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## Rumination in patients with binge-eating disorder and obesity: Associations with eating-disorder psychopathology and weight-bias internalization

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### Abstract

Overvaluation of shape and weight in binge-eating disorder (BED) is associated with greater eating-disorder psychopathology and greater weight-bias internalization, which are—in turn—associated with poorer mental and physical health. Little is known, however, about the significance of other cognitive processes, such as rumination, in BED. This study examined rumination and overvaluation of shape/weight with eating-disorder psychopathology and weight-bias internalization among 237 treatment-seeking patients with BED and comorbid obesity. Hierarchical multiple regressions indicated that rumination was associated with eating-disorder psychopathology and weight-bias internalization above and beyond the influence of overvaluation of shape/weight. Findings suggest that, among patients with BED/obesity, rumination is an important cognitive process associated with severity of eating-disorder psychopathology even after accounting for overvaluation of shape/weight. Patients with greater rumination might be more likely to dwell on weight-based discrimination experiences and internalize these negative attitudes. Additional controlled examination could determine whether rumination represents another potential target for BED/obesity treatment.

### Keywords

binge-eating disorder; rumination; overvaluation of shape/weight; stigma; weight-bias internalization

### Introduction

Binge-eating disorder (BED) is characterized by recurrent episodes of binge eating (i.e., eating objectively large amounts of food while experiencing a subjective loss of control over eating) without compensatory behaviors (e.g., vomiting) (American Psychiatric Association, 2013). BED is associated with obesity, heightened risk for obesity-related health problems (Kessler, *et al.*, 2013), and increased psychopathology and psychiatric comorbidity (Hudson, Hiripi, Pope, & Kessler, 2007). Individuals with BED also experience distress about binge eating (Grilo & White, 2011) and impairment across domains of work, home, and

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relationships (Kessler, *et al.*, 2013). Despite the distress and impairment experienced by individuals with BED, relatively little is known about cognitive processes associated with BED psychopathology. Research examining overvaluation of shape and weight (i.e., self-worth based primarily on shape and weight) has shown consistently that among individuals with BED, those who report overvaluation of shape/weight have more severe eating-disorder (ED) psychopathology and psychological distress than those without overvaluation (Grilo, 2013; Grilo, *et al.*, 2008). Moreover, overvaluation of shape/weight is a better indicator of severity than the *DSM-5* severity indicator of binge-eating frequency (Grilo, Ivezaj, & White, 2015), and prospectively predicts and moderates treatment outcomes (Grilo, Masheb, & Crosby, 2012).

Less is known about other cognitive processes that could contribute to ED psychopathology. Rumination, a cognitive pattern that involves a repetitive focus on oneself and one's situation in a self-critical and pessimistic manner (Nolen-Hoeksema, 1991), is a transdiagnostic cognitive process associated with increased vulnerability to mood disorders, anxiety disorders, and EDs (McLaughlin & Nolen-Hoeksema, 2011; Watkins, 2008). Rumination decreases cognitive flexibility (Davis & Nolen-Hoeksema, 2000) and problem-solving abilities (Watkins & Moulds, 2005), and is associated with reduced social support (Nolen-Hoeksema & Davis, 1999). There are two subtypes of rumination: brooding rumination involves a passive comparison of one's current situation to desired standards, and reflective rumination involves a purposeful inward focus on solving distressing symptoms (Treyner, Gonzalez, & Nolen-Hoeksema, 2003). Brooding rumination is more strongly associated with negative clinical outcomes, including binge eating (Gordon, Holm-Denoma, Troop-Gordon, & Sand, 2012), than reflective rumination (Joormann, Dkane, & Gotlib, 2006; Treyner, *et al.*, 2003).

Rumination is associated with the severity of ED psychopathology in clinical (Naumann, Tuschen-Caffier, Voderholzer, Caffier, & Svaldi, 2015; Seidel, *et al.*, 2016; Startup, *et al.*, 2013) and non-clinical (Gordon, *et al.*, 2012; Holm-Denoma & Hankin, 2010) samples. Individuals with anorexia nervosa and bulimia nervosa ruminate more than individuals without EDs (Cowdrey & Park, 2012; Naumann, *et al.*, 2015; Rawal, Park, & Williams, 2010; Seidel, *et al.*, 2016; Startup, *et al.*, 2013; Troop, Holbrey, & Treasure, 1998). Rumination is also associated with the onset of disordered eating behaviors, including binge eating, compensatory behaviors, and dietary restraint, in samples of adolescent girls (Holm-Denoma & Hankin, 2010; Nolen-Hoeksema, Stice, Wade, & Bohon, 2007) and undergraduate students (Gordon, *et al.*, 2012; Rawal, *et al.*, 2010).

Rumination has been implicated in the development and maintenance of binge eating (Gordon, *et al.*, 2012; Holm-Denoma & Hankin, 2010; Nolen-Hoeksema, *et al.*, 2007). Escape theory posits that individuals binge eat to escape frequent aversive thoughts about a failure to meet desired standards, often related to body shape or weight (Heatherton & Baumeister, 1991). Frequent aversive thoughts could be a form of rumination, yet despite this conceptual similarity, only one study to date has examined rumination among individuals with BED. In this study, rumination increased negative mood but not body dissatisfaction (Svaldi & Naumann, 2014). A similar study conducted with individuals with obesity (but not BED) found that rumination increased negative mood and body

dissatisfaction (Svaldi, Naumann, Trentowska, Lackner, & Tuschen-Caffier, 2013). Together, these suggest that rumination may differentially impact body dissatisfaction for patients with EDs and those with obesity.

Individuals with obesity experience discrimination because of their weight (Puhl & Suh, 2015). Internalization of stigmatizing attitudes increases their negative effects, and is associated with more frequent binge eating and increased body dissatisfaction (Puhl & Suh, 2015). Individuals with higher levels of rumination may be more likely to dwell on weight-based discrimination experiences, which could lead to greater internalization of weight bias. This relation among rumination, discrimination, and internalized bias has been shown with individuals experiencing other forms of stigma (e.g., ethnicity) (Borders & Liang, 2011; Szymanski, Dunn, & Ikizler, 2014), but has not been examined among individuals with excess weight. Additionally, overvaluation of shape/weight influences the association between low self-esteem and weight-bias internalization, such that among patients with BED and obesity, the relation of low self-esteem with weight-bias internalization was better explained through overvaluation of shape/weight (Pearl, White, & Grilo, 2014). Importantly, this suggests that a central cognitive component of ED psychopathology, overvaluation, also impacts weight-bias internalization. Examining the influence of rumination on weight-bias internalization could extend these results.

### Study Aims and Hypotheses

The current project examined the significance of brooding and reflective rumination on ED psychopathology and weight-bias internalization in treatment-seeking patients with BED and obesity. We hypothesized that patients with higher levels of rumination would endorse higher levels of ED psychopathology and weight-bias internalization. Because overvaluation of shape/weight is a potentially related yet distinct cognitive component of ED psychopathology, we also examined whether an association of rumination with ED psychopathology and weight-bias internalization was maintained after considering the role of overvaluation of shape/weight.

## Methods

### Participants

Participants in the current study were 237 individuals ( $n = 70$  men;  $n = 167$  women) who responded to advertisements for treatment studies for BED and obesity at a medical-school based program in the northeastern United States. Individuals were between 18 and 65 years old ( $M = 47.9$ ,  $SD = 10.0$ ), and self-identified as White (76.9%,  $n = 180$ ), Black (14.3%,  $n = 35$ ), Hispanic (5.5%,  $n = 13$ ), Asian (0.4%,  $n = 1$ ), or Other (2.5%,  $n = 7$ ). Individuals completed high school or less (20.2%,  $n = 47$ ), some college (34.5%,  $n = 82$ ), or college or more (44.5%,  $n = 106$ ). Patients were not eligible for the treatment studies if they were receiving outside treatment for eating/weight concerns, had a medical condition that influenced eating/weight (e.g., uncontrolled diabetes), had a severe mental illness that required a higher level of care (e.g., schizophrenia), or were pregnant. Individuals were included in the current analyses if they met full *DSM-IV-TR* criteria for BED, had a body mass index (BMI) in the obesity range (BMI  $\geq 30$  kg/m<sup>2</sup>,  $M = 39.45$ ,  $SD = 5.92$ ), and

completed assessments of rumination and weight-bias internalization. This study was reviewed and approved by the university's institutional review board; all participants provided informed consent prior to their participation.

## Measures

Diagnoses, based on *DSM-IV-TR*, were clinically derived by trained doctoral-level research clinicians who were monitored to maintain reliability. Research clinicians administered the *Structured Clinical Interview for DSM-IV Axis I Disorders (SCID-I/P)* (First, Spitzer, Gibbon, & Williams, 1997) to determine BED and MDD diagnoses, and the semi-structured Eating Disorder Examination (Fairburn & Cooper, 1993) to confirm the BED diagnosis. Research clinicians measured participants' height and weight and calculated BMI (kg/m<sup>2</sup>).

**Eating Disorder Examination (EDE) (Fairburn & Cooper, 1993)**—Doctoral-level clinicians administered the EDE interview. This interview assesses ED psychopathology over the past 28 days, and longer intervals as correspond to diagnostic criteria, including objective binge-eating episodes (OBEs). OBEs involve eating an objectively large quantity of food while experiencing a subjective sense of loss of control, which corresponds to the definition of binge eating in the *DSM*. Overvaluation of shape/weight is measured as the average of two EDE items assessing the extent to which shape and weight influenced self-evaluation. The EDE also provides subscale scores on dietary restraint, eating concerns, shape concerns, weight concerns, and overall ED psychopathology (global score). Items are rated on a seven-point scale; higher scores indicate greater symptom severity. The EDE is a well-established interview with high reliability among patients with BED and obesity (Grilo, Masheb, Lozano-Blanco, & Barry, 2004). In the current study, Cronbach's alpha was .81 for the EDE global score.

**Ruminative Responses Scale (Nolen-Hoeksema & Morrow, 1991)**—This scale assesses depressive rumination with 10 items about how much individuals repetitively think about the symptoms, causes, and consequences of their depressed mood. Participants responded using a four-point scale from 1 (almost never) to 4 (almost always); higher scores indicate more rumination. This scale has good predictive validity such that individuals who report higher scores are more likely to become depressed (Nolen-Hoeksema & Morrow, 1991). The items load on a two-factor model, reflective rumination and brooding rumination (Treyner, *et al.*, 2003). In the current study, Cronbach's alphas were .83 and .77 for brooding and reflective subscales, respectively.

**Weight-Bias Internalization Scale (WBIS)**—The WBIS (Durso & Latner, 2008) assesses the extent to which individuals believe that negative stereotypes about overweight or obesity apply to themselves. All items are rated on a seven-point scale; higher scores indicate more internalized weight bias. This scale has shown good convergent validity through correlations with anti-fat attitudes (Durso & Latner, 2008). In the current study, Cronbach's alpha was .85.

## Statistical Analyses

Correlation analyses were used to examine associations among rumination, ED psychopathology, and weight-bias internalization. Hierarchical multiple regression analyses were used to test whether brooding rumination and reflective rumination were related to ED psychopathology and weight-bias internalization above and beyond the influence of overvaluation of shape/weight. Analyses using the overvaluation composite score and the EDE global score (which includes the two overvaluation items) used a recalculated average EDE global score without the overvaluation items to maintain statistical independence. Finally, because of the association of rumination with depression and the comorbidity of major depressive disorder (MDD) with BED, subsequent parallel analyses tested the relation of rumination with ED psychopathology and weight-bias internalization in a subsample of participants who did not have comorbid MDD (as evaluated by the *SCID-IP*).

## Results

### Rumination among Individuals with BED and Obesity

Table 1 summarizes correlations among brooding rumination, reflective rumination, and eating- and weight-related variables. Both brooding and reflective rumination were associated with global ED psychopathology, as well as eating concern, shape concern, weight concern, and overvaluation of shape/weight. Neither brooding nor reflective rumination was associated with dietary restraint. Both brooding rumination and reflective rumination were associated with weight-bias internalization. Reflective rumination ( $\tau_b = .10$ ,  $p = .03$ ), but not brooding rumination ( $p = .07$ ), was associated with the frequency of OBEs within the past 28 days. Neither reflective rumination ( $p = .81$ ) nor brooding rumination ( $p = .36$ ) was associated with BMI.

### Influence of Rumination and Overvaluation of Shape/Weight

Table 2 summarizes hierarchical multiple regression analyses examining the influence of rumination and overvaluation of shape/weight on global ED psychopathology. Overvaluation of shape/weight was entered in the first step and contributed significantly to the model. Rumination (brooding and reflective) was added in the second step and significantly contributed to variance in global ED psychopathology above and beyond the effect of overvaluation of shape/weight,  $R^2 = .03$ ,  $F = 5.06$ ,  $p = .01$ . Brooding rumination, but not reflective rumination, had a significant main effect on global ED psychopathology.

A subsequent, parallel analysis evaluated the role of overvaluation of shape/weight followed by brooding and reflective rumination among a subset of patients who did not have comorbid MDD ( $n = 119$ ). Brooding rumination and reflective rumination did not contribute above and beyond the influence of overvaluation of shape/weight,  $R^2 = .02$ ,  $F = 1.50$ ,  $p = .23$ .

Hierarchical multiple regression also examined the influence of rumination and overvaluation of shape/weight on weight-bias internalization (see Table 2). Again, overvaluation of shape/weight had a significant influence on weight-bias internalization in the first step. Adding rumination in the second step significantly contributed to variance in

weight-bias internalization above and beyond the effect of overvaluation of shape/weight (step one),  $R^2 = .18$ ,  $F = 40.93$ ,  $p < .001$ . Both brooding and reflective rumination had significant main effects on weight-bias internalization.

A subsequent, parallel analysis evaluated the role of overvaluation of shape/weight followed by brooding and reflective rumination among a subset of patients who did not have comorbid MDD ( $n = 119$ ). Brooding rumination and reflective rumination accounted for a significant portion of the variance above and beyond the influence of overvaluation of shape/weight,  $R^2 = .15$ ,  $F = 14.66$ ,  $p < .001$ , but only brooding rumination had a significant main effect on weight-bias internalization ( $p < .001$ ).

## Discussion

This study is the first to examine the role of rumination in a clinical sample of individuals with BED and comorbid obesity. Our findings suggest that both brooding and reflective rumination are important cognitive processes that are associated with ED psychopathology, including eating concern, shape concern, and weight concern, in patients with BED. These results extend previous research showing associations between rumination and ED psychopathology among individuals with anorexia nervosa (Startup, *et al.*, 2013), bulimia nervosa (Naumann, *et al.*, 2015), and non-clinical disordered eating (Nolen-Hoeksema, *et al.*, 2007). The observed association between rumination and ED psychopathology persisted even after accounting for overvaluation of shape/weight, which research has consistently found to be a strong marker for specifying severity (Grilo, *et al.*, 2015).

Our findings suggest that brooding rumination is more strongly associated with ED psychopathology than reflective rumination, and this disparity is particularly the case for shape concern. This suggests that patients with comorbid BED and obesity who dwell on their current body size in comparison to desired standards may be especially concerned and distressed about their body shape. These findings replicate previous reports that brooding rumination is more strongly associated with ED psychopathology than is reflective rumination (Gordon, *et al.*, 2012; Rawal, *et al.*, 2010), and extend these findings to a clinical sample of patients with BED and obesity. Moreover, brooding rumination influenced ED psychopathology above and beyond the influence of overvaluation of shape/weight, whereas reflective rumination did not. Thus, brooding rumination seems to be a particularly relevant cognitive process in ED psychopathology, even when considering the important influence of overvaluation.

Among a subsample of patients with BED and obesity *without* comorbid depression, brooding and reflective rumination did not have a significant association with ED psychopathology above and beyond overvaluation of shape/weight. These findings might suggest that the associations with rumination are more important among those with depression than those without depression. The concept of rumination originated in depression research as an identified response to a depressed mood, and evidence suggests that rumination perpetuates depressive psychopathology (Nolen-Hoeksema, 1991). If the rumination observed in patients with BED and obesity is similar to the rumination in depression, then it might be a way that patients respond to negative experiences or negative

mood, which suggests that rumination would be weaker without the context of a depressive mood. Future research should examine whether the rumination observed among patients with BED, obesity and depression is phenomenologically similar to that of patients with depression alone, and whether the rumination observed in BED and obesity perpetuates ED psychopathology, negative mood, or a combination of both, particularly as existing work has been inconsistent (Svaldi & Naumann, 2014; Svaldi, *et al.*, 2013). Research of this kind would have important clinical implications for integrating rumination-focused interventions into treatment for BED and obesity, or BED and obesity with comorbid depression.

Both brooding and reflective rumination were associated with weight-bias internalization as well as ED psychopathology. As with ED psychopathology, these associations were stronger for brooding rumination. These results are similar to previous research linking rumination with internalization of other forms of stigma (Borders & Liang, 2011). Both brooding and reflective rumination significantly influenced weight-bias internalization above and beyond the influence of overvaluation, which suggests that patients with BED and obesity who dwell on the causes and consequences of their negative mood may be particularly likely to internalize negative weight-based biases. Importantly, this finding persisted for brooding rumination even among the subsample of patients without comorbid depression, which suggests that the association between rumination and weight bias is significant regardless of depression.

Findings for the current study should be considered in the context of the study's limitations. Our study used a treatment-seeking patient group, which is a strength in the potential applications for this patient group, but limits the generalizability of our findings to non-treatment-seeking or community samples of individuals with BED. Due to the cross-sectional nature of our study, we cannot make any assumptions about causality. In particular, we cannot know whether psychopathology resulted from cognitive processes, or whether psychopathology led to cognitive processes. To address this, future research should use longitudinal and experimental methods to examine whether rumination predicts ED psychopathology and weight-bias internalization over time.

Another potential direction for future research may be the exploration of underlying mechanisms for BED psychopathology that might be related to rumination. For example, emerging research on neural correlates suggests that among patients with depression, the limbic system and medial/dorsolateral prefrontal cortex are associated with the self-referential thinking inherent to rumination (Cooney, Joormann, Eugene, Dennis, & Gotlib, 2010). The relation of these areas to the regions associated with self-regulation and craving associated with food addiction (Gearhardt, *et al.*, 2011) and BED and obesity (Balodis, *et al.*, 2013) is unclear. Future research could examine the neural profiles of patients with BED with and without rumination, compared to patients with depression and rumination, to enhance our knowledge of potential underlying mechanisms.

With the above context in mind, this study contributes important new information about associations among rumination, overvaluation of shape/weight, ED psychopathology, and weight-bias internalization. Taken together, our results support rumination as a cognitive feature associated with the psychopathology of patients with BED and comorbid obesity,

even after accounting for overvaluation of shape/weight, which is a robust severity specifier (Grilo, *et al.*, 2015). These findings suggest that rumination might represent a potential additional target for intervention with this patient group, although future studies using longitudinal and experimental designs are needed. Specifically, it may be helpful for clinicians to identify and reduce rumination, and particularly brooding rumination. Rumination-focused cognitive-behavioral therapy improves maladaptive thinking patterns by helping patients identify negative and ruminative cognitive patterns and shift these patterns to more constructive styles of thinking, thereby reducing rumination and psychological distress (Watkins, *et al.*, 2011). Our findings suggest that rumination-focused cognitive-behavioral therapy, and other treatments that may reduce rumination such as mindfulness training (Jain, *et al.*, 2007) warrant consideration in clinical research efforts, although at present, any conclusions about their clinical utility for patients with BED are premature.

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**Table 1**

Mean scores and correlations among rumination, ED psychopathology, and weight bias internalization

	<i>M</i>	<i>SD</i>	<b>Brooding Rumination</b>	<b>Reflective Rumination</b>
Brooding Rumination	10.94	3.83		
Reflective Rumination	9.08	3.32		
<i>Eating Disorder Examination</i>				
OBEs	19.82	15.08		
SBEs	12.68	15.94		
OBEs	3.43	6.83		
Restraint	1.75	1.29	.05	.01
Eating Concern	2.25	1.31	.28 <sup>***</sup>	.20 <sup>**</sup>
Shape Concern	3.61	1.17	.40 <sup>***</sup>	.18 <sup>**</sup>
Weight Concern	3.16	1.11	.35 <sup>***</sup>	.20 <sup>**</sup>
Overvaluation of Shape and Weight	3.77	1.75	.32 <sup>***</sup>	.20 <sup>**</sup>
Global Score	2.69	0.91	.35 <sup>***</sup>	.20 <sup>**</sup>
Weight Bias Internalization	4.63	1.23	.56 <sup>***</sup>	.20 <sup>**</sup>

Note. *N* = 237; OBEs=Objective binge-eating episodes; SBEs=Subjective binge-eating episodes; OOE=Objective overeating episodes.

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*p* < .05,

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*p* < .01,

\*\*\*  
*p* < .001.

## Association of rumination and overvaluation with eating-disorder psychopathology and weight-bias internalization

Table 2

	<i>F</i>	<i>p</i>	<i>df</i>	Adjusted <i>R</i> <sup>2</sup>	<i>t</i>	<i>p</i>	$\beta$
DV: Global Eating-Disorder Psychopathology							
Step 1	81.67	< .001	1	.26			
Overvaluation of Shape and Weight					9.04	< .001	.51
Step 2	31.54	< .001	3	.28			
Overvaluation of Shape and Weight					7.71	< .001	.45
Brooding Rumination					2.78	.006	.19
Reflective Rumination					0.02	.98	.001
DV: Weight Bias Internalization							
Step 1	102.36	< .001	1	.30			
Overvaluation of Shape and Weight					10.12	< .001	.55
Step 2	73.00	< .001	3	.48			
Overvaluation of Shape and Weight					8.48	< .001	.42
Brooding Rumination					8.82	< .001	.50
Reflective Rumination					-2.45	.02	-.13

Note.  $N = 237$ . Rumination contributed to variance in global eating-disorder psychopathology beyond the effect of overvaluation of shape and weight,  $R^2 = .03$ ,  $F = 5.06$ ,  $p = .007$ . Global score was calculated without the two items evaluating overvaluation of shape and weight. Rumination contributed to variance in weight bias internalization beyond the effect of overvaluation of shape and weight,  $R^2 = .18$ ,  $F = 40.93$ ,  $p < .001$ .