

UNIVERSITY OF CALGARY

Negative Emotionality, Negative Urgency, and Eating Disorder Psychopathology: Mediation in  
Women with and Without Binge Eating

by

Chantelle Alice Magel

A THESIS

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## Abstract

Although negative emotionality (NE) and negative urgency (NU) are risk factors for binge eating, it is unknown how these traits may interact to increase risk for clinical levels of binge eating. We examined a model of cross-sectional associations among levels of NE, NU, and eating disorder psychopathology (i.e., eating, shape, and weight concerns, and restraint) in a community sample of 68 women with binge-eating disorder or bulimia nervosa and 75 control women with no eating disorder history. Participants completed semi-structured diagnostic interviews and self-report questionnaires measuring NE, NU, eating disorder psychopathology, and anxiety and depression symptoms. After controlling for anxiety and depression symptoms and body mass index, women with binge eating reported higher levels of negative urgency and eating disorder psychopathology than control women with no history of eating disorders, whereas there was no difference in levels of negative emotionality between the two groups. There was an indirect effect of negative emotionality on eating disorder psychopathology via negative urgency. Group membership did not moderate this association. Our findings support a model in which a tendency toward negative emotionality, coupled with a tendency to engage in rash action when experiencing negative emotions, is associated with eating disorder psychopathology in women with and without eating disorders characterized by binge eating.

**KEYWORDS:** Binge Eating, Eating Disorder Psychopathology, Emotion Regulation, Mediation, Negative Emotionality, Negative Urgency

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## Preface

This thesis is original, unpublished, independent work by the author, C. A. Magel. The research described here within was approved by the Conjoint Faculties Research Ethics Board at the University of Calgary, certificate number REB18-1215 for the project “Personality and Impulsivity in Women who Binge Eat” on September 13, 2018.

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## List of Abbreviations

ANCOVA	one-way analysis of covariance
ANOVA	one-way analysis of variance
BAI	Beck Anxiety Inventory
BDI-II	Beck Depression Inventory
BMI	body mass index
CI	confidence interval
DSM-IV	Diagnostic and Statistical Manual of Mental Disorders-Fourth Edition
DSM-5	Diagnostic and Statistical Manual of Mental Disorders-Fifth Edition
DV	dependent variable
EDE-Q	Eating Disorder Examination Questionnaire version 4
IV	independent variable
M	mean
MCAR	missing completely at random
MedV	mediator variable
ModV	moderator variable
MPQ	Multidimensional Personality Questionnaire
MPQ-NE	Multidimensional Personality Questionnaire-Negative Emotionality subscale
NE	negative emotionality
NU	negative urgency
SD	standard deviation
UPPS	UPPS Impulsive Behavior Scale
UPPS-NU	UPPS Impulsive Behavior Scale-Negative Urgency subscale

## **Introduction**

Binge eating is defined in the Diagnostic and Statistical Manual of Mental Disorders (DSM-5; American Psychiatric Association, 2013, p. 345) as “eating, in a discrete period of time, an amount of food that is definitely larger than what most individuals would eat in a similar period of time under similar circumstances”. This behavior is characteristic of several eating disorders outlined in the DSM-5 (American Psychiatric Association, 2013), including binge-eating disorder, characterized by recurrent binge eating accompanied by feelings of loss of control, and bulimia nervosa, characterized by recurrent binge eating, coupled with regular compensatory behaviours (such as vomiting or excessive exercise) (American Psychiatric Association, 2013). Approximately 1 million Canadians meet the diagnostic criteria for an eating disorder (Statistics Canada, 2016). Lifetime prevalence estimates of bulimia nervosa and binge-eating disorder in community samples are 0.28%-2.60% and 0.85%-5.60%, respectively (Cossrow et al., 2016; Hay, Girosi, & Mond, 2015; Stice, Marti, & Rohde, 2013; Udo & Grilo, 2018), making them the most common eating disorders included in the DSM-5 (American Psychiatric Association, 2013).

### **Binge Eating and Personality**

Research findings indicate that personality appears to play an important role in eating disorder etiology and maintenance (Farstad, McGeown, & von Ranson, 2016). In particular, the personality traits of negative emotionality—or the predisposition to experience negative affect (Tellegen, 1982)—and negative urgency—or the “disposition to engage in rash action when experiencing extreme negative affect” (Cyders & Smith, 2008, p. 807)—are established risk factors for binge eating (Culbert, Racine, & Klump, 2015).

**Negative emotionality.** Negative emotionality predicts the development of eating pathology (Leon, Fulkerson, Perry, & Klump, 1999), eating disorder diagnoses including anorexia nervosa, bulimia nervosa, and eating disorder not otherwise specified (Bulik et al., 2006; Cervera et al., 2003; Ghaderi & Scott, 2000) and subthreshold binge eating (Killen et al., 1996; Tyrka, Waldron, Graber, & Brooks-Gunn, 2002), with effect sizes ranging from small to large (Culbert et al., 2015). Women with eating disorders characterized by binge eating tend to report greater negative emotionality than those who do not binge eat (Hilbert & Tuschen-Caffier, 2007; Lavender et al., 2016; Peterson et al., 2010). However, previous research has not examined whether negative emotionality may also serve as a risk factor for binge-eating disorder.

Negative emotions often serve as a trigger for both binge eating and purging (Lavender et al., 2016; Leehr et al., 2015; Schulz & Laessle, 2010), and the desire to binge eat often increases in the context of stress (Gluck, 2006; Goldschmidt et al., 2014; Hilbert, Vögele, Tuschen-Caffier, & Hartmann, 2011). The literature supports a relationship among stress, coping, and disordered eating (Ball & Lee, 2000; Lee-Winn, Townsend, Reinblatt, & Mendelson, 2016) and indicates that, for certain individuals, binge eating may serve as a seemingly effective emotion regulation strategy, as negative affect decreases in the short-term following a binge, thereby negatively reinforcing the behavior (Lavender et al., 2016; Smyth et al., 2007). However, this improvement in mood is short-lived and subsequent feelings of shame and sadness can lead to further disordered eating behaviours, like additional binge eating and/or purging (Leehr et al., 2015), which is then likely to lead to a resurgence of negative affect (Lavender et al., 2016). A cycle is created wherein an individual continues to use binge eating as an ineffective strategy to alleviate negative emotions.

**Negative urgency.** However, not everyone who experiences negative emotionality engages in maladaptive emotion regulation strategies like binge eating. Additional factors must be considered to understand why some individuals engage in such behaviors. Although negative emotionality tends to be associated with a range of disordered eating symptoms, impulsivity relates specifically to binge eating and purging (e.g., Claes, Vandereycken, & Vertommen, 2005; Culbert et al., 2015; Rosval et al., 2006). Accumulating evidence suggests that negative urgency is the most relevant facet of impulsivity for binge eating and purging symptoms (Anestis, Smith, Fink, & Joiner, 2009; Sarah Fischer, Smith, & Cyders, 2008; Reas, Pedersen, & Rø, 2016; Steward et al., 2017). This facet of impulsivity is associated with binge eating in both clinical and non-clinical samples, even after controlling for other facets of impulsivity and anxiety and depression symptoms (Anestis, Selby, & Joiner, 2007; Anestis et al., 2009). Further, negative urgency has prospectively predicted binge eating in girls transitioning from elementary to middle school over a one-year period (Combs, Pearson, Zapolski, & Smith, 2013) and binge eating and purging in college women over one semester (Fischer, Peterson, & McCarthy, 2013), thereby providing support for a causal relationship between negative urgency and binge eating. The effect sizes of this relationship have ranged from small to moderate (Culbert et al., 2015). Although negative urgency is considered a risk factor for binge eating, research has yet to examine whether its risk factor status extends to eating disorders characterized by binge eating (i.e., bulimia nervosa and binge-eating disorder) (Culbert et al., 2015).

### **The Need for a New Etiological Model of Binge Eating**

Understanding differences between individuals who binge eat and those who do not is critical, as those who binge eat with and without compensatory behaviors tend to experience a significantly lower quality of life than healthy controls (Ágh et al., 2016) and often experience a

variety of psychological comorbidities, particularly mood and anxiety disorders (Sheehan & Herman, 2015; Swanson, Crow, Grange, Swendsen, & Merikangas, 2011), and physical complications (Sheehan & Herman, 2015). In particular, recurrent binge eating places individuals at heightened risk for developing medical complications including metabolic syndrome, hypertension, diabetes, ulcers, and chronic pain, regardless of weight status (Kessler et al., 2013; Mitchell, 2016). Additionally, purging behaviors that may follow binge eating elevate the risk for developing complications, including dental erosion, esophageal rupture, electrolyte imbalances, and potentially fatal cardiac complications (Mehler & Rylander, 2015). Consequently, those with eating disorders characterized by binge eating and/or purging have significantly elevated mortality rates relative to population norms, including higher suicide rates (Arcelus, 2011; Crow et al., 2009; Smink, Van Hoeken, & Hoek, 2012). Considering the psychological and physical health comorbidities of these disorders, along with the distress and impairment that accompany them, research to elucidate factors contributing to the onset and the maintenance of binge eating, such as personality variables, is critical.

Although negative emotionality and negative urgency have both emerged as risk factors for the development of subthreshold binge eating (Culbert et al., 2015), further research is needed to establish whether these traits may be risk factors for threshold diagnoses of eating disorders characterized by binge eating. Whereas most extant studies have investigated bivariate relationships between personality constructs (e.g., negative emotionality or negative urgency) and eating disorder psychopathology, a recent investigation of individuals with substance use disorders supported a model wherein negative urgency mediated the effect of negative affect on bulimic symptoms (Lavender, Green, Anestis, Tull, & Gratz, 2015). Although the effect of negative affect on bulimic symptoms was not statistically significant, there was a significant

indirect effect of negative affect on bulimic symptoms via negative urgency. Importantly, this study demonstrated a potential mechanism by which negative emotionality and negative urgency may confer risk for binge eating. As those who binge eat and those who engage in substance abuse both exhibit heightened negative urgency (Racine & Martin, 2016), research examining relationships among these three variables is warranted to determine whether negative urgency also mediates the relationship between negative emotionality and disordered eating in individuals with threshold eating disorders characterized by binge eating.

### **Limitations of Previous Research**

Whereas previous research on this topic has focused primarily on either undergraduates without eating disorder diagnoses or treatment-seeking individuals, the study of community individuals with eating disorders is critical. First, community samples are not tainted by Berkson's bias, or the notion that individuals who seek treatment tend to exhibit greater pathology than those who do not (Berkson, 1946). In addition, fewer than half of lifetime cases of bulimia nervosa and binge-eating disorder receive treatment (Kessler et al., 2013). Therefore, in refining risk and maintenance models of eating disorder psychopathology, data from community samples are valuable as they avoid biases evident in treatment samples and may be more representative of the majority of individuals living with these disorders. Nevertheless, there remains a dearth of studies examining community members.

### **Hypotheses**

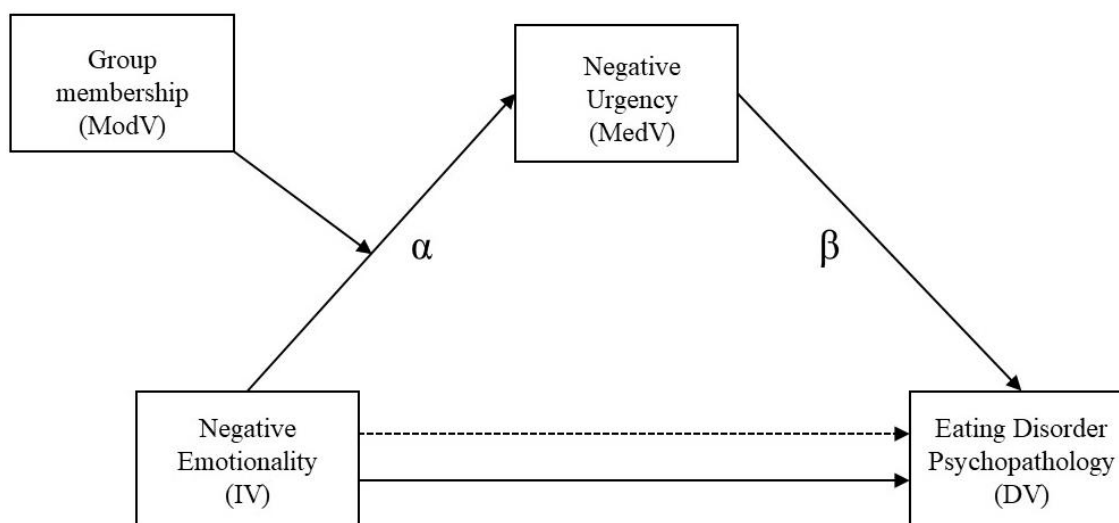
To our knowledge, no studies have compared levels of negative emotionality, negative urgency, and eating disorder psychopathology in women who do and do not binge eat. In the current study, we examined whether the mediation model found by Lavender and colleagues

(2015) in adults with substance use disorders could be replicated in community women with clinical levels of binge eating and/or women with no lifetime history of an eating disorder.

We investigated four hypotheses. Note that Hypotheses 2 and 3 were aimed at understanding components of the model explored in Hypothesis 4 (see Figure 1).

- 1) Women with binge eating will report greater negative emotionality, negative urgency, and eating disorder psychopathology than control women with no lifetime eating disorder. This hypothesis stems from the fact negative emotionality and negative urgency are both established risk factors for binge eating (Culbert et al., 2015) and that women with binge eating will likely be engaging in more disordered eating behaviors than controls, by nature of their diagnosis.
- 2) Negative urgency will mediate the relationship between negative emotionality and eating disorder psychopathology. This hypothesis stems from the mediation relationship found by Lavender and colleagues (2015), the theoretical notion that negative emotionality is an inherent precursor to negative urgency, and the supported relationships between negative emotionality and negative urgency (e.g., Anestis, Selby, Fink, & Joiner, 2007; Davis-Becker, Peterson, & Fischer, 2014) and negative urgency to disordered eating symptoms (Anestis et al., 2009; Steward et al., 2017).
- 3) Group membership (i.e., Binge-Eating vs Control group) will moderate the relationship between negative emotionality and negative urgency, such that the relationship will be stronger in women with binge eating than in controls. This hypothesis stems from the fact that binge eating is often experienced in the context of negative emotions (e.g., Leehr et al., 2015; Schulz & Laessle, 2010).

- 4) A moderated mediation relationship, in which the indirect effect of negative emotionality on eating disorder psychopathology through negative urgency, will be conditional upon group membership (i.e., the mediation model will hold only for women with binge eating, and not control women) (see Figure 1).



*Figure 1.* Conceptual diagram of the moderated mediation model, wherein the indirect effect of negative emotionality on eating disorder psychopathology through negative urgency is moderated by group membership. IV = independent variable; ModV = moderator variable; MedV = mediator variable; DV = dependent variable.

## Method

### Anticipated Sample Size

A power analysis was conducted a priori using the method described by Fritz and MacKinnon (2007). According to this method, minimum sample size is determined based upon the anticipated effect size of the  $\alpha$  and  $\beta$  paths in the mediation model. Although there is a dearth of studies examining the specific constructs included in our study, our anticipated effect sizes were based upon investigations of similar constructs (e.g., negative affect vs negative emotionality and disordered eating behavior and cognitions vs eating disorder psychopathology).

Previous studies examining the  $\alpha$  path in our model (negative emotionality to negative urgency) have yielded medium effect sizes ( $b=.31-.49$ ) (Davis-Becker et al., 2014; Lavender et al., 2015), and those examining our  $\beta$  path (negative urgency to eating disorder psychopathology) have yielded effect sizes ranging from small to moderate (see Culbert et al., 2015, for review).

Therefore, based on the expectation that the  $\alpha$  path would yield a medium effect size and the  $\beta$  path would yield an effect size between small and medium, the minimum required sample size according to Fritz and Mackinnon (2007) was 116 when using bias-corrected bootstrap methods at  $\alpha = .05$  and  $\text{power} = .80$ .

### **Recruitment**

The study sample comprised participants from an archival data set, as well as additional women recruited to reach the required sample size. Participants from the archival data set were recruited through community ads, media interviews, and posters displayed at Calgary hospitals, the University of Calgary, and community locales including gyms, malls, and supermarkets between January 2006 and April 2009. Other participants were recruited for the current study from across Canada through ads on online websites including Kijiji, Craigslist, and Facebook between November 2018 and April 2019.

### **Participants**

This study involved two groups of participants: women who had clinical levels of binge-eating (the Binge-Eating group) and control women with no history of an eating disorder (the Control group). The archival data set included 35 women with binge eating (30 with binge-eating disorder and 5 with bulimia nervosa) and 23 control women ( $n = 58$ ); an additional 36 women with binge eating and 52 controls ( $n = 88$  participants) were recruited, for a final sample of 146.

Inclusion criteria for both groups included identifying as female, being 18 years of age or older, able to read and write fluently in English, and having no history of psychosis. Those in the Binge-Eating group were also required to meet full or subthreshold DSM-5 diagnostic criteria for bulimia nervosa or binge-eating disorder. Control women were required to have no current or past clinically significant eating pathology, i.e., DSM-5 full or subthreshold anorexia nervosa, bulimia nervosa, or binge-eating disorder diagnoses and no first-degree relatives (i.e., child, parent, or sibling) with this pathology.

Binge eating was the behavior of interest for this study as it is most strongly associated with negative emotionality and negative urgency (Culbert et al., 2015). Therefore, the Binge-Eating group included women with binge-eating disorder or bulimia nervosa as both disorders are characterized by binge eating. Further, binge eating is the most common onset symptom of both bulimia nervosa and binge-eating disorder (Hilbert et al., 2014) (see Appendix A for comparison of participants with binge-eating disorder and bulimia nervosa on demographics, covariates, and modelled variables). These diagnoses were based on DSM-IV or DSM-5 criteria, depending on the time of recruitment. Previous studies examining DSM-IV eating disorder criteria found that subthreshold eating disorder diagnoses were associated with functional impairment, distress, and increased treatment (Crow, Stewart Agras, Halmi, Mitchell, & Kraemer, 2002; Thomas, Vartanian, & Brownell, 2009). Thus, DSM-5 changes reflect loosened frequency and duration criteria for both bulimia nervosa and binge-eating disorder. Thus, for the purposes of this investigation, participants who were evaluated using DSM-IV criteria were reclassified utilizing broadened DSM-5 criteria. Further, despite these broadened criteria, subthreshold eating disorders remain clinically significant, as individuals with subthreshold eating disorder diagnoses based on DSM-5 criteria still tend to exhibit similar levels of

impairment to those who meet full criteria (Fairweather-Schmidt & Wade, 2014) (see Appendix B for comparison of participants who met full and subthreshold diagnostic eating disorder criteria on demographics, covariates, and modelled variables). Therefore, to summarize, women were included in the Binge-Eating group if (1) they met diagnostic criteria for bulimia nervosa or binge eating disorder per DSM-5, (2) they met subthreshold eating disorder diagnoses as per DSM-5 due to binge eating frequency of less than one binge eating episode per month for six months or, in the case of one participant, endorsing only two of three necessary binge eating descriptors.

### **Demographics**

Participant sociodemographic information is displayed in Table 1. Overall, participants had a mean age of almost 38 years. The most common ethnicity was Caucasian, and the most common educational attainment was a college or university degree. Most of the participants had either never been married or were currently married, and there was a relatively even distribution of annual household incomes ranging from less than \$20,000 to over \$100,000. Age, ethnicity, marital status, education, and household income did not differ between groups,  $ps > .10$ .

Table 1

*Sociodemographic Characteristics for Binge-Eating and Control Groups (N = 143)*

Variable	Binge-Eating (n=68)	Control (n=75)	Full Sample (n=143)	F	p
	M (SD)	M (SD)	M (SD)		
Age (years)	36.06 (11.91)	39.59 (17.02)	37.91 (14.87)	2.02	.16
	%	%	%	$\chi^2$	p
Ethnicity				6.83	.15
Caucasian	77.94	80.28	79.14		
Other	11.76	2.82	7.19		
Mixed	5.89	5.63	5.76		
East Indian	2.94	4.23	3.60		
Asian	1.47	7.04	4.32		
Marital Status				2.92	.57
Never Married	52.94	40.85	46.76		
Married/Common Law	35.29	40.66	39.57		
Divorced/Annulled	8.82	8.45	8.63		
Widowed	1.47	4.23	2.88		
Separated	1.47	2.82	2.16		
Education				4.84	.78
Graduate School Completed	7.35	10.00	8.70		
Part Graduate School	7.35	10.00	8.70		
College Graduate	47.06	50.00	48.55		
Part College	23.53	22.86	23.19		
High School Graduate	11.76	4.29	7.97		
Grade 7 to 12 Completed	2.94	2.86	2.90		
Gross Annual Household Income				7.57	.27
>\$100,000	18.46	28.57	23.70		
\$61,000-\$100,000	23.08	14.29	18.52		
\$41,000-\$60,000	16.92	21.43	19.26		
\$21,000-\$40,000	21.54	22.86	22.22		
<\$20,000	20.00	12.86	16.30		

## Research Design and Procedure

**Ethics approval.** Prior to commencing data collection, ethics approval was received by the University of Calgary's Conjoint Faculties Research Ethics board (see Appendix C for certification of institutional ethics review).

**Eligibility.** When women emailed to express interest in participating in the study, a telephone screen to assess eligibility was scheduled. During this telephone conversation, potential participants were first read a brief description of the study. If they wished to proceed, they were screened for study eligibility using questions from the eating disorders module of either the Structured Clinical Interview for DSM-IV Axis-I (SCID-IV; (First, Gibbon, Spitzer, & Williams, 1996) or the Structured Clinical Interview for DSM-5-Research Version (SCID-5; First, Williams, Karg, & Spitzer, 2015), depending on the period of recruitment. The psychotic screen from the SCID-IV was also completed. If eligible, an in-person or telephone interview appointment was scheduled, depending on participant preference and feasibility (i.e., only local participants were offered the option to complete an in-person interview). Seventeen individuals were deemed ineligible following the initial screen because they were experiencing psychosis ( $n = 2$ ), had a past but not current eating disorder ( $n = 14$ ), or had a first-degree relative with an eating disorder but no personal history ( $n = 1$ ).

**Questionnaires.** After completing informed consent, participants were asked to complete a series of questionnaires prior to completing their interview, either in person or via a secure online data collection website (qualtrics.com) (see Appendix D for informed consent document). Participants completed questionnaires to assess study variables (negative emotionality, negative urgency, eating disorder psychopathology) as well as potential control variables. Specifically, scores on anxiety and depression measures were included based on the frequent comorbidity of

mood and anxiety disorders with both binge-eating disorder and bulimia nervosa (Kessler et al., 2013). Further, participant height and weight were measured during in-person interviews, or self-reported for phone interviews, to calculate BMI. BMI has been associated with personality characteristics and impulsivity (Brummett et al., 2006; Meule & Platte, 2015) and may vary by eating disorder diagnosis (Ágh et al., 2016). Thus, it was important to analyze whether differences in BMI and anxiety and depression symptoms existed between the Binge-Eating and Control groups and if so, control for their influence on the relationships of interest.

**SCID.** In addition to screening participants for eligibility, the SCID-IV or SCID-5 was used to evaluate symptoms of eating disorders (depending on time of recruitment) and the SCID-IV evaluated other major psychopathology. Following completion of the interview, participants were debriefed (see Appendix E for debriefing form).

## **Measures**

**SCID (First et al., 1996; First et al., 2015).** The SCID-IV and SCID-5 are semi-structured interviews designed to generate both current and lifetime diagnoses based on DSM-IV and DSM-5 criteria, respectively. They are considered gold-standard diagnostic measures of psychopathology (First et al., 2015; Haynes, McQuaid, Ancoli-Israel, & Martin, 2006).

**Multidimensional Personality Questionnaire (MPQ; Tellegen, 1982).** This 198-item version assesses self-reported normal personality dimensions on a 4-point response scale from “definitely true” to “definitely false” or “definitely A” to “definitely B”.

The MPQ was normed on a non-clinical sample and has three higher-order scales (Positive Emotionality, Negative Emotionality, and Constraint) that have been replicated in diverse samples (Ben-Porath, Almagor, Hoffman-Chemi, & Tellegen, 1995; Church & Burke, 1994). The measure has demonstrated acceptable internal consistency ( $\alpha=0.79-0.89$ )

(Harkness, Tellegen, & Waller, 1995; Tellegen, 1972/1982), 30-day test-retest reliability of 0.82 to 0.92 (Tellegen, 1982), and non-significant changes in higher-order scale scores over 10 years ( $p=.05-.94$ ) (Johnson, McGue, & Krueger, 2005). Further, although the MPQ was designed for use in non-clinical samples, it has demonstrated acceptable validity in clinical samples (DiLalla, Gottesman, Carey, & Vogler, 1993).

The Negative Emotionality subscale score (MPQ-NE) comprises lower-order scales tapping Stress Reaction, Alienation, Aggression, and Absorption. This subscale score is created by calculating a weighted sum of questionnaire responses, with higher scores indicating higher levels of negative emotionality. The MPQ-NE subscale has demonstrated acceptable test-retest reliability after one month ( $r=0.89$ ) (Tellegen & Waller, 2008).

**UPPS Impulsive Behavior Scale (UPPS; Whiteside & Lynam, 2001).** The UPPS is a 45-item self-report measure comprised of items rated on a 4-point scale from 1 (agree strongly) to 4 (disagree strongly). The original version of the scale was used in this study to permit comparison with previously collected data. Although this scale assesses four facets of impulsiveness, this study utilized the 12-item Urgency subscale, which measures negative urgency. Responses to the 12 items are summed to create a Negative Urgency score (UPPS-NU), with higher scores indicating higher levels of the trait. The factor structure of the UPPS has been replicated and the UPPS-NU has demonstrated acceptable internal consistency ( $\alpha = .86-.91$ ) (Anestis, Selby, Fink, et al., 2007; Anestis, Selby, & Joiner, 2007). This scale has also demonstrated acceptable convergent validity with interview methods ( $r=.64$ ) (Smith et al., 2007).

**Eating Disorder Examination-Questionnaire version 4 (EDE-Q, version 4; Fairburn & Beglin, 1994).** The EDE-Q is a 36-item self-report using 7-point Likert-style rating scales, which assesses the presence and severity of eating disorder psychopathology over the past 28

days. Version 4 of the scale was used to remain consistent with previously-collected data. It comprises four subscales: Eating Concern, Restraint, Shape Concern, and Weight Concern (Cooper, Cooper, & Fairburn, 1989). Item responses are summed to create a global score, with higher scores indicating greater eating disorder psychopathology. The subscales show acceptable internal consistency (alpha = .78 to .93) (Luce & Crowther, 1999). Research supports the reliability and validity of the EDE-Q for assessing eating disorder symptoms in community samples (Berg, Peterson, Frazier, & Crow, 2012).

**Beck Depression Inventory (BDI-II; Beck, Steer, & Brown, 1996).** The BDI-II is a 21-item questionnaire that assesses DSM criteria for major depressive disorder and provides a quantitative index of depression severity. Item responses are summed to create a total depression score, with higher scores indicating higher levels of depression.

Stability over time is reported to be acceptable, with one-week test-retest correlation of .93 (Beck et al., 1996). The BDI-II has demonstrated acceptable internal consistency in college students (alpha = .81 to .93) and psychiatric outpatients (alpha = .92) (Beck et al., 1996; Dozois, Dobson, & Ahnberg, 1998).

**Beck Anxiety Inventory (BAI; Beck, Epstein, Brown, & Steer, 1988).** The BAI is a 21-item questionnaire assessing subjective, somatic, and panic-related anxiety symptoms and provides a quantitative index of anxiety severity. The total score was created by summing item responses, where higher scores indicate greater anxiety. The BAI has acceptable internal consistency in university students (alpha = .92) and in outpatients with anxiety (alpha = .94) (Creamer, Foran, & Bell, 1995; Fydrich, Dowdall, & Chambless, 1992). The measure has acceptable one-week test-retest reliability ( $r = .75$ ) and discriminates between anxious and non-anxious diagnostic groups (Beck et al., 1988).

**Body mass index (BMI; kg/m<sup>2</sup>).** The BMI is a rough index of adiposity and highly correlated with more complex methods of measuring body mass such as total abdominal fat area ( $r = .73$ ) and visceral fat area ( $r = .67$ ) (Hung et al., 2012). BMI information was obtained via either self-report or measurement, depending on whether the participant's interview took place in-person or over the phone. Previous research has found that self-reported BMI values tend to overestimate measured BMI values at lower BMIs ( $< 22$ ) and underestimate BMI values at higher BMIs ( $> 28$ ) (Stommel & Schoenborn, 2009). Further, discrepancies also vary based on age and ethnic background of respondents (Stommel & Schoenborn, 2009). Nevertheless, the correlation between self-reported and measured BMI is high ( $r = .90-.95$  and  $Kappa = 0.86$ ) (McAdams, Van Dam, & Hu, 2007; Spencer, Appleby, Davey, & Key, 2002; Tang, Aggarwal, Moudon, & Drewnowski, 2016) and thus, it is unlikely that using both methods significantly altered any relationships among variables.

### **Statistical Analyses**

Each of the following analyses was completed using a  $\alpha = .05$  significance level.

**Bivariate correlations.** Bivariate correlations between main study variables were computed for the entire sample, to gain an understanding of relationships among the variables.

**Covariates.** Group differences in average BMI and BAI and BDI-II scores were evaluated using independent samples t-tests. If significant group differences emerged, we controlled for these variables in subsequent analyses.

**Group differences on main study variables.** To evaluate group differences, one-way analyses of covariance (ANCOVA) were performed for MPQ-NE, UPPS-NU, and EDE-Q scores.

**Moderated mediation analysis.** This analysis was used to examine the indirect effect of MPQ-NE on EDE-Q scores through UPPS-NU and whether it would be conditional upon group membership. This moderated mediation analysis was conducted by employing a bootstrapping method recommended by Preacher and Hayes (2004) and Hayes (2017), using Hayes' PROCESS macro (<http://www.processmacro.org/>) for SPSS (IBM Corporation, New York, USA; Hayes, 2013). A growing body of evidence suggests that this bootstrapping method provides the most powerful test of indirect effects (Kenny, 2008; Preacher, Rucker, & Hayes, 2007; Schoemann, Boulton, & Short, 2017). Further, because it is a non-parametric test, it is robust to violations of normality and is recommended even for small sample sizes.

Following recommendations by Hayes (2013), the hypothesized indirect effect (between MPQ-NE and EQE-Q scores via UPPS-NU) (Hypothesis 2) and moderating effect of group membership (Hypothesis 3) were first examined. For clarity, these variable designations (IV=independent variable, DV=dependent variable, MedV=mediator variable, ModV=moderator variable) are presented in the following subsections as they apply to Hypothesis 4 (i.e., the overall moderated mediation model; see Figure 1). A moderated-mediation analysis estimating all parameters simultaneously was then conducted, providing (a) an index of moderated mediation (which represents the slope of the line reflecting the association between the moderator and the indirect effect) and (b) estimates of the indirect effect and associated confidence intervals (CIs) conditional for each group (i.e., each level of the moderator). Each analysis utilized 10,000 bootstrap re-samples, and significance was based upon 95% bias-corrected confidence intervals (i.e., when the confidence interval did not contain zero, the parameter was interpreted as significant).

## Results

### Missing Data

Missing data ranged from 2.01% of total scores on the BAI to 8.39% of total scores on the MPQ. Little's MCAR test (1988) demonstrated that the missing values on all variables of interest were missing completely at random (MCAR) ( $\chi^2(32) = 34.54, p=.35$ ). Missing values were prorated for participants who had less than 10% missing data on any scale or subscale score (Scheffer, 2002). Three participants were excluded from analyses due to missing data (i.e., > 10%). Therefore, the final sample consisted of 68 women in the Binge-Eating group and 75 Control women ( $N=143$ ).

### Preliminary Analyses

**Bivariate correlations.** Bivariate correlations were computed to examine the associations among study variables (see Table 2). The following categorizations of correlation effect size were made based on guidelines by Cohen (1988) (weak:  $r = .10$ , moderate:  $r = .30$ , and strong:  $r = .50$ ). There was a weak positive correlation between BMI and MPQ-NE and a moderate correlation between BMI and UPPS-NU, EDE-Q, and BDI-II scores. There were strong positive correlations among MPQ-NE, UPPS-NU, EDE-Q, BAI, and BDI-II scores.

Table 2

*Intercorrelations of Study Variables (N=143)*

Variable	BMI	BAI	BDI-II	MPQ-NE	UPPS-NU	EDE-Q
BMI	-					
BAI	.15	-				
BDI-II	.34**	.80**	-			
MPQ-NE	.20*	.67**	.70**	-		
UPPS-NU	.37**	.61**	.65**	.64**	-	
EDE-Q	.37**	.59**	.69**	.50**	.59**	-

*Note.* BMI = Body mass index; BAI = Beck Anxiety Inventory score; BDI-II = Beck Depression Inventory-II score; MPQ-NE = Multidimensional Personality Inventory-Negative Emotionality score; UPPS-NU = UPPS-Negative Urgency score; EDE-Q = Eating Disorder Examination Questionnaire score.

\*  $p < .05$ . \*\*  $p < .001$ .

**Covariate descriptive information.** Participant covariate descriptive data are displayed in Table 3. Independent samples t-tests showed that the Binge-Eating group reported higher BAI scores and BDI-II scores than the Control group. The Binge-Eating group also reported higher BMIs than the Control group and their mean BMI was in the Obese range, whereas that of the Control group was in the Normal range (World Health Organization, 2019). Thus, we controlled for these variables in subsequent analyses.

Table 3

*Covariate Descriptive Statistics for Binge-Eating and Control Groups (N = 143)*

Variable	Binge-Eating (n=68)	Control (n=75)	<i>t</i>
	<i>M (SD)</i>	<i>M (SD)</i>	
BMI (kg/m <sup>2</sup> )	31.61 (10.35)	24.17 (4.60)	5.38*
BAI Score	19.26 (12.89)	5.84 (7.38)	7.54*
BDI-II Score	23.96 (13.54)	5.53 (6.18)	10.29*

*Note.* BMI = Body mass index; BAI = Beck Anxiety Inventory score; BDI-II = Beck Depression Inventory-II score.

\*  $p < .001$ .

### Hypothesis 1: Group Differences on Main Study Variables

Results of ANCOVAs comparing the Binge-Eating and Control groups are presented in Table 4. Consistent with our hypothesis, the Binge-Eating group reported higher UPPS-NU and EDE-Q scores than the Control group. However, unexpectedly, there were no group differences in MPQ-NE scores.

Table 4

*Group Differences on Study Variables for Binge-Eating and Control Groups (N=137)*

Variable	Binge-Eating (n=65)	Control (n=72)	F	p
	M (SD)	M (SD)		
MPQ-NE	95.38 (16.91)	80.75 (14.21)	0.83	.37
UPPS-NU	36.17 (6.47)	25.47 (6.09)	16.61	<.001*
EDE-Q	3.45 (1.20)	1.01 (0.93)	46.74	<.001*

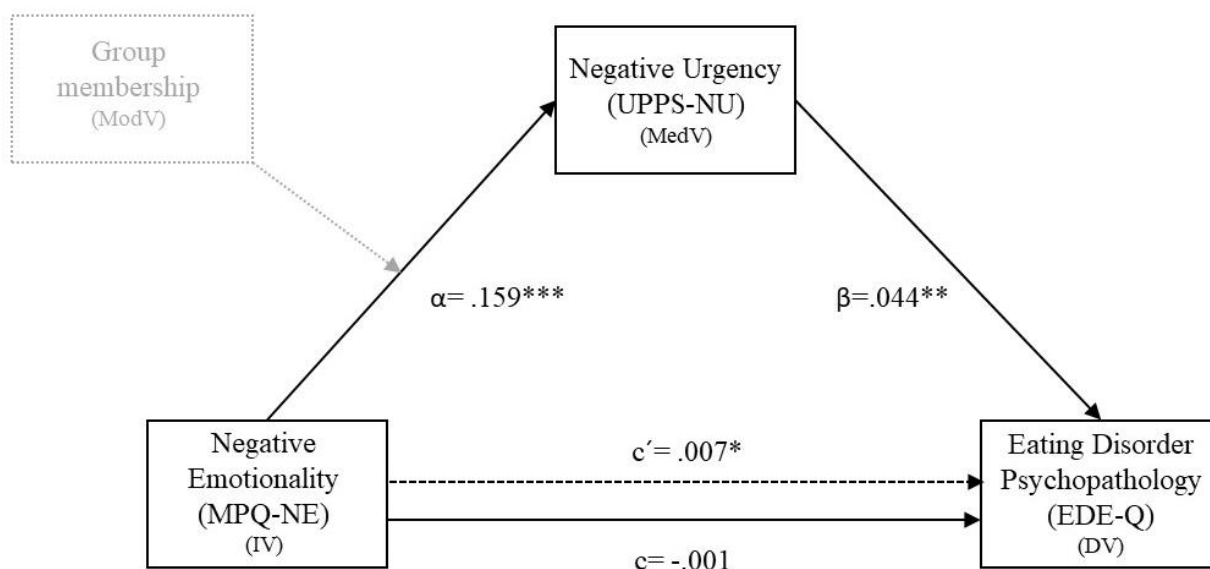
*Note.* These analyses controlled for body mass index (BMI) and scores on the Beck Depression Inventory-II and the Beck Anxiety Inventory. Six participants were excluded due to missing BMI values. MPQ-NE = Multidimensional Personality Questionnaire-Negative Emotionality score; UPPS-NU = UPPS-Negative Urgency score; EDE-Q = Eating Disorder Examination Questionnaire score.

\*  $p < .001$ .

### Hypothesis 2: Mediation Analysis

This analysis examined the indirect effect of MPQ-NE (IV) on EDE-Q scores (DV) through UPPS-NU (MedV) in the sample overall, while controlling for BMI and BAI and BDI-II scores (see Figure 2). There was an effect of MPQ-NE (IV) on UPPS-NU (MedV), such that higher MPQ-NE scores were associated with higher UPPS-NU scores ( $b=.159$ ,  $SE=0.041$ , 95%  $CI [-.077, .240]$ ,  $p<.001$ ). There was also an effect of UPPS-NU (MedV) on EDE-Q scores (DV), such that higher UPPS-NU scores were associated with higher EDE-Q scores ( $b=.044$ ,  $SE= 0.017$ , 95%  $CI [.010, .078]$ ,  $p= .01$ ). There was no direct effect of MPQ-NE (IV) on EDE-Q scores (DV) ( $b=-.001$ ,  $SE=0.009$ , 95%  $CI [-.018, .006]$ ,  $p=.91$ ). However, there was an indirect

effect of MPQ-NE (IV) on EDE-Q scores (DV) via UPPS-NU ( $b=.007$ ,  $SE= 0.004$ ,  $95\% CI$  [.001, .017]). Thus, results supported the hypothesis that negative urgency would mediate the relationship between negative emotionality and eating disorder psychopathology (see Figure 2).

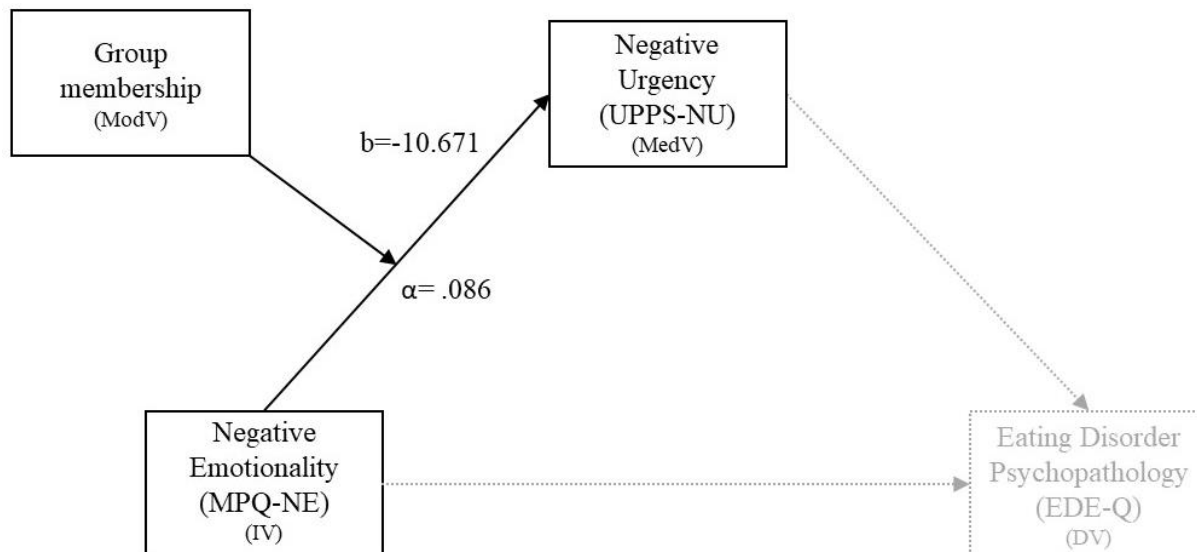


*Figure 2.* Diagram of the mediation model for the overall sample ( $N=137$ ), controlling for body mass index (BMI) and scores on the Beck Anxiety Inventory and Beck Depression Inventory-II. Six participants were excluded due to missing BMI values. The values shown represent unstandardized path coefficients. There was an effect of MPQ-NE (IV) on UPPS-NU score (MedV) and an effect of UPPS-NU (MedV) on EDE-Q score (DV). There was also an indirect effect of MPQ-NE (IV) on EDE-Q (DV) via UPPS-NU (MedV). MPQ-NE = Multidimensional Personality Questionnaire-Negative Emotionality score; UPPS-NU = UPPS-Negative Emotionality score; EDE-Q = Eating Disorder Examination Questionnaire score; IV = independent variable; MedV = mediator variable; DV = dependent variable.

\*confidence interval does not include zero. \*\* $p = .01$ . \*\*\* $p < .001$ .

### **Hypothesis 3: Moderation Analysis**

This analysis examined the moderating effect of group membership (ModV) on the association between MPQ-NE (IV) and UPPS-NU (MedV) (see Figure 3), while controlling for BMI and BAI and BDI-II scores. After accounting for group membership (ModV), there was no effect of either MPQ-NE (IV) or group membership (ModV) on UPPS-NU scores (MedV) ( $b = .086$ ,  $SE = 0.104$ ,  $95\% CI [-.120, .292]$ ,  $p = .41$ , and  $b = -10.671$ ,  $SE = 5.333$ ,  $95\% CI [-21.221, -.122]$ ,  $p = .05$ , respectively). Higher MPQ-NE scores were associated with higher UPPS-NU scores in the Binge-Eating group ( $b = .142$ ,  $SE = 0.052$ ,  $95\% CI [.039, .244]$ ,  $p = .01$ ) and the Control group ( $b = .197$ ,  $SE = 0.047$ ,  $95\% CI [.104, .290]$ ,  $p < .001$ ). Consistent with this finding, there was no interaction between MPQ-NE (IV) and group membership (ModV) ( $b = .056$ ,  $SE = 0.062$ ,  $95\% CI [-.067, .178]$ ,  $p = .37$ ). Thus, results did not support the hypothesis that group membership would moderate the association between negative emotionality and negative urgency (see Figure 3).

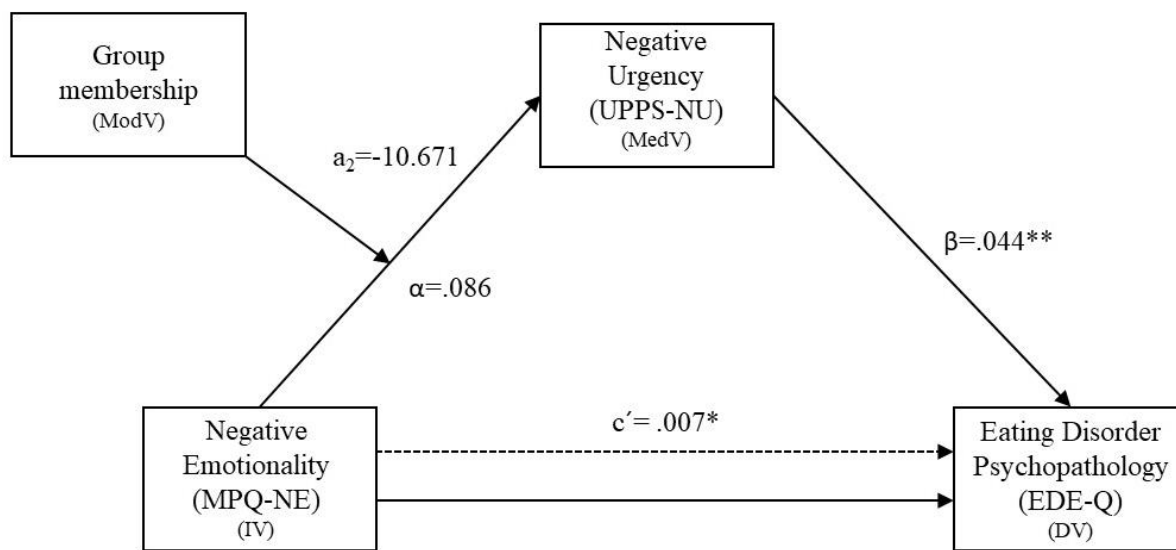


*Figure 3.* Diagram of the moderation model for the overall sample ( $N=137$ ), controlling for body mass index (BMI) and scores on the Beck Anxiety Inventory and Beck Depression Inventory-II. Six participants were excluded due to missing BMI values. The values shown represent unstandardized path coefficients. All effects were non-significant. MPQ-NE = Multidimensional Personality Questionnaire-Negative Emotionality score; UPPS-NU = UPPS-Negative Emotionality score; EDE-Q = Eating Disorder Examination Questionnaire score; IV = independent variable; ModV = moderator variable; MedV = mediator variable; DV = dependent variable.

#### **Hypothesis 4: Moderated Mediation Analysis**

This analysis examined the moderating effect of group membership (ModV) on the indirect relationship between MPQ-NE (IV) and EDE-Q scores (DV) via UPPS-NU (MedV) (see Figure 4), while controlling for BMI and BAI and BDI-II scores. The index of moderated mediation, which reflects the slope of the line representing the association between the moderator and the indirect effect, was not statistically significant ( $b=.003$ ,  $SE= 0.003$ ,  $95\% CI [-0.002, .012]$ ). Therefore, these results did not support the hypothesis that the indirect effect of

negative emotionality on eating disorder psychopathology through negative urgency would be conditional upon group membership (see Figure 4). Rather, contrary to our hypothesis that the mediation model would only hold for the Binge-Eating group, the model was significant for both groups.



*Figure 4.* Diagram of the full moderated mediation model, controlling for body mass index (BMI) and scores on the Beck Anxiety Inventory and Beck Depression Inventory-II ( $N=137$ ). Six participants were excluded due to missing BMI values. The values shown represent unstandardized path coefficients. There was an effect of UPPS-NU (MedV) on EDE-Q score (DV) and an indirect effect of MPQ-NE on EDE-Q via UPPS-NU. There was no moderated mediation effect. MPQ-NE = Multidimensional Personality Questionnaire-Negative Emotionality score; UPPS-NU = UPPS-Negative Emotionality score; EDE-Q = Eating Disorder Examination Questionnaire score; IV = independent variable; ModV = moderator variable; MedV = mediator variable; DV = dependent variable.

\* confidence interval does not include zero. \*\* $p = .01$ .

## Discussion

Whereas most extant studies have investigated bivariate relationships between personality constructs (e.g., negative emotionality or negative urgency) and eating disorder psychopathology, the present study examined the relationships among negative emotionality, negative urgency, and eating disorder psychopathology across community-ascertained groups of women with clinical levels of binge eating and control women with no lifetime history of eating disorders. An examination of the relationships among all three variables was necessary to investigate how they may interact to confer risk for disordered eating. Further, data from community samples are valuable as they avoid biases evident in treatment samples and may be more representative of the majority of individuals living with these disorders.

First, we found that, after controlling for anxiety and depression symptoms and BMI, women with binge eating reported higher levels of negative urgency and eating disorder psychopathology than women without a history of eating disorders, whereas there was no difference in levels of negative emotionality between the groups. Second, there was an indirect effect of negative emotionality on eating disorder psychopathology via negative urgency. Third, group membership did not moderate the relationship between negative emotionality and negative urgency. Rather, higher levels of negative emotionality were associated with higher levels of negative urgency in both groups. Fourth, the indirect effect of negative emotionality on eating disorder psychopathology via negative urgency did not differ by group.

### **Negative Emotionality and Negative Urgency Acting Together**

Previous literature has established that both negative emotionality and negative urgency are risk factors for disordered eating (see Culbert et al., 2015 for review). Further, ecological momentary assessment studies have demonstrated that aversive emotional states often serve as

triggers for both binge eating and purging (Goldschmidt et al., 2014; Hilbert & Tuschien-Caffier, 2007; Lavender et al., 2016; Schulz & Laessle, 2010). However, in our study, although women with binge eating reported higher levels of both negative urgency and eating disorder psychopathology than women without a history of eating disorders, there were no group differences in negative emotionality. Further, whereas there was no direct effect of negative emotionality on eating disorder psychopathology, there was an indirect effect via negative urgency. Therefore, our results suggest that negative emotionality and negative urgency may interact to confer risk for the development and/or maintenance of disordered eating, such that negative emotionality must be coupled with concurrent negative urgency in order to be associated with eating disorder psychopathology. Thus, the mediation results in our study suggest that negative emotionality may prompt certain individuals to engage in impulsive actions, which may increase eating disorder psychopathology. Together, our findings support the notion that negative emotionality and negative urgency should not be considered in isolation when discussing potential risk and/or maintenance models of disordered eating.

### **Disordered Eating as a Maladaptive Emotion Regulation Strategy**

Our findings also suggest that negative urgency may be a more specific risk factor for eating disorder psychopathology than negative emotionality more broadly. Whereas negative emotionality has been associated with a range of psychopathology including anxiety and depression (e.g., Kotov, Gamez, Schmidt, & Watson, 2010), negative urgency appears to be associated specifically with disorders characterized by impulsive behavior, like eating disorders characterized by binge eating and substance use disorders (Dir, Karyadi, & Cyders, 2013; Racine & Martin, 2016). The role of negative urgency in psychopathology characterized by impulsive behavior may be better understood by considering relevant impulsive behaviors (e.g., binge

eating or substance abuse) to be maladaptive emotion regulation strategies (Pearson, Wonderlich, & Smith, 2015). Individuals who binge eat or drink alcohol often do so in an attempt to decrease their distress (Fischer, Anderson, & Smith, 2004). For example, emotional overeating is significantly associated with binge frequency and eating disorder features in individuals with binge-eating disorder (Masheb & Grilo, 2006). Similarly, evidence suggests that individuals may engage in disordered eating behaviors as a response to negative affect (Lavender et al., 2016; Leehr et al., 2015; Schulz & Laessle, 2010) and experience a temporary decrease in their negative mood state as a result (Haynos & Fruzzetti, 2011; Lavender et al., 2016; Smyth et al., 2007).

The conceptualization of disordered eating as an emotion regulation strategy also implies that individuals who engage in such behaviors may be forgoing more adaptive strategies. In fact, those with binge eating exhibit deficits in emotion regulation skills, which may be associated with an increased propensity to engage in impulsive behaviors when experiencing distress. In particular, those who binge eat tend to exhibit difficulties identifying and making sense of emotional states (i.e., alexithymia) and regulating emotions (Dingemans, Danner, & Parks, 2017; Wallace, Masson, Safer, & von Ranson, 2014; Whiteside, Chen, Neighbors, & Hunter, 2007). One study found that emotional regulation difficulties accounted for significant variance in binge eating in undergraduates over and above gender, food restriction, and over-evaluation of weight and shape (Whiteside et al., 2007). Another study found that such difficulties accounted for unique variance in both emotional overeating and general eating pathology above and beyond negative affect in adults with binge-eating disorder (Gianini, White, & Masheb, 2013). These findings support the notion that individuals with binge eating may be experiencing difficulties with emotion regulation and, like the women with binge eating in our sample, may be more

prone to impulsively engage in maladaptive emotion regulation strategies, like disordered eating, when experiencing negative emotions.

### **Emotional Eating in Women Without Lifetime Eating Disorders**

Although negative urgency has been found to play a role in disordered eating behavior in individuals with clinical levels of binge eating, in our study, negative urgency also mediated the relationship between negative emotionality and eating disorder psychopathology in women with no history of eating disorders. Similarly, Lavender and colleagues (2015) found that negative urgency mediated the relationship between negative affect and bulimic symptoms in individuals with substance use disorders, rather than eating disorders. Therefore, even in women without eating disorders, a tendency toward rash action when experiencing negative affect is associated with increased eating disorder psychopathology.

Importantly, there are several disordered eating behaviors that are common among adult women and do not meet the diagnostic criteria for an eating disorder. For example, a substantial proportion of adult women report engaging in some form of weight control behavior (e.g., restricting food intake to lose weight or prevent weight gain) (Fayet, Petocz, & Samman, 2012; Kruger, Galuska, Serdula, & Jones, 2004; Mangweth-Matzek et al., 2006) or overeating (Skinner, Haines, Austin, & Field, 2012). However, in order to qualify as a “binge eating episode” according to the diagnostic criteria for binge-eating disorder and bulimia nervosa, the amount of food must be “definitely larger than what most people would eat during a similar period of time and under similar circumstances”, ingested within two hours, and be accompanied by an experience of loss of control. Nevertheless, there are many individuals who engage in overeating without experiencing a loss of control and thus, do not qualify for an eating disorder (e.g., Skinner, Haines, Austin, & Field, 2012). Further, even in women without eating disorders,

the propensity to eat as a means of coping with negative emotions has yielded terms such as “emotional eating” and “comfort food”. Even in these women, greater exposure and perception of stress is associated with increased drive to eat and feelings of disinhibited eating (Groesz et al., 2012). Further, suppressing one’s negative emotions has been associated with an increased consumption of comfort foods (Evers, Stok, & De Ridder, 2010). Therefore, even in women without eating disorders, certain disordered eating behaviors may be conceived of as attempts at emotion regulation. Together, these findings suggest that a tendency toward a combination of negative emotionality and negative urgency is associated with disordered eating in individuals with and without eating disorders.

### **Development of Disordered Eating**

Although our findings emphasize the importance of including both negative emotionality and negative urgency to risk and/or maintenance models of eating disorder psychopathology, it is also important to understand why some individuals who experience high negative emotionality and negative urgency experience disordered eating, while others may experience other psychopathology, like substance abuse (Dir et al., 2013). Evidence suggests that eating disorder-specific risk factors may shape negative urgency into manifesting as disordered eating versus another form of psychopathology (Racine & Martin, 2016). Specifically, appearance pressures, thin-ideal internalization, and body dissatisfaction, moderate the association between negative urgency and binge eating, with high levels of these risk factors and high negative urgency associated with the greatest binge eating (Racine et al., 2017). Therefore, negative urgency and eating disorder-specific risk factors appear to interact to confer risk for disordered eating. Further, high eating expectancy—or believing that eating will alleviate negative affect—also contributes to divergent symptom trajectories among individuals with negative urgency.

Specifically, eating expectancy mediates the relationship between negative urgency and dysregulated eating (Combs, Pearson, & Smith, 2011; Pearson, Combs, Zapolski, & Smith, 2012). Further, this indirect effect is also conditional on levels of eating disorder-specific risk factors (i.e., appearance pressures, thin-ideal internalization, body dissatisfaction, and dietary restraint) (Racine & Martin, 2017). Therefore, the inclusion of eating disorder-specific risk factors and eating expectancy to the mediation model explored in this study would serve to further elucidate a more precise risk and/or maintenance model for disordered eating.

### **Implications**

Our findings buttress literature which shows that women with binge eating are more likely than women without a lifetime history of eating disorders to act impulsively when experiencing negative emotions. However, this tendency toward rash action when experiencing negative emotions mediated the relationship between negative emotionality and eating disorder psychopathology in both women with binge eating and those without eating disorders. These conclusions add to our understanding of the potential etiology and maintenance of both eating disorders characterized by binge eating as well as emotional eating. Specifically, our findings suggest that negative emotionality and negative urgency should not be considered in isolation when attempting to understand risk and/or maintenance models of disordered eating. These findings also provide potentially useful avenues for prevention and intervention efforts for individuals engaging in disordered eating as an attempt at emotion regulation.

Cognitive behavioral therapy, dialectical behavior therapy, and mindfulness based therapies have all demonstrated efficacy in the treatment of binge eating (Lenz, Taylor, Fleming, & Serman, 2014; Peat et al., 2017; Slade et al., 2018), whereas mindfulness-based therapies have demonstrated efficacy for treating both binge eating and emotional eating (Godfrey, Gallo, &

Afari, 2014; Katterman, Kleinman, Hood, Nackers, & Corsica, 2014). These treatments focus on teaching effective coping strategies for dealing with negative emotions and distorted cognitions. Because treatment targeting these constructs is efficacious for improving binge eating and emotional eating, it is possible that teaching emotion regulation strategies in prevention efforts may also be efficacious (Le, Barendregt, Hay, & Mihalopoulos, 2017). Targeted prevention efforts may be especially appropriate. Such efforts involve targeting a group of people who share common characteristics (like personality traits) that may put them at a higher risk for developing a maladaptive behavior (like disordered eating) and developing specialized interventions to alter these traits. Personality-targeted approaches to alcohol prevention have been found to be effective at diminishing alcohol use (e.g., Newton et al., 2016); similarly, the strategy of targeting and altering personality traits may prove to be effective in tailoring the prevention of binge eating and emotional eating. By screening individuals using questionnaires to assess relevant personality traits, like negative urgency (e.g., Newton et al., 2016), prevention efforts aimed at teaching effective emotion regulation strategies could be implemented with those exhibiting these traits. The identification of additional avenues for eating disorder prevention is particularly important since empirical support for extant eating disorder prevention programs is mixed and none reduce eating disorder risk factors (Le et al., 2017).

### **Strengths and Limitations**

This study boasts several additional methodological strengths over previous research in the area. First, the use of a semi-structured interview to ascertain whether individuals met diagnostic criteria for an eating disorder was an important asset. Past research wherein participants are said to meet diagnostic criteria for an eating disorder has relied primarily on self-report questionnaires of eating disorder symptoms to confirm diagnoses, which may inflate rates

of psychopathology (Fairburn & Beglin, 1994). The use of structured interviews by trained interviewers ensured that individuals were accurately classified as either meeting necessary criteria for inclusion in the Binge-Eating group or having no history of clinically significant eating disorder pathology for inclusion in the control group.

Second, the inclusion of a control group without a lifetime history of eating disorder symptoms (but who might have mood, anxiety, and/or substance abuse disorders) allowed for meaningful comparison between groups on measures of negative emotionality, negative urgency, and eating disorder psychopathology. Because we also completed a diagnostic interview with all participants, we concluded that most women in both groups had a lifetime mood, anxiety, and/or substance abuse disorder (see Appendix F for diagnoses per group). This means that the control group utilized in this study is not a “super-normal” control group (Kendler, 1990), as is often utilized in similar research and thus, we can more confidently state that it is unlikely that any significant associations are accounted for by other psychopathology (i.e., mood, anxiety, and/or substance use disorders). Ruling out the role of other psychopathology is particularly important given the established association between negative emotionality and mood, anxiety, and substance use disorders (e.g., Boschloo et al., 2013; Kotov, Gamez, Schmidt, & Watson, 2010) and negative urgency and substance use disorders (e.g., Coskunpinar, Dir, & Cyders, 2013; Kaiser, Milich, Lynam, & Charnigo, 2012; Pang, Farrahi, Glazier, Sussman, & Leventhal, 2014).

Several limitations of the current study require consideration. First, the participants in our study were recruited using convenience sampling. Although our sample was recruited from across Canada, most participants were from Calgary, AB (see Appendix G for geographical distribution of participants). This fact, in addition to the use of convenience sampling, precludes knowing the extent to which the study’s findings may be generalizable to Canadian women

broadly. Nevertheless, the use of a community-based sample also diminished the presence of Berkson's bias, i.e., individuals who seek treatment exhibit greater pathology when compared to those who do not (Berkson, 1946). This is particularly important given that fewer than half of lifetime cases of bulimia nervosa and binge-eating disorder receive treatment (Kessler et al., 2013). Therefore, although the use of convenience sampling may have affected the generalizability of our study's findings, our sample may be more representative of individuals with binge eating than the undergraduates or treatment-seeking samples utilized by most previous research.

Second, the cross-sectional design of the study precludes concluding whether the variables of interest are risk factors for the development of binge eating. It is impossible to determine with these data the exact nature of the relationship between personality variables and eating disorder psychopathology. However, personality is over 40% heritable (Vukasović & Bratko, 2015) and longitudinal research has provided evidence for the existence of personality predictors of eating pathology prior to its onset (Culbert et al., 2015; Keel & Forney, 2013). These studies also indicate that most personality traits persist beyond recovery (Wagner et al., 2006). Nonetheless, longitudinal research should be conducted to investigate the temporal sequencing of personality dimensions with eating disorder symptoms and diagnoses.

## **Conclusion**

In summary, we found that women with binge eating reported higher levels of negative urgency and eating disorder psychopathology than women with no history of eating disorders, whereas there was no difference in levels of negative emotionality between the two groups. We also found a significant indirect effect of negative emotionality on eating disorder psychopathology via negative urgency. However, this indirect effect did not differ based on

group membership. Our findings support a model in which a tendency toward negative emotionality, coupled with a tendency to engage in rash action when experiencing negative emotions, may be associated with eating disorder psychopathology in women with and without eating disorders characterized by binge eating.

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## Appendix A

### Comparison of Women with Binge-Eating Disorder vs Bulimia Nervosa

The first step toward examining the heterogeneity of the Binge-Eating group was to compare women with binge-eating disorder vs bulimia nervosa on all study variables. This comparison was important to gain an understanding of the extent to which any group differences may impact study results.

Previous studies have found higher levels of pathology in women with bulimia nervosa than women with binge-eating disorder. Specifically, anxiety and mood disorders predict subsequent onset of bulimia nervosa more strongly than binge-eating disorder, and bulimia nervosa predicts subsequent comorbid psychiatric disorders somewhat more strongly than does binge-eating disorder (Kessler et al., 2013). Further, individuals with bulimia nervosa are arguably engaging in an additional level of disordered eating, compared to those with binge-eating disorder (i.e., purging). Those with bulimia nervosa are also more likely than those with binge-eating disorder to define themselves on the basis of their shape/weight and exhibit greater body image concerns (Grilo et al., 2010; Grilo, Ivezaj, Lydecker, & White, 2019). Finally, women with bulimia nervosa report significantly more dietary restriction behaviors (e.g., eating fewer meals per day, higher frequency of fasting, and consuming small or low calorie meals) than women with binge-eating disorder (Elran-Barak et al., 2015). Therefore, it was important to compare women with these disorders to determine whether those with bulimia nervosa experienced greater pathology than those with binge-eating disorder.

The Binge-Eating group comprised 52 women with binge-eating disorder and 16 women with bulimia nervosa. ANOVAs showed that women with bulimia nervosa had higher BAI and BDI-II scores than women with binge-eating disorder. Women with bulimia nervosa also

reported higher MPQ-NE, UPPS-NU, and EDE-Q scores than did women with binge-eating disorder (see Table A1). After controlling for BMI and BAI and BDI-II scores, the group differences in UPPS-NU ( $F(1,60)=5.44, p=.02$ ) and EDE-Q scores ( $F(1,60)=4.30, p=.04$ ) were maintained, but the group difference in MPQ-NE score was no longer significant,  $F(1,60)=0.29, p=.59$ . These findings are consistent with previous evidence showing that women with bulimia nervosa report greater pathology than women with binge-eating disorder (e.g., Elran-Barak et al., 2015; Grilo et al., 2019; Kessler et al., 2013). Therefore, the inclusion of women with bulimia nervosa may have elevated the mean level of depression and anxiety symptoms and levels of negative urgency and eating disorder psychopathology in the Binge-Eating group. However, there were no differences in frequency of lifetime mood, anxiety, or substance use disorders between through groups, except a larger proportion of women with bulimia nervosa reported lifetime non-alcohol substance abuse than women with binge-eating disorder (see Table A2). As the goal was to examine the extent to personality and impulsivity traits interact in individuals with clinical levels of binge eating (regardless of whether they also engaged in purging behavior), we concluded it was appropriate to group these individuals together.

Table A1

*Group Differences of Women with Binge-Eating Disorder vs Bulimia Nervosa (N=68)*

Variable	Binge-Eating Disorder	Bulimia Nervosa	<i>F</i>	<i>p</i>
	( <i>n</i> =52)	( <i>n</i> =16)		
	<i>M (SD)</i>	<i>M (SD)</i>		
BMI (kg/m <sup>2</sup> )	32.07 (10.45)	30.17 (10.23)	0.40	.53
BAI Score	17.08 (11.76)	26.38 (14.20)	6.93	.01*
BDI-II Score	20.94 (11.52)	33.75 (15.30)	12.89	.001*
MPQ-NE Score	92.70 (17.32)	102.40 (13.63)	4.21	.04
UPPS-NU Score	34.52 (6.14)	40.44 (5.60)	11.83	.001*
EDE-Q Score	3.20 (1.12)	4.24 (1.14)	10.38	.002*

*Note.* BMI=Body mass index; BAI = Beck Anxiety Inventory score; BDI-II = Beck Depression Inventory-II score; MPQ-NE = Multidimensional Personality Questionnaire-Negative Emotionality score; UPPS-NU = UPPS-Negative Urgency score; EDE-Q = Eating Disorder Examination Questionnaire score.

\*  $p < .01$ .

Table A2

*Lifetime SCID-IV Anxiety, Mood, and Substance Use Diagnoses in Women with Binge-Eating Disorder vs Bulimia Nervosa (N=68)*

Disorder	Binge-Eating Disorder	Bulimia Nervosa	$\chi^2$	<i>p</i>
	( <i>n</i> =52)	( <i>n</i> =16)		
	%	%		
Major Depressive Episode	69.23	81.25	2.33	.31
Specific Phobia	25.00	25.00	0.00	1.00
Alcohol Dependence	26.92	43.75	1.83	.40
Non-Alcohol Substance Abuse	23.10	50.00	4.27	.04*
Social Phobia	21.15	25.00	0.11	.75
Posttraumatic Stress Disorder	17.31	31.25	1.46	.23
Non-Alcohol Substance Dependence	15.38	25.00	4.27	.12
Panic Disorder	11.54	31.25	3.51	.06
Generalized Anxiety Disorder	13.46	12.50	0.01	.92
Obsessive Compulsive Disorder	3.85	18.75	3.99	.89
Panic Disorder with Agoraphobia	7.69	18.75	1.62	.20
Agoraphobia Without Panic Disorder	1.92	6.25	0.80	.37
Hypomanic Episode	1.92	0.00	0.31	.58
Manic Episode	1.92	0.00	0.31	.58
Dysthymia	0.00	6.25	3.30	.07

*Note.* As per SCID-IV guidelines, interviewers only completed the Generalized Anxiety Disorder section if the participant did not meet diagnostic criteria for any other anxiety disorder. SCID-IV = Structured Clinical Interview for DSM-IV Axis-I.

\* *p* < .05.

## Appendix B

### Comparison of Women with Full vs Subthreshold Eating Disorder Diagnoses

The first step toward examining the heterogeneity of the Binge-Eating group was to compare women with full vs subthreshold eating disorder diagnoses all study variables. This was important to gain an understanding of the extent to which it was appropriate to group participants with these diagnoses. Previous research indicates that those with subthreshold eating disorder diagnoses report increased distress, impairment, and treatment seeking than controls (Crow et al., 2002; Mond et al., 2006; Stice, Marti, Shaw, & Jaconis, 2009) and may not be clinically significantly different from those with threshold eating disorders (Wade & O'Shea, 2015).

In the Binge-Eating group, 54 women met full DSM-5 criteria for either bulimia nervosa or binge-eating disorder and 14 women were assigned subthreshold diagnoses. No group differences were found on any of the main study variables (see Table B1). Further, there were no group differences in lifetime mood, anxiety, or substance use disorders, except a larger proportion of women who met subthreshold criteria reported higher lifetime generalized anxiety disorder than women who met full criteria. The fact that the only difference between the groups was in lifetime rates of generalized anxiety disorder indicates that it was appropriate to characterize women with subthreshold eating disorders as experiencing clinical levels of binge eating.

Table B1

*Group Differences of Women with Full vs Subthreshold Eating Disorder Diagnoses (n=68)*

Variable	Full	Subthreshold	<i>t</i>	<i>p</i>
	( <i>n</i> =54)	( <i>n</i> =14)		
	<i>M (SD)</i>	<i>M (SD)</i>		
BMI (kg/m <sup>2</sup> )	32.01 (10.84)	30.14 (8.47)	0.68	.09
BAI Score	19.63 (13.10)	17.86 (12.42)	0.47	.62
BDI-II Score	24.46 (14.42)	22.00 (9.59)	0.76	.06
MPQ-NE Score	95.05 (17.89)	94.69 (13.23)	0.09	.29
UPPS-NU Score	35.72 (6.24)	36.64 (7.58)	-0.42	.27
EDE-Q Score	3.57 (1.18)	2.98 (1.19)	1.63	.99

*Note.* Women were included in the Full group if they met diagnostic criteria for bulimia nervosa or binge-eating disorder per DSM-5. They were included in the Subthreshold group if they met subthreshold eating disorder diagnoses per DSM-5 due to binge eating frequency of less than one binge eating episode per month for six months or, in the case of one participant, endorsing two of three necessary binge eating descriptors. BMI = Body mass index; BAI = Beck Anxiety Inventory score; BDI-II = Beck Depression Inventory-II score; MPQ-NE = Multidimensional Personality Questionnaire-Negative Emotionality score; UPPS-NU = UPPS-Negative Urgency score; EDE-Q = Eating Disorder Examination Questionnaire score.

Table B2

*Lifetime SCID-IV Anxiety, Mood, and Substance Use Diagnoses in Women with Full and Subthreshold Eating Disorders (N=68)*

Disorder	Full	Subthreshold	$\chi^2$	<i>p</i>
	( <i>n</i> =54)	( <i>n</i> =14)		
	%	%		
Major Depressive Episode	70.37	78.57	1.97	.37
Alcohol Dependence	29.62	35.71	0.42	.81
Non-Alcohol Substance Abuse	27.78	35.71	0.34	.56
Specific Phobia	27.78	14.29	1.08	.30
Social Phobia	25.93	7.14	2.28	.13
Posttraumatic Stress Disorder	20.37	21.43	0.01	.93
Non-Alcohol Substance Dependence	16.67	21.42	4.20	.12
Panic Disorder	14.81	21.43	0.36	.55
Generalized Anxiety Disorder	7.41	35.71	7.76	.01*
Panic Disorder with Agoraphobia	11.11	7.14	0.19	.66
Obsessive Compulsive Disorder	5.56	14.29	1.24	.27
Agoraphobia Without Panic Disorder	3.70	0.00	0.53	.47
Hypomanic Episode	1.85	0.00	0.26	.61
Manic Episode	1.85	0.00	0.26	.61
Dysthymia	1.85	0.00	0.26	.61

*Note.* As per SCID-IV guidelines, interviewers only completed the Generalized Anxiety Disorder section if the participant did not meet diagnostic criteria for any other anxiety disorder. SCID-IV = Structured Clinical Interview for DSM-IV Axis-I.

\*  $p < .05$ .

## Appendix C

### Certification of Institutional Ethics Review

7/6/2019

<https://iriss.ucalgary.ca/IRISSPROD/sd/Doc/0/JDMLMIAMB1GKJA7469JL4CI251/fromString.html>


Conjoint Faculties Research Ethics Board  
 Research Services Office  
 2500 University Drive, NW  
 Calgary AB T2N 1N4  
 Telephone: (403) 220-4283/6289  
[cfreb@ucalgary.ca](mailto:cfreb@ucalgary.ca)

#### CERTIFICATION OF INSTITUTIONAL ETHICS REVIEW

The Conjoint Faculties Research Ethics Board (CFREB), University of Calgary has reviewed and approved the below research. The CFREB is constituted and operates in accordance with the current version of the *Tri-Council Policy Statement: Ethical Conduct for Research Involving Humans* (TCPS).

Ethics ID: REB18-1215  
 Principal Investigator: Kristin Von Ranson  
 Co-Investigator(s): There are no items to display  
 Student Co-Investigator(s): Chantelle Magel  
 Study Title: Personality and Impulsivity in Women Who Binge Eat  
 Sponsor:

**Effective:** Thursday, September 13, 2018

**Expires:** Friday, September 13, 2019

**Restrictions:**

**This Certification is subject to the following conditions:**

1. Approval is granted only for the research and purposes described in the application.
2. Any modification to the approved research must be submitted to the CFREB for approval.
3. An annual application for renewal of ethics certification must be submitted and approved by the above expiry date.
4. A closure request must be sent to the CFREB when the research is complete or terminated.

**Approved By:**

[John H. Ellard, PhD, Chair](#), CFREB

**Date:**

Thursday, September 13, 2018

*Note: This correspondence includes an electronic signature (validation and approval via an online system).*

Appendix D  
Informed Consent Document



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**Name of Researcher, Faculty, Department, Telephone & Email:**

Kristin M. von Ranson, Ph.D., Faculty of Arts, Department of Psychology, [kvonrans@ucalgary.ca](mailto:kvonrans@ucalgary.ca), 403-210-9438

Chantelle Magel, M.Sc. student, Faculty of Arts, Department of Psychology, [eating@ucalgary.ca](mailto:eating@ucalgary.ca), 403-210-9438

**Title of Project:**

Personality and Impulsivity in Women Who Binge Eat

---

This consent form, a copy of which has been given to you, is only part of the process of informed consent. If you want more details about something mentioned here, or information not included here, you should feel free to ask. Please take the time to read this carefully and to understand any accompanying information.

The University of Calgary Conjoint Faculties Research Ethics Board has approved this research study. Participation is completely voluntary and confidential. You will be given a number code and will not be identified by name. You are free to discontinue participation at any time during the study.

**Purpose of the Study**

Eating disorders are caused by interacting cultural, familial, and biological factors. The purpose of this study is to evaluate personality characteristics in people with different kinds of eating problems and people without eating problems. You have been asked to participate in this study either because you are a woman who is currently experiencing symptoms of binge-eating disorder or bulimia nervosa, or because you have no history of an eating disorder.

**What Will I Be Asked To Do?**

Participation in this study involves completing a clinical interview and a number of questionnaires. We would also like to have your permission to contact you in the future to ask how you are doing, or to invite you to participate in another study, which would be explained to you and in which you could either agree or refuse to participate. We will ask you to indicate on this form whether you give

permission for us to contact you in the future.

During the interview, we will ask you about psychological symptoms and any recent problems you may have experienced. The questionnaires focus on what you are like in general, your likes and dislikes, as well as various aspects of your personality and your level of impulsivity. The questionnaires also ask about your eating behaviors, and symptoms of depression and anxiety.

The interviews and questionnaires will all be completed during this session and will take approximately one-and-a-half to two hours in total to complete. Questions may address sensitive topics, including those regarding your current and past mental state, and may possibly be uncomfortable. As a result of participating, you may experience transient distress. If so, note that a list of community mental health resources is appended to this form. If there are any questions you would prefer not to answer, that is fine; just tell us. Part of the interview may be audio recorded so that we can go back and make sure that our information is correct. We will ask you to indicate on this form whether you give permission for us to record the interview. Recordings will be erased once they are reviewed.

Participation is completely voluntary. You may refuse to participate altogether, may refuse to participate in parts of the study, may decline to answer any and all questions, and may withdraw from the study at any time without penalty.

### **What Type of Personal Information Will Be Collected?**

Should you agree to participate, you will be asked to provide your age, year of birth, phone number, and email address.

Should you provide your consent, we will audio record your interview. All recordings will be kept on a secure server, accessible only to the principal investigator (Dr. von Ranson) and study personnel. You will be given a number code and will not be identified by name. Recordings will be labeled with an ID number and will be retained until any group data is published.

I grant permission to be audio-recorded:

Yes: \_\_\_ No: \_\_\_

### **Are there Risks or Benefits if I Participate?**

Participation in this study does not involve risk or discomfort other than the personal nature of some of the questions. It has the potential to detect any emotional difficulties you may be experiencing, and it may benefit other people by improving our ability to identify who is at higher risk for developing an eating disorder. We have attached a compilation of community mental health resources that you may utilize, should you wish to obtain additional support.

You might gain a better understanding of your psychological symptoms through the questions asked. We will also be available to answer questions about eating disorders. The information we get from this study may help us to provide better treatments in the future for individuals who binge eat. Further, following participation in this study, you will have the option to be entered into a draw to win a \$100 Amazon gift certificate. If you choose to withdraw from the study at any time, you will still have the option to be entered into the draw. If you are completing an in-person assessment, you will also be

offered a \$10 gift card.

### **What Happens to the Information I Provide?**

No one except the researchers will be allowed to see or hear any of the answers to the questionnaire or the interview recording. There are no names on the questionnaires. Only group information will be summarized for any presentation or publication of results. Information you provide is kept in secure files only accessible by the researchers. Anonymous data will be stored indefinitely on a computer disk. This anonymous data may be used in future studies; only aggregate results, and not individual data, will be used in any resulting publications or presentations.

Are you interested in being contacted in the future, so we can ask how you are doing? The purpose of this would be to potentially collect follow-up data to be used to explore symptom changes over time.

Yes: \_\_\_ No: \_\_\_

Are you interested in being contacted in the future, so we can ask if you might be interested in participating in a different research study? Should you consent, we may contact you to participate in future studies.

Yes: \_\_\_ No: \_\_\_

---

### ***Signatures***

Your signature on this form indicates that 1) you understand to your satisfaction the information provided to you about your participation in this research project, and 2) you agree to participate in the research project.

In no way does this waive your legal rights nor release the investigators, sponsors, or involved institutions from their legal and professional responsibilities. You are free to withdraw from this research project at any time. You should feel free to ask for clarification or new information throughout your participation.

Participant's Name: (please print) \_\_\_\_\_

Participant's Signature: \_\_\_\_\_ Date: \_\_\_\_\_

Researcher's Name: (please print) \_\_\_\_\_

Researcher's Signature: \_\_\_\_\_ Date: \_\_\_\_\_

### **Questions/Concerns**

If you have any further questions or want clarification regarding this research and/or your participation, please contact:

Dr. Kristin von Ranson or Ms. Chantelle Magel  
 Department of Psychology  
[eating@ucalgary.ca](mailto:eating@ucalgary.ca), 403-210-9438

## Appendix E

### Debriefing Form



#### **Personality and Impulsivity in Women Who Binge Eat: Debriefing**

Thank you very much for participating in our study of personality characteristics in people with and without eating problems. This research project is being conducted to learn more about whether, compared to people without eating problems, people with certain kinds of eating problems tend to have similar kinds of personality traits. Thus, whether you do or do not have eating difficulties, your participation is very important in helping us better understand the role of personality in eating disorders. Previous research has suggested that people with certain kinds of eating problems might have similar personality styles or characteristics. One specific question we are interested in answering is whether people who experience eating binges describe themselves as impulsive in general. Some believe that eating disorders are like addictions, and that both kinds of problems might involve high levels of impulsivity. However, researchers have not yet systematically examined whether people who binge eat regularly are actually more impulsive than people who do not binge eat. To answer this and other questions, we will combine the interview and questionnaire responses of individual study participants and compare group responses. Particularly since some treatments for eating disorders use an addiction framework, this question has important implications. Another implication of this research is that eventually we may be able to help identify personality characteristics of people who are at elevated risk for developing eating problems. Together with other research, what we learn from this study may help in the development of better ways to prevent eating disorders from occurring.

Once again, thank you for your participation in this study. Research would not be possible without your contribution of time and energy!

*Please seek professional help if you are experiencing distress related to your eating habits or mental health.*

*In Calgary:*

**Distress Centre Calgary:** <http://www.distresscentre.com>, 403-266-HELP (4357)

**Calgary Access Mental Health: 403-943-1500**

*Outside Calgary, the following resources may assist you to find services in your area:*

**National Eating Disorder Information Centre (NEDIC) Helpline: 1-866-633-4220**

**Canadian Mental Health Association:** <http://www.cmha.ca/get-involved/find-your-cmha>

If you have any questions or concerns about this study or issues that arose during the study, please contact:

Chantelle Magel, M.Sc. student  
Department of Psychology, Faculty of Arts  
eating@ucalgary.ca

*or*

Dr. Kristin von Ranson  
Department of Psychology, Faculty of Arts  
kvonrans@ucalgary.ca

## NEGATIVE EMOTIONS, IMPULSIVITY, AND BINGE EATING

## Appendix F

## Lifetime SCID-IV Anxiety, Mood, and Substance Use Diagnoses

Disorder	Binge- Eating ( <i>n</i> =68)	Control ( <i>n</i> =75)	Overall Sample ( <i>n</i> =143)	$\chi^2$	<i>p</i>
Major Depressive Episode	72.06	32.00	51.05	27.28	<.001**
Specific Phobia	25.00	14.67	19.58	4.02	.13
Alcohol Dependence	30.88	5.33	17.48	16.22	<.001**
Non-Alcohol Substance Abuse	29.41	4.00	16.08	14.81	<.001**
Social Phobia	22.06	6.67	13.99	7.02	.01*
Posttraumatic Stress Disorder	20.59	5.33	12.59	7.54	.01*
Non-Alcohol Substance Dependence	17.65	5.33	11.19	6.71	.04*
Panic Disorder	16.18	2.67	9.09	7.88	.01*
Generalized Anxiety Disorder	13.24	4.00	8.39	3.96	.05
Obsessive Compulsive Disorder	7.53	8.00	7.69	0.02	.89
Panic Disorder with Agoraphobia	10.29	1.33	5.59	5.42	.02*
Agoraphobia Without Panic Disorder	2.94	1.33	2.10	0.50	0.50
Hypomanic Episode	1.47	2.67	2.10	0.25	.62
Manic Episode	1.47	0.00	0.70	1.11	.29
Dysthymia	1.47	0.00	0.70	1.11	.29

*Note.* As per SCID-IV guidelines, interviewers only completed the Generalized Anxiety Disorder section if the participant did not meet diagnostic criteria for any other anxiety disorder. SCID-IV = Structured Clinical Interview for DSM-IV Axis-I.

\*  $p < .05$ . \*\*  $p < .001$ .

## NEGATIVE EMOTIONS, IMPULSIVITY, AND BINGE EATING

## Appendix G

Participants Recruited by Canadian City ( $N=143$ )

City	<i>n</i>	%
Calgary, AB	99	69.23
Ottawa, ON	7	4.90
Vancouver, BC	7	4.90
Winnipeg, MB	6	4.20
Halifax, NS	5	3.50
Edmonton, AB	4	2.80
Toronto, ON	4	2.80
Charlottetown, PEI	2	1.40
St. John, NB	2	1.40
Cardinal, ON	1	0.70
Coquitlam, BC	1	0.70
Kelowna, BC	1	0.70
Maple Ridge, BC	1	0.70
Riverside, NB	1	0.70
Saskatoon, SK	1	0.70
Surrey, BC	1	0.70