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Rumination, Mindfulness, and Borderline Personality Disorder Symptoms

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Abstract Current research indicates that both rumination and low mindfulness are implicated in the development and maintenance of borderline personality disorder (BPD) symptoms, yet no research to date has synthesized these findings into one model. In this study, we examined the mediating interplay between BPD symptoms, rumination levels, and low engagement in mindfulness. Two hundred racially diverse undergraduate college students participated in the study. Major depressive disorder (MDD) and BPD symptoms were assessed using semi-structured interviews, and current rumination and mindfulness were assessed using self-report measures. Increased BPD symptoms predicted both decreased mindfulness and increased rumination. Bootstrapping mediation analyses indicated that rumination mediated the association between BPD symptoms and low mindfulness, and low mindfulness mediated the association between BPD symptoms and rumination. Both mediation effects held beyond effects of age, gender and current MDD. However, the magnitude of the indirect effect of BPD on low mindfulness through rumination was significantly larger than the indirect effect of BPD on rumination through low mindfulness. Furthermore, BPD symptoms had a significantly larger indirect effect on low mindfulness through brooding rumination than through reflection rumination. These findings suggest that low mindfulness, rumination, and BPD are intimately related. This study provides important preliminary information for the understanding of the relationship between low mindfulness and rumination in BPD symptom development and treatment.

Introduction

Borderline personality disorder (BPD) is a complex and severe disorder that causes significant distress to individuals who suffer from it. Growing evidence suggests that the symptoms of BPD are particularly impacted by mindfulness, which involves consciously attending to one's moment-to-moment experience and intentionally choosing one's focus of attention (Brown and Ryan 2003). Mindfulness is associated with clarity of thoughts, recognition of feelings, and the ability to control anger and emotional expression (Kabat-Zinn 2003). Perhaps unsurprisingly, numerous studies have shown that patients with BPD display impairments in mindfulness (Nicastro et al. 2010; Soler et al. 2012). One study found that patients with BPD reported lower mindfulness and more difficulties in describing experience, acting with awareness, and accepting without judgment than patients without BPD (Baer et al. 2004). In another study, mindfulness was inversely associated with severity of BPD symptoms, even after controlling for neuroticism, emotion regulation, and interpersonal effectiveness (Wupperman et al. 2009; Wupperman et al. 2008). This evidence suggests that mindfulness plays a key role in the experience of BPD symptoms.

Accordingly, there is increasing evidence that improving mindfulness abilities improves BPD symptoms. In one study, when mindfulness was induced in patients with BPD, those patients performed better on effort toward a goal during a computerized distress tolerance activity (Sauer and Baer

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2012). Another study using acceptance-based group therapy, which includes mindfulness as a central component, found that treatment significantly increased both emotional awareness and emotional acceptance in women with BPD relative to a comparison group (Gratz and Gunderson 2006). Furthermore, one of the most successful treatments for BPD, dialectical behavioral therapy, teaches mindfulness skills as one of its primary tenets (Linehan 1993). Despite this literature, it is still unclear precisely how improving mindfulness might ameliorate BPD symptoms. It is thought that increasing mindfulness heightens emotional awareness and clarity and improves patients' ability to choose effective emotion regulation methods over ineffective or maladaptive methods (Lynch et al. 2006). However, few studies have empirically examined the mechanisms through which BPD is associated with low mindfulness.

In order to improve our understanding of the function of mindfulness, it may be helpful to link deficits in mindfulness to other areas of dysfunction in BPD. One such area is rumination. Recent theoretical accounts of BPD psychopathology have suggested that one mechanism of change arising from mindfulness treatments for BPD may be the reduction of rumination (Selby and Joiner 2009; Selby et al. 2009). Rumination is a cognitive process that involves the experience of persistent repetitive thoughts about an upsetting problem, the causes of the problem, and the potential implications of the problem (Nolen-Hoeksema 1991). Research has found that tendencies to engage in rumination are associated with problematic emotional experiences across a number of psychopathologies, including depression, substance abuse, and eating disorders (Aldao et al. 2010). Experimental studies also show that rumination increases the intensity of negative emotion (Nolen-Hoeksema et al. 2007; Nolen-Hoeksema et al. 2008). Rumination has been particularly implicated as a problem for those with BPD. One study found that individuals with BPD report significantly higher levels of rumination than those with depression (Abela et al. 2003). Further research found that depressive and anger rumination were significantly associated with BPD features, even after controlling for trait negative affectivity and sadness (Baer and Sauer 2011). Additionally, Sauer and Baer (2012) showed that, after undergoing a rumination induction, BPD participants demonstrated more anger and decreased ability to tolerate distress while working toward a goal.

The role of rumination in BPD has been specifically addressed in one theoretical account of psychological processes contributing to the development of BPD called the *Emotional Cascade Model* (Selby and Joiner 2009). In this model, it is thought that much of the emotion dysregulation and impulsive behaviors found in BPD arise from the experience of emotional cascades, which are thought to arise from the progressive compounding effects of rumination and negative emotion on each other in response to an upsetting situation (Selby and

Joiner 2008). In this process, after an upsetting event, the individual ruminates about the problem, increasing negative emotion; then, as negative emotion increases, so does the intensity of rumination. This self-amplifying positive feedback loop between rumination and negative emotion causes an extremely aversive emotional state to develop. These emotional cascades may then lead to dysregulated behaviors, such as substance use, binge eating, fighting, and/or self-injury, because these behaviors provide potent physical sensations that may distract from rumination (e.g., taste, pain, sight of blood, effects of a drug, etc.) and short-circuit the cascade. Growing evidence from correlational, experimental, and experience sampling studies supports the role of emotional cascades in BPD psychopathology (Selby et al. 2009; Selby and Joiner 2013; Selby and Joiner 2013; Selby et al. in press; Tuna and Bozo 2014).

This literature on rumination and emotional cascades in BPD may also contribute to a better understanding of the role of low mindfulness in those with BPD. In many ways, rumination is the antithesis of mindfulness. While mindfulness refers to attentional control and awareness of one's internal experiences and thoughts, rumination is characterized by a lack of control and involves being engrossed in an involuntary torrent of repetitive thoughts about past, present, and future problems. Thus, if an individual has elevated ruminative tendencies, and the emotional cascade process is frequently activated in response to upsetting events, it seems likely that he or she will have difficulty being mindful and therefore have difficulty making calm and rational decisions about how to handle situations and regulate negative emotion. In support of this potential relationship, one study found that when dysphoric mood was induced in participants without a psychiatric diagnosis and then paired with either a rumination or mindfulness meditation condition, those in the rumination condition demonstrated significantly worse mood than those in the meditation condition (Broderick 2005). Similarly, mindfulness has long been theorized to directly interfere with ruminative thought patterns (Teasdale et al. 1995). Most research to date has examined the association between BPD and rumination *or* BPD and low mindfulness. An integration of these two areas is important to better understand the relationship between these components in the development and treatment of BPD.

The purpose the current study was to further examine the interrelations between symptoms of BPD, low mindfulness, and rumination using mediational analyses. Because rumination and poor mindfulness abilities are likely to influence each other in a bidirectional manner (Selby et al. in press), with problems in one leading to elevations in the other and vice versa, we explored two mediational models in a large sample of undergraduate students. First, we examined rumination as a mediator of the effects of BPD symptoms on low mindfulness. Then, we examined a second model in which low mindfulness mediated the association between BPD symptoms and

elevated rumination levels. Although we expected significant mediation effects in both models, based on the previous findings of the Emotional Cascade Model of BPD (Selby and Joiner 2009), we expected that the indirect effects of BPD on low mindfulness as a function of rumination levels would be significantly larger than the indirect effects of BPD on rumination via low mindfulness.

Method

Participants

Two hundred undergraduate students (M=18.70 years, SD= 1.40) participated in this study. To achieve the widest possible range of symptoms and traits, the only inclusion criterion for participation was fluency in English. All participants participated in clinical assessments for acute psychiatric disorders and BPD and a battery of questionnaires. The sample was approximately 60 % female, and it was racially diverse with the following self-identifications: 41.5 % Asian, 35.5 % Caucasian, 7 % African American, 7 % Hispanic, 1 % Native Hawaiian/Pacific Islander, 1 % Native American, and 7 % identifying more than one race.

Procedure

Participants completed the study in order to receive course credit. Participants completed an in-person diagnostic interview for major psychological disorders (including depression), as well as a structured clinical interview for assessing symptoms of BPD. In addition, all participants completed a battery of measures that included a measure of rumination and a measure of mindfulness. The university IRB approved the study, and all participants provided informed consent.

Measures

Assessment of Axis I Diagnoses

Axis I diagnoses were assessed with the *Mini International Neuropsychiatric Interview* (*MINI;* Sheehan et al. 1998), and current major depression disorder (MDD) diagnosis was used as a covariate in all analyses, as previous research has linked depression to low mindfulness (Michalak et al. 2008) and to the tendency to ruminate (McHolm et al. 2003). Eleven percent of the sample had current MDD diagnoses.

Assessment of BPD Symptoms

All participants were administered the *Structured Clinical Interview for DSM-IV Axis II Personality Disorders* (SCID-II; First et al. 1997) module for BPD. For a diagnosis of BPD, a participant had to endorse at least five out of nine diagnostic criteria. In this sample, 5.5 % of participants met full diagnostic criteria for BPD, and an additional 3 % of the sample reported having four BPD symptoms. A continuous measure of BPD was generated such that the threshold-level symptom ratings from the SCID-II were summed into one score, due to evidence that BPD symptoms may be continuous in nature, rather than taxonic (Clifton and Pilkonis 2007; Rothschild et al. 2003). The continuous BPD measure demonstrated good internal consistency (α=0.93).

Mindfulness Scale

Mindfulness ability was measured with the *Mindfulness Attention Awareness Scale* (MAAS; Brown and Ryan 2003), a self-report measure assessing current engagement in mindfulness activity. Tendencies evaluated with this scale include paying attention to what is happening in the present, how much one is focusing on other thoughts, emotions, or activities, and how much a person feels that he or she is on "autopilot" without much situational awareness. Scores on the scale ranged from 1 to 6, with 6 indicating the highest level of use of mindfulness techniques. The MAAS has regularly been used to evaluate changes in mindfulness following engagement in a mindfulness-based intervention, consistently demonstrating the ability of these interventions to improve attention to the present (Brown and Ryan 2003; Carlson and Brown 2005; Kimbrough et al. 2010). In the current sample, the MAAS demonstrated good internal consistency (α=0.88).

Rumination Scale

Rumination tendency was measured using the *Ruminative Responses Scale* (RRS; Nolen-Hoeksema and Morrow 1991), which is part of the larger *Response Styles Questionnaire* (Nolen-Hoeksema 1991; Treynor et al. 2003), and consists of 22 self-report items specifically assessing tendencies for an individual to engage in ruminative responses. Such responses can include analyzing recent distressing events, immersing oneself in thoughts about a problem, and/or focusing on the way one is feeling. Items utilize a Likert scale ranging from 1 (*Almost never*) to 4 (*Almost always*). In the current study, the RRS demonstrated good internal consistency (α= 0.95). The RRS can also be divided into "brooding" and "reflection/pondering" subscales, although both have been found to have associations with worse mood (Armey et al. 2009; Treynor et al. 2003).

Data Analyses

Data were analyzed using bootstrapping methods in the PROCESS SPSS macro (Hayes 2013). Bootstrapping is a newer version of mediation analysis that expands upon the former

approach recommended by Baron and Kenny (1986) and is advantageous in that it is less reliant on normal distributions of variables and it allows for significance testing of indirect mediation effects. Bootstrapping analyses were conducted with bias-corrected confidence intervals, which maximize power and diminish Type 1 errors (Zhao et al. 2010), and 5000 resamples were utilized. Indirect regression coefficients were tested for significance by examining the bias-corrected 95 % confidence intervals, and if these intervals did not include zero, then a significant indirect effect was obtained.

In the current study, we examined two potential models for the interplay between BPD symptoms, rumination levels, and mindfulness (see Fig. 1). The first model we examined consisted of BPD symptoms decreasing mindfulness through the effects of rumination. The second model we examined consisted of BPD symptoms increasing rumination levels through low mindfulness. Following examination of these models with primary variables only, we then included age and gender as covariates because of research suggesting that rumination may increase with age (Jose and Brown 2008) and is often higher in women (Nolen-Hoeksema and Jackson 2001). We also included current MDD diagnosis as a covariate due to its significant associations with BPD, low mindfulness, and rumination (Michalak et al. 2008; Sauer and Baer 2012; Wupperman et al. 2008). Models were first run without covariates to establish unadjusted regression coefficients, and then with the covariates included to ensure that the relationships examined held beyond the effects of relevant covariates.
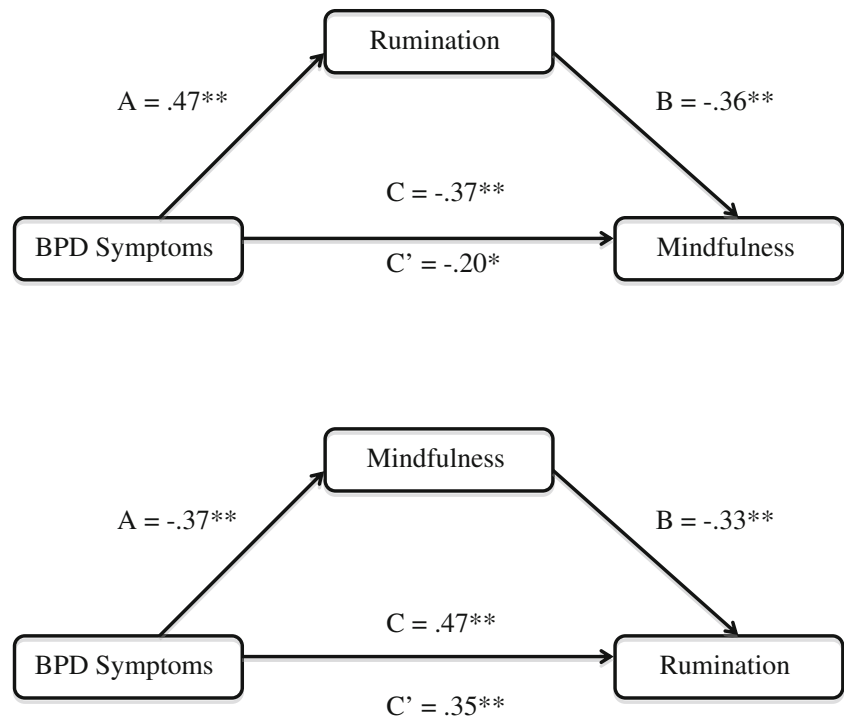
Results

Table 1 displays the means, standard deviations, and intercorrelations between all measures. Age and gender were not associated with mindfulness; however, gender was significantly correlated with rumination ($r=0.16$, $p<0.05$). Current MDD diagnosis was significantly associated with low mindfulness ($r=-0.37$, $p<0.001$). Consistent with previous findings, current MDD was also significantly associated with rumination ($r=0.47$, $p<0.001$; Nolen-Hoeksema 1991; Selby et al. 2008). The average number of BPD symptoms in this sample was 0.74 symptoms (SD=1.55), and the most commonly rated symptoms were frequently feeling empty (12.6 % of the sample), difficulties with anger (9.6 % of the sample), and having a lot of sudden mood changes (9.1 % of the sample). Although the continuous measure of BPD symptoms was mildly skewed (SPSS skew statistic was 2.74, when above 2.0 is typically considered the cutoff for elevated skew), a square root transformation reduced the skewness to acceptable levels (transformed skew statistic was 1.89). Furthermore, the analyses turned out essentially the same when either the transformed or original variables were included in the models.

The first model we tested involved examining the mediation of BPD symptoms and low mindfulness through elevations in rumination, and outcomes of the analysis are displayed in Table 2 and Fig. 1. Together, BPD and rumination accounted for 24 % of the variance in low mindfulness. The bootstrap analysis indicated that there was a significant direct effect of elevated BPD symptoms inversely predicting mindfulness (c: $B=-48.87$, SE=9.13, $t(196)=-5.38$, $p<0.001$). Similarly, BPD was also a significant predictor of increased rumination (a: $B=77.42$, SE=0.10.76, $t(196)=7.20$, $p<0.001$). On the other hand, rumination was a significant inverse predictor of low mindfulness (b: $B=-0.28$, SE=0.06, $t(196)=-4.94$, $p<0.001$). Finally, when both BPD symptoms and rumination were simultaneously accounted for in the bootstrapping model, the direct effect of BPD symptoms on rumination decreased (c': $B=-25.53$, SE=9.42, $t(195)=-2.71$, $p<0.01$). However, as this effect maintained significance, the nature of mediation was partial rather than full. There was also a bootstrap estimated indirect effect coefficient for effects of BPD on low mindful flowing through rumination was (a*b: $B=-21.96$, SE=6.03, standardized indirect effect=0.17). Examination of the 95 % confidence interval of the indirect effect revealed that it did not include zero (-35.60 to -11.58), the analysis indicated a significant indirect effect of BPD on low mindfulness through increased rumination. All effects were maintained even after accounting for the effects of age, gender, and current MDD diagnosis.

Bootstrapping analyses also supported the second model we examined, in which low mindfulness mediated the association between BPD symptoms and elevated rumination. Coefficients derived from the bootstrapping analysis are displayed in Table 2. Together, BPD and low mindfulness accounted for 32 % of the variance in rumination. There was a significant direct effect of BPD on rumination (c: $B=77.43$, SE=10.76, $t(196)=7.20$, $p<0.001$), as well as a significant association between BPD and low mindfulness (a: $B=-47.49$, SE=8.83, $t(196)=-5.38$, $p<0.001$). In this model, low mindfulness also predicted elevations in rumination (b: $B=-0.42$, SE=0.09, $t(196)=-4.94$, $p<0.001$). When the mediator was simultaneously examined, the direct effect of BPD on rumination decreased (c': $B=57.40$, SE=10.90, $t(195)=-5.27$, $p<0.001$), although it maintained significance. There was also an indirect effect of BPD on rumination as mediated by low mindfulness (a*b: $B=20.02$, SE=6.11, standardized indirect effect=0.12), and because the 95 % bias-corrected confidence interval did not include zero (9.84–33.55), the indirect effect was significant.

Because significant mediation effects were found in both models, with rumination mediating the BPD and low mindfulness association and low mindfulness mediating the BPD and elevated rumination association, we compared the absolute magnitude of the two indirect effects relative to each other

Fig. 1 Model 1 and Model 2 displaying standardized effects between BPD symptoms, rumination, and mindfulness. *BPD* borderline personality disorder; **p<0.001, *p<0.01

Finally, because significant research has been conducted examining different subtypes of rumination (Treynor et al. 2003), we examined the model in which rumination mediated the association between BPD symptoms and low mindfulness, with the RRS decomposed into the Reflection and Brooding subscales. When brooding rumination was examined, it was a significant predictor of lower mindfulness scores when accounting for BPD symptoms (b: $B=-0.55$, SE=0.13, $t=11.59$, $p<0.001$), and there was also a significant indirect effect of BPD symptoms on mindfulness via brooding (a*b: $B=-17.83$, SE=5.64, standardized indirect effect=−0.18; bias-corrected 95 % confidence interval:−30.45 to−8.35). When reflection rumination was examined, it was a marginal predictor of mindfulness scores while accounting for BPD symptoms (b: $B=-0.42$, SE=0.23, $t=-1.84$, $p=0.067$), but an indirect effect of BPD symptoms on mindfulness scores via reflection was not supported as the indirect effect confidence interval included zero (a*b: $B=-5.59$, SE=3.93, standardized indirect effect=−0.05; bias-corrected 95 % confidence interval: −14.59 to 1.20). Finally, when the magnitude of the indirect effect for brooding rumination was compared to the indirect effect for reflecting rumination using the test for two correlated regression coefficients along with pooled error standard deviation, the magnitude of the indirect effect of BPD on mindfulness through brooding was significantly larger than the indirect effect through reflection ($t(396)=69.5$, $p<0.001$, $d=6.97$). Thus, brooding rumination appears to have a significantly stronger inverse association with mindfulness abilities than reflection, a finding that supports the notion

using the test for two correlated regression coefficients along with pooled error standard deviation (Kenny 1987). This analysis indicated that the indirect effect of BPD on low mindfulness via rumination was significantly larger than the indirect effect of BPD on rumination via low mindfulness ($t(396)=18.45$, $p<0.001$, $d=1.85$). Thus, although rumination and low mindfulness likely impact each other, elevations in rumination may have a larger impact on mindfulness than the other way around. The effects of this mediation analysis were not changed when age, gender, or depression diagnosis were included as covariates in the model.

Table 1 Means, standard deviations, and intercorrelations of all measures

	1	2	3	4	5	6
1. BPD Symptoms	–					
2. MAAS	−0.37**	–				
3. RRS Total	0.45**	−0.41**	–			
4. MDD	0.31**	−0.27**	0.47**	–		
5. Age	0.04	0.09	−0.14	−0.05	–	
6. Gender	0.04	0.06	0.16*	0.06	0.05	–
Mean	0.74	58.87	47.14	–	18.70	–
SD	1.56	12.70	15.94		1.40	

For gender men, were coded as 0 and women were coded as 1

MDD major depressive disorder diagnosis, *MAAS* Mindfulness Attention and Awareness Scale, *RRS* Ruminative Responses Scale total score

*p<0.05, **p<0.01

Table 2 Model (independent variable, mediator, dependent variable)

			Direct effects				Indirect effects			
	Adjusted r^2	Path	Coeff.	SE	p		Bootstrap coeff.	SE	95 % CI	Stand. coeff.
1) BPD – >RRS – >MAAS	0.24	a	77.42	10.76	<0.001	a*b	−21.96	6.03	−35.60, −11.58	−0.17
		b	−0.28	0.06	<0.001					
		c	−48.87	9.13	<0.001					
		c'	−25.53	9.42	0.007					
2) BPD – >MAAS – >RRS	0.32	a	−47.49	−8.83	<0.001	a*b	20.02	6.11	9.84, 33.55	0.12
		b	−0.42	0.09	<0.001					
		c	77.43	10.76	<0.001					
		c'	57.40	10.90	<0.001					

BPD borderline personality disorder symptoms, *RRS* Ruminative Responses Scale total score, *MAAS* Mindfulness Attention Awareness Scale

that those with elevated BPD symptoms may experience more intense forms of rumination that interfere with mindfulness and contribute to impulsive behavior (Selby and Joiner 2009).

Discussion

The purpose of the current study was to synthesize two growing areas of research on BPD: increasing findings that those with BPD tend to display low levels of mindfulness, and increasing evidence that those with BPD demonstrate ruminative tendencies. Specifically, we examined two models: one in which rumination mediated the association between BPD symptoms and low mindfulness, and another in which low mindfulness mediated the association between BPD symptoms and rumination. Results supported partial mediation effects for both rumination and low mindfulness. However, when the indirect effects of BPD through each mediator were examined, the indirect effect of BPD on low mindfulness through rumination was significantly larger than the indirect effect of BPD on rumination through low mindfulness. Importantly, both mediation effects were maintained beyond the effects of current depression diagnosis, gender, and age.

Although a number of studies have found an association between BPD and low mindfulness or rumination, no studies to our knowledge have synthesized these findings and examined rumination as a mediator of the BPD-mindfulness relationship. The findings of a mediational effect of rumination on low mindfulness in those with elevated BPD symptoms merge two important factors of psychopathology in BPD. Those with BPD may exhibit difficulties with mindfulness because they are frequently experiencing rumination and/or emotional cascades, which lead them to engage in maladaptive methods of emotion regulation (e.g., self-injury, aggressive behavior).

Alternatively, low mindfulness abilities may lead to heightened rumination, where because of difficulties with acceptance of emotions and experiences, those with BPD may

engage in rumination more frequently in an attempt to solve problems (Watkins and Baracaia 2001). However, when we examined the magnitude of both indirect effects, the potential influence of BPD on low mindfulness through rumination was significantly stronger than the influence of BPD on rumination through low mindfulness. This finding suggests that although low mindfulness may be an important contributor to rumination in BPD, there may be other factors contributing to rumination in BPD beyond low mindfulness (e.g., external problems, interpersonal conflict). Furthermore, because both mediation effects support partial and not full mediation, rumination may impact important subcomponents of low mindfulness (e.g., non-acceptance of present experiences) less than other facets of BPD experience (e.g., trauma history, feelings of shame, or interpersonally difficult environments).

Finally, when we examined the effects of brooding rumination relative to reflection rumination, bootstrapping analyses indicated that brooding significantly mediated the association between BPD symptoms and mindfulness but not reflection. The indirect effect magnitude of BPD symptoms on mindfulness through brooding was also significantly larger than through reflection. These findings suggest that for those with BPD symptoms, intense forms of rumination such as brooding may be particularly problematic and interfere with mindfulness ability than reflection rumination. Such a finding is also consistent with the Emotional Cascade Model (Selby and Joiner 2009), which posits that intense rumination leads to emotional cascades and subsequent impulsive behaviors—both of which are the antithesis of mindfulness.

The current study had various strengths including as follows: assessment of BPD symptoms with a semi-structured clinical interview, use of validated measures of rumination and mindfulness ability, theoretical grounding of factors examined, and a diverse sample. Furthermore, the findings of the current study held even when key covariates were entered into the statistical models. However, one important limitation to the current study is that it was conducted using cross-

sectional self-report measures. Accordingly, we cannot conclusively determine if rumination drives low mindfulness, low mindfulness drives rumination, or if both variables impact each other in a bidirectional manner. Longitudinal methods should be utilized to help determine which issue appears first in the development of BPD: low mindfulness or elevated rumination. Finally, another limitation of the current study was that the participants were not recruited from clinical settings, reducing generalizability to clinical populations. Furthermore, although this study included a diverse sample, we did not examine the influence of race on key study variables because of reduced power to detect effects for some race categories. Given that BPD symptom presentation can differ by race/ethnicity (Selby and Joiner 2008), future studies should explore the potential influence of race on rumination and mindfulness in BPD.

The findings of this study may serve not only to increase our understanding of the cognitive factors involved in the development of BPD but also to increase our understanding of how some treatments may address BPD symptoms. Although there are a number of beneficial effects of treatment on the various facets of BPD psychopathology, increasing mindfulness ability may potentially help reduce rumination and emotional cascades, which could serve as important targets for future intervention research. Alternatively, identifying more specific ways to reduce rumination through treatment may also benefit BPD patients by helping them to improve their mindfulness abilities.

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