An examination of emotion-related facets of impulsivity in binge eating disorder

Therese E. Kenny[1], Christopher Singleton, Jacqueline C. Carter*

Department of Psychology, Memorial University of Newfoundland, St. John's, NL A1B 3X9, Canada

ABSTRACT

Objective: While research suggests a positive association between negative urgency (NU) and binge eating, the association between positive urgency (PU) and binge eating has been less well studied. Moreover, few studies have examined NU and PU in binge eating disorder (BED). The present study examined Whiteside and Lynam's (2001) five facets of impulsivity (including NU and PU) in individuals with BED and a control group with no history of an eating disorder (NED).

Method: Community samples of adults with BED (n = 72) and NED (n = 79) completed self-report measures of impulsivity, eating disorder (ED) psychopathology, and symptoms of depression and anxiety.

Results: The only facet of impulsivity that differed between the groups was NU, with the BED group reporting significantly higher scores on NU than the NED group. Although differences in PU initially emerged, these were no longer significant after controlling for NU. None of the impulsivity subscales predicted binge frequency, but four of the five subscales (NU, perseverance, premeditation, and PU) were significantly related to ED psychopathology.

Discussion: The present findings suggest that those with BED exhibit greater NU than those without BED and that this may play role in BED symptomatology. Furthermore, the association between various impulsivity factors and ED psychopathology suggests that additional research is needed to understand these relationships in BED.

1. Introduction

The five-factor model of impulsivity (Cyders et al., 2007; Whiteside & Lynam, 2001) suggests that impulsive behavior comprises five related, but distinct, dimensions: negative urgency (NU; acting rashly when distressed), lack of premeditation, lack of perseverance, sensation seeking, and positive urgency (PU; acting impulsively when experiencing positive emotions). Of these facets, NU has been most strongly associated with binge eating (Fischer, Smith, & Cyders, 2008). Studies suggest a positive association between NU and binge eating in both clinical (Anestis, Smith, Fink, & Joiner, 2009) and non-clinical (Anestis, Selby, Fink, & Joiner, 2007; Emery, King, & Levine, 2014; Kelly, Cotter, & Mazzeo, 2014) samples. Moreover, women who endorsed a lifetime history of binge eating, loss of control eating, or overeating reported greater NU than women with no reported history of these episodes (Racine et al., 2015). Further, NU predicts treatment outcome in binge eating disorder (BED; Manasse et al., 2016). However, only one study has examined the association between PU and binge eating (Cyders et al., 2007), concluding that PU is not associated with binge eating

(Cyders & Smith, 2008). It is worth noting that the eating disorder (ED) sample in this study consisted of multiple diagnoses (i.e., anorexia, bulimia, and EDNOS). As evidence suggests that the function of binge eating differs across EDs (e.g., Haedt-Matt & Keel, 2011), individuals who engage in binge eating should not be considered a homogenous group. Therefore, the current study focused exclusively on individuals with BED.

According to the emotion regulation model of BED, both NU and PU can trigger binge eating in BED. This model theorizes "that any intense emotion, whether it be a negative (e.g., sadness or anger) or positive (e.g., happiness or joy) one, requires the need for skillful emotion regulation" (Safer, 2017, p. 2). In the absence of adaptive regulation skills, it is hypothesized that susceptible individuals may use binge eating to modulate intense emotions (Lavender, 2015; Linehan, 1993; Safer, 2017; Telch, 1997). Based on this model, NU should be elevated in BED, as has been demonstrated in previous studies. This model, however, also predicts elevated PU in BED (Safer, 2017). Although PU was not associated with binge eating in an ED sample (Cyders et al., 2007), PU has been shown to predict eating concerns (Stojek, Fischer,

Murphy, & MacKillop, 2014) and disordered eating (Dir, Karyadi, & Cyders, 2013) among individuals who demonstrated heavy drinking and non-suicidal self-injury, respectively. Clinical evidence also suggests that positive emotions can trigger binge eating (Safer, Adler, & Masson, 2018). However, PU has yet to be examined in a BED sample, and additional research is necessary to characterize the association between PU and BED symptomatology.

The goals of the current study were: (1) to examine differences in impulsivity facets between those with BED and those with no history of an eating disorder (NED); (2) to replicate previous findings that NU is associated with binge eating in BED; (3) to examine the association between the other four dimensions of impulsivity (i.e., premeditation, lack of perseverance, sensation seeking, and PU) and binge eating in BED; and (4) to extend previous research by examining the relationship between the five facets of impulsivity and other aspects of ED psychopathology in BED.

2. Method

2.1. Participants

Adults who met criteria for BED according to the *Diagnostic and Statistical Manual of Mental Disorders* (DSM-5) were recruited for participation in a treatment trial. Adults with no self-reported history of an ED and who scored below the cut-off on the SCOFF screening tool for EDs (Hill, Reid, Morgan, & Lacey, 2010; Morgan, Reid, & Lacey, 1999) were recruited to form a NED control group. Both groups were recruited from the community via posters and media advertisements (see Kenny, Singleton, & Carter, 2017 for full description of recruitment procedures). The local Health Research Ethics Board approved this study.

2.2. Procedure

After completing an online screening questionnaire, eligible participants were sent an informed consent form and link to the study questionnaires via Qualtrics. Consent was implied by completion of the questionnaires. For individuals in the BED group, BED diagnosis was confirmed via telephone EDE interview. There were no missing responses for any online survey questionnaire items or EDE interview items.

2.3. Measures

2.3.1. Telephone interview

The *Eating Disorder Examination 17.0* (EDE; Fairburn, Cooper, & O'Connor, 2014) was administered over the phone to confirm BED diagnosis and to determine the number of objective binge episodes (OBEs) in the previous 28 days. Only items necessary for a diagnosis of BED were administered. The psychometric properties of the EDE are well established (Berg, Peterson, Frazier, & Crow, 2012; Rizvi, Peterson, Crow, & Agras, 2000). Although inter-rater reliability was not assessed in the current study, any unclear items were discussed with the research team until consensus was reached.

2.3.2. Self-report measures

The EDE-Q Global score[2] (Fairburn & Beglin, 2008) was used as a measure of ED psychopathology ($\alpha = 0.84$). Impulsivity facets ($\alpha = 0.85$–0.95) were assessed using the *UPPS-P Impulsive Behavior Scale* (Lynam, Smith, Cyders, Fischer, & Whiteside, 2007). Self-reported anxiety and depression were assessed using the *Brief Symptom Inventory* (BSI; Derogatis & Melisaratos, 1983) Depression ($\alpha = 0.88$) and Anxiety

($\alpha = 0.87$) subscales.

2.4. Data analysis

Age and BMI were compared across groups using one-way analyses of variance (ANOVAs) with post-hoc Tukey tests. EDE-Q Global, BSI Anxiety, and BSI Depression scores were compared using analyses of covariance (ANCOVA), including BMI and age as covariates. We also compared groups on UPPS-P subscales using ANCOVAs, with BMI, age, and BSI Anxiety and Depression as covariates. Follow-up analyses included NU and PU as covariates given the correlation between NU and PU ($r = 0.677$). Pearson bivariate correlations were computed to determine the association between the five UPPS-P subscales, binge eating (log-transformed to produce a normal distribution), and EDE-Q Global score in the BED group only. Two-tailed Fischer's r-to-z tests[3] were computed using an online generator (http://quantpsy.org/corrtest/corrtest2.htm; Lee & Preacher, 2013) to determine whether the correlations differed significantly from each other. Significance was determined at $\alpha = 0.05$.

3. Results

3.1. Participants

Seventy-two participants met DSM-5 diagnostic criteria for BED (93.1% female) and 79 reported NED. In the NED group, 39 (49%) individuals reported a BMI between 18.5 and 25 kg/m² (normal weight group [NW-NED]; 79.1% female) and 40 (51%) reported a BMI of 25 kg/m² or greater (overweight group [OW-NED]; 87.5% female). Descriptive statistics are presented in Table 1.

3.2. Impulsivity subscales

After controlling for BMI, age, BSI depression, and BSI anxiety, there were significant differences across groups on NU, $F(2, 144) = 11.04$, $p < .0005$, $\eta_p^2 = 0.13$, and PU, $F(2, 144) = 5.83$, $p = .004$, $\eta_p^2 = 0.08$ (Table 1). Individuals in the BED group reported greater NU and PU compared to individuals in the NW-NED, $p < .005$, and OW-NED, $p < .009$, groups. Effect sizes were large for NU (*Cohen's d* = 0.82–0.89) and moderate for PU (*Cohen's d* = 0.56–0.58). The BED and NED groups did not differ on the premeditation, $F(2,144) = 1.76$, $p = .17$, perseverance, $F(2,144) = 1.82$, $p = .16$, or sensation seeking, $F(2,144) = 0.72$, $p = .49$, subscales.

Since, theoretically, NU and PU could capture overlapping variance (Cyders & Smith, 2008), we conducted two follow-up ANCOVAs to determine whether between-group NU and PU differences would remain significant after controlling for the other variable. After controlling for PU, NU was still significantly higher in the BED group, $F(2, 143) = 5.03$, $p = .008$, $\eta_p^2 = 0.07$. However, PU was no longer significantly different across groups after controlling for NU, $F(2,143) = 0.24$, $p = .79$.

3.3. Bivariate correlations

Bivariate correlations between UPPS-P subscales, binge frequency, and EDE-Q Global score are presented in Table 2 for the BED group only. All UPPS-P subscales, except sensation seeking, were significantly positively associated with ED psychopathology. The correlation

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[2] Global score was computed using a 7-item, 3-factor version of the EDE-Q that has been validated in samples with BED (Grilo et al., 2010). Values may not correspond to established EDE-Q norms.

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[3] Since the correlations being compared involved a common variable (i.e., binge eating or EDE-Q), the Fischer's r-to-z tests were conducted to account for the level of correlation between the other two variables. The online generator then used equations described by Steiger (1980) to compute the asymptotic covariance matrix. Values were compared using an asymptotic z-test (Lee & Preacher, 2013).

Table 1
Descriptive statistics for NW-NED, OW-NED, and BED groups.

	Group		
	NW-NED (n = 39) Mean (SD)	OW-NED (n = 40) Mean (SD)	BED (n = 72) Mean (SD)
Participant characteristics			
BMI	21.94 (1.81)[a]	31.07 (4.68)[b]	37.55 (9.57)[c]
Age	31.18 (12.67)[a]	36.50 (14.22)[ab]	40.56 (11.45)[b]
OBEs	N/A	N/A	17.18 (16.91)
Clinical characteristics[1]			
EDE-Q Global	2.06 (1.40)[a]	3.24 (1.48)[b]	4.46 (0.93)[c]
Facets of impulsivity[2]			
UPPS-P			
Negative urgency	2.06 (0.60)[a]	2.22 (0.68)[a]	2.80 (0.52)[b]
Positive urgency	1.48 (0.50)[a]	1.59 (0.57)[a]	2.00 (0.67)[b]
Premeditation	1.86 (0.37)	1.82 (0.39)	2.05 (0.54)
Perseverance	1.95 (0.52)	1.90 (0.50)	2.22 (0.57)
Sensation Seeking	2.50 (0.61)	2.38 (0.62)	2.10 (0.61)

Note. Different superscripts indicate differences across groups after controlling for relevant covariates. BMI = body mass index (kg/m^2); OBE = objective binge episodes over the previous 28 days as measured by the Eating Disorder Examination interview; EDE-Q = Eating Disorder Examination Questionnaire; NW-NED = control group with no history of an eating disorder reporting a BMI between 18.5 and 25 kg/m^2; OW-NED = control group with no history of an eating disorder reporting a BMI > 25 kg/m^2; BED = binge eating disorder group.
[1] EDE-Q Global score was compared across groups after controlling for BMI and age given that these variables differed across groups.
[2] UPPS-P subscales were compared across groups after controlling for BMI, age, BSI depression score, and BSI anxiety score. Self-reported depression and anxiety were included in the model to control for negative affect, which has previously been associated with NU. There were no significant between-group differences on the UPPS-P Premeditation, Perseverance, and Sensation Seeking subscales.

depression. Given the theoretical overlap between NU and negative affect these findings suggest that individuals with BED experience elevated NU above and beyond elevated negative affect.

However, in contrast to previous findings (Anestis et al., 2007; Anestis et al., 2009; Farstad et al., 2015; Fischer & Smith, 2008), NU was not significantly associated with binge frequency. This discrepancy could be attributed to different binge eating measures and/or sample characteristics across studies. Binge eating is characterized by two features: (1) objective overeating and (2) loss of control (APA, 2013). Of note, previous studies have used self-report measures, whereby participants may have included eating episodes characterized by loss of control but not objective overeating. While Racine et al. (2015) reported that NU is associated with both aspects of binge eating in a community sample of women with a lifetime history of binge eating, it is possible that NU relates to loss of control eating but not objective binge episodes among individuals diagnosed with BED. Alternatively, the association between NU and binge eating could have been attenuated given that the correlation was only examined in the BED group who likely reported extreme scores (i.e., range restriction).

Individuals with BED also reported greater PU scores than individuals with NED after controlling for BMI, age, anxiety, and depression. When NU was added as a covariate, however, PU scores no longer differed across groups. Moreover, in contrast to predictions of the affect regulation model, PU was not associated with binge eating. Thus, while those with BED may struggle to tolerate negative and positive emotions, difficulties managing negative emotions could have a more pronounced impact on BED symptomatology, consistent with evidence that NU predicts BED treatment outcome (Manasse et al., 2016).

In addition to the association between impulsivity and binge eating, we also looked at the association between impulsivity and other aspects of ED psychopathology. All of the UPPS-P subscales, aside from sensation seeking, were positively associated with ED psychopathology.

Table 2
Bivariate correlations between UPPS-P subscales and measures of ED pathology in participants with BED.

	1	2	3	4	5	6	7
1. EDE-Q Global score	–						
2. Binge frequency	0.244*	–					
3. NU	0.456***	0.121	–				
4. Premeditation	0.222*	0.108	0.344**	–			
5. Perseverance	0.289**	0.106	0.447***	0.639***	–		
6. Sensation Seeking	−0.120	−0.097	0.085	0.396**	0.100	–	
7. PU	0.252*	0.082	0.677***	0.494***	0.498***	0.296*	–

Note. EDE-Q = Eating Disorder Examination Questionnaire; NU = negative urgency; PU = positive urgency; binge frequency refers to the number of objective binge episodes reported in the previous 28 days. Binge frequency has been log-transformed to produce a normal distribution.
* Indicates $p < .05$.
** Indicates $p < .01$.
*** Indicates $p < .0005$.

between EDE-Q Global score and NU was stronger than that between EDE-Q Global score and PU, $z = 2.31$, $p = .021$. In addition, the correlation between Sensation Seeking and EDE-Q Global score was significantly lower than the correlations between all other UPPS-P subscale scores and EDE-Q Global score, $p < .009$. None of the UPPS-P subscales were significantly associated with binge frequency over the previous month.

4. Discussion

This study examined facets of impulsivity across individuals with and without BED. Individuals with BED reported significantly greater NU and PU compared to individuals with NED, but not premeditation, perseverance, and sensation seeking. Importantly, individuals with BED reported greater NU after controlling for self-reported PU, anxiety, and

NU was more strongly associated with ED psychopathology than PU, consistent with the assertion that NU plays a more prominent role in BED. Though the correlations for the other subscales (i.e., perseverance, premeditation, and sensation seeking) and EDE-Q Global score were also weaker than that between NU and EDE-Q Global score, only the difference between NU and sensation seeking was significant. This pattern resembles parallels a meta-analysis by Fischer et al. (2008), in which NU was the impulsivity facet most strongly associated with bulimic behaviors in bulimia nervosa. Here we demonstrate that a similar pattern may be observable between NU and ED psychopathology in BED. These findings notwithstanding, it is worth noting that half of the items on the NU subscale do not include an emotional valence (e.g., "I have trouble resisting cravings"), which may bring the construct validity of this subscale into question.

This study had a number of limitations. First, it was a cross-sectional

and correlational analysis. Longitudinal research is necessary to determine the direction and temporal nature of the relationship between impulsivity and binge eating in BED. Second, there are many conceptualizations of impulsivity. Including multiple self-report and behavioral measures of impulsivity will be important for future studies. Nevertheless, the current findings suggest that both PU and NU may be elevated in BED, although only NU was significantly associated with binge eating.

Acknowledgements

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