ECOLOGICAL MOMENTARY ASSESSMENT OF STATE AFFECT PRIOR TO AND FOLLOWING LOSS OF CONTROL EATING IN YOUNG MEN

by

GINA WILLIAMSON

A DISSERTATION

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DISSERTATION APPROVAL PAGE

Student: Gina Williamson

Title: Ecological Momentary Assessment of State Affect Prior to and Following Loss of Control Eating in Young Men

This dissertation has been accepted and approved in partial fulfillment of the requirements for the Doctor of Philosophy degree in the Department of Counseling Psychology and Human Services by:

Dr. Nichole Kelly	Chairperson and Advisor
Dr. Nicole Giuliani	Core Member
Dr. Wendy Hadley	Core Member
Dr. Elliot Berkman	Institutional Representative

and

Dr. Krista Chronister	Vice Provost of Graduate Studies

Original approval signatures are on file with the University of Oregon Division of Graduate Studies.

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DISSERTATION ABSTRACT

Gina Williamson

Doctor of Philosophy

Department of Counseling Psychology and Human Services

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Title: Ecological Momentary Assessment of State Affect Prior to and Following Loss of Control Eating in Young Men

Loss of control eating (LOC) is a disordered eating behavior that is prevalent but understudied among young men. Affect regulation models propose that LOC eating functions as a maladaptive effort to escape from distressing affective states. As such, negative affect is thought to increase in the hours and minutes before LOC eating, and decrease afterwards. However, examinations specific to young men are lacking and it remains unclear which discrete types of affect are most implicated in young men's LOC eating. The current study examined the temporal roles of affect in LOC eating in a sample of 42 young men (18-35 years; *M*age = 25.31±5.38y; 46.3% White; 22% Black/African American; 9.8% Black but not African American) who engage in frequent LOC eating. Participants completed a 14-day ecological momentary assessment protocol and recorded all eating episodes and their state affect five times per day. Generalized linear mixed models (GLMMs) were conducted to examine the trajectories of global negative affect, global positive affect, and each discrete type of affect pre- and post-LOC eating episodes. Results did not support study hypotheses; rather, negative affect did not change significantly before or after LOC eating (*ps*<.05). Positive affect did not change significantly before LOC eating (*ps*<.05). Global positive affect, excitement, and happiness decreased significantly after LOC eating (*ps*≤.001, R^2*s*=-.03). Study findings contradict extant

theory and empirical data largely from female samples. Negative affect did not increase risk for LOC eating, nor did LOC eating function to improve participant's moods; rather, positive mood slightly decreased after LOC eating. Results from this pilot study can inform future research on LOC eating in young men who engage in subthreshold disordered eating behaviors. Further investigation around the observed decline in positive affect after LOC eating will clarify if this is a relevant intervention point in this population.

CURRICULUM VITAE

NAME OF AUTHOR: Gina Williamson

GRADUATE AND UNDERGRADUATE SCHOOLS ATTENDED:

University of Oregon, Eugene
College of Wooster, Wooster

DEGREES AWARDED:

Doctor of Philosophy, Counseling Psychology, 2023, University of Oregon
Master of Science, Counseling, Family, and Human Services, 2019, University of Oregon
Bachelor of Arts, Psychology; Spanish, 2017, College of Wooster

AREAS OF SPECIAL INTEREST:

Disordered eating in diverse populations
Loss of control eating
Body image concerns
Experiences of weight stigma

PROFESSIONAL EXPERIENCE:

Graduate Instructor, Counseling, Family, and Human Services, University of Oregon, Eugene, OR 2020-2022

Group and Primary Therapist, Eating Disorder Center of Eugene, Monte Nido, Eugene, OR, 2019-2022

Assessment Extern, Strong Integrated Behavioral Health, Eugene, OR, 2020-2021

Bilingual Therapist Extern, Oregon Mind Body Institute, Eugene, OR, 2019-2021

Practicum Intern, Child and Family Center, Eugene, OR, 2019-2020

Practicum Intern, Counseling and Psychological Services, Oregon State University, Corvallis, OR, 2018-2019

University Supervisor, Family and Human Services, University of Oregon, Eugene, OR, 2017-2019

GRANTS, AWARDS, AND HONORS:

University of Oregon Graduate Research Forum, 1st Place Research Poster, 2019

University of Oregon Graduate Research Forum, 1st Place Research Poster, 2018

Endowed Faculty Scholarship, Department of Psychology, College of Wooster, 2017

David A. Leach Memorial Prize in Psychology, College of Wooster, 2017

PUBLICATIONS:

Williamson, G., Osa, M. L., Budd, E., & Kelly, N. R. (2021). Weight-related teasing is associated with body concerns, disordered eating, and health diagnoses in racially and ethnically diverse young men. *Body Image*, 38, 37-48. DOI: 10.1016/j.bodyim.2021.03.010

Kelly, N. R., Kosty, D., Guerricabeitia, L., Guidinger, C., & Williamson, G. (2020). Evaluating components of existing theories for loss of control eating in a sample of young racially/ethnically diverse men. *Body Image*, *35,* 63-70. https://doi.org/10.1016/j.bodyim.2020.08.005

Kelly, N.R., Cotter, E., Guidinger, C., Williamson, G. (2020). Perceived discrimination, emotion dysregulation and loss of control eating in young men. *Eating Behaviors, 37*(101387). https://doi.org/10.1016/j.eatbeh.2020.101387

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Kelly, N.R., Smith, T., Hall, G., Guidinger, C., Williamson, G., Budd, E., & Giuliani, N. (2017). Perceptions of general and post-presidential election discrimination are associated with loss of control eating among racially/ethnically diverse young men. *International Journal of Eating Disorders*, *51*(1), 28–38. https://doi.org/10.1002/eat.22803

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CHAPTER I

INTRODUCTION

Binge eating is characterized as a discrete episode of excessive food consumption that is accompanied by a sense of loss of control (LOC; American Psychiatric Association, 2013). During a binge episode, individuals often eat more rapidly than normal and in the absence of feelings of hunger; feel uncomfortably full after eating; and/or feel embarrassed, disgusted, or guilty as a result of this eating behavior (American Psychiatric Association, 2013). This disordered eating behavior is a primary component of both binge eating disorder (BED) and bulimia nervosa (American Psychiatric Association, 2013). To meet diagnostic criteria for BED, binge eating must occur at least once a week, on average, for the past three months. BED, unlike most other eating disorders, is not accompanied by regular engagement in behaviors designed to compensate for increased caloric consumption, like self-induced vomiting or excessive exercise. Binge eating in the context of bulimia nervosa, in contrast, is accompanied by recurrent use of compensatory behaviors, as well as self-evaluation that is strongly based in an individual's body shape and weight disorder (American Psychiatric Association, 2013). Individuals with anorexia nervosa may also engage in binge eating (American Psychiatric Association, 2013), making this behavior a cross-diagnostic symptom for some of the most common eating disorders.

Episodes of binge eating are classified as either objective or subjective. Objective binge episodes (OBEs) consist of consuming an objectively large amount of food and are the primary symptoms for both bulimia nervosa and BED. Subjective binge episodes (SBEs) are viewed as excessive by the individual, but do not include an unusually large amount of food according to clinical rating standards (Fairburn et al., 1993). SBEs were originally conceptualized from the clinical observation that individuals often determine whether or not they binged based on the

subjective feeling of LOC, and not on the amount of food eaten (Brownstone et al., 2013; Cooper & Fairburn, 2009).

Both of these episodes involve LOC, and some research suggests that it is this subjective experience that is most closely related to comorbid psychological symptoms (Colles et al., 2008; Tanofsky-Kraff, 2008). Regardless of the amount of food consumed, the presence of LOC while eating is a predictor of distress before and after eating for both men and women (Goldschmidt, Engel, et al., 2012). Data also suggest that young men who engage in both OBEs and SBEs, relative to those who endorse engaging in only one form of binge eating, have the highest rates of physical and psychological comorbidities (Kelly, Cotter, et al., 2018). Frequency of LOC eating is also considered to be an indicator of severity of symptoms (Colles et al., 2008). Thus, LOC while eating, rather than the amount of food consumed during the designated episode, seems to represent the best indicator of psychosocial impairment in men and women (Striegel-Moore et al., 2000). For these reasons, the current study will focus specifically on LOC eating[1].

Physical and Emotional Health Concerns Associated with LOC Eating

LOC eating is associated with various physical health concerns for adult men and women, including hypertension, dyslipidemia, and type 2 diabetes, even after controlling for body mass index (BMI; Hudson et al., 2010). Data also suggest that men who engage in LOC eating report more chronic pain and daily impairment due to physical health problems than their peers who do not engage in LOC eating, regardless of BMI (Reichborn-Kjennerud et al., 2004). Other cross-sectional studies link LOC eating with arthritis (Higgins et al., 2013), chronic headaches (Johnson et al., 2001), and fibromyalgia (Javaras et al., 2008).

[1] The term "LOC eating" is used throughout the remainder of this manuscript, as it encapsulates both OBEs and SBEs.

LOC eating is also frequently comorbid with significant psychiatric symptoms, including mood, anxiety, and substance abuse disorders (Ulfvebrand et al., 2015). Data from the 2001-2003 National Comorbidity Replication survey suggest that over 75% of adults who engage in LOC eating also meet criteria for a lifetime mental health disorder, other than an eating disorder (Hudson et al., 2007). Relative to the general population, individuals who report LOC eating have greater odds of agoraphobia, substance abuse, obsessive-compulsive disorder, post-traumatic stress disorder, dysthymia, and bipolar disorder (Hudson et al., 2007). Other studies note that symptoms of anxiety and depression are significantly more frequent in men and women who engage in LOC eating, as opposed to individuals who do not, after controlling for BMI (Reichborn-Kjennerud et al., 2004). After controlling for BMI in men, LOC eating is also linked to greater odds of daily smoking, alcohol problems, and impairment due to mental health (i.e., difficulties at work; Reichborn-Kjennerud et al., 2004).

Gender Differences in LOC Eating

Eating disorder research tends to focus on cisgender women, as women have historically engaged in disordered eating at higher rates than men (Smink et al., 2012). However, extant research suggests that young men and women report similar rates of LOC eating (Hudson et al., 2007; Striegel-Moore et al., 2009; Udo et al., 2013). Specifically, approximately one quarter of adult men and women from community and college samples report engaging in LOC eating at least once in the prior month (Lavender et al., 2010; Quick & Byrd-Bredbenner, 2013; Striegel-Moore et al., 2009). More recent data from a large sample of racially and ethnically diverse young men demonstrates even higher rates of LOC eating, with around 50% of the sample reporting at least one episode of LOC eating in the past month (Williamson et al., 2021). Although substantial portions of young men endorse recent LOC eating, theoretical models for

this disordered eating behavior were created from and subsequently validated with primarily white female samples (Fairburn et al., 1993; Heatherton & Baumeister, 1991). As such, extant theoretical data offer limited insight into factors associated with the onset and maintenance of LOC eating in men.

Affect and LOC Eating

Affect is defined as the subjective experience of feeling, emotion, or mood (Hogg & Abrams, 2007). Although the experience of affect is nuanced, it is often separated into two general categories: negative (e.g., sadness, anger, guilt) and positive (e.g., happiness, excitement; Diener & Emmons, 1984; Larsen et al., 2017). Affect is also frequently assessed globally; that is, using composite measures that combine several discrete types of affect into one construct. For example, sadness, anger, guilt, and shame may be assessed, combined, and labeled as "global negative affect." From this approach, experiences with negative affect are consistently cited as antecedents to LOC eating in both theoretical models and empirical studies (Berg et al., 2015; Haedt-Matt & Keel, 2011; Heatherton & Baumeister, 1991; Polivy & Herman, 1993). Affect regulation models, such as the escape theory (Heatherton & Baumeister, 1991), are commonly used to conceptualize LOC eating behaviors in both clinical and research settings. These models propose that LOC eating functions as a maladaptive effort to escape from distressing affective states. Thus, as individuals experience increasing negative affect, the likelihood of engaging in LOC eating increases. Negative affect is proposed to then decrease following the disordered behavior (Heatherton & Baumeister, 1991), and LOC eating is maintained via negative reinforcement (Schaefer et al., 2020). Cross-sectional research consistently supports this theory and shows that global negative affect is significantly associated with LOC eating in men and women (Dingemans et al., 2017; Leehr et al., 2015). Other cross-sectional studies have examined

discrete types of negative affect and found that depression, stress, and anxiety are associated with LOC eating in adult men and women (Araujo et al., 2010; Gluck et al., 2004; Groesz et al., 2012; Rosenbaum & White, 2015). However, cross-sectional data suffer from recall bias (Colombo et al., 2020; Wang & Cheng, 2020) and severely limit our understanding of potential causal and maintenance factors for LOC eating. Although limited in quantity, extant prospective data confirm the link between affect and LOC eating, suggesting that depressive symptoms increase risk for LOC eating among male and female adolescents and young adults (Goldschmidt, Wall, et al., 2012; Skinner et al., 2012). In sum, while theoretical models suggest that negative affect increases in the hours and minutes before LOC eating in both men and women, neither cross-sectional nor prospective data capture the proposed changes within this temporal setting.

Ecological Momentary Assessment

One particularly useful method for examining temporal changes in affect is ecological momentary assessment (EMA). EMA was developed in the mid-1990's to address many of the limitations of self-report, interview, and observational assessment strategies. EMA involves real-time repeated measurement of an individual's experiences, in the natural environment (Engel et al., 2016; Stone & Shiffman, 1994). Individuals are prompted throughout the day to respond to ratings of their mood, behavior, and experiences, and data are typically collected via smartphone, multiple times a day for several days or weeks (Engel et al., 2016). EMA methodology minimizes recall bias and maximizes ecological validity, and has been described as an ideal method to assess disordered eating behaviors, including LOC eating (Smyth et al., 2001). As such, EMA can be employed to examine hour-by-hour affective states within the cycle of LOC eating (Engel et al., 2016).

Examining Affect with EMA Data

Extant data from EMA studies provide inconsistent support for affect regulation models of LOC eating. There is robust evidence from EMA studies demonstrating that global negative affect worsens rapidly in the time preceding LOC eating episodes in both men and women (Berg et al., 2015; Engel et al., 2013; Fischer et al., 2017; Haedt-Matt & Keel, 2011; Schaefer et al., 2020; Smyth et al., 2007). However, data on what happens after a LOC episode are more mixed. EMA data from adult women with anorexia nervosa (Engel et al., 2013) and bulimia nervosa (Smyth et al., 2007) demonstrate reductions in global negative affect after LOC eating. However, data from a 2011 meta-analysis only including women suggest that global negative affect may actually increase after LOC eating, which is counterproductive to the theorized function of this behavior (Haedt-Matt & Keel, 2011).

Some researchers have discussed a "trade off" theory of affect regulation, where a LOC eating episode serves to trade one type of negative affect (e.g., anxiety) for a less aversive type of negative affect (e.g., guilt; Kenardy et al., 1996). However, theses nuances in affective states are often missed by EMA studies that use composite measures of global negative affect (Haedt-Matt & Keel, 2011), and evidence in support of this theory is inconsistent (Redlin et al., 2002; Corstorphine et al., 2006; Wegner et al., 2002). The majority of EMA research on affect and LOC eating has utilized composite measures of global negative affect. Yet, certain discrete types of affect may be implicated in LOC eating more than others.

Limited preliminary evidence from EMA studies focused specifically on young men suggests that this population may demonstrate unexpected associations between negative affect and LOC eating. One recent EMA study, for example, examined global negative before three different types of eating episodes - overeating without LOC, overeating with LOC, and "normal"

eating episodes (without any overeating or LOC) - in a sample of 87 women and 94 men over the course of three days. They found that in men, on average, reported negative affect was not significantly different before the three types of eating episodes. In women, however, negative affect was, on average, highest before overeating with LOC, compared to overeating without LOC and "normal" eating episodes (Sultson et al., 2022). Another recent EMA study with 23 non-clinical 29-58 year-old men found that participants who reported levels of negative affect that were higher than their average levels engaged in less severe LOC eating (Mason et al., 2022).

These two studies suggest that negative affect may not prompt LOC eating in men, which contrasts with extant affect regulation models for this disordered eating behavior. Although these recent studies address an ongoing gap in the LOC eating literature (i.e., a focus on men), there are important methodological limitations to note. Both studies, for example, did not evaluate negative affect after LOC eating. Moreover, like many studies including women (e.g., Berg et al., 2014, 2017; Smith et al., 2018), they also examined negative affect as a global, unidimensional construct. Both of these factors significantly limit the ability to draw theoretical conclusions in men. Sultson and colleagues' (2022) EMA protocol also only spanned three days, which likely contributed to the limited number of LOC episodes analyzed (28 total episodes). Such a small sample size brings into question the power of their findings. Clearly, in order to adequately test affect regulation models in men, more research is needed to assess diverse domains of negative and positive affect both before and after LOC eating in a large sample of men.

Negative Affect

Guilt is frequently examined as a type of negative affect that contributes to the maintenance of LOC eating (Berg et al., 2013, 2015; De Young et al., 2013). Using EMA methods, guilt has been found to significantly increase prior to and decrease immediately after an LOC eating episode (Berg et al., 2015; Schaefer et al., 2020). In one study of adult men and women with a BMI above 30 kg/m^2, guilt was the only type of negative affect that fluctuated significantly pre- and post-LOC eating episodes, even after controlling for other types of negative affect, including fear, hostility, and sadness (Berg et al., 2013). However, some data with adult men and women suggest that guilt only decreases temporarily during LOC eating, and increases immediately after the eating episode ends (Corstorphine et al., 2006; Redlin et al., 2002; Wegner et al., 2002).

These inconsistencies may stem from researchers using a variety of definitions and measures of guilt that make comparisons across studies difficult (Tilghman-Osborne et al., 2010). For example, some measures include a "guilt" subscale that also includes feelings of shame and regret. These emotions are distinct constructs that, when combined together, may create a complicated conceptualization of guilt (Tilghman-Osborne et al., 2010). Thus, a parsimonious measure of guilt, and separate measures of related constructs, are needed to clarify how and if these specific feelings fluctuate throughout the LOC eating cycle.

When assessed with cross-sectional methodologies, anxiety and depression are also consistently and positively correlated with engagement in LOC eating in adult men and women (Araujo et al., 2010; Grilo et al., 2009; Grucza et al., 2007; Mitchell & Mazzeo, 2004; Ostrovsky et al., 2013; Rosenbaum & White, 2015). However, when employing EMA methods, the link between these affective experiences and LOC eating is much more complicated. Some studies with adult men and women report decreases in anxiety and increases in depression following

LOC eating (Hetherington et al., 1994; Redlin et al., 2002), whereas others found that sadness did not change in the hours before or after LOC eating episodes (Schaefer et al., 2020). Still other studies with only women have found increases in anxiety after LOC eating (Corstorphine et al., 2006; Wegner et al., 2002). If patterns of extant findings in largely female samples hold true for men, LOC eating may alleviate feelings of anxiety and depression for some men, while for others engagement in LOC eating may increase these same feelings. EMA methodology allows researchers to capture potential intra-individual changes in affect across the LOC eating cycle, and may clarify the roles of anxiety and depression within this cycle for young men specifically.

Positive Affect

While affect regulation models primarily focus on negative affect, some data suggest that positive affect may also be relevant to explore in empirical investigations of adults' LOC eating behaviors (Dingemans et al., 2017). Negative and positive affect often function orthogonal to each other, such that an individual may experience negative affect and positive affect concurrently (Watson et al., 1988). As such, affect regulation models for LOC eating propose that positive affect decreases before LOC eating, and increases after LOC eating (Heatherton & Baumeister, 1991; Polivy & Herman, 1993). Capturing changes in positive affect before and after LOC eating may be useful both in terms of fine-tuning existing affect regulation theories and in informing intervention points. Some affective experiences involved in LOC eating may be missed when we only examine negative affect. For example, an individual may conceptualize their mood largely in positive terms (i.e., more or less happy) and not identify or relate to conceptualizations of negative affect. Additionally, some individuals may be more aware of their positive mood states before and after LOC eating than their negative mood states. These experiences of positive affect are missed when only negative affect is assessed.

Limited data on positive affect confirm that it is, indeed, related to LOC eating behaviors. Several studies including men and women have examined both positive and negative affect in relation to LOC eating, conceptualizing them as orthogonal. For example, one prospective study with women and men with eating disorders found that, during weeks when participants reported higher than usual negative affect, more LOC eating episodes occurred, and during weeks when participants experienced higher than usual positive affect, fewer LOC eating episodes occurred (De Young, Zander, et al., 2014). An EMA study including women with bulimia nervosa found that positive affect decreased prior to and increased immediately after LOC, while negative affect simultaneously increases prior to and decreases after LOC eating (Smyth et al., 2007). A recent EMA study with adult men and women found a similar pattern of pre-LOC eating decreases in positive affect, but found no significant changes in positive affect following the eating episode (Schaefer et al., 2020). In the two studies mentioned above that include men, men comprised only 20% of the sample; as such, men were not evaluated independently, nor was gender examined as a moderator.

Two very recently published studies evaluated positive affect in relation to men's LOC eating specifically. Sultson and colleagues (2022) found that global positive affect before eating did not significantly vary for episodes that included LOC and those that did not. Mason and colleagues (2022) found that, when middle-aged men reported positive affect that was higher than their average levels, they reported more severe LOC eating. While these studies may seem to present contradictory findings, they also take quite different statistical approaches. Data from Sultson et al. suggest that, between participants, positive affect does not precede LOC eating., while data from Mason et al. suggest that, within participants, greater positive affect may actually prompt higher degrees of LOC eating. Both of these findings contradict affect regulation

models, although a within participant approach is better suited to empirically test these theories. Clearly, additional research with larger samples of men and more nuanced measurements of positive and negative affect are needed.

Brain Development and Emotion Regulation in Young Adults

Young adult men are in a unique developmental period that warrants further discussion in relation to LOC eating and affect. Brain maturation begins in adolescence and continues until approximately 25 years of age (Arain et al., 2013; Gavin et al., 2009). Some recent data suggest that brain development continues until 30 years of age (Somerville, 2016; Tamnes et al., 2010). Thus, young adult men are continuing to experience neurological developments related to their capacities to regulate impulses, evaluate risks and rewards, and manage their emotions throughout their 20's (Arain et al., 2013; John & Gross, 2004; Murray & Rosanbalm, 2017). This places young adult men within a unique developmental period when compared to their mid- or older-adult peers, as young men are in a liminal neurological zone between adolescence and adulthood. This stage of life warrants targeted study, as young men 18-30 years old report the highest rates of LOC eating when compared to their older peers (Forrester-Knauss & Stutz, 2012; Nicdao et al., 2007).

This developmental zone may also impact how young men subjectively experience and respond to their affective states. There are gendered differences in how men and women respond to experiences of negative affect (Tamres et al., 2002). Women, for example, are more likely than men to report using emotional regulation strategies, such as problem-solving, acceptance, rumination, and social support (Nolen-Hoeksema & Aldao, 2011; Zimmermann & Iwanski, 2014). Men, on the other hand, are more likely to use suppression or avoidance to cope with negative affect (Nolen-Hoeksema, 2012). As young adults are still developing their abilities to

regulate their emotions, some men may turn to LOC eating in attempts to avoid or suppress their emotions (Polivy & Herman, 2002). Emotion dysregulation is indeed linked with LOC eating behaviors in men (Hayaki & Free, 2016), and young adults also tend to engage in impulsive behaviors when distressed, which may be an underlying mechanism driving LOC eating in young men (Kelly et al., 2014; Osa et al., 2021; Racine et al., 2017). Thus, an exploration of affect regulation models specific to young adult men is warranted given that men and women tend to use different emotion regulation strategies and express different affective experiences.

Summary

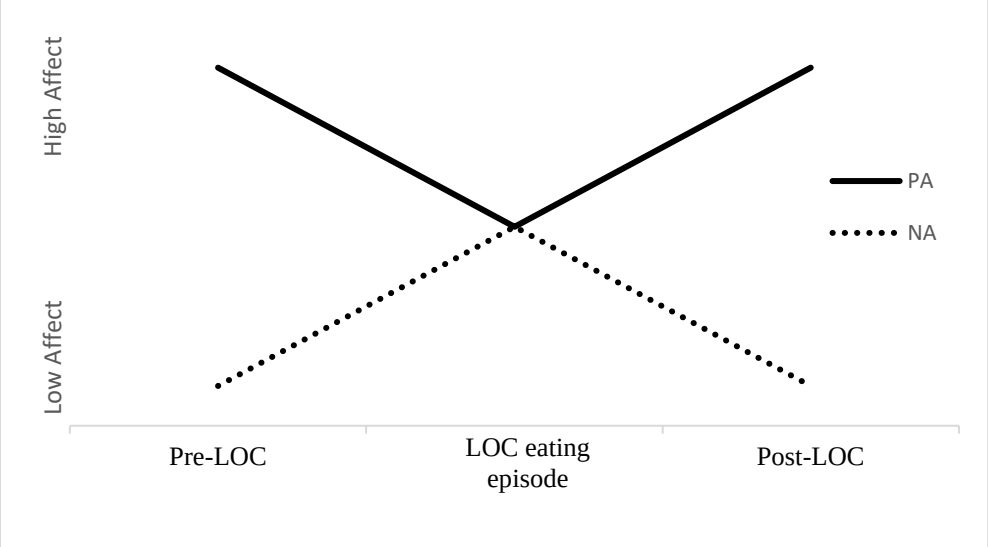
In summary, affect regulation models for LOC eating are well studied, yet examinations specific to young men are lacking. Moreover, it remains unclear which discrete types of negative and positive affect are most implicated in young men's LOC eating or if certain domains are more closely linked to LOC eating before or after an episode. EMA methods facilitate the close examination of these temporal changes in affect. This level of specificity will greatly enhance understanding of LOC eating in men, thereby contributing to the formulation of more inclusive theoretical models that address both positive and negative affect, as well as targeted intervention strategies. For example, interventions may be able to target specific affective vulnerabilities or tailor emotion regulation strategies to address specific emotional antecedents and consequences to LOC eating that are relevant for men. Empirically-supported LOC eating interventions designed specifically for men are currently non-existent, even though prevalence rates and psychosocial comorbidities for this disordered eating behavior are similar for men and women (Striegel et al., 2012).

Current Study

The current study seeks to explore the temporal roles of affect in LOC eating in a sample of high-risk young men. Based on prior theoretical and empirical findings, the current study will examine a conceptualization of men's LOC eating that includes both positive and negative affect (Figure 1). Although there are certainly some variations across studies, extant literature generally suggests that negative affect tends to increase before LOC eating and decrease afterwards, while positive affect tends to decrease before LOC eating and then increase afterwards. The current study asserts that these changes in affect occur concurrently within the same episodes, and are modeled as such.

Figure 1

Hypothetical Model & Visual Representation of Study Hypotheses



Note. Global negative affect (NA) is predicted to significantly increase before LOC eating and decrease significantly after LOC eating. Global positive affect (PA) is predicted to significantly decrease before LOC eating and increase significantly after LOC eating.

Study Aims and Hypotheses

Aim 1: LOC Descriptives

Given the lack of attention to both positive and negative affect in relation to LOC eating in young men, this dissertation will first describe the frequency of LOC eating reported by participants and their reported affective experiences across the 14-day protocol. No specific *a priori* hypotheses are specified as this aim is descriptive in nature.

Aim 2: Global Affect

This dissertation will also examine the trajectories of global negative and positive affect in relation to LOC eating. Based on previous EMA research with adult men and women (Berg et al., 2013, 2015; Haedt-Matt & Keel, 2011; Schaefer et al., 2020), it is hypothesized that global negative affect will increase before LOC eating and decrease significantly after LOC eating. Global positive affect is predicted to decrease before LOC eating and increase significantly after LOC eating (Figure 1).

Aim 3: Discrete Types of Affect

This dissertation will also explore the trajectories of discrete types of negative and positive affect prior to and following LOC eating. Due to limited prior research in this area, no *a priori* hypotheses are specified.

CHAPTER II

METHODOLOGY

Participant Recruitment

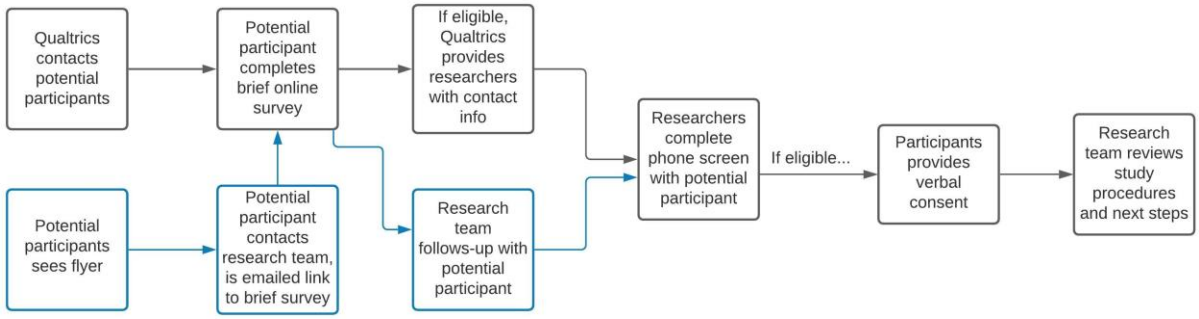
Participants were recruited for the current study using two methods: Flyers and Qualtrics. Electronic flyers were posted online on social networking sites (e.g., Facebook, reddit, craigslist) and paper flyers were posted on and near two college campuses – University of Oregon (a large public university in a small suburban city in the Pacific Northwest) and American University (a mid-size private university in a large city on the East coast). Flyers included the question "Do you have trouble controlling how much you eat?"; contact information for the researchers' labs; and instructed interested participants to either call or email the researchers to set up an initial phone screen. Men who directly called or emailed the lab after viewing the flyer were emailed a link to the brief online survey to assess preliminary eligibility. A secondary recruitment method involved Qualtrics Panels, a company that engages research participants through social media and panel providers. Qualtrics contacted potential respondents via email and interested participants completed the same brief online survey assessing preliminary eligibility noted above. Qualtrics provided researchers with the contact information (name, email, and phone number) of potentially eligible participants in order to complete a more in-depth phone screen. See Figure 2 for a representation of screening and recruitment procedures.

Eligibility criteria included being between the ages of 18-35; identifying as male; the ability to speak and understand English; and the possession of a smartphone with internet access. Participants were also required to endorse weekly LOC eating in the prior 28 days, corresponding with DSM-5 criteria for "recurrent" episodes (American Psychiatric Association, 2013). Exclusion criteria included the presence of regular compensatory behavior (i.e., vomiting,

laxative or diuretic use, compulsive exercise at least once a week for the past 3 months); current diagnosis of anorexia or bulimia; history of weight loss surgery; recent use of medication known to affect appetite and/or weight; or current enrollment in weight- or mental health-related treatment.

Figure 2

Participant Recruitment and Screening Procedures



Procedures

All study procedures were approved by the two university's Institutional Review Boards. Data collection occurred between July 2018 and April 2019. All study procedures occurred online or over the phone.

Initial Phone Screen

Men who were identified as potentially eligible after completing the brief eligibility survey were contacted by a research team member. They completed a phone screen to further assess eligibility, with a specific emphasis on exclusion criteria (i.e., engagement in regular compensatory behaviors). Researchers also reviewed with potential participants the details of the study, including study procedures, risks, benefits, study aims, their rights as a research

participant, and the steps taken to protect their confidentiality. Potential participants were then asked to provide their verbal consent (or not) to enroll in the study. Those who did not consent to participate were thanked for their time and consideration and provided with the primary investigator's email for any future questions that may arise.

Baseline Procedures

After providing verbal consent during the initial phone screen, participants were sent a link to a brief online survey to complete within the next day. Survey items gathered basic demographic and anthropometric information, as well as several trait-level variables (e.g., impulsivity, emotion regulation tendencies).

After completing the baseline assessment, participants were entered into the ReTAINE™ (Real-Time Assessment in the Natural Environment) system (Neuropsychiatric Research Institute, Fargo, ND). A member of the research team reviewed instructions for responding to EMA prompts delivered via text with each participant, to ensure they understood the study protocol. Participants completed a 1-day practice period to familiarize themselves with the ReTAINE™ system. Research staff called participants after the practice day to review adherence, discuss potential barriers to completing the EMA protocol, and to brainstorm how to improve adherence. Compliance was monitored every 3-5 days for a total of two weeks and participants were contacted and provided with feedback about their compliance to the protocol. The EMA protocol involved a combination of random signal-contingent, event-contingent, and interval-contingent recordings. Only random signal-contingent and event-contingent recordings were utilized in the current study, and these will be described below in the measures section. Please see Appendix A for a list of EMA items used in the current study.

Payment

Participants were paid $100 for participating in the current study, and were given an additional $50 bonus for ≥80% adherence to the total EMA protocol. Participants received this incentive at the end of the two-week EMA period. This level of compensation is comparable to previous EMA studies (aan het Rot et al., 2012; Stone et al., 2007).

Measures

Demographic Characteristics

Participants self-reported their age; race; ethnicity; education; school status; sexual orientation; and height and weight, which were used to calculate BMI (kg/m^2; Center for Disease Control, 2018).

Affect Ratings

Affect ratings were captured from the random signal-contingent recordings. Participants were asked to complete signal-contingent surveys five times a day, every day. Each prompt was randomly distributed around specific stratified daily intervals, at approximately 10am, 1pm, 4pm, 7pm, and 10pm (±15 minutes).

Negative and positive affect were captured with 14 total items from the Brunel Mood Scale (BRUMS; Terry et al., 1999; Terry et al., 2003) and the Positive and Negative Affect Schedule-Expanded Form (PANAS-X; Watson & Clark, 1999). Anger, confusion, depression, fatigue, and tension were measured with items from the BRUMS. BRUMS items demonstrate high estimated internal consistency (Cronbach's alpha = .74 - .90) and test-retest reliability that is appropriate for state affect (.26 - .53; Terry et al., 1999). It is validated for use with adults (Terry et al., 1999; Terry et al., 2003) and has been used in previous studies on eating disorders (Neves et al., 2017; Terry & Galambos, 2004). Joviality and guilt were measured with items from the PANAS-X (Watson & Clark, 1999). Items from the PANAS-X are reliable (Watson &

Clark, 1999) and the survey has been validated in non-clinical adult populations (Crawford & Henry, 2004) and used in prior EMA studies on eating disorders (De Young et al., 2013).

Both the BRUMS and PANAS-X items include single words used to describe state affect, and participants are asked to rate the extent to which they currently felt each of these emotions on a 5-point scale, ranging from 1 (*not at all*) to 5 (*extremely*). The following specific words were used in the current study: annoyed, guilty, angry, worried, worn out, ashamed, confused, depressed, tired, anxious, regretful, unhappy, excited, and happy. The item "regretful" was added by the researchers to distinguish guilt from regret (Berndsen et al., 2004; Fisher & Exline, 2010).

A confirmatory factor analysis was conducted to examine factor loadings for all 14 affective items. Two items ("tired" and "worn out") were cross loaded and dropped from analyses. Thus, the final global negative affect composite included the following 10 items: annoyed, guilty, angry, worried, ashamed, confused, depressed, anxious, regretful, and unhappy (Cronbach's alpha = .93). The final global positive affect composite included two items: excited and happy (Cronbach's alpha = .73).

LOC Eating

LOC eating episodes were assessed with event-contingent recordings. Event-contingent recordings were completed whenever an eating episode occurred, defined for participants as: "Any time of eating or drinking that you consider to be a meal or snack. If the food or drink was considered an 'eating episode' to you, we would like you to report on it." Participants were instructed to not report on instances of consuming a single bite of food, cough drop, or chewing gum. Participants were advised to only include drinks if they considered them a meal or snack (e.g., a breakfast smoothie would count, but a coffee might not count).

For every eating episode, participants were asked the following two questions on a Likert scale from 1 (*not at all*) to 5 (*extremely*): (a) "To what extent do you feel that you overate?"; (b) "While you were eating, to what extent did you feel a sense of loss of control?". In past EMA studies, LOC has been determined to be present when participants respond to both items with a 3 or greater on the 1-5 Likert scale (Berg et al., 2014, 2015; Goldschmidt et al., 2018; Schaefer et al., 2020; Smith, Schaumberg, Reilly, Anderson, Schaefer, et al., 2020). In the current study, LOC eating was analyzed in two ways. First, an eating episode was classified as LOC plus overeating if the participant rated both items a and b at ≥ 3 (henceforth referred to as LOC+OE), as done in prior research. Conceptualizing LOC in this manner will assist in comparisons across studies. However, this conceptualization of LOC eating excludes any LOC episodes without objective overeating and as noted in past literature including men (Colles et al., 2008; Goldschmidt, Engel, et al., 2012; Kelly, Cotter, et al., 2018), it is the presence of LOC while eating that is most clinically relevant. Thus, analyses were also conducted with only item (b) with a cutoff of ≥ 3 (henceforth referred to as LOC Only) to isolate the experience of LOC regardless of the amount of food consumed.

Data Analytic Plan

Power

Statistical power is the probability that a significance test will accurately reject or fail to reject the null hypothesis. Having a sufficient sample size is one of the key ways to ensure a study is adequately powered (Ryan, 2013). For most statistical approaches, power can be easily calculated ahead of time using a statistical package such as G*Power (Faul et al., 2007). However, it is quite challenging to compute power for EMA studies, as each participant in the study will contribute a different number of data points (Oleson et al., 2022; Stone et al., 2007).

Both number of participants and number of responses per participant are important to consider for an EMA study's power. Thus, a conventional power analysis was not conducted *a priori*. Instead, the target of 50 participants was determined by consulting previous EMA studies and evaluating their sample sizes. In extant EMA studies on LOC eating, sample sizes range from 17 to 130 participants, with a modal number of approximately 50 participants (Berg et al., 2013, 2015, 2017; De Young, Lavender, et al., 2014; Goldschmidt et al., 2018; Romano et al., 2020; Schaefer et al., 2020; Smith et al., 2018; Smith, Mason, Schaefer, Anderson, Hazzard, et al., 2020; Svaldi et al., 2019; Zhu, 2018). Participation in an EMA study is time intensive and burdensome for participants, as they are responding to multiple prompts over a period of two weeks, and thus requires substantial financial compensation for their time. For these reasons, a sample size of 50 was selected as the study enrollment target.

Missing Data

All analyses were conducted using SPSS v. 26. First, an examination of the pattern and frequency of missing data was conducted by examining adherence to the EMA protocol for each participant. EMA necessitates a different approach to missing data than cross-sectional studies. For example, the default approach to missing data, listwise deletion, would change the time intervals between data points and bias parameter estimates (Ji et al., 2018; Liu & Molenaar, 2014). As such, in the current study, no missing data were imputed and missing records were not deleted. The chosen analytical approach uses all available data and is tolerant of missing data. This approach is consistent with prior EMA studies (Berg et al., 2014, 2017).

Before conducting analyses, any participant with < 40% adherence to the EMA protocol was removed from analyses due to their low adherence. Five participants met this adherence criteria. Of these five excluded participants, three men did not report any LOC+OE or LOC Only

episodes. Two of these men each reported one LOC Only episode, and neither reported affect ratings surrounding these episodes. Thus, none of their data would have been included in hypothesis-testing analyses.

Aim 1: LOC Descriptives

To address Aim 1, descriptive analyses were conducted to examine the frequency of each type of LOC eating. Reported LOC eating was aggregated by participant to obtain the number of participants reporting LOC eating and the range of the number of episodes reported across the 14-day protocol. Descriptive analyses were also conducted for the global measures of positive and negative affect and for each discrete type of affect. Descriptive statistics were calculated and line graphs were created to visually present each participant's affective experiences across the 14-day protocol.

Aim 2: Global Affect

Model selection. To address Aim 2, generalized linear mixed models (GLMM; Hedeker & Gibbons, 2006) were conducted to examine how global negative and positive affect change before and after LOC eating. GLMMs were selected because they are well suited to examine non-independent repeated measures provided by the same participants. These models are consistent with recommended approaches for testing affect regulation models and are commonly used in prior investigations with similar aims and methodology (Berg et al., 2013, 2017; Schaefer et al., 2020; Smyth et al., 2007; Stevenson et al., 2018).

Assumption testing. Two main assumptions were tested while fitting the GLMMs. First, GLMMs assume that the random effects in the model are normally distributed (Field, 2013). Day (cumulative hours) was the only random effect in the model, and histogram plots demonstrate a normal distribution. Second, the chosen link function must be appropriate to the data. Histograms

with normality curves were examined for all target variables (affect composite measures and discrete types). Data were continuous, positive, and right skewed for all affective distributions. Thus, a gamma distribution with a log link was selected for all GLMMs (Manning et al., 2005). In multilevel models, there is no assumption of homogeneity of regression slopes (as the relationship between LOC eating and affect can vary by person) and no assumption of independence (Field, 2013) so these assumptions were not tested.

Model specifications. Affect was entered as the target variable. The linear, quadratic, and cubic effects for LOC eating were entered as fixed main effects. These terms represent the pre-LOC eating effects. Fixed interaction terms were created with the linear, quadratic, and cubic effects to represent the post-LOC eating effects. Day (cumulative hours) was entered as the random effect. No covariates were entered into the models. For within-subject analyses, the use of between-subject covariates (i.e., age, BMI) would not change the results. This approach is consistent with prior investigations with similar data analytic approaches (Berg et al., 2013, 2014, 2015, 2017; Smith et al., 2018; Svaldi et al., 2019; Zhu, 2018).

In situations where more than one LOC eating episode was reported in a day, only the first episode was used in analyses. Using only the first episode in a day avoids confounding effects from affect ratings that may be both the post-LOC rating from the first episode and the pre-LOC affect rating from the second episode in a day. This approach is consistent with prior investigations in this area (Berg et al., 2013, 2015).

All available affect ratings provided four hours before and after LOC eating episodes were used, consistent with prior EMA studies (Berg et al., 2013, 2015; Smyth et al., 2007).

A first-order autoregressive error structure (AR(1)) was also used to account for dependency due to the nested data structure. This structure takes into account that within-person

data points are closely related, and that data points close together in time are more closely related than data points that are further apart in time (Schwartz & Stone, 1998).

Model interpretation. To interpret model results, the linear effects were examined first, to see if the trend of change was significant or not. The linear effect demonstrates if the slope of the regression line is increasing, decreasing, or flat (i.e., how does affect change immediately prior to a LOC episode). Then, if the linear effect was significant, the quadratic and cubic effects were interpreted. The quadratic effect indicates whether the linear slope moves downward or upwards, which demonstrates the acceleration or deceleration in the rate of change. The cubic effect shows changes in the rate of affect change and indicates whether the initial deflection of the quadratic component accelerates or decelerates over time. Figures were then created for all models with significant linear terms to allow for visual interpretation of the significant trends.

The coefficient for GLMMs is R^2, known as the coefficient of determination. R^2 is a measure of effect size that represents the proportion of variance explained by the model (Nakagawa et al., 2017). It ranges from 0 to 1, with 0.02 representing a small effect, 0.13 a medium effect, and 0.26 a large effect (Cohen, 1988). Effect sizes were examined to assess the practical meaningfulness of significant results, and to explore which discrete types of affect are most strongly related to LOC eating.

Aim 3: Specific Facets of Affect

To address Aim 3, the same procedures for Aim 2 were conducted with each individual discrete type of affect (annoyed, guilty, angry, worried, worn out, ashamed, confused, depressed, tired, anxious, regretful, unhappy, excited, and happy).

Determining Significance

Statistical significance was determined by a p-value < .05. To reduce the likelihood of type I errors associated with multiple statistical models, the Benjamini–Hochberg correction was applied within each set of analyses (Aim 1 and Aim 2). Both original and adjusted *p*-values are reported in tables, and adjusted *p*-values are reported in-text (Benjamini & Hochberg, 1995). The Benjamini-Hochberg correction takes a sequential approach that results in greater power than the Bonferroni correction, and is completed manually using a widely available Excel spreadsheet (Thissen et al., 2002).

CHAPTER III

RESULTS

Participants and Descriptive Data

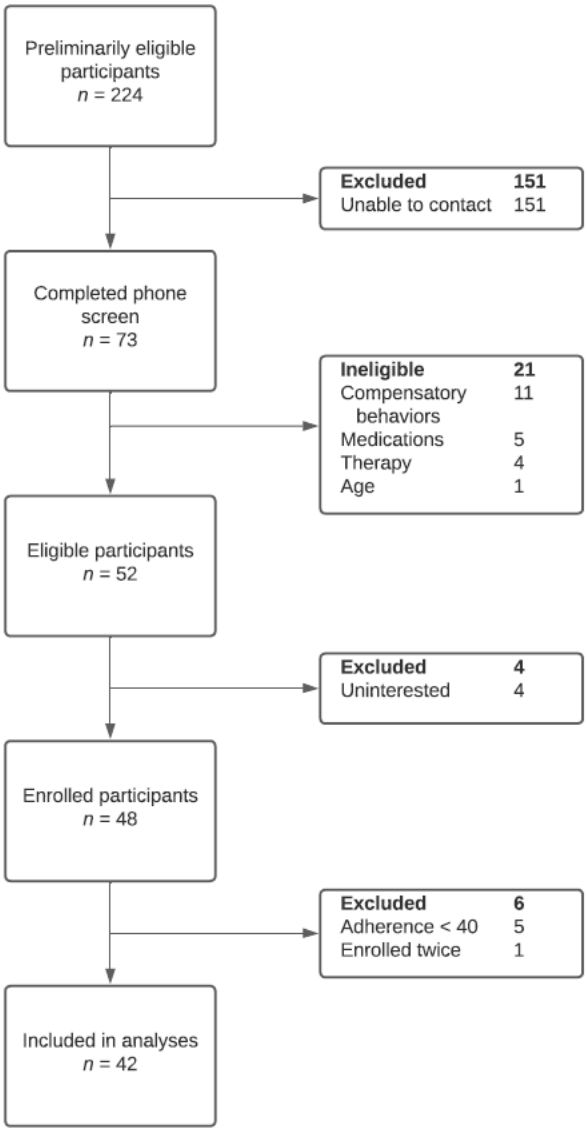
The brief online survey used to determine preliminary eligibility was completed 512 times. This number reflects anytime an individual clicked on the survey link and it is unclear if these are duplicates or all unique individuals. Of these initial responses, 288 were deemed ineligible for the following reasons: 196 did not meet the LOC eating frequency criteria; 42 were out of the age range; 27 did not identify as a man; 14 did not have a smartphone with internet capabilities; and nine were eligible but uninterested in participating in the study once they were informed of the details. Of the 224 responses deemed preliminarily eligible, 151 provided inadequate contact information (e.g., a wrong phone number or fake email address); did not respond to the research team's attempts to contact them; or did not provide any means of contact. The remaining 73 respondents completed the full screening procedures for the current study. Of these potential participants, one did not meet the age eligibility criteria; five were taking medications that affect weight and/or appetite; four were currently enrolled in therapy; and 11 reported engaging in regular compensatory behaviors. Four men were no longer interested in participating in the current study after the procedures were reviewed. See Figure 3 for a visual representation of participant enrollment and exclusion.

A total of 48 men consented and enrolled in the current study. Five of these men completed less than 40% of the EMA protocol and were excluded from analyses. The five excluded participants were significantly older (*M* age = 32.50 ± 2.38y), on average, than the sample retained for primary analyses ($p = .02$); they did not vary meaningfully in any other demographic factor. One participant enrolled in the study twice, and only their first enrollment

was included in analyses. Thus, 42 total men (*M*age = 25.31±5.38 years) consented and fully participated in the current study (20 enrolled by University of Oregon, 22 enrolled by American University). Within this final sample, one participant was recruited through Qualtrics Panels, and the remaining 41 were recruited through electronic and paper flyers.

Figure 3

Participant Enrollment and Exclusion Procedures



See Table 1 for demographic information for the sample. Briefly, the average age was about 25 years old; there was moderate diversity in race and ethnicity; half of the sample had at least a 4-year college degree (50.0%); and most participants were not in school at the time of the study (65.9%). Sexual orientation lacked diversity, with 88.1% of men identifying as heterosexual. Independent samples t-tests and chi-square tests revealed no significant differences in demographic factors between those enrolled by the University of Oregon and American University (*ps* > .05).

Table 1

Demographic Information for the Current Study's Sample

Demographic category	American University (n = 22)	University of Oregon (n = 20)	Full Sample (N = 42)
Age	25.09 ± 5.01	25.55 ± 5.88	25.31 ± 5.38
BMI (kg/m^2)	27.73 ± 6.20	27.97 ± 7.82	27.84 ± 6.93
Race/Ethnicity			
White	38.1%	55.0%	46.3%
Hispanic/Latino/Spanish	0.0%	15.0%	7.3%
Black/African American	33.3%	10.0%	22.0%
Black but NOT African American	14.3%	5.0%	9.8%
East or Southeast Asian	4.8%	0.0%	2.4%

Table 1 Continued

Demographic Information for the Current Study's Sample

Demographic category	American University (n = 22)	University of Oregon (n = 20)	Full Sample (N = 42)
Middle Eastern or North African	4.8%	0.0%	2.4%
Pacific Islander or Native Hawaiian	0.0%	5.0%	2.4%
Other	4.8%	10.0%	7.3%
Education			
≤ High school	22.7%	20.0%	21.4%
Some college	27.3%	20.0%	23.8%
2-year college degree	9.1%	0.0%	4.8%
≥ 4-year college degree	40.9%	60.0%	50.0%
School Status			
Not in school	52.4%	80.0%	65.9%
Undergraduate student	42.9%	20.0%	31.7%
Graduate student	4.8%	0.0%	2.4%
Sexual Orientation			
Heterosexual	95.5%	80.0%	88.1%
Gay	4.5%	15.0%	9.5%
Bisexual	0.0%	5.0%	2.4%
Cisgender male	100.0%	100.0%	100.0%

Note. BMI = body mass index.

Missing Data and Compliance

Participant compliance was determined by summing the percentage of completed signal-contingent ratings and interval-contingent ratings completed within the hour before or after the events occurred. Among those included in the final sample (N = 42), overall compliance to the EMA protocol was strong with 79.8% overall adherence. More specifically, 85.7% of participants completed 70% or more of EMA items; 57.1% of participants completed 80% or more of EMA items; and 21.4% completed 90% or more.

Aim 1: LOC Descriptives

LOC+OE Frequency

When LOC eating episodes were conceptualized as both LOC and overeating, 29 participants (69.0%) endorsed LOC+OE episodes. The range of number of episodes reported across the 14-day protocol was 1-50 (*Mode* = 1, M = 7.66, SD = 11.16). Across the 14 days, six men reported only 1 LOC episode, 19 men reported between 2-9 episodes, and four men reported between 21-50 episodes. By limiting included eating episodes to only the first LOC+OE episode per day, 150/226 episodes were included in analyses (66.37%).

LOC Only Frequency

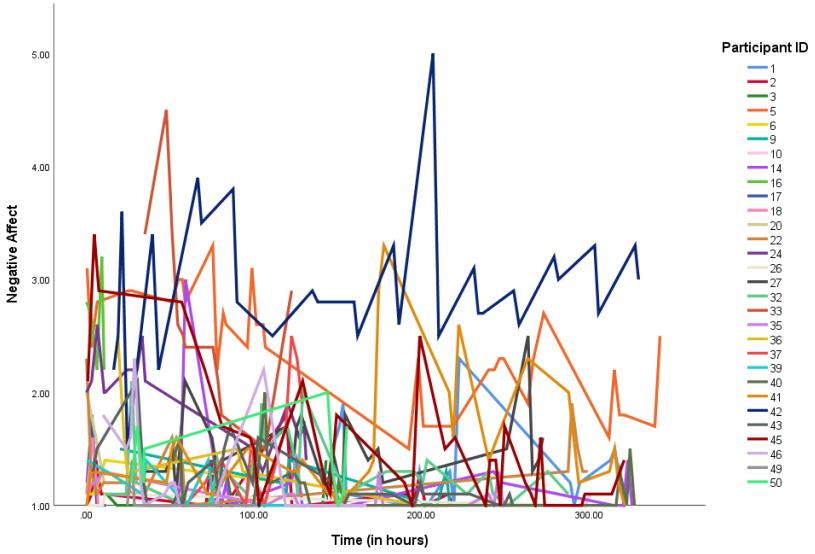
When LOC eating episodes were conceptualized as only the sense of LOC, regardless of the amount of food consumed, 31 participants (73.8%) endorsed LOC Only episodes. The range of number of episodes reported across the 14-day protocol was 1-50 (Mode = 1, M = 8.90, SD = 11.59). Across the 14 days, six men reported only 1 LOC Only episode, 19 men reported between 2-9 episodes, two men reported between 10-20 episodes, and four men reported between 21-50 episodes. By limiting included eating episodes to only the first LOC Only episode per day, 162/276 episodes were included in analyses (58.70%).

Affective Experiences

Figure 4 demonstrates reported global negative affect across the 14-day protocol for each participant who reported LOC Only episodes, and Figure 5 demonstrates reported global positive affect across the 14-day protocol for each participant who reported LOC Only episodes.

Figure 4

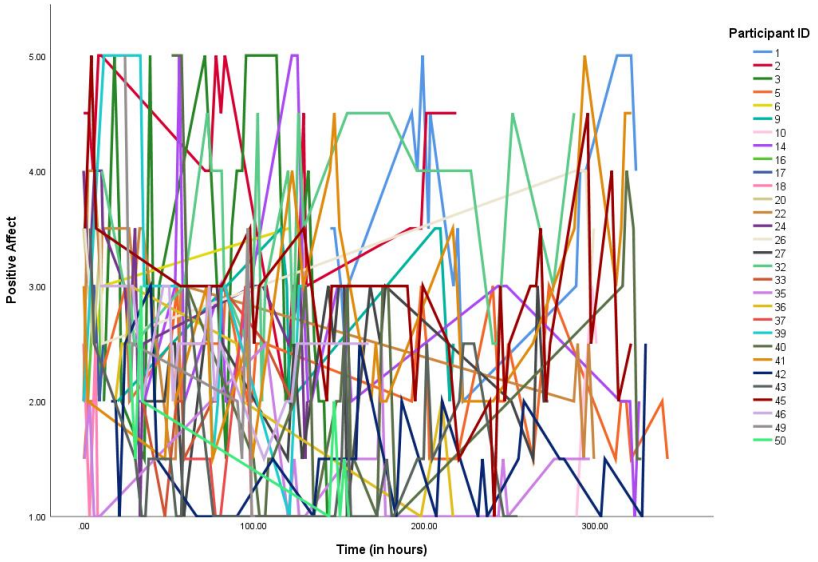
Fluctuations in Global Negative Affect Across the 14-day Protocol for Each Participant



Note. This figure plots global negative affect ratings across the 14-day protocol for each participant (N = 31).

Figure 5

Fluctuations in Global Positive Affect Across the 14-day Protocol for Each Participant



Note. This figure plots global positive affect ratings across the 14-day protocol for each participant (N = 31).

Aim 2: Global Affect

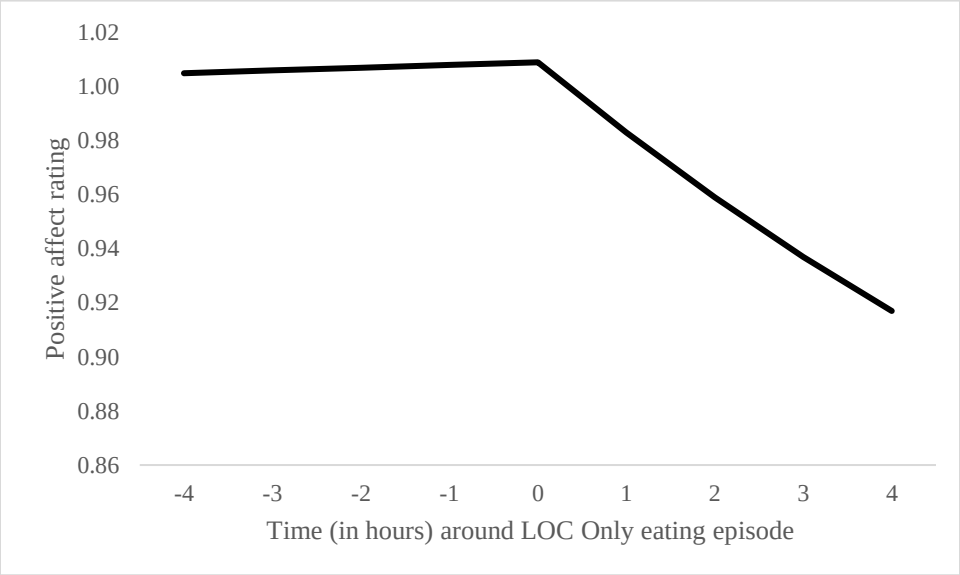
For the LOC+OE analyses, there were no significant findings (ps > .05), indicating no significant linear or quadratic changes in the trajectories of composite negative affect or composite positive affect before or after LOC+OE (Table 2).

For LOC Only analyses, composite negative affect did not change significantly before or after LOC eating (p > .05; Table 3). Composite positive affect did not change significantly before LOC Only eating (p > .05). For the positive affect composite, the post-LOC Only eating linear component was significant ($p \leq .001$, R^2 = -.03), indicating a small but meaningful change in the trajectory of global positive affect after LOC Only eating. The post-LOC Only eating quadratic component was also significant ($p \leq .001$, R^2 = .001), indicating a small but significant

change in the slope of global positive affect after LOC eating. Global positive affect decreased significantly in the four hours following LOC eating, and the slope of this decrease slightly lessened over time (Figure 6).

Figure 6

Positive affect trajectories before and after LOC eating



Note. Global positive affect decreased significantly in the four hours following LOC Only eating, and the slope of this decrease slightly lessened over time (*p*s ≤ .001).

Aim 3: Discrete Types of Affect

Model Fit

When running models with LOC+OE episodes, SPSS gave warnings that convergence could not be reached for the following models: annoyed, guilty, angry, worried, worn out, ashamed, tired, and unhappy. Thus, the number of iterations for these models were increased from 100 to 1,000, but models still did not converge. The cubic terms were also dropped from all

models to increase parsimony as none of the cubic effects were significant. Dropping the cubic term also simplified the models, which assisted some models in reaching convergence (Kiernan et al., 2012).

When examining the random effects table, the Rho parameter was redundant in some models, and a warning was given by SPSS that the covariance matrix was not positive definite. This indicates that there is not enough variance in the random effects (Lee et al., 2012). In the context of these models, this warning indicates that affect is not changing very much (if at all) over time. To address this warning, the random effects structure should be simplified (Kiernan, 2018). The original AR(1) variance component structure was selected to address the assumption that data points close together in time are more closely related than data points that are further apart in time. A variance components covariance structure was tested instead and improved overall fit, as evidenced by decreased AIC values, for the following models: annoyed, guilty, angry, worried, worn out, ashamed, confused, tired, and unhappy. A variance components covariance structure assumes that random effects are independent (Field, 2013). After implementing these changes, SPSS warnings stopped and all models reached convergence.

The same warnings were given for the LOC Only models, and the steps outlined above were repeated. All cubic terms were dropped from all models. The following models were further simplified by using the variance components covariance type in lieu of the AR(1) type: annoyed, guilty, worn out, ashamed, tired, regretful, and happy. After implementing these changes, SPSS warnings stopped and all models reached convergence. The covariance type used for each model is specified in all tables.

Results

For LOC+OE models, there were no significant findings for individual discrete types of affect before or after LOC eating episodes (*ps* > .05; Table 4).

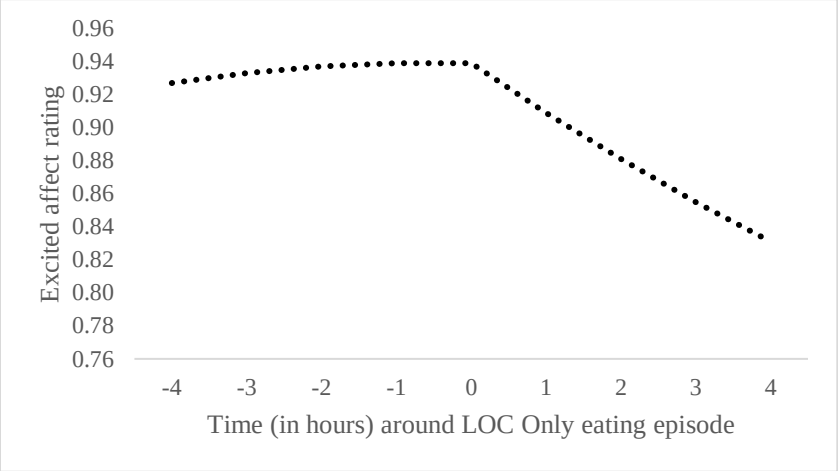
For LOC Only models, there were no significant findings before or after LOC Only eating for the individual discrete types of negative affect: annoyed, guilty, angry, worried, worn out, ashamed, confused, depressed, tired, anxious, regretful, or unhappy (*ps* > .05). Although neither individual type of positive affect (excitement, happiness) changed significantly before LOC Only eating ($p > .05$), both significantly declined after LOC Only eating (*ps* < .05; Table 5).

For "excited," more specifically, the post-LOC Only eating linear component was significant ($p \leq .01$, $R^2 = -.03$), indicating a small but significant change in the trajectory of excitement after LOC Only eating. The post-LOC Only eating quadratic component was also significant ($p < .01$, $R^2 = .001$), indicating a small but significant change in the slope of excitement after LOC Only eating. Excitement decreased significantly in the four hours after LOC Only eating, and the slope of this decrease slightly lessened over time (Figure 7).

For "happy," the post-LOC Only eating linear component was significant ($p \leq .01$, $R^2 = -.03$), indicating a small but significant change in the trajectory of happiness after LOC Only eating. The post-LOC Only eating quadratic component was also significant ($p < .01$, $R^2 = .001$), indicating a small but significant change in the slope of happiness after LOC Only eating. Happiness decreased significantly in the four hours after LOC Only eating, and the slope of this decrease slightly lessened over time (Figure 8).

Figure 7

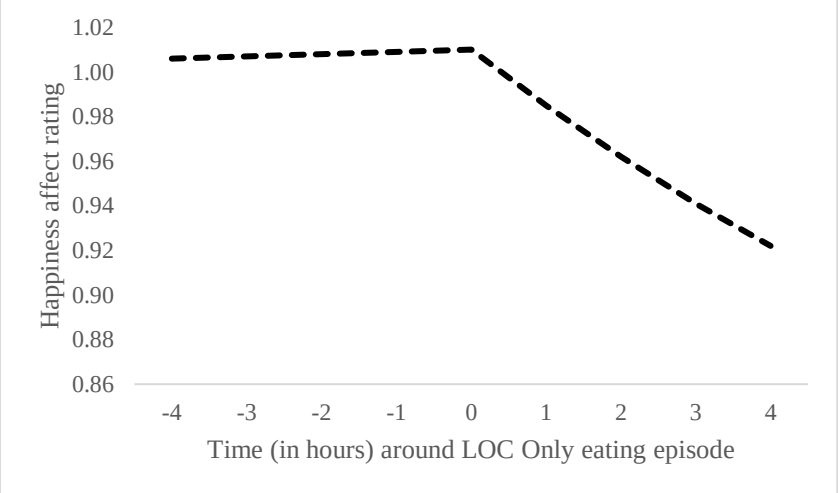
Excitement trajectories before and after LOC eating



Note. Excitement decreased significantly in the four hours after LOC Only eating, and the slope of this decrease slightly lessened over time (*ps* ≤ .01).

Figure 8

Happiness trajectories before and after LOC eating



Note. Happiness decreased significantly in the four hours following LOC eating, and the slope of this decrease slightly lessened over time (*ps* ≤ .01).

Table 2

Aim 2 Results for LOC+OE

		95% CI					
Model Term	***R²***	**Lower**	**Upper**	***SE***	***t***	***p***	**Adj. *p***
NA composite[a]							
Intercept	.46	.36	.56	.05	8.93	< .001	< .001
Hours before LOC	< .001	-.02	.02	.01	.30	.76	.89
(Hours before LOC)^2	< .001	< .001	< .001	< .001	.41	.68	.88
Hours after LOC	< .001	-.03	.03	.01	-.06	.95	.95
(Hours after LOC)^2	< .001	< .001	< .001	< .001	-.82	.41	.88
PA composite[a]							
Intercept	.96	.88	1.05	.04	22.45	< .001	< .001
Hours before LOC	-.01	-.03	.02	.01	-.43	.67	.88
(Hours before LOC)^2	< .001	< .001	< .001	< .001	-.10	.92	.92
Hours after LOC	-.01	-.05	.03	.02	-.47	.64	.88
(Hours after LOC)^2	< .001	< .001	< .001	< .001	1.17	.24	.56

Note. NA = negative affect; PA = positive affect; LOC = loss of control; [a] = AR1; [b] = variance components; Adj. *p* = Benjamini-Hochberg corrected *p*-values.

Table 3

Aim 2 Results for LOC Only

		95% CI					
Model Term	***R²***	**Lower**	**Upper**	***SE***	***t***	***p***	***Adj. p***
NA composite[a]							
Intercept	.435	.35	.52	.04	9.78	< .001	< .001
Hours before LOC	-.001	-.01	.01	< .001	-.46	.65	.67
(Hours before LOC)^2	.000	< .001	< .001	< .001	-.29	.78	.97
Hours after LOC	.002	-.01	.02	.01	.37	.71	.96
(Hours after LOC)^2	.000	< .001	< .001	< .001	-.69	.49	.49
PA composite[a]							
Intercept	.955	.84	1.07	.06	16.66	< .001	< .001
Hours before LOC	.002	-.01	.01	< .001	.34	.74	.96
(Hours before LOC)^2	.000	< .001	< .001	< .001	.56	.57	.61
Hours after LOC	-.031	-.05	-.01	.01	-3.38	< .001	< .001
(Hours after LOC)^2	.001	< .001	< .001	< .001	2.70	.01	< .001

Note. NA = negative affect; PA = positive affect; LOC = loss of control; [a] = AR1; [b] = variance components; Adj. *p* = Benjamini-Hochberg corrected *p*-values.

Table 4

Aim 3 Results for LOC+OE

Model Term	R^2	95% CI Lower	95% CI Upper	*SE*	*t*	*p*	Adj. *p*
Annoyed[b]							
Intercept	.45	.29	.61	.08	5.45	< .001	< .001
Hours before LOC	.01	-.02	.04	.02	.62	.54	.88
(Hours before LOC)^2	< .001	< .001	< .001	< .001	.79	.43	.88
Hours after LOC	-.01	-.06	.04	.03	-.36	.72	.88
(Hours after LOC)^2	< .001	< .001	< .001	< .001	-.95	.34	.88
Guilty[b]							
Intercept	.20	.07	.32	.06	3.11	< .001	< .001
Hours before LOC	-.01	-.03	.02	.01	-.51	.61	.88
(Hours before LOC)^2	< .001	< .001	< .001	< .001	-.16	.88	.89
Hours after LOC	.01	-.03	.05	.02	.64	.52	.88
(Hours after LOC)^2	< .001	< .001	< .001	< .001	-.36	.72	.89
Angry[b]							
Intercept	.31	.18	.44	.07	4.70	< .001	< .001
Hours before LOC	.02	-.01	.04	.01	1.52	.13	.49
(Hours before LOC)^2	< .001	< .001	< .001	< .001	1.52	.13	.49
Hours after LOC	-.03	-.07	.01	.02	-1.55	.12	.42
(Hours after LOC)^2	< .001	< .001	< .001	< .001	-.91	.37	.88
Worried[b]							
Intercept	.45	.28	.61	.08	5.41	< .001	< .001
Hours before LOC	-.01	-.04	.02	.01	-.70	.49	.88
(Hours before LOC)^2	< .001	< .001	< .001	< .001	-.49	.63	.89
Hours after LOC	.02	-.03	.06	.02	.72	.47	.88
(Hours after LOC)^2	< .001	< .001	< .001	< .001	-.24	.81	.89
Worn out[b]							
Intercept	.74	.58	.90	.08	8.96	< .001	< .001
Hours before LOC	.01	-.02	.04	.01	.81	.42	.88
(Hours before LOC)^2	< .001	< .001	< .001	< .001	.74	.46	.88
Hours after LOC	-.01	-.06	.03	.02	-.63	.53	.88
(Hours after LOC)^2	< .001	< .001	< .001	< .001	-.42	.67	.88
Ashamed[b]							
Intercept	.23	.11	.36	.06	3.69	< .001	< .001
Hours before LOC	.01	-.02	.03	.01	.52	.60	.88
(Hours before LOC)^2	< .001	< .001	< .001	< .001	.74	.46	.88
Hours after LOC	-.01	-.05	.03	.02	-.48	.63	.88
(Hours after LOC)^2	< .001	< .001	< .001	< .001	-.43	.67	.88

Table 4 Continued

Aim 3 Results for LOC+OE

Model Term	R^2	95% CI Lower	95% CI Upper	*SE*	*t*	*p*	Adj. *p*
Confused[b]							
Intercept	.30	.16	.44	.07	4.10	< .001	< .001
Hours before LOC	-.01	-.04	.02	.01	-.68	.50	.88
(Hours before LOC)^2	< .001	< .001	< .001	< .001	-.78	.44	.88
Hours after LOC	.02	-.03	.06	.02	.68	.50	.88
(Hours after LOC)^2	< .001	< .001	< .001	< .001	< .001	< .001	.96
Depressed[a]							
Intercept	.56	.43	.69	.07	8.30	< .001	< .001
Hours before LOC	< .001	-.02	.03	.01	.23	.82	.89
(Hours before LOC)^2	< .001	< .001	< .001	< .001	.22	.83	.88
Hours after LOC	-.01	-.04	.03	.02	-.33	.74	.89
(Hours after LOC)^2	< .001	< .001	< .001	< .001	-.41	.68	.09
Tired[b]							
Intercept	.82	.68	.97	.07	11.17	< .001	< .001
Hours before LOC	< .001	-.03	.03	.01	-.21	.83	.89
(Hours before LOC)^2	< .001	< .001	< .001	< .001	-.22	.83	.89
Hours after LOC	.01	-.03	.06	.02	.48	.63	.88
(Hours after LOC)^2	< .001	< .001	< .001	< .001	-.31	.76	.89
Anxious[a]							
Intercept	.57	.47	.68	.06	1.38	< .001	< .001
Hours before LOC	-.01	-.04	.02	.02	-.63	.53	.88
(Hours before LOC)^2	< .001	< .001	< .001	< .001	-.63	.53	.88
Hours after LOC	.02	-.03	.07	.03	.70	.48	.89
(Hours after LOC)^2	< .001	< .001	< .001	< .001	-.29	.77	.88
Regretful[a]							
Intercept	.41	.24	.58	.09	4.81	< .001	< .001
Hours before LOC	.02	-.01	.05	.02	1.43	.15	.49
(Hours before LOC)^2	< .001	< .001	< .001	< .001	1.07	.28	.87
Hours after LOC	-.01	-.06	.04	.03	-.48	.63	.88
(Hours after LOC)^2	< .001	< .001	< .001	< .001	-1.99	.05	.22
Unhappy[a]							
Intercept	.41	.26	.56	.08	5.32	< .001	< .001
Hours before LOC	.01	-.01	.04	.01	.98	.33	.87
(Hours before LOC)^2	< .001	< .001	< .001	< .001	.86	.39	.88
Hours after LOC	-.01	-.06	.03	.02	-.59	.56	.88
(Hours after LOC)^2	< .001	< .001	< .001	< .001	-.85	.40	.88

Table 4 Continued

Aim 3 Results for LOC+OE

Model Term	R^2	95% CI Lower	95% CI Upper	*SE*	*t*	*p*	Adj. *p*
Excited[a]							
Intercept	.81	.66	.96	.08	1.50	< .001	< .001
Hours before LOC	-.02	-.05	.01	.02	-1.12	.27	.85
(Hours before LOC)^2	< .001	< .001	< .001	< .001	-1.10	.27	.87
Hours after LOC	< .001	-.05	.06	.03	.10	.92	.95
(Hours after LOC)^2	< .001	< .001	< .001	< .001	1.68	.09	.22
Happy[a]							
Intercept	.99	.85	1.14	.07	13.57	< .001	< .001
Hours before LOC	< .001	-.02	.03	.01	.25	.80	.89
(Hours before LOC)^2	< .001	< .001	< .001	< .001	.59	.55	.88
Hours after LOC	-.02	-.06	.02	.02	-.78	.44	.88
(Hours after LOC)^2	< .001	< .001	< .001	< .001	.31	.76	.89

Note. LOC = loss of control; [a] = AR1; [b] = variance components; Adj. *p* = Benjamini-Hochberg corrected *p*-values.

Table 5

Aim 3 Results for LOC Only

Model Term	R^2	95% CI Lower	95% CI Upper	*SE*	*t*	*p*	*Adj. p*
Annoyed[b]							
Intercept	.379	.24	.52	.07	5.44	< .001	< .001
Hours before LOC	-.004	-.02	.01	.01	-.61	.54	.60
(Hours before LOC)^2	.000	< .001	< .001	< .001	.02	.99	.98
Hours after LOC	.012	-.01	.04	.01	.98	.33	.23
(Hours after LOC)^2	-.001	< .001	< .001	< .001	-1.01	.31	.20
Guilty[b]							
Intercept	.218	.11	.33	.06	3.94	< .001	< .001
Hours before LOC	-.002	-.01	.01	< .001	-.40	.69	.96
(Hours before LOC)^2	.000	< .001	< .001	< .001	.47	.64	.67
Hours after LOC	-.012	-.03	.01	.01	-1.25	.21	.09
(Hours after LOC)^2	.001	< .001	< .001	< .001	1.20	.23	.14

Table 5 Continued

Aim 3 Results for LOC Only

Model Term	R^2	95% CI Lower	95% CI Upper	*SE*	*t*	*p*	*Adj. p*
Angry[a]							
Intercept	.360	.27	.45	.05	7.61	< .001	< .001
Hours before LOC	-.004	-.01	.01	< .001	-.83	.41	.42
(Hours before LOC)^2	.000	< .001	< .001	< .001	-.20	.84	.98
Hours after LOC	.003	-.02	.02	.01	.30	.76	.97
(Hours after LOC)^2	.000	< .001	< .001	< .001	-.27	.79	.97
Worried[a]							
Intercept	.478	.33	.63	.08	6.21	< .001	< .001
Hours before LOC	-.002	-.01	.01	.01	-.33	.75	.97
(Hours before LOC)^2	.000	< .001	< .001	< .001	.44	.66	.79
Hours after LOC	.007	-.02	.03	.01	.60	.55	.60
(Hours after LOC)^2	-.001	< .001	< .001	< .001	-1.34	.18	.07
Worn out[b]							
Intercept	.718	.56	.87	.08	9.20	< .001	< .001
Hours before LOC	.001	-.01	.01	.01	.15	.89	.98
(Hours before LOC)^2	.000	< .001	< .001	< .001	.43	.67	.79
Hours after LOC	.002	-.02	.03	.01	.21	.83	.98
(Hours after LOC)^2	.000	< .001	< .001	< .001	-.42	.67	.85
Ashamed[b]							
Intercept	.217	.11	.32	.05	4.01	< .001	< .001
Hours before LOC	-.002	-.01	.01	< .001	-.39	.70	.96
(Hours before LOC)^2	.000	< .001	< .001	< .001	.24	.81	.97
Hours after LOC	.000	-.02	.02	.01	-.04	.97	.98
(Hours after LOC)^2	.000	< .001	< .001	< .001	-.04	.97	.98
Confused[a]							
Intercept	.406	.31	.50	.05	8.17	< .001	< .001
Hours before LOC	-.005	-.02	.01	.01	-.91	.36	.32
(Hours before LOC)^2	.000	< .001	< .001	< .001	-1.17	.24	.19
Hours after LOC	-.001	-.02	.02	.01	-.06	.95	.98
(Hours after LOC)^2	.000	< .001	< .001	< .001	.45	.65	.77
Depressed[a]							
Intercept	.530	.41	.65	.06	8.86	< .001	< .001
Hours before LOC	.002	-.01	.01	< .001	.37	.71	.96
(Hours before LOC)^2	.000	< .001	< .001	< .001	.49	.63	.65
Hours after LOC	.001	-.02	.02	.01	.15	.88	.98
(Hours after LOC)^2	-.001	< .001	< .001	< .001	-1.34	.18	.07

Table 5 Continued

Aim 3 Results for LOC Only

Model Term	R^2	95% CI Lower	95% CI Upper	*SE*	*t*	*p*	*Adj. p*
Tired[b]							
Intercept	.790	.65	.93	.07	11.36	< .001	< .001
Hours before LOC	-.001	-.01	.01	.01	-.19	.85	.98
(Hours before LOC)^2	.000	< .001	< .001	< .001	.17	.86	.98
Hours after LOC	.017	-.01	.04	.01	1.50	.13	.20
(Hours after LOC)^2	-.001	< .001	< .001	< .001	-1.77	.08	.14
Anxious[a]							
Intercept	.469	.32	.62	.08	6.14	< .001	< .001
Hours before LOC	-.002	-.01	.01	.01	-.33	.74	.96
(Hours before LOC)^2	.000	< .001	< .001	< .001	-.74	.46	.46
Hours after LOC	.009	-.02	.04	.01	.69	.49	.50
(Hours after LOC)^2	.000	< .001	< .001	< .001	-.62	.54	.60
Regretful[b]							
Intercept	.380	.24	.52	.07	5.21	< .001	< .001
Hours before LOC	.007	-.01	.02	.01	1.12	.27	.20
(Hours before LOC)^2	.000	< .001	< .001	< .001	-.07	.94	.98
Hours after LOC	-.005	-.03	.02	.01	-.42	.68	.96
(Hours after LOC)^2	.000	< .001	< .001	< .001	-.70	.49	.46
Unhappy[a]							
Intercept	.385	.25	.52	.07	5.74	< .001	< .001
Hours before LOC	.001	-.01	.01	.01	.18	.86	.98
(Hours before LOC)^2	.000	< .001	< .001	< .001	.03	.98	.98
Hours after LOC	.000	-.02	.02	.01	.01	.99	.99
(Hours after LOC)^2	.000	< .001	< .001	< .001	-.31	.76	.97
Excited[a]							
Intercept	.875	.74	1.01	.07	13.13	< .001	< .001
Hours before LOC	.000	-.01	.01	.01	-.04	.97	.98
(Hours before LOC)^2	.000	< .001	< .001	< .001	-.52	.61	.61
Hours after LOC	-.033	-.06	-.01	.01	-2.48	.01	< .001
(Hours after LOC)^2	.001	< .001	< .001	< .001	2.11	.04	.01
Happy[b]							
Intercept	1.010	.89	1.13	.06	16.39	< .001	< .001
Hours before LOC	.002	-.01	.01	< .001	.34	.74	.96
(Hours before LOC)^2	.000	< .001	< .001	< .001	1.34	.18	.06
Hours after LOC	-.027	-.05	-.01	.01	-2.76	.01	< .001
(Hours after LOC)^2	.001	< .001	< .001	< .001	2.16	.03	.01

Note. LOC = loss of control; [a] = AR1; [b] = variance components; Adj. *p* = Benjamini-Hochberg corrected *p*-values.

CHAPTER IV

DISCUSSION

The objective of this study was to expand our understanding of the temporal roles of diverse affective experiences in the LOC eating behaviors of young men. This is one of the first EMA studies to specifically examine diverse affective experiences both before and after LOC eating in a sample of high-risk young men. While data consistently demonstrate that men engage in LOC eating at similar rates to women, they remain understudied and underrepresented in theoretical conceptualizations of LOC eating (Kelly, Cotter, et al., 2018). This study provides important preliminary findings that extant affect regulation models for LOC eating may not apply to young men. Results demonstrated no significant changes in negative affect (both the composite measure and discrete types of negative affect) before or after LOC eating in this sample of men. There were also no significant changes in positive affect before LOC eating. Composite positive affect (and happiness and excitement on their own) significantly decreased after engaging in LOC eating, regardless of the amount of food consumed.

LOC Regardless of the Amount of Food Consumed was Linked with Affect

The only significant findings in the current study involved LOC Only, which represents the experience of LOC regardless of the amount of food consumed. When examining LOC+OE, no results were significant. These results parallel findings from this sample where overeating did not predict within-participant negative affect, and LOC was the only eating quality that was significantly linked to greater negative affect in within-participant analyses (Kelly et al., manuscript submitted for publication). Likewise, extant literature has found that regardless of the amount of food consumed, LOC is the best indicator of psychosocial impairment in adult men and women (Kelly, Cotter, et al., 2018; Striegel-Moore et al., 2000). These findings appear to

hold true in the current study. There also were more episodes of LOC Only (162) than LOC+OE (150) included in analyses, which may have resulted in this significant association for one categorization and not the other. Nevertheless, study results confirm the empirical relevance of experiences of LOC to momentary affect.

Negative Affect did not Change Significantly Before or After LOC Eating

Results demonstrated no significant changes in negative affect (both the composite measure and discrete facets of negative affect) before or after LOC eating. These findings are contrary to study hypotheses and do not support affect regulation models of LOC eating (Heatherton & Baumeister, 1991; Polivy & Herman, 1993). In previous EMA studies that include both men and women, negative affect consistently increased prior to LOC eating (Berg et al., 2015; Engel et al., 2013; Fischer et al., 2017; Haedt-Matt & Keel, 2011; Schaefer et al., 2020; Smyth et al., 2007). While data describing negative affect changes after a LOC episode are more mixed, EMA studies with women indicate either reductions (Engel et al., 2013; Smyth et al., 2007) or increases (Haedt-Matt & Keel, 2011) in negative affect after LOC eating. However, in this sample of men, no significant changes in negative affect occurred before or after LOC eating, despite methodological similarities to the studies mentioned above (i.e., 4-hour time window for affect measurements). Importantly, our findings are consistent with some very recent research. Although negative affect was analyzed quite differently, men in Sultson and colleagues' (2022) study also did not experience significant changes in their negative affect before LOC eating episodes. Combined, data from these studies suggest that, in men, LOC eating may not function as an emotion regulation strategy for high-risk young men.

It is also possible that affect regulation models for LOC eating may still be relevant for young men, but need modifications specific to their unique experiences of LOC eating. For

example, young men may experience different prompting events to their LOC eating that were not captured in the current study. Specific stressors may better predict LOC eating in men, rather than general affective states. Smith and colleagues (2020) conducted an EMA study on stress and LOC eating and found that moments of stress "pileup" (defined as the accumulation of stressors over time) predicted both LOC and overeating in adult men and women (Smith, Mason, Schaefer, Anderson, Critchley, et al., 2020). Importantly, 82% of this sample were women, and findings unique to men were not examined. Yet, qualitative data support that notion that men report experiencing stress before overeating (Carey et al., 2017). These experiences, specifically of "stress," may prompt emotion dysregulation and subsequent engagement in LOC eating as an attempt to cope. Future research may want to more closely attend to financial stress, which is a common source of discomfort among men (Denton et al., 2004; McDonough & Walters, 2001). Preliminary analyses in the same sample of men presented in the current study indicate that, on a given day, higher stress related to money was linked with greater odds of engaging in LOC eating (Cotter et al., 2020).

Body image concerns may be another form of stress that prompt men's LOC eating behaviors. Social comparison and media messages that focus on leanness and muscularity can prompt men to engage in LOC eating (Lavender et al., 2017). In one recent study that evaluated affect regulation theories for men, concerns with body fat were directly linked with LOC eating, and concerns with muscularity were related to LOC eating indirectly, through emotion dysregulation (Kelly et al., 2020). Men who experience body dissatisfaction may engage in LOC eating as a way to distract from these feelings.

Identity-based stressors may also play a role in prompting men's LOC eating behaviors. Specifically, LOC eating may function as a behavioral response to stress from discrimination

(Mays, Cochran, & Barnes, 2007). Indeed, a recent meta-analysis confirms that there tends to be a positive association between perceived discrimination and LOC eating in adult men and women across racial and ethnic groups (Rodrigues et al., 2022). Studies specifically with racially and ethnically diverse men confirm these patterns (Kelly et al., 2020; Kelly, Smith, et al., 2018). Research also suggests that individuals with stigmatized identities often use emotional suppression to regulate their affect after experiencing discrimination (Gross & John, 2003). As 53.7% of our sample were men of color, it is possible that chronic stress related to discrimination is an antecedent to their LOC eating that was not captured in the current study.

Weight stigma, an additional type of discrimination based on an individual's weight (Papadopoulos & Brennan, 2015; Puhl & Heuer, 2009), may also be implicated in men's LOC eating across racial and ethnic identities. Weight-related teasing has been found to be significantly and positive associated with LOC eating frequency in a sample of racially and ethnically diverse young men (Williamson et al., 2021). Repeated attempts to cope with stressors and stigma deplete self-regulation abilities (Hofmann et al., 2012; Inzlicht et al., 2006), and thus repeated exposure to weight stigma may prompt men to engage in LOC eating as a way to cope with their emotional reactions.

As we did not ask participants to report their stress levels before and after LOC eating in the current study, the momentary stress responses for these participants in relation to their eating behaviors are unknown. It is recommended that future EMA research examines if specific stressors, such as financial concerns, body image concerns, and experiences of discrimination, prompt and/or reinforce LOC eating in young men, given the cross-sectional links noted above.

There may also be other experiences separate from affect that serve to maintain LOC eating in young men. For example, dietary restraint—the conscious restriction of food intake in

order to influence body weight—is a robust predictor of LOC eating. Several theoretical models cite dietary restraint as a risk and maintenance factor for LOC eating (Fairburn et al., 2003; Polivy & Herman, 1993; Stice et al., 1996). Limited qualitative data suggest that men may engage in dietary restraint due to not having time to eat or having limited access to food throughout the day (Carey et al., 2017). Thus, men may engage in LOC eating as compensation for missing meals, or in anticipation of not having access to food later in the day. The concept of "cheat meals" may also be relevant to men's LOC eating behaviors, as they involve a planned consumption of calorie-dense "forbidden" foods, often ranging from 1,000 to 9,000 calories. These meals often occur within a cycle of extreme dietary restraint, and can include feelings of LOC while eating (Murray, Griffiths, Hazery, et al., 2016; Pila et al., 2017). It is possible that in the current study, LOC episodes were linked to dietary restraint, rather than specific affective experiences.

Positive Affect Decreased Significantly After LOC Eating

Similar to negative affect, our findings related to positive affect did not support affect regulation models (Heatherton & Baumeister, 1991; Polivy & Herman, 1993). We hypothesized that positive affect would decrease before LOC eating and increase after LOC eating. Instead, there were no significant changes in positive affect before LOC eating, and global positive affect and both discrete types of affect (happiness and excitement) significantly decreased after engaging in LOC eating, regardless of the amount of food consumed. Essentially, LOC eating did not function to improve participant's moods.

It is possible that positive affect increased while eating and functioned to immediately improve participants' mood within a short window of time. Our findings may be reflective of normal mood fluctuations after eating. Research demonstrates a food "pleasure cycle" in which

pleasure gradually increases while expecting or wanting food, peaks while consuming food, and then decreases once satiety is reached (Kringelbach et al., 2012). It is also possible that planning for a LOC episode increases positive affect in young men before LOC eating. Some data using fMRI methods demonstrate this pattern, showing that for women with bulimia nervosa, it is the anticipation of food that activates the reward center of the brain, rather than the actual receipt of food (Bohon & Stice, 2012; Stice et al., 2008). Any of these potential changes in affect that occur immediately before or after LOC eating would have been missed with our data collection methods, as our four-hour time frame before and after LOC eating did not allow for the nuance and detail that would be required to explore these potential changes.

There may also be a gender-bound explanation for the study's unexpected positive affect findings. Young men may be more attuned to changes in their positive emotions than their negative mood states. It is possible that expressing and noticing changes in positive affect (i.e., feeling less happy) may be more accessible or socially acceptable for young men than negative affect (i.e., feeling sad). Indeed, in our sample, men appeared to experience greater variability in their positive affect across the 14-day protocol compared to their negative affect. It is also possible that there was simply not enough variability in the negative affect responses to detect statistically significant fluctuations. Participants may also have minimized their self-reported emotional expression to remain consistent with traditional masculine gender roles that discourage emotional expression (Domes et al., 2010; Levant et al., 2006; Polanco-Roman et al., 2018). This concept is often referred to as "restricted emotionality," or men's tendencies to shove away their emotions and not externally express their emotions (Jansz, 2000). These gendered differences in emotional expression may help to explain the differing variability in positive and negative affect in the current study.

Importantly, effect sizes for significant changes in positive affect after LOC eating were quite small, representing a 0.1-point decrease on the 1-5 scale, on average. It is unclear whether these changes are clinically meaningful, particularly for participants who endorsed daily fluctuations in affect across the scale. However, for participants who reported a more restricted range, this point decrease may indeed represent a meaningful decrease in their positive affect after eating. Clearly, additional research is needed to determine if individual variations in positive affect are detectable and meaningful, and whether and to what extent they serve to perpetuate LOC eating.

Limitations

There are several important limitations to the current study. First, including the question "Do you have trouble controlling how much you eat?" on recruitment flyers may have led to recruitment of a biased sample. This question might have captured the attention of men who have concerns with their eating, and would have missed any men who engage in LOC eating yet are not particularly concerned with this behavior. Thus, our sample only includes men who had pre-existing concerns with their eating, and potentially misses other LOC eating phenotypes and experiences.

Second, ratings of state affect were collected at varying timepoints before and after eating episodes. While only ratings four hours before and after LOC eating were included in analyses, participant's reported affect was not always collected immediately before or immediately after an eating episode. For example, an individual may have recorded their mood two hours before reporting LOC eating and then experienced meaningful changes in their mood within that timeframe. These changes would not have been captured by our methodology. Affect was also not collected during the moment of LOC eating episodes. Affect during an eating episode may

play an important role in the function of the eating behavior, and may also directly impact how affect changes after eating (Deaver et al., 2003). However, it would have increased participant burden to add in additional surveys throughout their day. Asking participants to identify their emotions immediately before, during, and after LOC eating may also impact external validity, as participants would be asked to attune to their feelings in a situation where they may not otherwise be cognizant of their emotions.

Third, using abbreviated subscales from the PANAS-X (Watson & Clark, 1999) and BRUMS (Terry et al., 1999; Terry et al., 2003) may have overlooked important nuances in pre- and post-LOC eating affect. With all EMA study designs, it is important to balance the thoroughness of data collected while also limiting participant burden. By keeping the list of affective words short, we likely increased the accuracy and frequency with which participants completed each signal, while potentially compromising the breadth of data collected. Capturing more nuanced experiences of positive affect, such as states with lower arousal (e.g., calm, content), in future studies will add depth to our understanding of the link between positive affect and LOC eating.

Additionally, the final sample included in analyses was quite small. Out of 42 total participants, only 29 reported any LOC eating during the 14-day protocol. This was surprising, given that we specifically recruited men who reported engaging in regular LOC eating in the prior month. Examinations of each participant's reported LOC eating revealed that four men reported very high frequencies of LOC eating (21-50 episodes total), while the rest of participants reported lower frequencies (10 or less episodes total). It is possible that among men who report frequent LOC eating, some may engage in consistent LOC eating, while others engage in more sporadic episodes. Because analyses were conducted at the episode level, our

findings may be driven by the few participants who reported very frequent LOC eating. Future studies may consider exploring if there are any meaningful differences in the emotional experiences of men who engage in fewer LOC episodes compared to men who are engaging in many LOC episodes, and if these patterns represent distinct phenotypes of LOC eating. Future studies that recruit a subclinical population may also benefit from a recruiting a larger sample size of men, to ensure that there is a high frequency of reported LOC eating episodes.

There was also limited variability in sexual orientation within our sample, with 89% of men identifying as heterosexual. Future studies should seek to examine LOC eating in young men with diverse sexual orientations, as sexual minority men report disproportionate rates of LOC eating compared to their heterosexual peers (Calzo et al., 2017; Grunewald et al., 2021; Kamody et al., 2020). Additionally, there is a large need within the field of eating disorders to explore LOC eating in gender diverse populations, as transgender and nonbinary individuals tend to report higher rates of disordered eating, eating disorders, and body image concerns than their cisgender peers (Coelho et al., 2019; Cusack et al., 2022).

Strengths

The use of EMA methodology is a key strength of this study, as it limits recall bias and facilitates the measurement of temporal associations. By allowing participants to remain in their natural environments and daily routines, the current study was able to capture more ecologically valid reports of men's LOC eating behaviors and their affective states.

The inclusion of a detailed examination of discrete types of positive and negative affect allowed for a nuanced examination of men's affective experiences before and after LOC eating. These findings begin to add depth to extant literature that primarily relies on composite measures of affect, by identifying two types of positive affect that are relevant to young men's LOC eating.

Additionally, the engagement of a high-risk but community-based sample of young men living across the United States increases the generalizability of our findings, as previous studies have largely included women, clinical samples (i.e., individuals in eating disorder treatment), and adults with limited racial and ethnic diversity.

The participants in the current study are also unique when compared to past studies examining adults of all ages. The age range of this sample was restricted to young men between the ages of 18-35, to target the population of men who report the highest rates of LOC eating (Forrester-Knauss & Stutz, 2012; Nicdao et al., 2007). Our sample represents the younger side of young adult men, as our participants were 25 years old, on average. However, men in emerging adulthood are still experiencing brain development that may uniquely impact their emotion regulation and subsequent coping skill use (Arain et al., 2013; John & Gross, 2004; Murray & Rosanbalm, 2017). It is possible that our sample of men is not representative of the larger population of adult men who engage in LOC eating. Researchers should continue to explore LOC eating within specific male populations and age ranges, such as middle-aged adults (Mason et al., 2022), so that the potential impact of brain development is addressed.

Future Research and Implications

Gender-specific investigations of disordered eating theoretical models are only just beginning. Further research is needed to add to our understanding of LOC eating in men before creating interventions and novel clinical approaches. Below are several recommendations for directions for future research.

First, as research continues to clarify trends for men, researchers and clinicians alike should use caution when applying affect regulation models for LOC eating to men. LOC eating may not serve as an emotion regulation strategy for men. Alternatively, men may not identify

specific affective states that precede or follow their LOC eating. Rather, exploring the specific stressors present in men's lives may provide clearer links to LOC eating, given quantitative and qualitative data that stress precedes LOC eating (Carey et al., 2017; Smith, Mason, Schaefer, Anderson, Critchley, et al., 2020). Speaking directly to young men about their LOC eating experiences will be an important next step in this work, to gather much needed qualitative information about men's emotional (and otherwise) experiences surrounding this behavior. Carey and colleagues (2017) started this work in their qualitative study with a sample of male college students with larger bodies who engage in overeating behaviors, providing valuable insight into factors relevant to young men, such as mindless eating and social encouragement to overeat. Holding individual, remote interviews and focusing on establishing trusting relationships may enhance participant's sense of safety and comfort to disclose their emotional experiences surrounding LOC (Kraft et al., 2018). Asking specifically about experiences of positive affect will also help researchers to intentionally include relevant types of positive affect in future EMA studies with men, and will inform modified conceptualizations of men's LOC eating.

Second, further clarification is needed around the observed decline in positive affect after LOC eating in the current study. Future studies should explore if this pattern holds true; if this decrease is clinically meaningful for participants; and if it serves to reinforce the LOC eating cycle in men. If so, post-meal could be a key intervention time to bolster positive affect and interrupt the LOC eating cycle, as LOC eating is associated with numerous physical and mental health concerns for adult men and women (Hudson et al., 2010; Hudson et al., 2007; Reichborn-Kjennerud et al., 2004).

Lastly, the potential gendered differences in how LOC eating presents and is maintained prompts questions about the validity of BED diagnostic criteria in men. Per DSM-5 diagnostic criteria, binge eating must involve both overeating and a sense of LOC (American Psychiatric Association, 2013). However, the sense of LOC regardless of the amount of food consumed has been shown to be linked to disordered eating, body image distress, and negative affect in both men and women (Brownstone & Bardone-Cone, 2021); and, in the current study, LOC+OE was not linked to affect, whereas LOC regardless of the amount of food consumed was associated with decreases in positive affect after eating. Furthermore, diagnostic criteria include "eating alone because of feeling embarrassed by how much one is eating" and "feeling disgusted with oneself, depressed, or very guilty afterward" (American Psychiatric Association, 2013, pg. 350). Some of these criteria based on experiences of negative affect may not apply to men, as evidenced by the current study and others that have not found links between negative affect and LOC eating in men (Mason et al., 2022; Sultson et al., 2022).

Additionally, a recent meta-analysis examined the DSM-5 severity ratings for BED, and found that across 12 studies involving both clinical and community samples of adults, approximately 80% of individuals with BED fell within the "mild" and "moderate" range (indicating 1-3 or 4-7 binge eating episodes per week, respectively; American Psychiatric Association, 2013; Dang et al., 2022). Results also suggested that individuals who reported at least one episode per week experience similar levels of eating disorder psychopathology as individuals who engaged in four or more episodes per week (Dang et al., 2022). Thus, "mild" BED and even subthreshold LOC eating are often clinically significant disordered eating behaviors that should be taken seriously by providers, regardless of if an individual meets current diagnostic criteria for an eating disorder or reports negative affect around LOC episodes.

Ultimately, much remains unknown about experiences of LOC in young adult men, despite the similar prevalence rates of LOC eating as women (Hudson et al., 2007; Striegel-Moore et al., 2009; Udo et al., 2013). As researchers continue to explore the unique antecedents and consequences for young men's LOC eating, the field will gain clarity on how current theoretical conceptualizations, diagnostic criteria, and treatment approaches are effective for young men, and where they miss the mark and require adjustment.

Conclusion

In conclusion, the current study addresses a significant gap in the literature by examining the affect regulation model of LOC eating in young men. Study results confirm the clinical and empirical relevance of experiences of LOC, regardless of the amount of food consumed, to momentary affect in men, but in a pattern that contradicts affect regulation models for LOC. Negative affect did not increase risk for LOC eating, nor did LOC eating function to improve participant's moods; rather, positive mood slightly decreased after LOC eating. Findings elucidate some potential differences in the ways that affect relates to LOC eating in men compared to women, perhaps, in part, due to gendered variations in emotional awareness and expression. Results from this pilot study can inform future research on LOC eating in young men who engage in subthreshold disordered eating behaviors. Examining specific stressors, such as financial concerns, body image concerns, and experiences of discrimination may elucidate relevant antecedents to men's LOC eating better than specific affective states. Further investigation around the observed decline in positive affect after LOC eating will clarify if this is a relevant intervention point in this population.

APPENDIX

EMA Protocol Items Used in the Current Study

Random Signal-Contingent Recordings

Below is a list of words that describe feelings. Please read each one carefully. Then, for each feeling, select the box that best describes HOW YOU FEEL RIGHT NOW on a scale from 1 (Not at all) to 5 (Extremely).

Annoyed	1	2	3	4	5
Excited	1	2	3	4	5
Guilty	1	2	3	4	5
Angry	1	2	3	4	5
Worried	1	2	3	4	5
Worn Out	1	2	3	4	5
Ashamed	1	2	3	4	5
Confused	1	2	3	4	5
Depressed	1	2	3	4	5
Happy	1	2	3	4	5
Tired	1	2	3	4	5
Anxious	1	2	3	4	5
Regretful	1	2	3	4	5
Unhappy	1	2	3	4	5

Event Contingent Recordings

How long ago did you eat?
< 15 minutes
15-30 minutes
30-60 minutes
60-90 minutes
> 90 minutes

What type of eating episode was it?
Meal
Snack

Select the box that best describes HOW YOU FEEL ABOUT YOUR LAST EATING EPISODE on a scale from 1 (Not at all) to 5 (Extremely).

To what extent do you feel that you overate?
1 2 3 4 5

While you were eating, to what extent did you feel a sense of having lost control over your eating?
1 2 3 4 5

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