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ABSTRACT OF THESIS

RUMINATIVE THOUGHT IN INDIVIDUALS WITH BORDERLINE PERSONALITY FEATURES

Borderline personality disorder (BPD) is characterized by patterns of intense negative affect, interpersonal difficulties, and maladaptive impulsive behaviors, and is associated with impairments in social and occupational functioning. Rumination is a maladaptive form of repetitive thought that maintains and intensifies emotional disturbance and is associated with behavioral dysregulation. This study tested several hypotheses about relationships between rumination and borderline personality features. This study included 117 college student participants, 88 female students and 29 male students, most of whom (84%) identified themselves as Caucasian. Participants completed a series of measures which included a writing sample to sample repetitive thought. Findings consistently suggested that rumination accounts for significant incremental variance in BPD features after controlling for various facets of neuroticism, which suggests that individuals with BPD features are probably engaging in high levels of multiple types of rumination. However, scores derived from the On Your Mind writing sample did not predict severity of borderline features after controlling for the NEO-neuroticism domain. Implications for these findings and limitations to this study are also discussed.

KEYWORDS: Borderline Personality Disorder, Rumination, Repetitive Thought, Neuroticism, Borderline Features

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February 13, 2011

RUMINATIVE THOUGHT IN INDIVIDUALS WITH
BORDERLINE PERSONALITY FEATURES

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THESIS

Brian Thomas Upton

The Graduate School
University of Kentucky
2011

RUMINATIVE THOUGHT IN INDIVIDUALS WITH
BORDERLINE PERSONALITY FEATURES

THESIS

A thesis submitted in partial fulfillment of the
requirements for the degree of Master of Science in the
College of Arts and Sciences at the University of Kentucky

By

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2011

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Chapter One: Introduction

Borderline personality disorder (BPD) is characterized by patterns of intense negative affect, interpersonal difficulties, and maladaptive impulsive behaviors, and is associated with impairments in social and occupational functioning (APA, 2000).

Rumination is a maladaptive form of repetitive thought that maintains and intensifies emotional disturbance and is associated with behavioral dysregulation. Although rumination has been studied most extensively in depression, preliminary data and theoretical arguments suggest that rumination may be common in BPD, with effects that are at least as damaging in BPD as they are in depression. This study tested several hypotheses about relationships between rumination and borderline personality features.

Characteristics of borderline personality disorder

Affective instability (also known as emotional vulnerability) and behavioral dysregulation are central features of BPD (Linehan, 1993; Zanarini & Frankenburg, 2007). Affective instability includes high reactivity (emotions are easily triggered), high intensity (emotions are very strong) and slow return to baseline (emotions are long lasting). Evidence suggests that affective instability in BPD may be biologically based (Linehan, 1993). For example, Herpetz et al. (2001) reported abnormal amygdala functioning in response to emotionally aversive slides in individuals with BPD. Recent research also suggests that affective instability may be the core BPD feature that drives other symptoms (Tragesser, Solhan, Schwartz-Mette, & Trull, 2007). Much of the behavioral dysregulation seen in BPD, including self-harm, substance use, binge eating, and impulsive spending has been conceptualized as maladaptive patterns of behavior in which individuals with BPD attempt to reduce or avoid this intense negative affect (Brown, Comtois, & Linehan, 2002;

Chapman, 2006; Koenigsberg et al., 2002; Nock & Prinstein, 2004). In addition, the intense negative affect typical of BPD is believed to distort thoughts and beliefs about the self and others, leading to problematic interpersonal behavior (Zanarini & Frankenburg, 2007) and identity problems (Linehan & Heard, 1992).

Rumination

Rumination is a maladaptive form of repetitive thought (Nolen-Hoeksema, Wisco, & Lyubomirsky, 2008) that has been studied extensively in the context of depression. Response styles theory (Nolen-Hoeksema, 1991; 2004) defines depressive rumination as repetitive thinking about symptoms of depression and their causes, meanings, and consequences. Although many dysphoric people report that they believe rumination to be necessary to gaining insight and solving their problems, depressive rumination generally does not lead to constructive solutions, and numerous studies have shown that it has negative outcomes for dysphoric individuals (see Nolen-Hoeksema et al. 2008; Watkins, 2008, for reviews). Depressive rumination intensifies and maintains negative mood, impairs concentration, memory, and problem-solving, reduces motivation for instrumental behavior, and predicts the onset of future depressive episodes. Depressive rumination has been shown to amplify the mood-lowering effects of negative cognition, perhaps by bringing maladaptive cognitions to mind more often (Ciesla & Roberts, 2007). Thus, rumination may function as a catalyst that increases the influence of negative cognition on depressive affect, and vice versa. This could result in a maladaptive cycle of negative affect and negative cognition, in which they intensify each other over time. Ruminating when feeling sad also has been shown to account for incremental variance in depression after accounting for neuroticism, and has been shown to fully or partially mediate the

relationship between neuroticism and both anxiety and depression (Kuyken, Watkins, Holden, & Cook, 2006; Muris, Roeffels, Rassin, Franken, & Mayer, 2005; Roberts, Gilboa, & Gotlib, 1998). These findings suggest that rumination may be a mechanism through which the trait of neuroticism leads to psychological symptoms. These findings also highlight an important distinction between the tendency to experience negative affect and the tendency to respond to negative affect by ruminating about it. Finally, recent studies suggest that depressive rumination contributes to the etiology and maintenance of forms of psychopathology other than depression, including disordered eating, substance abuse, anxiety, and post-traumatic stress.

Although depressive rumination has received the most attention in the research literature, other forms of rumination have been described. For example, the concept of stress-reactive rumination was proposed by Alloy et al. (2000) and Robinson & Alloy (2003), who define it as repetitively dwelling on negative inferences (e.g., “it was all my fault” or “things like this always happen to me”) following stressful life events. In a student sample, Robinson & Alloy (2003) found that stress-reactive rumination prospectively predicted the onset, number, and duration of depressive episodes over a period of several years. Angry rumination is characterized by repetitive thoughts about anger-inducing experiences, and includes focusing attention on the angry mood, recalling past angry episodes, and dwelling on the causes and consequences of these events and feelings (Sukhodolsky, Golub, & Cromwell, 2001). Angry rumination has been shown to increase feelings of anger (Rusting & Nolen-Hoeksema, 1998), physiological arousal (Ray, Wilhelm, & Gross, 2008) and aggressive behavior (Bushman et al., 2005). A similar form of rumination, known as rumination on interpersonal offenses (Wade, Vogel, Liao, &

Goldman, 2008) involves repetitive thinking about having been hurt or offended by another and has been shown to be significantly related to cortisol levels (McCullough et al., 2007) and to self-reported vengefulness (McCullough, Bellah, Kilpatrick, & Johnson, 2001). Anxious rumination involves repetitive thinking about an ongoing anxious state (Nolen-Hoeksema, 2000; Rector, Antony Laposa, Kocovski, & Swinton, in press), including thoughts about difficulties in controlling anxious feelings or coping with stressors when anxious. Anxious rumination focuses mostly on the experience of anxiety itself, and therefore is distinct from worry, which focuses upon external events such as work-related concerns, family matters, or finances. Post-event rumination (also known as post-mortem rumination or post-event processing, Brozovich & Heimberg, 2008) is repetitive thinking about a recent uncomfortable social interaction. In socially anxious persons, it is related to recall of negative self-related information and negative self-judgments (Mellings & Alden, 2000). McEvoy & Kingsep (2006) found that post-event rumination is related to general anxiety, depression, and stress and argued that it is a maladaptive response to emotional disturbance in general, rather than specific to social anxiety. A more general form of rumination was described by Trapnell and Campbell (1999) who define it as a maladaptive type of recurrent thinking about the self prompted by threats, losses, or injustices and the associated feelings of anxiety, depression, or anger.

Rumination and BPD

Several factors suggest that rumination may be common in BPD. First, the tendency to ruminate is correlated with the personality trait of neuroticism (Teasdale & Green, 2004; Wupperman & Neumann, 2006). Neuroticism is in turn associated with many forms of psychopathology (Watson & Clark, 1984), including BPD (Clarkin, Hull,

Cantor, & Sanderson, 1993; Morey & Zanarini, 2000). Although the relationship between rumination and neuroticism has rarely been studied in BPD, it seems likely that, because of their high levels of neuroticism, individuals with BPD may be engaging in high levels of rumination. Second, affective instability, as a core feature and possible driving force behind other BPD symptoms, may be intensified by rumination. While this has been shown in other disorders, it has yet to be studied in BPD. Third, many of the documented negative outcomes of rumination, including substance use, binge eating, dysfunctional interpersonal behavior, anger, anxiety, and increased stress levels, are associated with BPD.

A preliminary study of relationships between rumination and BPD features was conducted by Baer and Sauer (in press). Using a student sample that had been screened and selected to include a group with clinically significant levels of borderline features, this study reported that both depressive and angry rumination were strongly associated with borderline features. This effect was seen even when controlling for the presence of current Axis I-related symptoms, suggesting that the relationship between rumination and BPD features is not attributable to comorbid depression, anxiety, or stress. Rumination also accounted for incremental variance in BPD features after controlling for trait-level negative affectivity. Although the study was cross-sectional, results were consistent with partial mediation, suggesting that rumination may be a mechanism through which trait-level negative affect leads to BPD features. Findings were stronger for angry than for depressive rumination, suggesting that angry rumination may be of particular importance in BPD.

The current study expanded on the findings of Baer and Sauer (in press) in two ways. First, in addition to depressive and angry rumination, it included measures of the

other forms of rumination described earlier, including stress-reactive rumination, rumination on interpersonal offenses, anxious rumination, and post-event rumination. Inclusion of this broad range of rumination measures is important because individuals with BPD are subject to a wide range of negative moods and stressful events and their tendencies to ruminate about them have not been comprehensively studied. Second, the present study included an expert-coded writing task that assesses repetitive thought without reliance on participants' self-reports of their tendencies to ruminate.

Chapter Two: Method

Participants

This study included 117 college student participants, screened and recruited through the Introductory Psychology (PSY 100) subject pool in the Department of Psychology at the University of Kentucky. There were 88 female students and 29 male students, most of whom (84%) identified themselves as Caucasian. The rationale for using an undergraduate sample was based on the work of Trull (1995; 2001), who reported that clinically significant borderline features are common in undergraduate samples. Trull (1995) found that students with raw scores over 37 ($T = 70$) on the Borderline Features Scale of the Personality Assessment Inventory (PAI-BOR; Morey, 1991) showed clinically significant BPD characteristics and levels of maladjustment similar to those in clinical populations. These difficulties persisted for a 2-year follow-up period (Trull, Useda, Conforti, & Doan, 1997). Trull (1995) also argued that clinical samples probably represent only the upper range of BPD severity. Studies of emotional and cognitive functioning associated with BPD will have greater power to detect effects if they include a wider range of BPD features. For the present study, all members of the participant pool were screened using the PAI-BOR. The study was posted on the online system and made available to the entire subject pool. In addition, email invitations to participate in the study were sent to students who had obtained either high or low scores ($T > 70$ or $T < 50$) on the PAI-BOR. In the final sample, 22 fell above the BPD threshold established by Trull (1995) ($T = 70$), and 23 in the low range ($T < 50$). The remaining 72 participants fell in the average range on BPD features. This sampling strategy created a symmetrical distribution of scores without excessive kurtosis and with adequate representation of the high end of the distribution.

Measures

Neuroticism was assessed using the NEO Personality Inventory-Revised (NEO PI-R; Costa & McCrae, 1992), a well established measure of the domains and facets of the five factor model of personality. An extensive research base supports its reliability and validity (Costa & McCrae, 1992). The Neuroticism domain (all facets) was administered. In addition, the Trust facet from the Agreeableness domain was administered, for a total of 56 items.

Borderline features were assessed using the Borderline Features Scale of the Personality Assessment Inventory (PAI-BOR; Morey, 1991), which includes 24 items rated on a 4-point Likert scale. This scale contains four subscales, each assessing one of four features of BPD pathology: affective instability, identity problems, negative relationships, and self-harm (including items about impulsivity). The PAI-BOR has high internal consistency and convergent correlations with other measures of BPD features (Trull, 1995). The four subscales are consistent with factor analytic research on the fundamental components of BPD pathology (Skodol et al., 2002). Several studies support the discriminant validity of the PAI-BOR. Morey (1991) reported that while BPD patients scored above the clinical threshold (raw score > 37) on the PAI-BOR, other diagnostic groups did not, including major depression, dysthymia, anxiety disorders, schizophrenia, schizoaffective disorder, mania, antisocial personality disorder, alcohol abuse or dependence, or drug abuse. Trull (1995) and Trull et al. (1997) found that PAI-BOR scores predicted aspects of academic and interpersonal functioning in a student sample after controlling for Axis I pathology and neuroticism. These findings clearly suggest that high scores on the PAI-BOR are likely to reflect BPD-specific pathology rather than general

distress or other disorders.

Current psychological symptoms consistent with Axis I disorders were measured using the Depression Anxiety Stress Scales (DASS; Lovibond & Lovibond, 1993). This 42-item instrument assesses levels of negative affect and bodily symptoms over the last week and provides subscale scores for depression, anxiety and stress as well as a total score. The DASS has shown good internal consistency, with alphas of .84 and higher (Lovibond & Lovibond, 1995) and strong correlations with other measures of anxiety and depression. Only the total score was used in the present study.

Rumination was assessed using several self-report questionnaires. The Ruminative Responses Scale from the Response Styles Questionnaire (RRS; Nolen-Hoeksema & Morrow, 1991) assesses the tendency to ruminate when feeling sad, blue or depressed. The 22-item scale currently recommended by Treynor, Gonzalez, & Nolen-Hoeksema (2003) has high internal consistency and acceptable convergent validity (Butler & Nolen-Hoeksema, 1994; Nolen-Hoeksema & Morrow, 1991). It can be scored for two factors, brooding and reflective pondering. The brooding factor (e.g., “think, what am I doing to deserve this?”) is consistently correlated with current and future depression and is clearly maladaptive. The reflective pondering factor (e.g., “analyze recent events to try to understand why you are depressed”) shows mixed relationships with depression and is believed to represent a potentially more adaptive form of repetitive thinking about the self. The two factors were scored and analyzed separately.

The Anger Rumination Scale (ARS; Sukhodolsky, Golub, & Cromwell, 2001) is a 19-item scale that assesses the tendency to ruminate on anger, including focusing attention on angry moods, recalling past anger episodes, and thinking about the causes and

consequence of anger episodes (e.g., “When something makes me angry I turn this matter over and over again in my mind”). This scale has good internal consistency ($\alpha = .93$) and test-retest reliability ($r = .77$). Sukhodolsky et al. (2001) found moderate correlations between ARS scores and anger-related constructs such as anger expression, anger-out, anger-in, etc. Factor analysis indicated that items representing anger constructs loaded on separate factors from the anger rumination items, which all loaded on a single factor. This supports the discriminant validity of anger rumination as distinct from anger.

The Anxious Rumination Questionnaire (ARQ; Rector et al., 2008) is a 22-item scale that assesses the tendency to ruminate on anxious moods, such as focusing attention on anxious feelings and how they are likely to interfere with plans and goals (e.g., “I’ll never accomplish my goals if I continue to feel this way”). Rector et al. report good internal consistency ($\alpha = .88$). Although it significantly correlates with anxiety, worry, and anxiety sensitivity, anxious rumination was found to predict the severity of anxiety after accounting for worrying and anxiety sensitivity. This suggests that anxious rumination is distinct from these variables.

The Stress-Reactive Rumination Scale (SRRS; Alloy et al., 2000; Robinson & Alloy, 2003) is a 9-item scale that assesses the tendency to ruminate on negative inferences following stressful life events of all types (e.g., the stressful event is “all your fault”). Respondents rate how much they focus on these thoughts after a stressful event on a scale from 0 - 100. Robinson & Alloy (2003) report good internal consistency ($\alpha = .89$) and convergent and discriminant validity correlations.

The Rumination on Interpersonal Offenses Scale (RIO; Wade et al., 2008) is a 6-item scale which measures rumination about having been hurt or offended by someone.

Respondents are asked to think of times when they have felt hurt or offended and to rate the thought processes associated with such a circumstance (e.g., “The wrong I suffered is never far from my mind”). The developers report good internal consistency ($\alpha = .91$), a clear single-factor structure, and significant correlations in the expected directions with related constructs.

The Post-Event Processing Questionnaire – Revised (PEPQ-R; McEvoy & Kingsep, 2006) is an 8-item scale which assesses the tendency to ruminate after uncomfortable social situations. Respondents are asked to recall uncomfortable social interactions and rate the extent to which they ruminated about them afterwards (e.g., “Did you find it difficult to forget about the event?”). Developers report good internal consistency ($\alpha = .85$), a clear single-factor structure and moderate correlations with depression, anxiety, and stress.

The Rumination-Reflection Questionnaire (Trapnell & Campbell, 1999) includes two subscales measuring the general tendencies to ruminate and reflect, respectively. The rumination scale measures a maladaptive form recurrent thinking about the self (“I spend a great deal of time thinking back over my embarrassing or disappointing moments”) whereas the reflection scale measures a form of recurrent thinking about the self motivated by curiosity or open-mindedness (“I love exploring my inner self”). The rumination scale was expected to be significantly correlated with BPD features, whereas the reflection scale was not.

In order to assess rumination and other qualities of repetitive thought using an alternative methodology, the On Your Mind Writing Task (OYM) developed by Segerstrom et al. (2003) was used to supplement the self-report questionnaires. This

measure has the advantage of sampling repetitive thought without the limits imposed by the content of self-report questionnaires. In this task, respondents are asked to write for 10 minutes about something that they have recently been thinking about frequently or for long periods of time and to describe both the content of their thoughts and the typical nature or style of thinking. The instructions for this task are as follows:

Think of something that has been on your mind lately; that is, you have thought about this topic frequently or for long periods of time. In the following space, please give a detailed description of your thoughts. In addition to describing what you have been thinking about, please also describe how you have been thinking about it: for example, where and when you have the thoughts and what kind of thoughts they are. (Note: our experience suggests that you should write for at least 10 minutes to describe your thoughts thoroughly. You can use the back of this page if necessary.)

After they complete the writing sample, participants are asked to use Likert scales to rate several aspects of their thinking, such as controllability, frequency, helpfulness, etc. They also are asked to rate how much they typically experience several types of affect during these episodes of repetitive thought, such as happy, sad, or anxious affect. The OYM was scored by expert raters for two variables: positive vs. negative content was rated on a 1-5 scale (1 = completely positive, 5 = completely negative) and self vs. other focus was similarly rated (1 = completely self-focused, 5 = completely other-focused).

Procedure

Students were recruited online using the Introductory Psychology (PSY 100) subject pool in the Department of Psychology at the University of Kentucky. All

participants reported individually or in small groups to a room in the psychology department for a session lasting no more than 85 minutes. Study procedures were explained and the informed consent document was completed. Packets were then distributed. All participants were instructed to spend the next ten minutes of the session completing the On Your Mind writing task. This task preceded the questionnaires so that the content of the questionnaires would not prime the participants to write about particular subject matter during the writing task. At the end of the ten minute period, participants were informed that they could move on to complete the remainder of their packet when they were ready to do so. All remaining measures in the packet were in randomized order. Each session was scheduled to last for 85 min., although most participants finished within 60 min. Participants were given a debriefing sheet upon turning in their completed packets and received class credit for their participation.

Chapter Three: Results

Hypothesis 1

The first hypothesis was that borderline features would be significantly correlated with all self-report measures of rumination, after controlling for current levels of Axis I-related symptoms (depression, anxiety, and stress). This hypothesis was tested with partial correlations between each rumination variable and BPD features (PAI-BOR subscales and total score), controlling for depression, anxiety, and stress as measured by the DASS total score. Findings can be seen in Table 1. Because of the large number of correlations computed, only those with p values less than .01 are described as significant. Anger rumination and depressive rumination were significantly correlated with most BPD features, as was the brooding subscale of the depressive rumination scale. The pondering subscale showed a similar pattern, except that it was not correlated with self-harm and only marginally correlated with affective instability. Anxious rumination was significantly correlated only with the identity problems subscale and the total score. Stress-reactive and interpersonal offense rumination showed significant correlations with the PAI-BOR total score but mixed relationships with the PAI-BOR subscales. Post-event rumination and general rumination (as measured by the RRQ) were positively correlated with all BPD features. Reflection, as measured by the RRQ, showed smaller and mostly nonsignificant relationships with BPD features. This was expected because reflection is conceptualized as an adaptive form of repetitive thinking about the self.

These findings suggest that BPD features are significantly correlated with several forms of rumination and that these relationships are not attributable to comorbid symptoms of depression, anxiety, or stress, which are also associated with rumination.

Table 1

Partial correlations between self-report rumination measures and borderline features scales, controlling for depression, anxiety, and stress (DASS total score)

Rumination scales	Borderline features scales				
	Affective Instability	Identity Problems	Negative Relationships	Self-harm/ Impulsivity	Total
Anger rumin (ARS)	.41**	.31	.35**	.33**	.51**
Depress. rumin (RSQ)	.32**	.60**	.42**	.22	.56**
Brooding (RSQ)	.30*	.50**	.41**	.26	.53**
Pondering (RSQ)	.24*	.40**	.37**	.09	.40**
Anxious rumin (ARQ)	.09	.43**	.14	.14	.28*
Stress react rumin (SRRS)	.14	.51**	.13	.20	.35*
Interpers off. rumin (RIO)	.24	.38**	.40**	.17	.43**
Post-event rum (PEPQ-R)	.42**	.36**	.28**	.31*	.50**
General rumin (RRQ)	.52**	.38**	.39**	.26*	.57**
Reflection (RRQ)	.17	.17	.27*	.13	.25

Note: rumin = rumination, ARS = Anger Rumination Scale, RSQ = Response Styles Questionnaire, ARQ = Anxious Rumination Questionnaire, SRRS = Stress-Reactive Rumination Scale, RIO = Rumination on Interpersonal Offenses Scale, PEPQ-R = Post-Event Processing Questionnaire, RRQ = Rumination Reflection Questionnaire
*p < .01, **p < .001

Hypothesis 2

The second hypothesis was that rumination questionnaires would show incremental validity over neuroticism in the prediction of BPD features. This was tested in several ways. First, a set of six hierarchical regression analyses examined whether content-specific measures of rumination were significant predictors of BPD features after controlling for the corresponding trait-level facet of neuroticism or other trait-level tendency. In each case the dependent variable was the PAI-BOR total score. The relevant facet of neuroticism entered the equation at Step 1. The corresponding type of rumination entered at Step 2. The critical question in each case was whether ruminating about a particular type of negative affect accounts for variance in BPD features after controlling for the tendency to experience that type of negative affect. Significant incremental validity would support recent theoretical writings and empirical findings suggesting that how people respond to their negative affect (e.g., by ruminating about it) is at least as important to their mental health as how often negative affect occurs.

Results are shown in Table 2. Analysis 1 showed that trait-level depressive features, assessed by the NEO-depression facet scale, accounted for 46% of the variance in BPD features. Depressive rumination accounted for an additional 5% of the variance, a significant increase in R^2 . Similarly, in analysis 2, anxious rumination showed significant incremental validity over trait-level anxiety in predicting BPD features, accounting for an additional 5% of the variance. In analysis 3, anger rumination accounted for an additional 7% of the variance in BPD features after controlling for trait-level angry hostility. Analysis 4 found that stress-reactive rumination had small but significant incremental validity over trait-level vulnerability (the tendency to feel unable to cope with stress). In analysis 5, the

Table 2

Hierarchical regression analyses examining incremental validity of content-specific forms of rumination over corresponding trait-level characteristics in predicting borderline features

Analysis	Dependent Variable	Step	Predictor	Change in R ²	Total R ²
1	PAI-BOR total	1	NEO-depression	.46***	.46
		2	brooding	.05***	.51
2	PAI-BOR total	1	NEO-anxiety	.29***	.29
		2	anxious rumination	.05**	.34
3	PAI-BOR total	1	NEO-angry hostility	.47***	.47
		2	anger rumination	.07***	.54
4	PAI-BOR total	1	NEO-vulnerability	.37***	.37
		2	stress-reactive rumin.	.02*	.39
5	PAI-BOR total	1	NEO-self-conscious	.32***	.32
		2	post-event rumination	.13***	.45
6	PAI-BOR total	1	NEO-trust	.33***	.33
		2	interpers off. rumin.	.14***	.47

PAI-BOR = Personality Assessment Inventory – Borderline Features Scale.

*p < .05, **p < .01, ***p < .001

tendency to ruminate after uncomfortable social interactions accounted for 13% of the variance in BPD features after controlling for trait-level self-consciousness (the tendency to feel shame, embarrassment, and inferiority to others). In analysis 6, the trust facet from the agreeableness domain entered at Step 1 and accounted for 33% of the variance in BPD features, suggesting a tendency for people high in BPD features to believe that others do not have good intentions and are dishonest or dangerous. The tendency to ruminate when experiencing an interpersonal offense accounted for an additional 14% of the variance in BPD features.

Overall, findings were consistent across all six analyses in suggesting that the tendency to ruminate about a particular type of negative affect accounts for significant variance in borderline features after controlling for trait-level tendencies to experience these types of negative affect. The amount of additional variance accounted for by the rumination scale ranged from .02 (stress reactive rumination over NEO-vulnerability) to .14 (interpersonal offense rumination over NEO-trust).

More stringent tests of incremental validity of rumination over neuroticism were conducted by repeating these analyses with the NEO-neuroticism domain score at Step 1. Findings are shown in Table 3. Analysis 1 showed that trait-level general neuroticism, assessed by the NEO-neuroticism domain scale, accounted for 64% of the variance in BPD features. Depressive rumination accounted for an additional 1% of the variance, a small but statistically significant increase in R^2 . In analysis 2, anxious rumination did not show significant incremental validity over general neuroticism in predicting BPD features,

Table 3

Hierarchical regression analyses examining incremental validity of content-specific forms of rumination over NEO-neuroticism domain scores in predicting borderline features

Analysis	Dependent Variable	Step	Predictor	Change in R ²	Total R ²
1	PAI-BOR total	1	NEO-neuroticism	.64***	.64
		2	brooding	.01*	.65
2	PAI-BOR total	1	NEO-neuroticism	.64***	.64
		2	anxious rumin.	.00	.64
3	PAI-BOR total	1	NEO-neuroticism	.64***	.64
		2	anger rumin.	.06***	.70
4	PAI-BOR total	1	NEO-neuroticism	.64***	.64
		2	stress-reac rumin.	.00	.64
5	PAI-BOR total	1	NEO-neuroticism	.64***	.64
		2	post-event rumin.	.02**	.66
6	PAI-BOR total	1	NEO-neuroticism	.64***	.64
		2	interpers off. rumin.	.04***	.67

PAI-BOR = Personality Assessment Inventory – Borderline Features Scale.

*p < .05, **p < .01, ***p < .001

accounting for less than 1% of additional variance. In analysis 3, anger rumination accounted for an additional 6% of the variance in BPD features after controlling for general neuroticism. Analysis 4 found that stress reactive rumination did not show incremental validity over general neuroticism. In analysis 5, the tendency to ruminate after uncomfortable social interactions accounted for 2% of the variance in BPD features after controlling for general neuroticism, a significant increase in R^2 . In analysis 6, the tendency to ruminate when experiencing an interpersonal offense accounted for an additional 4% of the variance in BPD features, which was also statistically significant.

These findings show that, even when the total Neuroticism domain score enters at Step 1, several types of rumination show significant incremental validity over neuroticism in accounting for BPD features, including depressive rumination (brooding), angry rumination, post-event rumination, and rumination about interpersonal offenses. However, anxious rumination and stress-reactive rumination did not account for incremental variance in BPD features beyond trait-level general neuroticism.

Hypothesis 3

The remaining hypotheses involved variables derived from the On Your Mind Writing Task. Reliability of the coders' ratings was evaluated by calculating Cronbach's alpha for positive vs. negative valence ($\alpha = .89$) and self vs. other focus ($\alpha = .86$). Examples of writing samples, one provided by a person who scored high on the PAI-BOR and one who scored low, can be seen in Table 4, along with the ratings that each writing sample received.

The third hypothesis was that BPD features would be associated with greater negative valence and greater self-focus in the writing samples, as rated by trained coders.

Table 4

Examples of writings samples and coder ratings

From a participant with a low score on the PAI-BOR:

Lately I have been thinking a lot about what I want to do as a job when I am finished with school. I am a pre-nursing student, so will eventually graduate ready to work in the nursing field. However, sometimes I think I want to do more and use nursing to try to get into med school. Either way I will be happy because working in a hospital will keep me busy and if I'm busy I tend to be satisfied. My ideal job, though, is to be an orthopedic surgeon and specialize with athletes. This obviously would require med school but when I think about this I wonder if I am willing to go to school that much longer and be focused and dedicated enough to succeed. Usually I think about this when I am in my nursing anatomy class because the body is so interesting to me and I don't just want to be a nurse on the side of the operation helping, I want to be right in the middle of everything doing the operation.

Ratings:

valence: 1.5 (almost entirely positive)

focus: 1.0 (almost all self-focused)

From a participant with a high score on the PAI-BOR:

I broke up with my boyfriend last Sunday. I didn't want to, but the way our anger flared up so quickly I didn't see any other option. I feel so sad when I think about him and our situation. I think about him all the time, it seems...when I don't keep myself busy, that is. I miss him so much. He was my everything. He was my best friend. Now every time I see him I want to throw my arms around him and cry. Since we've been broken up I've cried every day. Our emotions towards each other have varied every day. One minute, we're laughing together and the next minute, we're crying and saying we hate each other. He threatens to kill himself and I get scared. I ran to his dorm last night because I feared he was going to die. I miss everything about him, but I want him to go away so I can move on. Is that selfish? I don't want him to kill himself though, which is my biggest fear. Our parents and friends say we're not right for each other. But I'm afraid to believe that.

Ratings:

Valence: 5 (almost all negative)

Focus: 2.75 (both self and other focused)

Greater negative valence was expected because previous work has shown that people with higher levels of psychological symptoms also tend to have more negative topics on their minds (Segerstrom, Stanton, Alden, & Shortridge, 2003). Greater self-focus was expected because rumination is often described as a form of self-focused attention. That is, rumination typically involves thinking about one's own symptoms and their meanings, causes, and implications. The hypothesis was tested with correlations between PAI-BOR scores and the two coder-rated variables: positive vs negative valence and self vs other focus. Results are shown in Table 5. The hypothesis was largely supported for valence. Negative valence of writing sample content was significantly correlated with all PAI-BOR scores except self-harm. However, the hypothesis was not supported for self-focus. Correlations between self-focus and PAI-BOR scores were small but positive, suggesting a tendency for BPD features to be associated with other-focus in the writing samples (e.g., writing about others who had upset them). In this case, correlations were significant only for identity problems and the total score.

Hypothesis 4

The writing task asks respondents to rate the thoughts they have just described on several dimensions. The fourth hypothesis was that participants with higher levels of BPD features would rate their thoughts in ways consistent with maladaptive forms of rumination (e.g., they would describe their thoughts as difficult to control, negative, prolonged, frequent, etc). This hypothesis was tested with correlations between PAI-BOR scores and participants' ratings of their thought characteristics. Results are shown in Table 6. Findings show that BPD features were most strongly related to ratings of thoughts as difficult to control, negative, prolonged, unhelpful, and unresolved. Ratings of these five

Table 5

Bivariate correlations between BPD features and coder-rated valence (positive vs negative) and coder-rated focus (self vs other) in On Your Mind writing samples

	Borderline features scales				
	Affective Instability	Identity Problems	Negative Relationships	Self-harm/ Impulsivity	Total
Neg. valence	.32***	.39***	.25**	.14	.37***
Other-focus	.23*	.27**	.14	.19*	.28**

*p < .05, **p < .01, ***p < .001

Table 6

Bivariate correlations between BPD features and self-ratings of thoughts described in the writing sample

Thought characteristic	Borderline features scales				
	Affective Instability	Identity Problems	Negative Relationships	Self-harm/ Impulsivity	Total
difficult to control	.27**	.38***	.16	.11	.30***
negative	.21*	.28**	.13	.12	.24**
prolonged	.20*	.30***	.19*	.07	.25**
frequent	.13	.15	.12	.13	.18
about self	-.12	-.11	-.19*	-.07	-.16
unhelpful	.26**	.26**	.13	.03	.22*
disrupt concentration	-.05	-.01	-.08	.06	-.04
no shift in perspective	.02	.04	-.01	.20*	.08
unresolved	.39***	.35***	.24**	.15	.38***
uncertain	.18	.22*	.04	.08	.17
about something imp.	.14	.14	.16	-.05	.13
rumination index	.37**	.45**	.24**	.14	.40**

Note. The rumination index is a mean of the ratings of thoughts as difficult to control, negative, prolonged, unhelpful, and unresolved.

* $p < .05$, ** $p < .01$, *** $p < .001$

characteristics then were averaged to create ruminative thought index. Correlations between this index and BPD features were computed and can be seen in the last line of Table 6. The ruminative thought index was significantly correlated with all PAI-BOR scores except self-harm. The ruminative thought index was showed small but significant correlations with all of the self-report rumination variables, and these results can be seen in Table 7.

Hypothesis 5

The writing task also asks participants to rate the affect they typically experience when they are immersed in the repetitive thoughts they have just described. The fifth hypothesis was that participants with higher levels of BPD features would rate the affect associated with their repetitive thoughts as more negative (sadness, anxiety, anger, guilt/shame, and general negative affect). This hypothesis was tested with bivariate correlations between BPD features and self-rated negative affect associated with the repetitive thoughts described in the writing task. Results can be seen in Table 8. In general, results show that the tendency to experience repetitive thinking associated with negative affect is significantly correlated with BPD features. In contrast, the tendency to have repetitive thoughts associated with positive affect was not associated with BPD features.

Finally, regression analyses were also conducted to examine whether any of the writing task variable predicted BPD features after accounting for neuroticism. Findings are shown in Table 9. None of the writing task variables significantly predicted borderline features beyond trait-level general neuroticism.

Table 7

Correlations between rumination index and self-report rumination variables

	Rumination Variables								
	ARS	ARQ	SRRS	PEPQ	RIO	RRQ	RSQ	brood	ponder
Rumin. Index	.20*	.22*	.13	.22*	.20*	.34**	.34**	.34**	.25*

Note: ARS = Anger Rumination Scale, ARQ = Anxious Rumination Questionnaire, SRRS = Stress-Reactive Rumination Scale, PEPQ = Post-Event Processing Questionnaire, RIO = Rumination on Interpersonal Offenses Scale, RRQ = Rumination-Reflection Questionnaire, RSQ = Response Styles Questionnaire, brood = Brooding (RSQ), ponder = Pondering (RSQ)

*p < .01, **p < .001

Table 8

Bivariate correlations between BPD features and self-rated affect associated with the thoughts described in the writing task

	Borderline features scales				
	Affective Instability	Identity Problems	Negative Relationships	Self-harm/ Impulsivity	Total
general neg. affect	.35**	.47**	.25*	.22	.42**
general positive affect	-.10	-.19	-.11	-.03	-.14
fear	.26*	.36**	.13	.07	.27*
anger	.31**	.35**	.27*	.30**	.40**
guilt/shame	.29**	.36**	.26*	.34**	.40**
sadness	.33**	.54**	.37**	.12	.45**

*p<.01, **p<.001

Table 9

Hierarchical regression analyses examining incremental validity of writing sample variables over trait-level general neuroticism in predicting borderline features

Analysis	Dependent Variable	Step	Predictor	Change in R ²	Total R ²
1	PAI-BOR total	1	NEO-neuroticism	.64***	.64
		2	pos./neg. valence	.00	.64
2	PAI-BOR total	1	NEO-neuroticism	.64***	.64
		2	self/other focus	.01	.65
3	PAI-BOR total	1	NEO-neuroticism	.64***	.64
		2	ruminative style index	.00	.64
4	PAI-BOR total	1	NEO-neuroticism	.64***	.64
		2	positive affect	.00	.64
5	PAI-BOR total	1	NEO-neuroticism	.64***	.64
		2	negative affect	.00	.64
6	PAI-BOR total	1	NEO-neuroticism	.64***	.64
		2	fear	.00	.65
7	PAI-BOR total	1	NEO-neuroticism	.64***	.64
		2	anger	.00	.65
8	PAI-BOR total	1	NEO-neuroticism	.64***	.64
		2	guilt	.00	.64
9	PAI-BOR total	1	NEO-neuroticism	.64***	.64
		2	sadness	.00	.64

PAI-BOR = Personality Assessment Inventory – Borderline Features Scale.

*p < .05, **p < .01, ***p < .001

Chapter Four: Discussion

The goal of the current study was to expand on the findings of Baer & Sauer (in press), which suggested that even after controlling for the presence of current Axis-I related symptoms and trait-level negative affectivity, both depressive and angry rumination were strongly associated with borderline features. This goal was accomplished in two ways. First, in addition to depressive and angry rumination, the present study included measures of other forms of rumination, such as stress-reactive rumination, rumination on interpersonal offenses, anxious rumination, and post-event rumination. These ruminative tendencies have not been comprehensively studied in relation to BPD features. Findings showed numerous significant correlations between BPD features and all types of rumination included here. Moreover, these associations were not attributable to comorbid Axis-I symptoms that are also associated with rumination. That is, people with high levels of BPD features appear to be engaging in many forms of rumination, but not because they are also depressed, anxious, or stressed.

In addition, the present study examined whether the tendency to experience negative affect (or stressful events) and the tendency to respond to these experiences by ruminating about them account for independent variance in BPD features. Findings consistently suggested that rumination accounts for significant incremental variance in BPD features after controlling for various facets of neuroticism. When controlling for the total Neuroticism domain score, brooding, angry rumination, post-event rumination, and rumination on interpersonal offenses accounted for significant incremental variance in BPD features. Although statistically significant, the changes in R^2 were small, ranging from .01 to .06 (Table 3). These values are smaller than those reported by Baer & Sauer (in

press), who found a change in R^2 for angry rumination over negative affectivity of .22. The difference may be attributable to the use of different measures to assess neuroticism or negative affectivity. Baer & Sauer (in press) used the PANAS-X, in which respondents rate how often they experience negative emotions that are described using single words or very short phrases (e.g., sad, irritable, guilty, ashamed of self, etc). In contrast, the NEO assesses a broader conceptualization of neuroticism that includes the occurrence of negative affect (feeling fearful, sad, resentful, etc) as well as cognitive content and process (such as worrying, self-criticism, decision-making, and low self-esteem) and behavioral responses to negative affect (such as giving in to impulses or avoiding people). Recent research has emphasized the utility of distinguishing between the occurrence of negative affect and ways of responding to it when it occurs (such as by ruminating about it, trying to suppress it, engaging in impulsive behavior to get rid of it, etc). The rationale for this distinction is that negative affect is unavoidable in the course of life, whereas adaptive responses to negative affect can be conceptualized as skills that can improve mental health and wellbeing even in the presence of negative affect. For future research on rumination and other ways of responding to the intense negative affect typical of BPD, the PANAS-X may be a more appropriate measure of negative affectivity, because it allows a clearer distinction between the occurrence of negative affect and ways of responding to it.

This study also included an expert-coded writing task to assess repetitive thought in ways that might complement the self-report questionnaires. It was hypothesized that BPD features would be associated with greater negative valence and greater self-focus in the writing samples. This hypothesis was partially supported. Negative valence in the writing samples was significantly associated with BPD features, but contrary to

expectations, higher levels of BPD features were associated with a tendency to focus on others in the writing samples. It was also hypothesized that participants with greater levels of BPD features would describe their thoughts in ways consistent with maladaptive forms of rumination. This hypothesis also was supported. Participants with higher BPD features rated their thoughts as more difficult to control, negative, prolonged, unhelpful, and unresolved. Participants with higher BPD features also were more likely to experience negative affect when immersed in their repetitive thoughts. However, the experience of positive affect while immersed in repetitive thoughts was not significantly associated with BPD features.

Finally, regression analyses were conducted to examine whether any of the writing task variables predicted BPD features after accounting for neuroticism. These findings were nonsignificant. This finding suggests that, although the writing task provides interesting information about the nature of repetitive thought in persons with BPD features, the writing task variables are not independent of neuroticism in predicting severity of BPD features.

The results of the current study provide important extensions of the literature describing the relationship between repetitive thought and BPD features. First, the questionnaire-based findings suggest that individuals with BPD features are probably engaging in high levels of multiple types of rumination. While it has previously been shown that angry and depressive rumination are strongly associated with BPD features, the present study included a broader range of ruminative tendencies. As individuals with BPD features experience a wide range of negative affect and frequent interpersonal stressors, these findings highlight the probably that these persons are ruminating about

these experiences in ways that are related to the severity of their BPD symptoms.

The findings from the writing task also make important contributions to the literature on rumination and BPD features. Rumination has been defined in a variety of ways. Ratings from the writing task showed that, at least in this sample, BPD features were most strongly correlated with repetitive thoughts that are difficult to control, negative, prolonged, unhelpful, and unresolved. These findings are consistent with previous research showing that rumination is most likely to be maladaptive when it is uncontrollable (Raes & Williams, in press) and that rumination tends not to lead to constructive solutions to problems (Nolen-Hoeksema et al., 2008). However, rumination is usually described as a form of self-focused attention, because it involves thinking about one's own feelings and their causes and meanings. In the present study, BPD features were unexpectedly found to be associated with more other-focus in the writing samples. This unexpected finding may be related to the importance of anger in BPD. Previous research describing rumination as self-focused has dealt specifically with depressive rumination. Although dysphoric persons may center their ruminative thoughts on their own feelings, it is possible that anger is more likely to be associated with repetitive thoughts about anger-inducing people or situations (how badly others behaved, how unfair the situation was, etc). Thus, an important goal for future research is to clarify the nature of the repetitive thoughts typical of anger rumination, and how these thoughts may differ from depressive rumination.

The present findings may have treatment implications for the BPD population. Treatments such as rumination-focused cognitive behavior therapy (Watkins et al., 2007), behavioral activation (Dimidjian et al., 2006), metacognitive therapy (Wells, 2000), and mindfulness-based cognitive therapy (Segal, Williams, & Teasdale, 2002), specifically

target rumination and have accrued encouraging empirical support for their efficacy, including evidence that the tendency to ruminate is susceptible to change with treatment. However, these interventions have been studied primarily in mood and anxiety disorders. If rumination is exacerbating the affective instability typical of BPD, then adaptations of these treatment methods could be beneficial for the BPD population.

Several limitations to this study must be noted. First, scores derived from the On Your Mind writing sample did not predict severity of borderline features after controlling for the NEO-neuroticism domain. As noted earlier, however, the On Your Mind task was important in demonstrating that persons with higher levels of BPD features characterize their repetitive thoughts as difficult to control, negative, prolonged, unhelpful, and unresolved. Future research could develop ways to code for these characteristics in writing samples to more clearly assess the characteristics of ruminative thought.

Second, the participant sample consisted entirely of undergraduate students, a majority of whom were Caucasian females. As noted earlier, the presence of clinically significant BPD features in student samples has been documented, and the present study oversampled the high end of the distribution on the PAI-BOR scale in order to include a reasonable number with BPD features. However, no diagnostic interview was conducted to determine how many of these participants met criteria for BPD. In future studies, it would be useful to include individuals who meet criteria for the disorder to better study ruminative thought in a more representative sample.

In spite of these limitations, the present study adds to the growing literature suggesting that individuals with borderline personality features are probably engaging in multiple forms of rumination, and that this maladaptive cognitive style is significantly

correlated with severity of BPD symptoms, even after accounting for current Axis-I related symptoms and the trait-level negative affect typical of BPD. Findings suggest both similarities and differences between rumination in BPD and rumination as studied in other disorders. Consistent with previous literature on depressive rumination, the present findings showed that BPD features are most strongly associated with repetitive thoughts that are difficult to control, negative, prolonged, unhelpful, and unresolved. However, in this sample, borderline features were more strongly associated with other-focused rather than self-focused thoughts. Findings also support the distinction between experiencing negative affect and ruminating about it. Although persons with borderline features may have biologically based tendencies toward strong negative affect, rumination is only one of several ways of responding when negative affect occurs, and the literature increasingly suggests that it is maladaptive. Thus, the present findings may have clinical implications, particularly in suggesting that efforts to teach skills for reducing rumination may be helpful to persons with BPD features.

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Presentations:

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