clinical samples (e.g., Fassino et al., 2004; Merwin et al., 2010). However, some prospective research conducted in children indicated that alterations in interoceptive processes follow the onset of maladaptive eating behaviors and over-consumption patterns in childhood (Koch & Pollatos, 2014). Considering that women in the LOC eating group did not endorse extremely elevated EDE-Q scores as compared to norms in college samples (e.g., Mond et al., 2006), it’s possible that women in the current study may not have significant deficits in interoceptive awareness, as the level of eating pathology may need to be greater before alterations in interoceptive processes develop. Additionally, it should be noted that many prior examinations of interoceptive awareness within the eating disorders literature have been measured using the Eating Disorders Inventory-3 – Interoceptive Deficits scale which contains items assessing emotional awareness and eating disorder symptoms (EDI-3-ID; Garner, 2004). In addition, the measure of the EDI-3-ID is based on self-report items, which may yield biased or inaccurate estimates of one’s ability to detect interoceptive sensations. Noting this, discrepancies between prior findings and current results may be due to differences in assessment method, as interoceptive awareness was measured using an objective assessment of interoceptive experience (e.g., awareness of heart beats verified using EmWave recordings) rather than self-report.
Regardless of discrepant findings for interoceptive awareness, results from this analysis suggest that emotional awareness, in addition to emotion regulation deficits, may be a differentiating factor between individuals who struggle with LOC eating and those who do not. While additional research should be conducted to better elucidate the relations between constructs central to emotional awareness, emotion regulation, and disordered eating, the current results suggest that alexithymia and emotion regulation difficulties are factors associated with LOC eating in young women. However, the role of interoceptive awareness – particularly as a component of the larger, overarching construct of emotional awareness – may require additional consideration in future research.

**Negative Mood and Food Intake in Young Women with and without LOC Eating**

Tests of total food intake over the course of the test meal revealed no significant differences between LOC and HC group participants. Rather, women consumed similar amounts of food regardless of LOC eating status or mood induction condition, with no change in results after accounting for effects of alexithymia and interoceptive awareness. Altogether, the lack of food intake differences across the sample did not support the hypotheses, given that affect regulation theory would predict that women endorsing LOC eating would report higher post-mood-induction negative affect and greater decreases in negative mood states over time, as compared to healthy comparison participants and LOC individuals in neutral mood conditions.

Mood induction condition did not appear to affect total food intake, as no significant differences emerged for the interaction between LOC eating status (Group) and participant mood induction condition (Mood Condition). When the effect of mood condition on food intake was examined in the subset of women who endorsed LOC, similar results emerged – suggesting mood induction condition had no significant effect on laboratory meal consumption.
Examination of covariate effects indicated the amount of food consumed was not associated with level of alexithymia or interoceptive awareness among women endorsing LOC eating behaviors.

Although findings conflict with hypotheses, several factors may explain the unexpected lack of association between mood and food intake. For example, the use of laboratory-based manipulation of negative mood induction and presentation of a multi-item meal limits generalizability of laboratory-induced and laboratory-measured emotion states. For example, it may be difficult to induce similar emotional intensities or provide personalized mood-inducing scenarios using negative mood cues specific to the participant. In fact, several studies utilizing mood manipulations and test meals to examine affect regulation model for binge eating conducted in clinical samples have failed to demonstrate significant differences in food intake between people who binge eat and healthy controls (e.g., Gianini et al., 2013; Goldschmidt et al., 2012; Agras & Telch, 1998), suggesting that naturalistic methodologies (e.g., ecological momentary assessment; EMA, Berg et al., 2012) may provide a more accurate measure of mood-driven consumption.

Indeed, meta-analytic results suggest that, within EMA research, increased negative affect precedes binge eating episodes (Haedt-Matt & Keel, 2011); therefore, it is possible that the utilization of a mood induction protocol is not guaranteed to capture relevant facets of negative affect or induce negative emotion states of equal magnitude to those experienced in naturalistic settings. Therefore, while manipulation checks demonstrated significant differences in negative mood states between mood induction conditions, it is possible that the negative mood induced did not induce equivalent emotional intensity experienced prior to a typical LOC or binge eating episode.
Finally, sample demographic and anthropometric characteristics may have contributed to null results for both food intake and trends in mood change in the present study. For example, given that BMI can be an indirect indicator of overall food intake (e.g., individuals with binge eating disorder often report greater BMI values, due to increased caloric intake with no compensatory behaviors), one explanation for null results in food intake might be the fact that LOC and HC group participants were matched based on BMI (+/- 1 unit). This was done to control for the influence BMI has been shown to have on measures of interoceptive awareness and alexithymia; however, it is possible that controlling for group differences in BMI removed a significant amount of variance in the outcome measure of objective food intake. Indeed, in studies examining LOC or binge eating, mood, and food intake in child and adult samples, BMI has been allowed to vary across groups, such that BED groups are often comprised of individuals with significantly greater body mass than healthy control or comparison groups (e.g., Goldschmidt et al., 2012). It is possible that by matching participants according to BMI, potential variance in between-group food intake was removed from the current sample. Thus, additional work may benefit from replicating the current aims, but allowing BMI to vary across LOC and HC groups.

Another potential factor that may have influence food intake is the potential error inherently associated with self-reported “binge” eating. For instance, while participant definition and interpretation of an “unusually large amount of food” may have reflected true, objectively large eating episodes with a sense of LOC, it is also possible that the binge episodes endorsed were primarily driven by estimates of eating episodes (of any size) defined by a sense of LOC. Although EDDS-5 item responses used for screening purposes indicated that LOC group participants met criteria for DSM-5 diagnostic thresholds for binge episodes that include
objectively large amounts of food intake plus LOC during the eating episode, it is possible that the self-reported binge episodes were predominantly defined by the sense of LOC, rather than a clinically-significant amount of food consumed with LOC. Therefore, it is possible that the women with LOC eating in the present study represent a group of individuals who do experience problematic LOC eating, but when faced with theoretical binge eating cues (i.e., elevated negative mood states), may not engage in objectively large eating episodes.

One additional explanation for no differences in food intake may be explained by generally low levels of eating disorder severity within the LOC group. When compared to the healthy comparison participants, individuals who endorsed LOC eating demonstrated significant differences in EDE-Q subscales. However, evaluation of LOC group scores on the EDE-Q suggested that, despite statistically significant group differences in EDE-Q measures of eating pathology, participants in the LOC group reported levels of eating pathology that remained well within norms established for young adult and undergraduate women (Luce et al., 2008; Mond et al., 2006). This suggests that the current results may be reflective of subthreshold binge eating related concerns, in a group of women for whom “binge episodes” are characterized by LOC, as compared to objective eating episode definitions consistent with formal eating disorder diagnoses. Said differently, results in the present study may be a product of comparing healthy comparison participants to generally healthy individuals who endorse at-least-weekly LOC eating episodes, but who do not meet full threshold diagnostic severity for what is consistent with binge eating disorder or other binge-type eating disorder diagnoses (e.g., bulimia nervosa, purging disorder).

In the case that current sample of women with LOC represents a group of individuals with subthreshold eating pathology, it is possible that overall food intake is not the primary
outcome variable of interest when studying problematic binge-type eating behaviors in young women who report LOC eating concerns. Indeed, significant differences in EDE-Q scores, difficulties in emotion regulation, and levels of alexithymia symptoms between healthy comparison participants and women in the LOC group, indicate more research is needed to examine the clinical significance of LOC eating in college-age women, as results suggest that endorsement of LOC may be a significant factor for identifying women who otherwise appear generally healthy. Given the significant differences in measures of eating pathology, along with greater deficits in emotion regulation and alexithymia, it is possible that regardless of food intake, individuals who endorse LOC eating may be at risk for greater binge eating symptom severity and psychological comorbidities in the future. Therefore, given that assessment of risk factors falls outside the scope of this study, prospective work is needed to evaluate risk in this population, over time. In the case that young women are at increased risk for later DSM-5 eating disorder diagnoses, assessment of perceived LOC may prove useful for identifying those in need of early prevention or intervention efforts to mitigate the development of more severe eating pathology in individuals who may otherwise go unnoticed during a period during which they might instead receive preventive support.

**Pre-meal to Post-meal Negative Mood in Young Women with and without LOC eating**

Examination of negative mood states over the course of a test meal suggested that, throughout the full sample, all women in the current sample experienced similar decreases in negative mood states over the course of the bogus test meal. Significant main effects for groups and mood induction conditions were observed; however, no interaction between LOC eating status and mood induction condition emerged. Examination of group differences indicated that women who endorsed LOC eating experienced the highest levels of negative mood throughout
the study, regardless of mood condition. When examined across LOC and HC groups, women
assigned to the negative mood condition reported significantly higher negative mood states
following the mood induction, regardless of eating status. Examination of the degree of change
in mood over time indicated that women in the negative mood condition experienced the greatest
decrease in negative mood over time, as compared to the neutral mood condition. However, no
Group X Mood Condition or Group X Mood Condition X Time interactions emerged, suggesting
change in negative mood states did not significantly differ between women with or without LOC
eating. Altogether, results challenge the affect regulation model for LOC and binge eating, in the
current sample.

It should be noted that the current study utilized a mood induction designed to induce
general feelings of negative affect, rather than specific mood states, as individuals with eating
disorders have been shown to demonstrate deficits in emotion identification and labeling, thus
leading to possible ambiguity in studies aiming to assess particular mood states. However, the
use of more specific mood induction (e.g., anger for an individual who engages in binge eating in
response to anger) may be a valuable endeavor to pursue in both research and clinical efforts. For
example, it is possible that the utilization of an induction protocol designed to induce negative
affect, rather than a specific emotion, along with the current assessment of negative mood as an
overarching, single construct may have missed meaningful nuances in negative mood states.
Indeed, some studies of negative affect prior to and following binge episodes in clinical samples
indicate that specific facets of negative affect, including guilt and anger, may be particularly
salient predictors of binge episodes in both clinical and nonclinical samples (Berg et al., 2012;
Engel et al., 2012). Given the many factors that can be considered while evaluating the affect
regulation model, continued research is needed to assess the wide range of variables that may
impact the likelihood to engage in LOC eating. If pursued in future work, an individualized approach to assessing LOC or binge eating behaviors as forms of emotion regulation may be particularly useful when in a clinical setting with an individual with specific emotion cues that may provide valuable treatment targets.

**Future Directions**

Results suggest that additional factors not assessed in the current study likely influence LOC eating, and therefore should be identified and accounted for in future work examining relations between negative mood and LOC or binge eating pathology. The current study primarily focused on the relations between negative affect, emotional awareness and regulation, and food intake, yielding primarily null results. However, it is possible that consideration of additional factors may influence emotion-driven food intake. For example, prior research indicates that negative urgency (the tendency to engage in impulsive action in response to negative affect) is a prospective risk factor for binge eating in adolescent and college-aged samples (e.g., Pearson, Combs, Zapolski, & Smith, 2012), as it increases risk for binge eating in efforts to regulate negative emotions (Fischer et al., 2008). Although not tested in the current investigation, negative urgency has been implicated as a key individual difference factor in binge eating - particularly when interacting with elevated negative affect (e.g., Racine et al., 2013). As such, incorporation of negative urgency within the model of affect regulation may account for the tendency to act impulsively in response to urges to mitigate or escape from aversive states of negative affect. Negative urgency may also impact associations between alexithymia, interoceptive awareness and binge eating, as it has been shown to interact with high alexithymia to increase risk for emotion dysregulated behaviors (Fink, Anestis, Selby, & Joiner, 2010). Given the significant differences between LOC and HC participants on measures of difficulties in
emotion regulation, it is possible that the interactions between alexithymia and negative urgency or between interceptive awareness and negative urgency may influence the development and/or maintenance of LOC eating and binge eating pathology. Although underpowered to accommodate additional covariates within analyses in the current study, future research may benefit from examining whether emotional awareness and negative urgency interact to influence LOC and binge eating in both subclinical and clinical samples.

**Strengths and Limitations**

Results should be interpreted while remaining aware of various strengths and limitations that may impact confidence in conclusions drawn from the current study. Several strengths of the current study include efforts to recruit from a community-based sample, use of validated experimental manipulation paradigms that offered increased control over naturally variable constructs (e.g., negative mood states) and constructs that are liable to biased self-reporting (e.g., BMI, interoceptive awareness). In addition, the current study is the first, to the author’s knowledge, to examine the relation between mood and eating behavior (food intake) while accounting for emotional awareness constructs alexithymia and interoceptive awareness within a controlled laboratory test meal setting. Moreover, assessment of momentary mood states allows for reduction of possible recall bias when examining the relations between post-mood-induction mood states, which is a weakness of many retrospective self-report measures of emotion.

Despite the strengths in this study, limitations should also be noted. For example, one limitation relates to the fact that negative mood states were only assessed at pre-meal, mid-meal, and post-meal (end of test meal) time points. Therefore, it is possible that the inclusion of additional time points may have yielded greater insight in terms of the trajectory of post-meal
mood states over the course of and following end of meal assessment time points (e.g., allowed for assessment of non-linear trends in negative mood states).

Another limitation lies in the fact that it is possible that the current sample size did not capture meaningful differences in total food intake over the course of the bogus taste test meal. Noted within the analytic plan, analyses were adequately powered to detect small effect sizes ($d = .2 - .25$) between mean levels of food intake for LOC and HC groups. Based on past studies utilizing similar methodology, significant difference between groups for food intake was anticipated to be approximately 500 kcals between LOC and HC groups (e.g., Goldschmidt et al., 2012). However, current analyses may have been underpowered to detect smaller effect sizes within the sample. Examination of means and standard deviations in the current study indicates that restricted range in total food intake may have limited analyses, as the total amount of food consumed did not vary widely within the sample. Given the fact that little variance existed between LOC and HC group food intake the current study and therefore limited statistical power to identify true group differences in meal consumption, additional research in populations with greater eating pathology variability is needed to adequately assess the relations between objective measures of food intake and alexithymia, interoceptive awareness, and emotion regulation-related variables. However, given that research indicates LOC eating is a better predictor of psychological comorbidities and clinical impairment than eating episode size (Vannucci et al., 2013), it seems important for future LOC and binge eating research to consider increased clinical emphasis on outcomes other than total food intake or eating episode size (e.g., sense of LOC, negative mood or specific negative emotions such as anger or guilt felt after eating), as individuals may demonstrate relatively similar amounts of food intake in a given
eating setting, decreasing the likelihood for group differences to emerge, while still experiencing significant psychological suffering.

Finally, limitations in generalizability should be noted, as the sample was limited to predominantly healthy young women from a community- and college-based sample who endorsed weekly LOC eating. Replication and additional examination of relations between alexithymia, interoceptive awareness, and binge eating pathology should be examined in individuals who may endorse different levels of the traits and symptoms of interest (e.g., in clinical and non-clinical samples of different ages, gender, weight status). Moreover, the current study was completed in a highly-controlled, laboratory setting. Therefore, mood induced in the lab may not reflect mood states experienced in participants’ daily lives. Therefore, conclusions should be drawn with limitations including altered food intake due to social desirability concerns or limitations in mimicking antecedents to LOC eating episodes in the current sample. For example, given that a majority of individuals reported the bogus taste test meal was most similar to a snacking episode, comparisons between the current test meal and a “typical” LOC or binge episode should be interpreted with caution.

**Summary and Conclusions**

The affect regulation model of LOC and binge eating presents an etiological model for binge eating that is generally well-known, and often used to inform prevention and intervention efforts for eating disorders. However, evaluations of the model have yielded mixed findings across naturalistic and experimental studies in clinical and nonclinical populations. One explanation for discrepant results may be due to the fact that most prior studies testing negative affect and in-laboratory eating behavior often do not assess or account for individual difference factors. Therefore, the current study sought to contribute to and fill this gap within the literature,
as it evaluated relations between negative mood states, LOC eating pathology, and relatively unexplored constructs associated with emotion regulatory processes and disordered eating. Altogether, this study used a multimethod laboratory study design to examine theoretical individual factors related to emotion regulation and LOC eating behaviors in a sample of college-age women with and without LOC eating.

Overall, study results do not support the affect regulation model of LOC or binge eating pathology in young women in the sample, as significant differences in food intake or mood states were not evident between women in the LOC eating group and the healthy comparison group. In particular, when compared to healthy comparison women, results do not indicate that women with LOC experience a significantly greater decrease in negative mood states after eating. Moreover, no group differences emerged between total food intake, suggesting that individuals endorsing subthreshold levels of binge eating pathology (e.g., LOC eating) may not necessarily demonstrate overt differences in negative mood or food intake, without accounting for key factors that may influence binge eating.

Noting that LOC and HC participants demonstrated significant differences on levels of alexithymia and difficulties in emotion regulation, the current findings suggest that future work must better elucidate predictors of problematic LOC eating and individual difference factors that may increase vulnerability to developing and/or maintaining subclinical binge eating. In the case that such endeavors are successful, prevention and early intervention efforts may be able to better identify young adults at risk for LOC eating before LOC eating and subclinical binge eating pathology develops into more severe, full-threshold binge eating psychopathology.
References


Eizaguierre, A. E., de Cabasón, A. O. S., de Alda, I. O., Olariaga, L. J., & Juaniz, M.


Fukunishi, I. Eating attitudes in female college students with self-reported alexithymic characteristics. *Psychological Reports, 82*, 35–41. doi: 10.2466/pr0.1998.82.1.35.


on the relationship between cardiac awareness and the sensitivity for gastric functions.

_PloS One, 7, e36646._


Racine, S. E., Keel, P. K., Burt, S. A., Sisk, C. L., Neale, M., Boker, S., & Klump, K. L.


Psychology, 49, 381-385. doi: 10.1037/0022-0167.49.3.381.


Zeeck, A., Stelzer, N., Linster, H. W., Joos, A. & Hartmann, A. (2011), Emotion and eating in
Figure 1. The laboratory session and schedule of study assessments.

**Screening Questionnaires:**
Screening Survey Informed Consent Form, Revised Restraint Scale, Eating Disorder Diagnostic Scale, Beck Depression Inventory-II, Demographics, Weight Suppression, Psychological and Physical Health History and Current Status, Eating Disorder Treatment History, Referral Source

- **Baseline**
  - Online Consent & Baseline Questionnaires:
    - EDE-Q
    - STAI - Trait
    - FCQ - State
  - **TOTAL:** 20-30 mins

- **Time 0**
  - Heart Rate Task (~5 min)
  - Mood Induction (10 min)

- **Time 1**
  - Taste Test meal (10 min)
  - T0 Hard Copy Questionnaires:
    - VAS ratings (5 min)
  - T1 Hard Copy Questionnaires:
    - VAS ratings (5 min)

- **Time 2**
  - “Scoring” time (10 min)
  - T2 Hard Copy Questionnaires:
    - VAS ratings (5 min)

- **Time 3**
  - Debriefing/End of Study
  - T3 Hard Copy Questionnaires:
    - VAS ratings (5 min)

- **Online Questionnaires:**
  - DERS
  - PANAS-X
  - TAS-20
  - Crave question
  - Binge question (~10-15 min; completed during “Scoring Time”)
Figure 2. Visual Analog Scale Ratings of Subjective Negative Mood States Over Time

*Note.* Visual Analog Scales (100mm) anchored at 0 “not at all” and 10 “extremely,” with 10 indicating extremely high negative mood states. Time 1 = pre-meal *and* post-mood-intervention assessment time point.
Table 1. Trait Level Mood- And Affect-Related Variables Among Participants with and without LOC Eating

<table>
<thead>
<tr>
<th>Variable Name</th>
<th>LOC group (n = 61)</th>
<th>HC group (n = 61)</th>
<th>F-value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M (SD)</td>
<td>M (SD)</td>
<td></td>
</tr>
<tr>
<td>Full MANOVA model</td>
<td>---</td>
<td>---</td>
<td>$F(3, 188) = 8.14, p &lt; .001$</td>
</tr>
<tr>
<td>BDI Total Score (log$_{10}$)*</td>
<td>1.19 (.26)</td>
<td>.94 (.31)</td>
<td>$F(1, 120) = 23.89, p &lt; .001$</td>
</tr>
<tr>
<td>PANAS-X Negative Affect Scale*</td>
<td>21.02 (7.37)</td>
<td>20.52 (5.87)</td>
<td>$F(1, 120) = 14.98, p &lt; .001$</td>
</tr>
<tr>
<td>STAI-Trait Anxiety Total Score</td>
<td>45.98 (11.84)</td>
<td>37.82 (11.46)</td>
<td>$F(1, 120) = .17, p = .68$</td>
</tr>
</tbody>
</table>

Note. Asterick (*) denotes statistically significant univariate comparison between groups. BDI = Beck Depression Inventory; PANAS-X = Positive and Negative Affect Schedule – Extended; STAI = State-Trait Anxiety Inventory. log$_{10}$ – log transformation applied prior to analyses, to address MANOVA multivariate normality assumption.
<table>
<thead>
<tr>
<th>Variable Name</th>
<th>LOC group (n = 50)</th>
<th>HC group (n = 56)</th>
<th>F-value</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Full MANOVA model</td>
<td>---</td>
<td>---</td>
<td>$F(6, 99) = 8.11$</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>EDE-Q Eating Concern</td>
<td>1.37 (.13)</td>
<td>.32 (.12)</td>
<td>$F(1, 104) = 37.75$</td>
<td>.02</td>
</tr>
<tr>
<td>EDE-Q Restraint</td>
<td>1.55 (.17)</td>
<td>1.00 (.16)</td>
<td>$F(1, 104) = 5.37$</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>EDE-Q Shape Concern</td>
<td>2.86 (.22)</td>
<td>1.71 (.21)</td>
<td>$F(1, 104) = 14.23$</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>EDE-Q Weight Concern</td>
<td>2.30 (.22)</td>
<td>1.36 (.20)</td>
<td>$F(1, 104) = 10.05$</td>
<td>.002</td>
</tr>
<tr>
<td>Revised Restraint Scale</td>
<td>15.82 (.72)</td>
<td>11.57 (.68)</td>
<td>$F(1, 104) = 18.26$</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>FCQ State Craving – Time 0</td>
<td>50.76 (1.44)</td>
<td>43.73 (1.37)</td>
<td>$F(1, 104) = 12.51$</td>
<td>.001</td>
</tr>
</tbody>
</table>

*Note.* LOC group = participants who endorsed at least one loss of control eating episode per week, over the past 3 months; HC group = participants with no current or past history of eating disorder symptoms. EDE-Q Eating Concern = Eating Disorder Examination-Questionnaire Eating Concern subscale score; EDE-Q Restraint = Eating Disorder Examination-Questionnaire Restraint subscale score; EDE-Q Shape Concern = Eating Disorder Examination-Questionnaire Shape Concern subscale score; EDE-Q Weight Concern = Eating Disorder Examination-Questionnaire Weight Concern subscale score; RRS = Revised Restraint Scale total score; FCQ = Food Craving Questionnaire – state version score at baseline (Time 0).
Table 3. Correlations for Demographic and Psychosocial Variables of Interest in Loss of Control and Healthy Comparison Groups

<table>
<thead>
<tr>
<th>Outcome Variables</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Food Intake (kCals)</td>
<td>1</td>
<td>.81**</td>
<td>0.04</td>
<td>0.02</td>
<td>0.03</td>
<td>0.07</td>
<td>0.06</td>
<td>0.03</td>
<td>-0.19</td>
<td>0.07</td>
</tr>
<tr>
<td>2 Food Intake (g)</td>
<td>.97**</td>
<td>1</td>
<td>-0.04</td>
<td>0.03</td>
<td>0.03</td>
<td>-0.02</td>
<td>0.06</td>
<td>0.14</td>
<td>0.01</td>
<td>0.10</td>
</tr>
</tbody>
</table>

Baseline Demographic and Psychosocial Variables

<table>
<thead>
<tr>
<th>Variable</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 Age (years)</td>
<td>-0.19</td>
<td>-0.18</td>
<td>1</td>
<td>0.04</td>
<td>0.03</td>
<td>-0.11</td>
<td>-0.06</td>
<td>0.17</td>
<td>0.01</td>
<td>0.05</td>
</tr>
<tr>
<td>4 BMI_{verified} (kg/m²)</td>
<td>-0.12</td>
<td>-0.12</td>
<td>0.17</td>
<td>1</td>
<td>0.13</td>
<td>.43**</td>
<td>.30*</td>
<td>0.11</td>
<td>-0.13</td>
<td>0.05</td>
</tr>
<tr>
<td>5 BDI Total</td>
<td>0.15</td>
<td>0.21</td>
<td>0.16</td>
<td>.32**</td>
<td>1</td>
<td>.31*</td>
<td>.72**</td>
<td>.58**</td>
<td>0.10</td>
<td>.43**</td>
</tr>
<tr>
<td>6 RRS Total</td>
<td>0.03</td>
<td>0.07</td>
<td>0.22</td>
<td>.57**</td>
<td>.27*</td>
<td>1</td>
<td>.65**</td>
<td>0.07</td>
<td>-0.19</td>
<td>-0.08</td>
</tr>
<tr>
<td>7 EDEQ global</td>
<td>-0.04</td>
<td>0.01</td>
<td>0.26</td>
<td>.52**</td>
<td>.28*</td>
<td>.68**</td>
<td>1</td>
<td>.40**</td>
<td>-0.06</td>
<td>.28*</td>
</tr>
<tr>
<td>8 DERS Total</td>
<td>.30*</td>
<td>.30*</td>
<td>0.07</td>
<td>.32*</td>
<td>.44**</td>
<td>.27*</td>
<td>0.25</td>
<td>1</td>
<td>0.08</td>
<td>.72**</td>
</tr>
<tr>
<td>9 MTM - IA</td>
<td>-0.23</td>
<td>-0.24</td>
<td>0.12</td>
<td>-0.06</td>
<td>-0.15</td>
<td>-0.06</td>
<td>0.09</td>
<td>-0.12</td>
<td>1</td>
<td>0.14</td>
</tr>
<tr>
<td>10 TAS-20 Total</td>
<td>0.12</td>
<td>0.07</td>
<td>-.31*</td>
<td>0.06</td>
<td>0.03</td>
<td>-0.01</td>
<td>0.01</td>
<td>.58**</td>
<td>-0.17</td>
<td>1</td>
</tr>
</tbody>
</table>

Note. Correlations above diagonal = Healthy Comparison group. Correlations below diagonal = Loss of Control group. ** p < 0.01, * p < 0.05. BMI_{verified} = Body mass index (kg/m²) verified by researcher; BDI = Beck Depression Inventory total scale; RRS = Revised Restraint Scale total scale; EDEQ = Eating Disorder Examination Questionnaire total score; DERS = Difficulties with emotion
regulation total score; MTM-IA = Mental tracking method interoceptive awareness score; TAS-20 = Toronto Alexithymia Scale-20 total score.
Table 4. Descriptive Statistics for Demographic, Psychosocial, and Pre-meal Variables of Interest per Group

<table>
<thead>
<tr>
<th>Variable Name</th>
<th>Group</th>
<th>n</th>
<th>Range</th>
<th>Mean</th>
<th>SD</th>
<th>Skewness (SE)</th>
<th>Kurtosis (SE)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Primary Outcome Variables</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Food Intake (Kilocalories)</td>
<td>LOC</td>
<td>63</td>
<td>161.70</td>
<td>2672.29</td>
<td>736.02</td>
<td>1.91</td>
<td>.30</td>
</tr>
<tr>
<td></td>
<td>HC</td>
<td>64</td>
<td>160.37</td>
<td>2210.64</td>
<td>719.35</td>
<td>1.36</td>
<td>.30</td>
</tr>
<tr>
<td>Food Intake (Grams)</td>
<td>LOC</td>
<td>63</td>
<td>239.40</td>
<td>3736.89</td>
<td>1091.59</td>
<td>657.43</td>
<td>1.72</td>
</tr>
<tr>
<td></td>
<td>HC</td>
<td>64</td>
<td>239.47</td>
<td>2472.92</td>
<td>1067.79</td>
<td>499.14</td>
<td>.69</td>
</tr>
<tr>
<td><strong>Demographic and Psychosocial Variables</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age (in years)</td>
<td>LOC</td>
<td>64</td>
<td>18.00</td>
<td>29.00</td>
<td>19.50</td>
<td>2.27</td>
<td>2.30</td>
</tr>
<tr>
<td></td>
<td>HC</td>
<td>64</td>
<td>18.00</td>
<td>26.00</td>
<td>19.09</td>
<td>1.54</td>
<td>2.18</td>
</tr>
<tr>
<td>BMI_{Self-Report} (kg/m^2)</td>
<td>LOC</td>
<td>64</td>
<td>18.01</td>
<td>32.61</td>
<td>23.38</td>
<td>3.72</td>
<td>.96</td>
</tr>
<tr>
<td></td>
<td>HC</td>
<td>64</td>
<td>17.92</td>
<td>35.19</td>
<td>23.60</td>
<td>3.84</td>
<td>1.09</td>
</tr>
<tr>
<td>BMI_{Verified} (kg/m^2)</td>
<td>LOC</td>
<td>64</td>
<td>18.20</td>
<td>35.60</td>
<td>24.08</td>
<td>4.18</td>
<td>1.04</td>
</tr>
<tr>
<td></td>
<td>HC</td>
<td>64</td>
<td>17.70</td>
<td>36.70</td>
<td>23.78</td>
<td>4.11</td>
<td>1.21</td>
</tr>
<tr>
<td>BDI Total Score*</td>
<td>LOC</td>
<td>63</td>
<td>2.00</td>
<td>39.00</td>
<td>17.24</td>
<td>9.44</td>
<td>.46</td>
</tr>
<tr>
<td></td>
<td>HC</td>
<td>64</td>
<td>2.00</td>
<td>41.00</td>
<td>9.89</td>
<td>8.05</td>
<td>1.47</td>
</tr>
<tr>
<td>Variable</td>
<td>LOC</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>--------------------------------------</td>
<td>------</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>DERS Total Score*</td>
<td>57</td>
<td>44.00</td>
<td>156.00</td>
<td>88.47</td>
<td>25.43</td>
<td>.21</td>
<td>.32</td>
</tr>
<tr>
<td></td>
<td>62</td>
<td>40.00</td>
<td>133.00</td>
<td>74.77</td>
<td>22.98</td>
<td>.58</td>
<td>.30</td>
</tr>
<tr>
<td>EDE-Q Global Score*</td>
<td>54</td>
<td>.11</td>
<td>4.89</td>
<td>1.92</td>
<td>1.23</td>
<td>.45</td>
<td>.33</td>
</tr>
<tr>
<td></td>
<td>60</td>
<td>.00</td>
<td>3.63</td>
<td>1.14</td>
<td>1.00</td>
<td>.78</td>
<td>.31</td>
</tr>
<tr>
<td>Interoceptive Awareness</td>
<td>61</td>
<td>.02</td>
<td>.33</td>
<td>.22</td>
<td>.07</td>
<td>-.49</td>
<td>.31</td>
</tr>
<tr>
<td></td>
<td>59</td>
<td>.00</td>
<td>.33</td>
<td>.19</td>
<td>.09</td>
<td>-.48</td>
<td>.31</td>
</tr>
<tr>
<td>PANAS-X Negative Affect*</td>
<td>62</td>
<td>10.00</td>
<td>40.00</td>
<td>21.06</td>
<td>7.32</td>
<td>.67</td>
<td>.30</td>
</tr>
<tr>
<td></td>
<td>61</td>
<td>11.00</td>
<td>36.00</td>
<td>20.52</td>
<td>5.87</td>
<td>.46</td>
<td>.31</td>
</tr>
<tr>
<td>RRS Total Score*</td>
<td>61</td>
<td>5.00</td>
<td>27.00</td>
<td>15.69</td>
<td>5.24</td>
<td>.22</td>
<td>.31</td>
</tr>
<tr>
<td></td>
<td>61</td>
<td>2.00</td>
<td>23.00</td>
<td>11.54</td>
<td>5.02</td>
<td>.24</td>
<td>.31</td>
</tr>
<tr>
<td>STAI - Form Y2 - Trait Anxiety*</td>
<td>63</td>
<td>23.00</td>
<td>74.00</td>
<td>45.94</td>
<td>11.66</td>
<td>.01</td>
<td>.30</td>
</tr>
<tr>
<td></td>
<td>64</td>
<td>19.00</td>
<td>70.00</td>
<td>37.39</td>
<td>11.38</td>
<td>.72</td>
<td>.30</td>
</tr>
<tr>
<td>TAS-20 Alexithymia Score*</td>
<td>60</td>
<td>26.00</td>
<td>89.00</td>
<td>52.72</td>
<td>13.58</td>
<td>.30</td>
<td>.31</td>
</tr>
<tr>
<td></td>
<td>60</td>
<td>27.00</td>
<td>78.00</td>
<td>45.88</td>
<td>10.94</td>
<td>.55</td>
<td>.31</td>
</tr>
<tr>
<td><strong>Baseline and Pre-meal Variables of Interest</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fullness (Time 1)</td>
<td>63</td>
<td>.00</td>
<td>8.80</td>
<td>1.74</td>
<td>1.75</td>
<td>1.56</td>
<td>.30</td>
</tr>
<tr>
<td></td>
<td>LOC</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>------------------</td>
<td>-----------</td>
<td>-------</td>
<td>-------</td>
<td>-------</td>
<td>-------</td>
<td>-------</td>
<td>-------</td>
</tr>
<tr>
<td>Hunger (Time 1)</td>
<td>HC 64</td>
<td>.00</td>
<td>7.60</td>
<td>1.65</td>
<td>1.75</td>
<td>1.61</td>
<td>.30</td>
</tr>
<tr>
<td></td>
<td>LOC 63</td>
<td>.50</td>
<td>9.80</td>
<td>6.62</td>
<td>2.11</td>
<td>-.72</td>
<td>.30</td>
</tr>
<tr>
<td></td>
<td>HC 64</td>
<td>2.30</td>
<td>10.00</td>
<td>6.47</td>
<td>2.33</td>
<td>-.91</td>
<td>.30</td>
</tr>
<tr>
<td>NA (Time 0)*</td>
<td>LOC 63</td>
<td>.00</td>
<td>8.40</td>
<td>2.68</td>
<td>2.23</td>
<td>.58</td>
<td>.30</td>
</tr>
<tr>
<td></td>
<td>HC 6</td>
<td>.00</td>
<td>8.50</td>
<td>1.72</td>
<td>1.75</td>
<td>1.74</td>
<td>.30</td>
</tr>
<tr>
<td>NA (Time 1)</td>
<td>LOC 63</td>
<td>.00</td>
<td>10.00</td>
<td>4.14</td>
<td>2.94</td>
<td>.31</td>
<td>.30</td>
</tr>
<tr>
<td></td>
<td>HC 63</td>
<td>.00</td>
<td>10.00</td>
<td>3.14</td>
<td>2.76</td>
<td>.67</td>
<td>.30</td>
</tr>
<tr>
<td>STATE FCQ (Time 1)*</td>
<td>LOC 61</td>
<td>29.00</td>
<td>70.00</td>
<td>50.97</td>
<td>9.76</td>
<td>-.05</td>
<td>.31</td>
</tr>
<tr>
<td></td>
<td>HC 63</td>
<td>15.00</td>
<td>70.00</td>
<td>43.51</td>
<td>9.97</td>
<td>-.34</td>
<td>.30</td>
</tr>
</tbody>
</table>

Note. LOC = Loss of control eating group, HC = healthy comparison group. RRS = Revised Restraint Scale total score, Time 0 = pre-mood induction time point, Time 1 = post-mood induction/ pre-meal time point. *Statistically significant differences between LOC and HC group (p<.05). Sample sizes vary per variable, due to missing data.
Table 5. Multivariate Analysis of Variance: Emotion Regulation and Emotional Awareness Variables Between LOC and HC Groups

<table>
<thead>
<tr>
<th>Variable Name</th>
<th>M (SD) LOC group (n = 53)</th>
<th>M (SD) HC group (n = 55)</th>
<th>F-value</th>
<th>p-value</th>
<th>(\eta_p^2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Full MANOVA model</td>
<td>---</td>
<td>---</td>
<td>(F(3, 104) = 2.97)</td>
<td>.04</td>
<td>.08</td>
</tr>
<tr>
<td>DERS Emotion Regulation Difficulties</td>
<td>14.26 (5.95)</td>
<td>12.15 (5.84)</td>
<td>(F(1, 106) = 6.51)</td>
<td>.01*</td>
<td>.06</td>
</tr>
<tr>
<td>(\log_{10})</td>
<td>1.93 (.13)</td>
<td>1.86 (.13)</td>
<td>(F(1, 106) = 6.51)</td>
<td>.01*</td>
<td>.06</td>
</tr>
<tr>
<td>MTM Interoceptive Awareness</td>
<td>.22 (.07)</td>
<td>.19 (.09)</td>
<td>(F(1, 106) = 2.00)</td>
<td>.16</td>
<td>.02</td>
</tr>
<tr>
<td>(\log_{10})</td>
<td>.08 (.03)</td>
<td>.08 (.03)</td>
<td>(F(1, 106) = 2.00)</td>
<td>.16</td>
<td>.02</td>
</tr>
<tr>
<td>TAS-20 Alexithymia</td>
<td>51.87 (13.25)</td>
<td>46.53 (11.00)</td>
<td>(F(1, 106) = 4.59)</td>
<td>.04*</td>
<td>.04</td>
</tr>
<tr>
<td>(\log_{10})</td>
<td>1.71 (.11)</td>
<td>1.67 (.10)</td>
<td>(F(1, 106) = 4.59)</td>
<td>.04*</td>
<td>.04</td>
</tr>
</tbody>
</table>

Note. LOC group = participants who endorsed at least one loss of control eating episode over the past 3 months; HC group = participants who denied loss of control eating episodes and other eating disorder symptoms over the past 3 months, and denied any history of eating pathology or eating- or weight-related treatment. DERS = Difficulties in Emotion Regulation Scale total score; MTM = Mental Tracking Method assessment of interoceptive awareness; TAS-20 = Toronto Alexithymia Scale total score for alexithymic symptom severity. \(\log_{10}\) = Variable value following application of scale transformation applied to independent variable and entered in model, to address violations of normality assumption in MANOVA. *significance at \(p < .05\).
Table 6. Means and Standard Deviations of Food Intake in LOC and HC Groups, per Mood Induction Condition

<table>
<thead>
<tr>
<th>Variable</th>
<th>Negative Mood Condition $M$ ($SD$)</th>
<th>Neutral Mood Condition $M$ ($SD$)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>LOC group (n = 30)</td>
<td>HC group (n = 30)</td>
</tr>
<tr>
<td>Intake (in kilocalories)</td>
<td>693.97 (478.19)</td>
<td>740.51 (417.74)</td>
</tr>
<tr>
<td>Intake (in grams)</td>
<td>1027.89 (661.70)</td>
<td>1068.32 (493.63)</td>
</tr>
</tbody>
</table>

Note. LOC group = participants who endorsed at least one loss of control eating episode over the past 3 months; HC group = participants who denied loss of control eating episodes and other eating disorder symptoms over the past 3 months, and denied any history of eating pathology or eating- or weight-related treatment. $M$ = group mean; $SD$ = standard deviation.
Table 7. Main effects and interactions of predictor variables on negative mood states from Time 1 to Time 3

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Effect</th>
<th>Fixed effects</th>
<th>Random effects</th>
<th>Model AIC</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>B</td>
<td>SE b</td>
<td>95% CI</td>
</tr>
<tr>
<td>Negative Mood State</td>
<td></td>
<td>-.11</td>
<td>2.06*</td>
<td>1569.30</td>
</tr>
<tr>
<td></td>
<td>Time (linear)*</td>
<td>-.39</td>
<td>.18</td>
<td>-.75, -.03</td>
</tr>
<tr>
<td></td>
<td>Group*</td>
<td>1.56</td>
<td>.48</td>
<td>.62, 2.51</td>
</tr>
<tr>
<td></td>
<td>Mood Condition*</td>
<td>2.45</td>
<td>.49</td>
<td>1.49, 3.41</td>
</tr>
<tr>
<td></td>
<td>Group X Mood Condition</td>
<td>-1.19</td>
<td>.69</td>
<td>-2.56, .17</td>
</tr>
<tr>
<td></td>
<td>Time X Group</td>
<td>- .41</td>
<td>.26</td>
<td>-.92, .10</td>
</tr>
<tr>
<td></td>
<td>Time X Mood Condition*</td>
<td>-1.23</td>
<td>.26</td>
<td>-1.75, -.71</td>
</tr>
<tr>
<td></td>
<td>Time X Group X Mood Condition</td>
<td>.53</td>
<td>.37</td>
<td>-.20, 1.26</td>
</tr>
</tbody>
</table>

Note. The table shows the best-fitting model for the dependent variable, negative mood state. The models including alexithymia and interoceptive awareness as fixed effects did not improve model fit. Asterick (*) denotes significance at $p < .05$. AIC = Akaike Information criterion; Negative Mood State = visual analog scale (0-100mm) rating of negative mood state.
Appendix A

Scripts and Text for Telephone and/or Email Correspondence

Email contact text (for individuals who contact the lab with interest in study):

Hi, my name is [research assistant name] from the UAlbany Weight and Eating Disorders Research Laboratory. I’m emailing because you indicated interest in the taste test study that we are conducting. I have included a brief study description, and have included a weblink to the screening survey to determine your eligibility for this study. If you would like to take the screening study to determine your eligibility for the study, please click on the link, provided.

Brief Study Description:

Why is this study being done?
Our goal is to better understand how different factors such as mood, thoughts, and feelings impact your eating experiences (perception of taste, texture, liking or disliking of foods). We are, therefore, interested in seeing the impact of a mood induction (listening to music and reading self-referential statements) on taste test ratings of various food items.

What will I be asked to do?
First, you will be asked to complete a screening survey that takes approximately 10-15 minutes to complete. This will be done to ensure your eligibility for the study. In order to complete the screening survey, I need to get your preferred email address so that I can send that survey link to you. This link is secure, and will not contain any personal identifying information.

If you are eligible for the study, a researcher will contact you via email with information about scheduling an in-laboratory appointment. Should you choose to participate in the study, you will be asked to attend a single appointment in the Weight and Eating Disorders laboratory at the University at Albany, in the Social Sciences Building Room 137a.

Screening Link: https://www.surveymonkey.com/r/TASTETEST_SCREEN

Please email the researcher when you have completed the screening survey.

Thank you!
Appendix B

Informed Consent
Taste-Test Study: Examining Factors that Impact Eating Experiences
Screening Survey

Description of the research:
Researchers, Lisa Anderson, M.A. (doctoral student), and Drew Anderson, D.A. (faculty advisor), at the University at Albany-SUNY are conducting a research study designed to investigate how different factors such as mood and feelings impact your eating experiences during a taste test (perception of taste, texture, liking or disliking of foods). To determine your eligibility for the study, please read the full informed consent form before consenting to participate in the study.

Description of your involvement:
As part of your participation, you will be asked to first complete this screening survey to determine your eligibility for the taste test study. This screening survey is expected to take no more than 10-15 minutes to complete in total.

The screening survey will ask you to complete questions about your typical mood, eating patterns, and basic demographic factors. You will also be asked to verify whether you are physically and medically able to complete a 3-hour fasting period prior to your in-lab appointment.

In the case that you are not eligible for the taste-test study, you will be contacted by a researcher via the email address that you provided to receive the link to this screening survey. In the case that you are eligible for the study, you will be contacted by a researcher from the University at Albany Weight and Eating Disorders Research Laboratory via your provided email address, and will be provided with additional information for scheduling an in-lab study appointment.

In the case that you decide to schedule an appointment time slot, you will be asked to attend one (1) 90-minute-long appointment in the Weight and Eating Disorders laboratory at the University at Albany, in the Social Sciences Building Room 137a. The first appointment will consist of an informed consent process for the taste test study, and a detailed explanation of what to expect in the study.

Anticipated Risks:
While you will be asked to feel various emotions and feelings that may cause some momentary discomfort, none of them pose any real risk above and beyond the emotions and feelings that you might experience on a daily basis. Thus, we do not anticipate any risk in your participation. You will be encouraged to discuss any discomfort or distress that you experience during any point of the survey, and will be provided with information for support services and resources in the case that you feel that you would like additional support.

If you do experience negative effects during or after your participation in the study, we encourage you to contact a mental health professional. The University at Albany provides counseling services for students at the University Counseling Center.
Expected benefits:
It is possible that you experience no direct benefit from the exposure session. In this case, the main benefit of participation is knowing that this study contributes to current research that might improve our understanding of factors that influence eating experiences and perceptions.

Voluntary nature of participation:
Your participation in this study is completely voluntary. Even after you agree to participate in the research, you may choose not to answer any questions and may refuse to complete any portions of the research you do not wish to for any reason.

Confidentiality of records/data:
All information obtained in this study is strictly confidential unless disclosure is required by law. In addition, the Institutional Review Board, the sponsor of the study (e.g. NIH, FDA, etc.) and University or government officials responsible for monitoring this study may inspect these records.

Confidentiality for internet research:
This project has been approved by the University at Albany Institutional Review Board. Approval of this project only signifies that the procedures adequately protect the rights and welfare of the participants. Please note that absolute confidentiality cannot be guaranteed due to the limited protections of Internet access. Please be sure to close your browser when finished so no one will be able to see what you have been doing.

Contact Information:
If you have any questions about this study, please contact the Principal Investigator: Lisa Anderson, M.A. (763) 742-8136; lmanderson@albany.edu; or Faculty Advisor: Drew Anderson, Ph.D. (518) 442-4835; daanderson@albany.edu. You will be offered a copy of this form to keep.

Your rights as a research participant:
IRB contact about your rights in the study or to report a complaint:
Research at the University Albany involving human participants is carried out under the oversight of the Institutional Review Board (IRB). This research has been reviewed and approved by the IRB. If you have any questions concerning your rights as a research subject or if you wish to report any concerns about the study, you may contact University at Albany Office of Regulatory & Research Compliance at 1-866-857-5459 or hsconcerns@albany.edu.

Now that you have read through the study description and information, please use the checkboxes to indicate your consent:
o By marking here, I validate that I am at least 18 years old and I have read, or been informed of, the information about this study. I understand that this is a series of questionnaires that will determine whether I am eligible or not eligibly to participate in the study of interest. I hereby consent to participate in the study.

o I do not consent to participate. I understand that clicking here will exit me from this consent form page and will not continue to the survey.
Appendix C

Institutional Review Board (IRB)
Informed Consent Information
for Participation in a Research Study

Taste Test Study: Examining Factors that Impact Eating Experiences
Study Principle Investigator Name: Lisa Anderson
Study Faculty Advisor: Drew Anderson

Introduction:
You are being asked to participate in a research study conducted at the University at Albany, Department of Psychology. Please review the following information before deciding to participate.

Why is this study being done?
Our goal is to better understand how different factors such as mood, thoughts, and feelings impact your eating experiences (perception of taste, texture, liking or disliking of foods). We are, therefore, interested in seeing the impact of a mood induction (listening to music and reading self-referential statements) on taste test ratings of various food items.

What will I be asked to do?
As part of your participation, you will be asked to attend a single appointment in the Weight and Eating Disorders laboratory at the University at Albany, in the Social Sciences Building Room 137a. This appointment will consist of a series of questionnaires and activities that you will complete in the laboratory.

Specifically, you will be asked to complete a series of online and paper-and-pencil surveys that relate to your typical eating and health behaviors, attitudes, moods and feelings. A researcher will also gather various anthropometric measures including height, weight, and heart rate feedback. You will also be asked complete a brief task in which you will watch a series of sentences and listen to music for a brief period of time. After you have completed the series of questionnaires, anthropometric measures, and music and sentence task, you will be asked to rate a variety of food items that range in taste and texture, and also report your degree of liking for each food item. Therefore, you will be asked to taste and eat a variety of food types and items.

How long will it take?
Altogether, this study appointment is expected to take up to 90 minutes (1.5 hours) to complete.

What are the risks or inconveniences of the study?
There are no known risks associated with participation in this study. However, you will be asked to complete a taste test of a wide range of food items. Therefore, there is risk for food allergens. In order to reduce risk of adverse health outcomes due to food allergies, you will be asked to report any known food allergies to the researcher. The researcher will also
verify food allergies throughout the study in order to reduce risk for the taste test. If you have questions or would like a list of ingredients in foods presented in the study in order to avoid food allergy risk, you will have the opportunity to ask the researcher for the ingredient lists for the foods presented.

It is also possible that you may experience mild discomfort as you think about and answer some of the questions in the survey, complete the 3-hour fasting period (required immediately prior to the in-laboratory appointment), or complete various tasks/exercises in the study. In addition, Internet and e-mail communications are never entirely secure forms of communication, so there is a small possibility of a confidentiality breech. However, accounts and web sources used for this study are secured and fully encrypted.

You are encouraged to discuss any discomfort or distress that you experience during any point of the survey, and will be provided with information for support services and resources in the case that you feel that you would like additional support.

If you do experience negative effects during or after your participation in the study, we encourage you to contact a mental health professional. The University at Albany provides counseling services for students at the University Counseling Center.

University Counseling Center
Suite 104, 400 Patroon Creek Blvd
Albany, NY 12206
(518) 442-5800
http://www.albany.edu/counseling_center/services.shtml

Expected benefits:
It is possible that you experience no direct benefit from the exposure session. In this case, the main benefit of participation is knowing that this study contributes to current research that might improve our understanding of factors that influence eating experiences and perceptions.

Will I receive payment for participation? Are there costs to participate?
There is no cost to you to participate in this study. You can earn up to 2 Psychology participant pool credits, and one (1) entry to a raffle for 1 of 3 $50 Amazon.com gift cards for completing the experimental session. In the case that you refer friends or peers to participate in this study who are not in the Psychology 101 Research Pool (e.g., students from the general UAlbany community and do not want Psychology Research Pool Credits), you may earn one (1) additional raffle entry for each individual who lists you as a reference for “How did you hear about this study?”. In total, you could earn up to a maximum of 10 additional raffle entries (e.g., 10 non-research pool participants list you as a referral source). If you decide to withdraw from the study, you will retain all raffle entries, Research Pool credit, and/or payments you have earned up to that point.

Can you explain the voluntary nature of participation in the study?
Your participation in this study is completely voluntary. Even after you agree to participate in the research, you may choose not to answer any questions and may refuse to complete any portions of the research you do not wish to for any reason.

**How will my personal information be protected?**

Our website is secured and encrypted. Your personal information is stored in password-protected databases separately from your survey data, and all data files are encrypted when in transit or storage. Additionally, all personally identifiable information will be deleted upon the end of data collection. Records are available only to research staff and will be deleted within 6 years from the completion of the project. We may publish what we learn from this study, but will not include any identifying information.

All information obtained in this study is strictly confidential unless disclosure is required by law. In addition, the Institutional Review Board, the sponsor of the study (e.g. NIH, FDA, etc.) and University or government officials responsible for monitoring this study may inspect these records.

**A note regarding confidentiality for internet research:**

This project has been approved by the University at Albany Institutional Review Board. Approval of this project only signifies that the procedures adequately protect the rights and welfare of the participants. Please note that absolute confidentiality cannot be guaranteed due to the limited protections of Internet access. Therefore, we ask that you please be sure to close your browser when finished so no one will be able to see what you have been doing.

**Whom do I contact if I have questions about the study?**

If you have any questions about this study, please contact the Principal Investigator: Lisa Anderson, M.A. (763) 742-8136; lmanderson@albany.edu; or Faculty Advisor: Drew Anderson, Ph.D. (518) 442-4835; daanderson@albany.edu. You will be offered a copy of this form to keep.

**Whom do I contact if I have questions about my rights as a research participant?**

Research at the University Albany involving human participants is carried out under the oversight of the Institutional Review Board (IRB). This research has been reviewed and approved by the IRB. If you have any questions concerning your rights as a research subject or if you wish to report any concerns about the study, you may contact University at Albany Office of Regulatory & Research Compliance at 1-866-857-5459 or hsconcerns@albany.edu.

Now that you have read through the study description and information, please use the checkboxes to indicate your consent.

Please note that by marking that you consent to participate, you validate the following study participant requirements:
✓ You self-identify as a female individual
✓ You are at least 18 years old
✓ You are fluent and proficient in reading, writing and speaking the English language
✓ You have no need for corrective lenses OR are wearing corrective lenses today
✓ You have read, or been informed of, the information about this study.
✓ You have informed the researcher of ALL KNOWN FOOD ALLERGIES.
✓ You understand that this is a series of questionnaires, tasks, and a taste test that will take up to 90 minutes to complete in a single laboratory session.
✓ You also understand that by marking here, you indicate that you have completed a three-hour fasting period where you did not eat foods, and only drank clear liquids (e.g., coffee, tea, water).

If any of the listed statements are not true, please notify the researcher.

- By marking here, I validate the following study participant requirements: I hereby consent to participate in the study.

- I do not consent to participate. I understand that clicking here will exit me from this consent form page and will not continue to the survey.
Appendix D

Participant Cover Sheet

Participant: ________________________________

Date of appointment: ________________

Start time of appointment: ________________

End time of appointment: ________________

Referral Source: ________________________________

Name?

________________________________________________________________________________________

Verified Height (total inches): ________________

Verified Weight (total pounds): ________________

________________________________________________________________________________________

Mood Condition: ________________________________

________________________________________________________________________________________

Debriefing Notes: ________________________________

________________________________________________________________________________________

Other Notes: ________________________________

________________________________________________________________________________________

Research Assistant Initials: ________________
Appendix E

Hunger Rating Scale

<table>
<thead>
<tr>
<th>Participant ID: ________</th>
<th>Group: ____</th>
</tr>
</thead>
<tbody>
<tr>
<td>Session Date: ____</td>
<td>Researcher Initials: ___</td>
</tr>
</tbody>
</table>

Please think about how you feel RIGHT NOW.
Please use the lines to rate how you feel at the moment.
Marks on the left represent low levels and marks on the right indicate high levels.

<table>
<thead>
<tr>
<th>NOT AT ALL</th>
<th>EXTREmELY</th>
</tr>
</thead>
</table>

**Hunger**
(How hungry do you feel right now?)

I-------------------------------I

**Fullness**
(How full do you feel right now?)

I-------------------------------I

**Urge to Eat**
(How strong is your urge to eat right now?)

I-------------------------------I

**Urge to Binge**
(How strong is your urge to binge right now?)

I-------------------------------I
Please think about how you feel RIGHT NOW.
Please use the lines to rate how you feel at this moment.
Marks to the left represent low levels and marks to the right indicate high levels.

**Positive Affect**
(How positive or generally happy do you feel right now?)

[------------------------------------------]

**Negative Affect**
(How negative or generally unhappy do you feel right now?)

[------------------------------------------]
Appendix F

Step-by-step Taste Test Protocol and Script for Researchers

Taste-test Meal Paradigm Overview.
Taste test measures assessing food characteristics and sensory qualities (i.e., taste, texture, salty, sweet ratings) will be administered during the taste test meal. Participants will be told that they have 10 minutes to complete taste test measures using a range of high-calorie and low-calorie foods (i.e., chocolate, chips, fruit). Similar to past taste test meal paradigms conducted in the Weight and Eating Disorders Research Lab (e.g., Shapiro & Anderson, 2005), participants will be offered the option to can eat as much or as little of the food as they would like of the taste test foods.

Unbeknownst to participants, all food in the taste test paradigm will be pre-weighed and recorded by the researcher, prior to the study session. Mirroring the ad lib taste test meal paradigm presented by Shapiro and Anderson (2005), food categories will include high fat/high sugar, low fat/low sugar, high fat/low sugar, and low fat/high sugar food options. Food will be presented in large bowls. Participants will be instructed to taste and rate each food. Participants will be asked to turn their taste ratings in at the end of the 10 minute taste test. Participants will be informed that the researcher needs to score the taste test forms, and will be gone for approximately 10 minutes. At this point, the researcher will tell the participant that he/she should feel free to eat as little or as much as he/she feels like eating, as a token of gratitude for participating in the study.

After conducting a funnel debriefing protocol with the individual at the end of the study, the researcher will weigh and record the remaining food, thus, providing an overt measure of eating behavior following either a negative or neutral mood induction among individuals with and without loss of control eating behaviors.

Mandatory Steps to Complete Prior to the Taste Test Paradigm
(Researcher note: Please do these three steps prior to the participant’s arrival)

1. Prior to beginning the in-lab study session, weight and record all food items on the taste test ad-lib buffet table.
   PLEASE make sure to record plate/bowl weight and SEPARATELY RECORD the food item weight.
   Participants should not know that the amount of foods consumed will be recorded.

2. Prior to beginning the in-lab study session, please make sure to have all hard copy forms ready for the participant’s taste test.

3. Note: Hunger/satiety and mood state ratings will be assessed immediately prior to (Time 0), and immediately following the 12-minute mood induction (Time 1). Time 1 ratings will be immediately prior to the taste test paradigm. These ratings will be used in a manipulation check for the mood induction. Ratings will also be used to establish a
baseline, pre-meal mood and hunger ratings for subsequent analyses. PLEASE HAVE THESE READY BEFORE THE PARTICIPANT BEGINS THE STUDY.

Taste Test Paradigm: Step-by-step Protocol and Script
Immediately following the mood induction, participants will complete a taste test meal.

1. Prior to beginning the taste test, you must ask the participant to, “Please verify all known food allergies”. Record all known food allergies for this participant, if they report any. If allergic to the food items in the taste test, please inform the participant of the food items that will be presented. If the participant indicates that she is allergic to a food presented in the taste test, due to safety concerns, please ask her to skip the taste test and complete only the final set of online surveys. If this is the case, please note this on the taste test rating forms designated for this participant.

2. Instruct participants to complete the taste test measures assessing food characteristics and sensory qualities (i.e., taste, texture, salty, sweet ratings).
   Answer any questions at this point.
   Give participants forms for taste test ratings!

3. Tell participant that he/she has 10 minutes to complete taste test measures using a range of high-calorie and low-calorie foods (i.e., chocolate, chips, fruit).
   Similar to other taste test meal paradigms (e.g., Shapiro & Anderson, 2005), participants should be offered the option to can eat as much or as little of the food as they would like of the taste test foods presented:
   “Please feel free to eat as much or as little of the food as you would like.”

   Foods should have been weighed prior to beginning the experiment; remaining food will be weighed and recorded at the end of the study. This will serve as an overt measure of food consumed following the mood induction.

4. After 10 minutes, ask participants to complete mood state and hunger/satiety ratings (Time 2).
   Give forms to participant.

5. Following the taste test, ask the participant to remain in the research lab meal room for ten additional minutes to complete the last series of self-report survey forms related to mood and personality characteristics
   Give forms to participant.

6. Inform the participant that he/she can continue to consume taste test foods.
   “For food safety reasons, we must discard the remainders, so you can feel free to eat any of the taste test foods that are left while you are working on these forms.”
7. While the participant completes the remaining forms, researcher can score the hunger/taste test forms and enter the data into the designated, password-protected data spreadsheet.

8. At the end of the 10-minute “scoring” duration, ask participants to complete one last set of hunger/satiety and mood state questionnaires.

9. Once Step 7 is completed, conduct the following brief funnel debriefing procedure for the study, providing the participant time to ask questions or discuss concerns before completing the study:

   **Step-by-step Funnel Debriefing Protocol and Script**

   1. Following the participant’s completion of the study, the researcher will read the following script and then continue to complete the outlined funnel debriefing protocol with the participant:

      “You are almost done with the study. Before you go, I just want to check in with you to make sure that we know how well we are conducting the study. I just have a few brief questions that I have to ask to do a quality check for this study:”

   2. Protocol Question 1: “Now that you have been through the experiment, do you have any questions?”

   3. Protocol Question 2: “Were the instructions clear?”
      *Note: usually, these questions get a one-word response, but the researcher can follow this up with #3 and #4 (below)*

   4. Protocol Question 3: “Using your own words, can you describe the purpose of this study?”

   5. Protocol Question 4: “Great, do you have any other questions?”
      *Note: If the participant has further questions, researcher should answer to best of ability and/or refer the participant to the PI (Lisa Anderson) or the faculty advisor (Drew Anderson) for this study.*

      *If the participant has no further questions, the participant is free to go.*

   6. Before the participant leaves, he/she must receive a hard copy of the list of mental health services and contact information.
      *Give form to participant to take.*

10. After the participant has finished the study and left the lab, measure the remaining food in order to calculate the amount of food consumption following the mood induction.
Notes for Bogus Taste Test:

Food Display:
Foods will be displayed in white plastic bowls and on white plastic plates/platters. Participants will be given a white plastic plate to serve herself taste test foods. Bowl and plate size will remain consistent throughout the study in order to avoid plate size/external cue effects.

Food Management:
Foods will be stored in a dry, cool cabinet in the Weight and Eating Disorders Research Lab, as we have done with prior research studies employing taste test methods. Foods will be kept in accordance with expiration dates, and will only be handled by research assistants and the researcher with sterile, non-latex gloves for sanitary reasons. All food will be placed in their respective bowls and platters using clean serving utensils and all unused food will be discarded after participants to reduce concern regarding food safety. With the exception of fruits, which will be purchased weekly to ensure freshness, all other foods are processed and present low risk for food poisoning (i.e., crackers, gummy bears, chocolate).

Allergy Statement:
The allergy verification that is initially read aloud by the researcher at the start of this taste-test paradigm, is included throughout the protocol, including: verification in the screening survey, verification in the eligibility email text, verbal verification in this taste test paradigm. Prior to beginning the taste test, the participant will also be able to see and request the ingredient label for any food items presented, if so desired.
Appendix G

Bogus Taste Test Foods and Table Layout

<table>
<thead>
<tr>
<th>Food A: Saltine Crackers</th>
<th>Food B: Chocolate Chip Cookies</th>
<th>Food C: Gummy Bears</th>
<th>Food D: Goldfish Crackers</th>
<th>Food E: Grapes</th>
<th>Food F: Popcorn</th>
</tr>
</thead>
<tbody>
<tr>
<td>Food G: Cheese Crackers</td>
<td>Food H: Skittles</td>
<td>Food I: Potato Chips</td>
<td>Food J: Chocolate Candies</td>
<td>Food K: Pretzels</td>
<td>Food L: Peanuts</td>
</tr>
</tbody>
</table>

Participant Plate For Taste Test

[Table]

[Participant Seat]
Appendix H

**TASTE TEST QUESTIONNAIRE***

Please use the provided scales below to rate the listed qualities of the specific food items.

Food Item: ___________________________

<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>Smell</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Taste</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Texture</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Flavor</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Ratings completed for each food item*
Appendix I Debriefing protocol

Funnel Debriefing Protocol for End of In-lab Study Appointment

Protocols to evaluate awareness and suspicion.

Several protocols have been developed to assess awareness and suspicion in participants (see Fitzsimons & Shah, 2008, Experiment 2; Stapel, Koomen, & Ruys, 2002 for examples). We have modified basic funnel debriefing procedures for the current study. A basic description and the specific, proposed protocol and scripts are included in the following sections:

Funnel debriefing procedure

A funnel debriefing procedure implies the researcher will ask increasingly specific questions (see Fitzsimons & Shah, 2008, Experiment 2; Stapel, Koomen, & Ruys, 2002 for examples).

First, researchers ask broad questions about the study. In particular, they might ask participants to specify their perceptions of the purpose or aim of this study. In addition, participants are asked whether or not performing the first task might affect behavior on a subsequent activity. Furthermore, participants are asked whether any facet of the study seemed odd or suspicious. Second, researchers often ask questions about the stimuli used. Finally, researchers might ask participants to paraphrase the purpose of the study in their own words to gain more specific or detailed insight regarding the nature of the study.

The funnel debriefing procedure and corresponding scripts proposed for the current study is outlined in the later sections of this document (see below). Ideally, no participants will be aware of the true intentions of the study. In addition, although they will be asked to report on various disordered eating attitudes and behaviors, it is hoped that no participants will be aware of the intent to compare individuals who endorse loss of control eating to individuals who do not engage in loss of control eating.

References
Step-by-step Funnel Debriefing Protocol and Script

1. Following the participant’s completion of the study, the researcher will read the following script and then continue to complete the outlined funnel debriefing protocol with the participant:
   “You are almost done with the study. Before you go, I just want to check in with you to make sure that we know how well we are conducting the study. I just have a few brief questions:”

2. Protocol Question 1: Now that you have been through the experiment, do you have any questions?

3. Protocol Question 2: Were the instructions clear?
   Note: usually, these questions get a one-word response, but the researcher can follow this up with #3 and #4 (below)

4. Protocol Question 3: Using your own words, can you describe the purpose of this study?

5. Protocol Question 4: Great, do you have any other questions?
   Note: If the participant has further questions, researcher should answer to best of ability and/or refer the participant to the PI (Lisa Anderson) or the faculty advisor (Dr. Drew Anderson) for this study.
   If the participant has no further questions, the participant is free to go.

6. Final Step of the Study: Before the participant leaves, he/she must receive a hard copy of the list of mental health services and contact information.

Coding Note (record on Participant Cover Sheet form):

0 – participant reported no suspicion at all

1 – participant was suspicious that something deceptive was happening but we can probably keep them in the analyses

2 – participant was completely aware of the deceptive nature of the manipulation and should be removed from analysis
Step-by-step Final Debriefing/Full Disclosure Protocol & Email Script

1. Following completion of the data collection for the proposed study, the PI (Lisa Anderson) will send all participants an email to their provided email addresses which will contain the following (bolded) text. This email will be sent from the researcher to the participants’ indicated preferred email address. This email will be secure and only accessible to the research team in order to reduce contact and to increase participant anonymity and decrease threats to confidentiality:

To whom it may concern:

You are receiving this email because you participated in a study that was conducted by researchers at the University at Albany’s Weight and Eating Disorders Research Laboratory. We appreciate the time and effort that you gave to complete this study, and have now completed our data collection phase of the study. Because we have concluded this part of the study, we wanted to provide a full debriefing and disclosure regarding the true aims of the study. This is now outlined below:

The general purpose of this research was to examine various factors such as awareness of physical/internal feelings, mood states, and emotions related to your eating behaviors in the research lab. Overall, this study sought to compare individuals who reported some form of loss-of-control eating (e.g., feeling like you are not in control of some eating factor such as how fast you eat, how much you eat, eating when you are not hungry) and individuals who did not report any loss-of-control eating. Past research suggests that some loss-of-control eating follows various mood states (positive, negative, neutral). Therefore, this study aimed to investigate whether the amount of food eaten in the lab was impacted by mood and related factors such as the awareness of internal sensations and emotional states.

We invited people who self-reported either loss-of-control eating or no loss-of-control eating to participate in this study. The experimenter did not know whether you were in the loss-of-control or no-loss-of-control group. In this study, you were asked to complete a heart rate monitoring task, a mood induction scenario, and you were asked to rate many variables including your mood, hunger level, taste and texture characteristics of food. All of these variables (internal awareness, mood states, and taste or hunger cues) may influence one’s tendency to engage in loss-of-control eating behaviors. Therefore, it is our hope that the findings from this study inform research and clinical efforts for professionals who work with individuals who seek to reduce loss-of-control and related eating behaviors.

We were unable to disclose this information during your in-lab appointment and throughout our duration of data collection, as potential awareness of the true aim of this study may have biased your attitudes, feelings, and behavior in the study.

If you feel especially concerned about any mood concerns, weight management, or eating behaviors, please feel free to contact any of the mental health and/or eating disorder services and resources listed in the attached document. This document contains contact info about options for counseling and support.
If you would like to withdraw your data from the study, or have any questions, concerns, or comments that you would like to share or discuss with a researcher, please feel free to contact the principle investigator, Lisa Anderson, directly via email (lmanderson@albany.edu) or call the research laboratory’s secure telephone line: (518) 437-4446. In the case that your call is not received, please feel free to leave a voicemail on the research laboratory’s secure voicemail line and Ms. Anderson will return your phone call as soon as possible.

If you have concerns, please send any comments or concerns to the listed contact information, above.

Thank you, again, for your participation and contribution to our research in the Weight and Eating Disorders Research Laboratory!

Sincerely,

Lisa Anderson, M. A.
Appendix J

Provider and Emergency Services Contact Information List

Psychological Services Center (PSC)
299 Washington Avenue
Albany, NY 12206
Office Phone: (518) 442-4900

The Psychological Services Center offers psychological services to children and adults, including psychotherapy, counseling, and assessment. Services are scheduled by appointment only and include:

- Individual psychotherapy for children, adolescents, and adults
- Family and Couples therapy
- Vocational testing and counseling
- Psychodiagnostic, cognitive and neuropsychological assessments

Counseling and Psychological Services
400 Patroon Creek Blvd., Suite 104
Albany, NY 12206
518-442-5800

The Counseling and Psychological Services center at the University at Albany offers psychological services students, including psychotherapy and counseling. Services are scheduled by appointment only. For more information, see their website:

Capital District Psychiatric Center Providers (CDPHP)
Albany, NY
Business Hours: 1-888-320-9584
Crisis Hotline: (518) 549-6500
After-hours Crisis Hotline: 1-888-320-9584

CDPHP behavioral health staff is available 24 hours a day, seven days a week to facilitate inpatient admissions. CDPHP network providers are required to ensure that members have access to care within the following standards:
- Emergency—Immediate access (may be referred to the ER)
- Urgent appointment—within 48 hours
- Initial routine appointments—within 10 business days
- Ambulatory appointment post-inpatient discharge—within 7 days of discharge

The behavioral health utilization management (UM) process includes triage and referral as well as prospective, concurrent, and retrospective review of the services delivered to our members.
Health Psychology Associates
260 Corporate Plaza,
Washington Ave Ext., Suite 101
Albany, NY
Business Hours: 518-218-1188

Health Psychology Associates (HPA) is an alliance of independent psychologists who seek to provide the best and most current therapeutic interventions for our patients, based on their individual needs. They offer an extensive range of services, including psychotherapy for individuals, couples, families and groups, and nutritional counseling for people of all ages. They also offer psychological testing and psychiatric evaluation related to a wide range of psychological issues including Autism Spectrum Disorders and Attention Deficit/Hyperactivity Disorder.

At HPA, clients are assigned a provider who best fits his/her needs. The HPA staff seeks to honor a team approach and communicate fully with support members, family, medical providers and schools when appropriate. More information is available at: http://albanyhpa.com/about-hpa/#sthash.PjgPYMaa.dpuf

LiveWell Intensive Outpatient Program for Eating Disorders
260 Corporate Plaza,
Washington Ave Ext., Suite 101
Albany, NY
Business Hours: 518-218-1188

The LiveWell practice provides individual, family and group therapy, as well as nutritional counselling and intensive outpatient treatment (IOP) for women, men, children and adolescents suffering from an eating disorder. This intensive outpatient program includes individual, group and family therapy, nutrition counseling, Maudsley coaching and medical management. More information is available at: http://albanyhpa.com/livewell/#sthash.Ufo8BRmX.dpuf