



## Moderators of post-binge eating negative emotion in eating disorders

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### ABSTRACT

The purpose of this study was to test the impact of two variables on post-binge eating negative emotion in a combined sample of women with anorexia nervosa (AN;  $n = 47$ ) and bulimia nervosa (BN;  $n = 121$ ). Participants completed two weeks of an ecological momentary assessment protocol during which they provided multiple daily ratings of overall negative affect and guilt and reported eating disorder behaviors including binge eating and self-induced vomiting. The results indicate that both overall negative affect and guilt exhibited a statistically significant decrease in the hour immediately following binge eating episodes. The decrease in guilt, but not overall negative affect, was moderated by eating disorder diagnosis and the tendency to engage in self-induced vomiting. Specifically, individuals with BN reported a greater reduction in guilt than those with AN, and individuals who did not typically engage in self-induced vomiting reported more decreases in guilt than those who typically engaged in self-induced vomiting. This study extends the existing literature on the relationship between negative affect and eating disorder behaviors, suggesting guilt as a potentially relevant facet of negative affect in the maintenance of binge eating. In addition, the findings indicate that two individual differences, eating disorder diagnosis and self-induced vomiting, may influence the trajectory of guilt following binge eating episodes.

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### 1. Introduction

Binge eating is characterized by two key features: (1) eating within a discrete period of time an amount of food that is much more than what most others would eat under similar circumstances; and (2) a subjective experience of loss of control over eating (APA, 2000). It occurs across eating disorder diagnoses, in individuals with other psychiatric diagnoses, and in non-clinical populations (e.g., Hudson et al., 2007; McElroy et al., 2011). Binge eating is a core diagnostic feature of binge eating disorder and bulimia nervosa (BN) and may also be present in anorexia nervosa (AN). Binge eating in AN and BN is often accompanied by compensatory behaviors (e.g., self-induced vomiting, misuse of laxatives/diuretics, dietary restriction, excessive exercise) in an attempt to prevent weight gain, and these compensatory behaviors are thought to be associated with the body weight and shape concerns (i.e., fear of weight gain in AN and overvaluation of weight/

shape in AN and BN) that characterize these disorders (Fairburn, 2008).

Given that many individuals with AN and BN exhibit a consistent pattern of binge eating despite the presumably distressing nature of the behavior and its consequences in eating disorder populations, researchers have sought to understand the processes underlying the maintenance of binge eating. In particular, affect regulation models have received substantial attention in empirical studies testing the idea that binge eating is maintained via negative reinforcement (i.e., reduction of aversive affective states). For instance, both Heatherton and Baumeister's (1991) *Escape Theory* and the recently proposed emotional dysregulation model of AN (Haynos and Fruzzetti, 2011) suggest that binge eating results in temporary reductions in negative affect. Consistent with these theories, an extensive body of research indicates that binge eating is more likely to occur during states of elevated negative affect (e.g., Crosby et al., 2009; Engelberg et al., 2007; Hilbert and Tuschen-Caffier, 2007; Smyth et al., 2007). In addition, the two largest studies assessing momentary affective states in the natural environment in AN (i.e., Engel et al., 2010) and BN (i.e., Smyth et al.,

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2007) indicate that negative affect decreases over the 4 h following binge eating episodes. However, a recent meta-analysis of negative affect immediately pre- and post-binge eating in BN suggested that negative affect may increase after episodes of binge eating (Haedt-Matt and Keel, 2011). It is possible that there are individual differences that moderate affective changes following binge eating episodes. Specifically, some individuals with eating disorders may tend to experience a reduction in negative affect following binge eating while others do not, making it difficult to broadly characterize the function of binge eating in individuals with eating disorders.

The objective of this study was to test two individual difference variables that may account for variability in post-binge eating negative affect using data drawn from two ecological momentary assessment (EMA) studies, which have been described previously (Engel et al., 2010; Smyth et al., 2007). Specifically, two theoretically relevant moderators of post-binge eating changes in negative affect were examined: (a) eating disorder diagnosis (AN and BN) and (b) propensity to engage in compensatory self-induced vomiting. Additionally, we sought to extend the existing literature on affect and binge eating by comparing overall negative affect and the specific facet of guilt, both of which are of particular conceptual relevance to binge eating (e.g., Sanftner and Crowther, 1998). While negative affect is a broad construct comprised of several distinct affective states, guilt, a specific facet of negative affect, is a complex emotion that is elicited by a cognitive process of self-evaluation that is driven by the belief that one could have prevented a negative outcome by exerting greater behavioral control (Schmader and Lickel, 2006; Tilghman-Osborne et al., 2010). Given that binge eating is a behavior that is defined in large part by loss of control, guilt may be of central importance to emotional experiences following binge eating. In contrast, negative affect includes guilt and other more basic emotions (e.g., sadness, fear) for which cognitive processes are less central (Lewis, 2008). As such, the affective impact of binge eating may be stronger for emotions that depend more heavily on self-evaluative processes (e.g., guilt). Thus, compared to the broader construct of negative affect, the facet of guilt may be more specifically influenced by binge eating.

## 2. Method

### 2.1. Participants

Participants came from two EMA studies, one in women with AN (data collected in Fargo, Minneapolis, Chicago; Engel et al., 2010) and one in women with BN (data collected in Fargo; Smyth et al., 2007). Demographics and information regarding the severity of illness and psychosocial functioning are displayed in Table 1. Participants were required to be female and at least 18 years of age and meet Diagnostic and Statistical Manual of Mental Disorders (DSM-IV; APA, 2000) criteria for BN, full-threshold AN, or sub-threshold AN (meeting all AN criteria except: (1) Criteria B-D, but BMI 17.6–18.5, (2) Criteria A-C, but no amenorrhea, or (3) Criteria A and D, but no body image disturbance and intense fear of gaining weight or becoming fat). Only participants who reported engaging in binge eating and had at least one affect rating within 1 h post-binge eating episode while enrolled in the study procedures were included in the present study. This requirement resulted in 121 women with BN, which represents 92.4% of the original sample of 131 participants. For AN, 47 women were included (15 restricting type,<sup>1</sup> 32 binge eating-purging type), which represents 39.8% of the

**Table 1**  
Participant demographics.

	Anorexia nervosa (n = 47)		Bulimia nervosa (n = 120–121 <sup>1</sup> )		
	M	SD	M	SD	
Age (years)	25.68	8.27	25.21	7.55	
BMI (kg/m <sup>2</sup> ) <sup>a</sup>	16.99	0.95	24.00	5.21	
EDE global	3.08	1.20	3.27	1.13	
EDE restraint	3.15	1.49	3.00	1.56	
EDE eating concern	2.57	1.30	2.28	1.38	
EDE shape concern	3.34	1.53	3.78	1.32	
EDE weight concern <sup>a</sup>	3.26	1.59	4.00	1.39	
		n	%	n	%
Ethnicity (Caucasian)		45	95.74	116	96.67
Marital status (single/never married)		31	65.96	79	65.83
Education (any post-secondary)		42	89.36	106	88.33

Note. BMI = Body Mass Index; EDE = Eating Disorder Examination interview. <sup>1</sup>Demographic information (except for BMI) is missing for one participant. <sup>a</sup>Diagnostic groups differed significantly in BMI ( $t(165) = 9.15, p < .001$ ) and EDE Weight Concern ( $t(166) = 2.97, p < .01$ ). All other diagnostic comparisons were non-significant ( $p > .05$ ).

original sample of 118 individuals. A total of 27 of these 47 (57.4%) individuals with AN met full DSM-IV criteria, and the remaining met sub-threshold criteria. Additional details about co-occurring diagnoses, treatment history, and symptom severity have been reported elsewhere (Engel et al., 2010; Smyth et al., 2007).

### 2.2. Measures

#### 2.2.1. Diagnostic interview

Structured Clinical Interview for DSM-IV Axis I Disorders, Patient Edition-Eating Disorder Module (SCID-I/P). The SCID-I/P (First et al., 1995) is a semi-structured interview that assesses DSM-IV Axis I disorders and was used to make eating disorder and other Axis I diagnoses. The interview was administered by trained assessors. In the AN sample, a subsample of 30 interviews were rated by an independent assessor for reliability and yielded a kappa coefficient of 0.929. In the BN sample, a subsample of 25 randomly selected interviews was independently rated and yielded a kappa coefficient of 1.00.

Eating Disorders Examination (EDE). The EDE (Fairburn and Cooper, 1995) is a structured interview that provides an index of eating pathology in the form of a global score and four subscales (restraint, eating concern, shape concern, and weight concern). In addition, the frequency of binge eating and purging are assessed over the previous 3 months. The EDE has demonstrated good reliability and validity (Berg et al., 2012; Fairburn, 2008). In the AN sample, 25% of interviews were recorded and rated by a second independent assessor, finding intraclass correlation coefficients for the EDE subscales ranging from 0.894 to 0.997. In the BN sample, 20% of interviews were rated by a second assessor, with intraclass correlation coefficients ranging from 0.65 to 0.98.

#### 2.2.2. EMA measures

Positive and Negative Affect Schedule (PANAS). This measure (Watson et al., 1988; Watson and Clark, 1994) assesses positive affect and negative affect broadly, and a subset of eight negative affect items from the full PANAS-X (afraid, ashamed, disgusted, distressed, nervous, dissatisfied with self, sad, and angry at self) served as a measure of momentary negative affect. These items were selected from several of the lower order emotion scales due to their high factor loadings (Watson and Clark, 1994) and conceptual relevance to eating disorders. Participants rated the extent to which they currently felt each of these emotions on a 5-point scale,

<sup>1</sup> AN restricting type is not characterized by the regular occurrence of episodes of binge eating or purging, although they may occasionally occur (APA, 2000).

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