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## Characteristics of Repetitive Thought Associated with Borderline Personality Features: A Multimodal Investigation of Ruminative Content and Style

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### Abstract

Increased ruminative style of thought has been well documented in borderline personality disorder (BPD); however, less is known about how the content of rumination relates to domains of BPD features. Relationships between forms of rumination and BPD features were examined in an undergraduate sample with a wide range of BPD features. Participants completed self-report measures of rumination and a free-writing task about their repetitive thought. Rumination on specific themes, including anger rumination, depressive brooding, rumination on interpersonal situations, anxious rumination, and stress-reactive rumination were significantly associated with most BPD features after controlling for general rumination. Coded writing samples suggested that BPD features are associated with repetitive thought that is negative in valence, difficult to control, prolonged, unhelpful, and unresolved. Although rumination is often described as a form of self-focused attention, BPD relationship difficulties were correlated with greater other-focus in the writing samples, which may reflect more interpersonal themes. Across both self-reports and the writing task, the BPD feature of self-destructive behavior was associated specifically with anger and hostility, suggesting this content may play a particularly important role in fueling impulsive behavior. These findings suggest that both the style and the content of repetitive thought may play a role in BPD features.

### Keywords

borderline personality disorder; rumination; repetitive thought; self-focused attention; anger

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Rumination is a maladaptive form of repetitive, passive, and unconstructive thinking about symptoms of distress and their possible causes and meanings (Nolen-Hoeksema, Wisco, & Lyubomirsky, 2008). Although many dysphoric people believe ruminating about difficulties to be necessary for gaining insight and solving problems (Papageorgiou & Wells, 2001; Watkins & Baracaia, 2001), rumination has many negative consequences, such as intensifying and maintaining negative mood, impairing concentration, memory, and problem-solving, reducing motivation for instrumental behavior, and contributes to the etiology and maintenance of problems including depression, aggression, disordered eating, substance abuse, post-traumatic stress, and self-injurious behaviors (for reviews, see Nolen-Hoeksema et al, 2008; Watkins, 2008). Most of these negative outcomes of rumination are associated with borderline personality disorder (BPD), a severe and prevalent condition characterized by intense negative affect, interpersonal difficulties, and maladaptive impulsive behaviors (APA, 2000). Understanding the characteristics of ruminative thought related to the range of symptoms present in BPD may provide greater understanding of the mechanisms perpetuating its symptoms as well as targets for interventions.

For people with BPD, negative affect may trigger rumination in a misguided attempt to solve problems and reduce distress; however, rumination actually intensifies the negative affect. This leads to further rumination and dysregulated behavior, such as self-harm or substance abuse, in attempts to escape the vicious cycle (Selby, Anestis, & Joiner, 2008). Consistent with this model, a composite rumination variable that included depressive brooding, anger rumination, and catastrophizing was associated with BPD symptoms and mediated the relationship between selected symptoms of BPD and dysregulated behavior such as self-harm and binge eating (Selby, Anestis, Bender, & Joiner, 2009). This general form of rumination was also shown to interact with momentary negative affect to predict behavioral dysregulation (Selby & Joiner, 2013) and non-suicidal self-injury (Selby, Franklin, Carson-Wong, & Rivzi, 2013). While this model examines the impact of rumination on impulsivity in BPD, less is known about its potential connection to internal states characteristic of the disorder, such as affective lability and disturbed identity, as well as the hallmark symptom of unstable and chaotic relationships.

While ruminative thought is generally characterized by a repetitive, negative, and unresolved *style* (Nolen-Hoeksema, 1991), the *content* may vary. Distinct forms of content of ruminative thought (i.e., what people are ruminating about) can have unique influences on affect and behavior. For example, depressive rumination specifically increases depressed mood, whereas anger rumination exacerbates anger and aggression (Peled & Moretti, 2010), and anger rumination, but not depressive, has been shown to predict alcohol consumption in students (Ciesla, Dickson, Anderson, & Neal, 2011). Identifying relevant ruminative content may be important in understanding particular problems or disorders and in developing interventions, for example incorporating emotion-specific regulation strategies such as behavioral activation or anger management. This may be particularly true for BPD, given its highly heterogeneous presentations, comprised of varying combinations of symptoms and including a range of intense affective states.

Relatively little work to date has examined how repetitive thought *content* relates to BPD features; however, preliminary evidence suggests particular relevance of several forms. Depressive rumination has been demonstrated to predict BPD symptoms independently of shared variance with depression in both cross-sectional clinical samples (Watkins, 2009) and longitudinal student samples (Smith, Grandin, Alloy, & Abramson, 2006). Anger rumination may be even more important in accounting for BPD features. When examined in students oversampled for high BPD features, anger rumination demonstrated strong associations with affective instability and negative relationships and moderate correlations with identity disturbance and self-harm/maladaptive impulsivity (Baer & Sauer, 2011). In contrast, depressive rumination demonstrated moderate associations with affective instability, negative relationships, and identity disturbance, and was not significantly associated with self-harm/maladaptive impulsivity. Only anger rumination was a significant predictor in a model predicting total BPD features from both forms of rumination over and above negative affect (Baer & Sauer, 2011).

Individuals with BPD are prone to experiencing a wide range of negative moods and experiences about which they might ruminate, including depression, anger, anxiety, uncomfortable interpersonal interactions, and other stressful events; however, previous research examining specific types of rumination in BPD has focused only on depressive and anger rumination. The present study expands the literature on rumination and BPD features by examining relationships between these multiple forms of rumination and severity of specific BPD features, with the aim of characterizing both the content and style of repetitive thought associated with BPD. In addition to well-validated self-report measures of a variety of forms of rumination, the present study employed a repetitive thought writing task using a validated coding system (Segerstrom, Stanton, Alden, & Shortridge, 2003) to explore the characteristics of repetitive thought associated with BPD features without the constraints imposed by the content of available questionnaires.

Historically, rumination has been described as self-focused thought (Nolen-Hoeksema, 1991), and previous work using this repetitive thought writing task with student samples have demonstrated that self-focus, when also in the context of negative valence, is associated with depressive symptoms (Segerstrom, Stanton, Flynn, Roach, Testa, & Hardy, 2012). However, research to date on emotion regulation in BPD has highlighted the importance of anger and anger rumination (e.g., Jacob et al, 2008; Baer & Sauer, 2011), as well as reactivity to interpersonal relationships in the form of sensitivity to rejection (e.g., Staebler, Helbing, Rosenbach, & Renneberg, 2011; Peters, Smart, & Baer, 2015). These findings suggest the possibility that rumination in BPD may center less strictly around the self and more around interpersonal forms of affect and events, as well as on relationships with others, in contrast to previous assumptions about ruminative thought.

BPD features were hypothesized to be significantly correlated with measures of all forms of dysfunctional rumination. To examine the role of ruminative content, correlations were also computed between specific forms of rumination and BPD, controlling for general rumination. Associations were expected to be strongest and most consistent across domains of BPD features with anger rumination and interpersonal forms of rumination, such as rumination on interpersonal offenses and post-event processing. These differences in

patterns of associations were expected to be particularly pronounced for self-destructive and impulsive behavior, given past findings of relations with anger, but not depressive, rumination. BPD features were also predicted to be significantly associated with more negative content in the writing samples as rated by trained coders. Previous literature provides support for two competing hypotheses about self-vs-other focused content, with the literature on general repetitive thought and depressive rumination predicting greater self-focus (in the context of negative valence) relating to more maladaptive functioning, whereas the broader literature on BPD suggests ruminative focus may be on conflicts and problems and thus more other-focused, particularly in the context of BPD-related relationship problems. To test these competing hypotheses, we examined both zero-order associations of self-vs-other focus with BPD features, as well as the interaction of this dimension with negative valence. Finally, it was predicted that participants higher in BPD features would rate both the style and content of the thoughts they had reported in the writing task in ways consistent with maladaptive rumination: e.g., as having more negative content and a more prolonged and difficult to control style, and that BPD features would also be associated with more negative affect and less positive affect during episodes of repetitive thought.

## Method

### Participants

The full sample included 225 undergraduate students (66.8% female, 83.8% Caucasian) with a mean age of 19.02 years ( $SD = 1.11$ ). Clinically significant levels of BPD features are common in the undergraduate population (Trull, 1995; Trull, 2001), and students with raw scores over 37 ( $T = 70$ ) on the Borderline Features Scale of the Personality Assessment Inventory (PAI-BOR; Morey, 1991) show clinically significant BPD characteristics and levels of maladjustment similar to those in clinical populations (Trull, 1995). Clinical samples represent only the upper range of BPD severity (Trull, 1995); therefore, studies of characteristics associated with BPD will have more power to detect effects if they include individuals with a wide range of scores on measures of BPD features.

Participants signed up for the study using an online registration system available to all students in introductory psychology classes, who earn course credit for participation in research. Given that participants who sign up without prompting mostly fall into the low and average range of BPD features, in order to insure that a wide range of BPD features would be represented, additional email invitations to participate in the study were sent to students in that eligible group who had obtained high scores ( $T > 70$ ) on a prior administration of the PAI-BOR included in a packet of screening measures administered at the beginning of the semester to identify potential participants for numerous studies in the psychology department. This sampling strategy was designed to create a symmetrical distribution of PAI-BOR scores without excessive kurtosis and with adequate representation of the high end of the distribution. Two such samples were recruited across two semesters, with identical recruitment and administration procedures. Both were administered all self-report measures and the data from these two samples combined for these analyses (full  $N = 225$ ). The second sample ( $N = 117$ ) was administered the On Your Mind Writing Task in addition to self-

report measures. The demographics of this section of the full sample were similar to the full sample: 75% female, 84% Caucasian with a mean age of 19.15 years ( $SD = 1.25$ ).

## Measures

**Borderline features**—The PAI-BOR has 24 items measuring four aspects of BPD pathology: affective instability (AI), identity problems (ID), negative relationships (NR), and self-harm (given that this subscale encompasses broader maladaptive impulsivity (3 items; e.g., “I sometimes do things so impulsively that I get into trouble.”) and problematic spending (2 items; e.g. “I spend money too easily.”), in addition to a single item about deliberate self-harm (“When I’m upset, I typically do something to hurt myself.”), we refer to it as “Self-Destructive Behavior” for clarity in the present study [SDB]). Elevated scores have been shown to differentiate BPD patients from those with other diagnoses, including anxiety, mood, and psychotic disorders, antisocial personality disorder, and substance abuse disorders (Morey, 1991). PAI-BOR scores also predicted academic and interpersonal functioning in a student sample after controlling for Axis I pathology and neuroticism (Trull, 1995; Trull, Ueda, Conforti, & Doan, 1997). These findings suggest that high scores on the PAI-BOR are likely to reflect BPD-specific pathology rather than general distress or other disorders. In the present study, PAI-BOR scales demonstrated adequate to good internal consistency (AI  $\alpha = .82$ , ID  $\alpha = .69$ , NR  $\alpha = .71$ , SDB  $\alpha = .73$ ).

**General rumination**—The tendency to ruminate generally was assessed with the Rumination-Reflection Questionnaire (RRQ; 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 tend to ‘ruminate’ or dwell over things that happen to me for a really long time afterward.”), in contrast to the reflection scale, which 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 used in the present study to control for the process of general rumination, in order to explore specificity of relationships between rumination types and BPD features. This 12-item subscale demonstrated excellent internal consistency ( $\alpha = .90$ ) in our sample.

**Depressive rumination**—Depressive rumination was measured using the Ruminative Responses Scale (RRS), derived from the Response Styles Questionnaire (Nolen-Hoeksema & Morrow, 1991). The RRS assesses the tendency to engage in ruminative thinking when feeling sad, blue, or depressed. Scores are related to both the onset and severity of depressive symptoms (Nolen-Hoeksema et al., 2008). Several authors (Treynor, Gonzalez, & Nolen-Hoeksema, 2003; Segerstrom, Tsao, Alden, & Craske, 2000) have argued that this relationship may be inflated by the presence of items that confound specific symptoms of depression with the tendency to ruminate about them and have addressed these concerns by deleting items that include content related to specific depressive symptoms (poor concentration, feeling alone, fatigued, passive, unmotivated). The remaining items focus on repetitive thinking about depression or sadness in general. This allows the total score to better represent the general tendency to ruminate when feeling sad or depressed, without reference to the presence or absence of specific symptoms that not all depressed people

experience. Sample items include “isolate yourself and think about the reasons why you feel sad” and “go someplace alone to think about your feelings.” This 10-item scale had good internal consistency ( $\alpha = .82$ ) in our sample.

**Anger rumination**—The Anger Rumination Scale (ARS; Sukhodolsky, Golub, & Cromwell, 2001) has 19 items assessing the tendency to focus attention on angry moods, recall past anger episodes, and think 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”). ARS scores demonstrate moderate correlations with anger-related constructs such as anger expression and suppressed anger; however, factor analysis has shown that items representing anger constructs load on separate factors from the anger rumination items, which all load on a single factor, supporting the discriminant validity of anger rumination as distinct from anger (Sukhodolsky et al., 2001). The ARS demonstrated excellent internal consistency in the present study ( $\alpha = .92$ ).

**Anxious rumination**—The Anxious Rumination Questionnaire (ARQ; Rector, Antony, Lapsa, Kocovski, & Swinson, 2008) has 22 items assessing 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 (“I’ll never accomplish my goals if I continue to feel this way”). Anxious rumination predicted severity of anxiety after accounting for worry and anxiety sensitivity, suggesting that anxious rumination is distinct from these variables (Rector et al., 2008). The ARQ demonstrated good internal consistency in the present study ( $\alpha = .84$ ).

**Stress-reactive rumination**—The Stress-Reactive Rumination Scale (SRRS; Alloy et al., 2000; Robinson & Alloy, 2003) has 9 items assessing the tendency to ruminate on negative inferences following stressful life events (e.g., the stressful event is “all your fault”). The SRRS has demonstrated good convergent and discriminant correlations with expected constructs (Robinson & Alloy, 2003) and had good internal consistency in the present study ( $\alpha = .85$ ).

**Rumination on interpersonal offenses**—The Rumination on Interpersonal Offenses Scale (RIO; Wade, Vogel, Liao, & Goldman, 2008) has 6 items measuring rumination about having been hurt or offended by someone. Respondents think of times when they have felt hurt or offended and rate associated thought patterns (“the wrong I suffered is never far from my mind”). The developers report a clear single-factor structure and significant correlations in the expected directions with related constructs. For the present study, the instructions were modified slightly so that respondents rated their thoughts “when this has happened to you” rather than “in the past seven days” in order to be equivalent to the other measures used in the study, which ask about rumination more generally. The RIO demonstrated good internal consistency in the present study ( $\alpha = .89$ ).

**Post-event processing**—The Post-Event Processing Questionnaire – Revised (PEPQ-R; McEvoy & Kingsep, 2006) has 8 items assessing the tendency to ruminate after uncomfortable social situations. Respondents are asked to recall uncomfortable interactions and rate how much they ruminated about them afterwards (“Did you find it difficult to forget



about the event?”). The developers report a clear single-factor structure and moderate correlations with depression, anxiety, and stress. The PEPQ-R showed good internal consistency in the present study ( $\alpha = .87$ ).

**Recent repetitive thought**—The On Your Mind Writing Task (OYM; carried out as described in Segerstrom et al., 2003) was used to assess characteristics of recently occurring repetitive thought in an open-ended manner. Respondents were asked to write about any topic of repetitive thought that has occupied their minds recently. Instructions were 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. Please **write for at least 10 minutes**.

Consistent with Segerstrom et al. (2003), participants completed two self-report questionnaires after writing about their thoughts for 10 minutes. First, participants used 7-point bipolar Likert scales to rate several characteristics of their recent repetitive thought, including valence (positive vs. negative), typical duration (around for short periods of time vs. prolonged), frequency (occurred frequently vs. occurred infrequently), controllability (easy to control vs. difficult to control), focus (mostly about me vs. mostly about someone or something else), helpfulness (helpful vs. unhelpful), impact on concentration (affected my concentration vs. did not affect my concentration), and impact on perspective about the topic (caused a shift in my perspectives on the topic vs. caused little or no shift in my perspectives on the topic). Although not part of the hypotheses of the present study, correlations between coder-rated and self-rated thought characteristics were conducted as part of a validity check, occurred in expected directions, and are provided in detail in supplementary materials (see Online Resource 1).

Second, participants rated their repetitive thought on 35 affective items that provide full coverage of the affective circumplex, including the 10-item PANAS Positive Affect Scale (Watson, Clark & Tellegen, 1988), as well as the PANAS-X (Watson & Clark, 1994) scales for fear, hostility, and self-conscious affect (all 6 items each), and sadness (5 items), for more specificity about the nature of negative affect. Items were preceded with the instructions: “When you are thinking about this topic, how much do you typically feel each of the following feelings?” Each of these items were rated from 1 (very slightly or not at all) to 5 (extremely). Internal consistencies were good to excellent for all scales ( $\alpha = .85-.92$ ).

Trained raters scored the writing samples on the three dimensions of repetitive thought identified through multidimensional scaling in the validation samples for the OYM (Segerstrom et al., 2003): valence (positive vs. negative), focus (self- vs. other), and purpose (searching vs. solving). Three coders scored each writing sample simultaneously on valence and focus; four coders separately scored each writing sample for purpose in order to increase the reliability of this more complex coding dimension. *Searching* purpose of repetitive thought is defined as “exploring, considering possibilities, or expressing confusion.

Examples include expressions of uncertainty, generating options, indecision or confusion, listing multiple possibilities, and learning new perspectives or ways” (Segerstrom et al., 2003, pg. 916). *Solving* purpose of repetitive thought, in contrast, is defined as “trying to narrow down, to make sure, to make plans, or to declare knowledge. Examples include causal statements, summary statements, statements of definite consequences, planning, imperatives, and expressions of clarity.” Positive vs. negative valence was rated on a 1–5 scale (1 = completely positive, 5 = completely negative), self vs. other focus was similarly rated (1 = completely self-focused, 5 = completely other-focused), and purpose was rated on a 1–5 scale (1 = completely searching, 5 = completely solving). Inter-rater reliability across all coders was excellent for valence ( $\alpha = .92$ ), focus ( $\alpha = .91$ ), and purpose ( $\alpha = .90$ ). Given the mixed associations of purpose with psychological wellbeing and symptoms in previous samples (Segerstrom et al., 2003), we had no a priori hypotheses for purpose, but it was included as an exploratory variable.

## Procedure

Participants completed the session typically in small groups, with several participants ( $N < 10$ ) completing the study individually due to scheduling difficulties. Following informed consent procedures, participants were given study packets and instructed to spend the next ten minutes of the session completing the 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. After ten minutes, participants were told that they could move on to the remainder of the packet when they were ready to do so. All remaining measures in the packet were in randomized order.

## Analyses

Analyses were conducted using SPSS v 23. Correlations were computed using bootstrapping (1000 samples drawn with replacement); this approach generates more stable estimates that minimize the impact of potential outliers within the sample (DiCiccio & Efron, 1996; Shao, 2003; Wagstaff, Elek, Kulis, & Marsiglia, 2009). Significance was determined using the generated confidence intervals; a 99% CI was used to examine intercorrelations among the self-report rumination and BPD measures in the larger sample; a 95% CI was used for analyses with the OYM writing task utilizing the smaller sample.

## Results

### Borderline Feature Distribution

The recruitment strategy employed was designed to obtain coverage of the full spectrum of BPD features in the sample, without significant skew. Descriptives (means, standard deviations, and skew) for the PAI-BOR and its subscales are presented in Table 1. None of these scales demonstrated problematic skew ( $\text{skew}/\text{SE skew} > 5$ ; Tabachnick & Fidell, 2000) in either the full sample or the subsample that completed the OYM task. The recruitment succeeded at capturing both high and low BPD features in both the full sample and the subsample completing the OYM, with 24% (full)/19% (OYM subsample) of participants falling above the clinical threshold on the PAI-BOR ( $T > 70$ ), 17% (full)/20% (OYM

subsample) in the low range ( $T < 50$ ), and 41% (full)/61% (OYM subsample) in the average range of BPD features.

### **Borderline Features and Rumination Questionnaires**

The first hypothesis was that borderline features would be significantly correlated with all forms of dysfunctional rumination and that significant, specific relationships between forms of rumination and BPD features would remain when controlling for general rumination. Zero-order correlations between rumination questionnaires and BPD features (see Table 2) showed significant, positive relationships between all forms of rumination and most of the BPD features scales. The self-destructive behavior scale demonstrated less consistent associations with rumination.

As expected, all of the measures of specific forms of rumination demonstrated significant, large, positive associations with general rumination (RRQ-rum). To provide evidence that the self-report measures capture unique and specific forms of rumination, the specific rumination measures were correlated with self-reported affect endorsed during the OYM task, controlling for general rumination (see Table 3). Rumination scales were generally correlated with affect in expected patterns: anger rumination and post-event processing were correlated with hostility; depressive rumination with sadness and self-consciousness affect; and anxious rumination, while correlated with all forms of negative affect, was the only scale correlated with fear. Only anger rumination was correlated with reporting positive affect during repetitive thought. Stress-reactive rumination was associated with sadness, and rumination on interpersonal offenses was not specifically associated with any affect. These findings are generally consistent with these self-report scales capturing different, specific components of rumination.

Partial correlations were then computed between rumination measures and BPD features, controlling for general rumination (see Table 2). Consistent with hypotheses, anger rumination was the only form of rumination correlated with all types of BPD features over and above general rumination. Also largely consistent with predictions, only anger rumination and post-event processing remained significantly correlated with self-destructive behavior; however, contrary to predictions, rumination on interpersonal offenses was not also specifically associated with self-destructive behavior. Depressive and stress-reactive rumination were correlated with all BPD features except self-destructive behavior, and anxious rumination and rumination on interpersonal offenses with identity disturbances and negative relationships only.

### **Borderline Features and the On Your Mind Writing Task**

Correlations between PAI-BOR scales and coder-rated valence, focus, and purpose are shown in Table 4. BPD features were hypothesized to be associated with greater negative valence in the writing samples. This hypothesis was largely supported: negatively valenced writing sample content was significantly correlated with all PAI-BOR scales except self-harm. We conducted exploratory analyses on the purpose ratings without a priori hypotheses, and there were no significant associations between solving purpose (vs. searching) and BPD features.

We compared two competing hypotheses about focus and BPD features. The correlation between other-focus and the PAI-BOR negative relationships scale was small but positive, suggesting a tendency for negative relationships to be associated with other-focus in the writing samples (e.g., writing about others who had upset them). To examine whether valence moderated the effect of focus, we conducted a hierarchical regression model predicting each BPD features subscale. Both other-focus and negative-valence variables were mean-centered and the cross-product of the two computed. In step one, other-focus and negative-valence were entered, and in step two, the cross-product was added. In each model, step 2 provided no significant incremental increase in variance predicted ( $p = .36$ ), showing that negative valence did not moderate the effect of focus on BPD features. Main effects demonstrated the same patterns of significance and similar effect sizes as shown in zero-order correlations.

The writing task asks respondents to rate several characteristics of the thoughts they have just described. It was predicted that participants with higher levels of BPD features would rate their repetitive thought in ways consistent with maladaptive forms of rumination. Correlations between PAI-BOR scores and participants' ratings of their thought characteristics are shown in Table 4. Affective instability and identity problems were significantly related to ratings of repetitive thought as difficult to control, negative, unhelpful, uncertain, and unresolved, with identity problems also linked to rating thoughts as prolonged. The negative relationships subscale was significantly related to ratings of repetitive thought as unresolved. The self-destructive behavior subscale was not significantly correlated with any self-rated thought characteristics.

Participants also rated their typical affect while thinking about the topic, and PAI-BOR scores were hypothesized to correlate with greater negative and less positive affect during repetitive thought. Correlations between PAI-BOR scales and affect ratings are presented in Table 4. PAI-BOR subscales varied in positive associations with specific forms of negative affect. Only hostility and self-conscious affect were significantly associated with all PAI-BOR subscales. All except for self-destructive behavior were significantly associated with sadness, and affective instability and identity disturbance were significantly associated with more fear. Positive affect was significantly negatively associated with identity disturbance.

## Discussion

Consistent with predictions, all BPD features were related to increased general rumination, and most BPD features were significantly related to most measures of maladaptive rumination. Individuals with high levels of BPD features likely ruminate on a broad range of content, and this tendency is related to the severity of their features. Of the different forms of rumination, anger rumination was the most consistent and robust in its associations with the full range of BPD symptoms, including self-harm, even after controlling for general rumination. This is consistent with previous findings suggesting that anger rumination may play a particularly critical role in BPD (Baer & Sauer, 2011). Affective instability was specifically linked to rumination on sadness, stress, and anger; rumination on these domains in particular may fuel the intense and changeable moods characteristic of BPD. In contrast, identity disturbance and negative relationships demonstrated specific associations

(controlling for general rumination) with the broadest range of forms of rumination, suggesting rumination on a broad range of content may contribute to these areas of dysfunction.

The On Your Mind Writing provided a task-based method for further examination of the characteristics of repetitive thought associated with BPD. Participants with higher levels of BPD features were expected to produce writing samples and ratings about their repetitive thoughts consistent with maladaptive forms of rumination described in previous literature. As predicted, coder-rated negative valence and self-rated negative thought content and negative affect while engaging in the thoughts were all significantly associated with most BPD features. Severity of BPD features was also associated with self-ratings of repetitive thought as more difficult to control, negative, prolonged, unhelpful, and unresolved. These findings are consistent with previous research showing that repetitive thought is more dysfunctional when it is negatively valenced (Watkins, 2008), that rumination tends not to lead to constructive solutions to problems (Nolen-Hoeksema et al., 2008), and that rumination is most likely to be maladaptive when it is uncontrollable (Raes & Williams, 2010). In particular, these aspects of repetitive thought were associated with affective instability and identity disturbance. This prolonged and intense negative reactivity may fuel cycles of dysphoria and disrupt the formation of a stable and cohesive sense of self.

In contrast to past research on repetitive thought and depression, the BPD feature of negative relationships was associated with coder-rated other-focus, rather than self-focus, and this effect was not moderated by negative valence. Although depressed people may ruminate primarily about their own feelings, repetitive thought focused on interpersonal interactions or relationships may contribute to the tumultuous relationships characteristic of BPD. The lack of moderation by valence suggests that rumination on others in individuals high in these BPD features may encompass both positive and negative content; this is consistent with dysfunctional relationships in BPD encompassing both extremes.

Common themes in the writing samples from individuals with high BPD features included others' problematic behavior (e.g., how badly others behaved, how unfair the situation was). Together, these findings suggest that this greater other-focus in repetitive thought may generate affect that increases approach motivation toward potential relationship issues and conflict, rather than the avoidance typical of internalizing problems. It is possible, if not likely, that rumination in BPD may differ in other ways from that in depression, and further work exploring these differences and how they impact symptom expression is warranted.

As predicted, the self-harm and maladaptive impulsivity characteristics of BPD (both captured in the PAI-BOR self-destructive behavior subscale) may in particular relate to the tendency to engage in angry and shameful rumination. While this subscale generally demonstrated much less consistent associations with rumination-related variables, both self-reported trait levels of anger rumination and the endorsement of heightened hostility and self-conscious affect while engaging in the repetitive thought in the On Your Mind task were associated with higher levels of BPD-related self-destructive behavior. Additionally, while the post-event processing was specifically associated with both experiencing hostility during ruminative thought and increased self-destructive behavior, rumination on interpersonal

offenses was associated with neither, suggesting that anger may be key to the link between interpersonal rumination and maladaptive impulsivity. Consistent with these findings, experiences of shame have been linked to anger rumination in the context of BPD (Peters, Geiger, Smart, & Baer, 2014; Law & Chapman, 2015). Anger rumination increases anger, which, unlike other forms of negative affect, increases approach motivation (C. Harmon-Jones, Schmeichel, Mennitt, & Harmon-Jones, 2011); this is also consistent with our finding of anger rumination as the only form of rumination to demonstrate a positive association with the endorsement of positive affect, as well as hostility, during repetitive thought. Perhaps this activating quality makes anger rumination particularly likely to facilitate dysfunctional, impulsive behavior. While the present study did not include a recently published measure examining self-critical or shame-related rumination (Smart, Peters, & Baer, 2016), future work should examine whether this form of rumination also has a relationship with BPD-related self-harming and impulsive behaviors. Future research should examine whether these findings hold up for specific impulsive and self-destructive behaviors, such as non-suicidal self-injury, substance abuse, and problematic eating.

A limitation of the present study is that it did not assess or control for symptoms of the many disorders that tend to be co-morbid with BPD, such as depression, PTSD, substance use disorders, and eating disorders. Future work should examine the specificity of these findings to BPD. Although we oversampled for high BPD features, this study utilized a student sample, so future work should also examine these relationships in clinical samples. Given that previous work has demonstrated sex-based differences in rumination (e.g., Johnson & Whisman, 2013), the effect of sex on the nature of repetitive thought in BPD is another area for future exploration in samples adequately powered to do so. Additionally, we examined associations between BPD features and a range of components of the OYM task, resulting in a high amount of comparisons performed. Given the potential for Type 1 errors, these findings with more focus on limited components of the task should be confirmed in further samples. Other limitations of the present study include its cross-sectional nature. Longitudinal methods could also be used to determine whether the extent of rumination at one point in time predicts severity of BPD features at a later time, while controlling for initial severity of BPD features. Descriptive research using structured interview methods to explore the nature of ruminative thoughts typical of BPD might also be informative.

The OYM task was administered as designed and validated; however, these findings provide a starting point for the development of a new task or coding scheme that may code for dimensions of thought of greatest relevance to BPD. For example, exploration of more specific content themes (e.g., interpersonal relationships) and how this interacts with valence and/or purpose may be of use. Coding techniques adapted to capture differences within samples, such as coding them statement by statement, and examining within-person variability, may also aid in deeper examination of these processes. Additionally, as administered, the OYM task is limited by sampling a single example of repetitive thought—repeated administrations might increase the writing samples' representativeness of typical thought processes.

## Conclusion

In summary, the present study adds to the growing literature suggesting that people with BPD features engage in rumination on a broad range of content, with anger-related content particularly relevant for self-destructive impulsivity. While these findings are exploratory and generalizability is limited due to the use of a non-clinical sample, the results suggest potential areas for further inquiry. There may be both similarities and differences between rumination in BPD and rumination in other disorders. As in depression, repetitive thought in BPD appears to be negative in content and characterized by prolonged, difficult to control, unhelpful, and unresolved style. However, in the present sample, BPD relationship difficulties were associated with a greater degree of other-focus content. While most BPD features were related to rumination and repetitive thought on a range of negative affect, impulsive and self-destructive behavior may be more specifically linked to rumination on anger and self-conscious emotions.

Although people with BPD features tend to experience strong negative affect, rumination is only one of several ways of responding when negative affect occurs. Dialectical behavior therapy (DBT; Linehan, 1993), an empirically supported intervention for BPD, includes training in mindfulness skills that facilitate more adaptive, present-centered responding to emotion. Increasing nonjudgment of internal experiences, a component of mindfulness emphasized by DBT, may be particularly relevant for targeting anger rumination and its outcomes (Peters, Eisenlohr-Moul, Upton, & Baer, 2013; Peters, et al, 2015; Eisenlohr-Moul, Peters, Pond, & DeWall, 2016). Given the connection between rumination and the severity of BPD features, training in these types of skills may benefit individuals struggling with BPD symptoms.

## Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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**Table 1**

Descriptives (means, standard deviation, skew, standard error of skew) for borderline personality feature measures.

PAI-BOR scales	Full Sample (N = 225)		OYM subsample (N = 117)	
	Mean (SD)	Skew (SE)	Mean (SD)	Skew (SE)
Total	30.28 (12.58)	.57 (.16)	28.26 (11.60)	.66 (.23)
Affect Instability	7.27 (4.25)	.45 (.16)	6.75 (3.97)	.57 (.23)
Identity Disturbance	9.13 (3.97)	.22 (.16)	8.47 (3.89)	.37 (.23)
Negative Relationships	7.88 (4.09)	.31 (.16)	7.53 (3.96)	.37 (.23)
Self-Harm	5.98 (3.55)	.69 (.16)	5.58 (3.44)	.74 (.23)

Note: PAI-BOR = Personality Assessment Inventory Borderline Features Scale; OYM= On Your Mind task

**Table 2**

Zero-order correlations between forms of rumination and borderline personality features, and partial correlations (shaded) controlling for general rumination (N = 225).

	ARS	RSQ	ARQ	SRRS	RIO	PEP-Q	RRQ-rum
<b>Rumination</b>							
ARS							<b>.59*</b> (.46 – .69)
RSQ	<b>.50*</b> (.34 – .64)						<b>.55*</b> (.41 – .67)
ARQ	<b>.26*</b> (.07 – .43)						<b>.46*</b> (.30 – .60)
SRRS	<b>.51*</b> (.35 – .63)	<b>.62*</b> (.50 – .72)					<b>.48*</b> (.32 – .62)
	<b>.33*</b> (.17 – .47)	<b>.49*</b> (.34 – .62)					
RIO	<b>.45*</b> (.32 – .58)	<b>.56*</b> (.43 – .68)	<b>.60*</b> (.45 – .70)				
	<b>.24*</b> (.07 – .39)	<b>.41*</b> (.23 – .55)	<b>.48*</b> (.31 – .62)				
PEP-Q	<b>.62*</b> (.51 – .72)	<b>.52*</b> (.36 – .65)	<b>.42*</b> (.26 – .55)	<b>.46*</b> (.29 – .60)			
	<b>.44*</b> (.30 – .58)	<b>.32*</b> (.12 – .51)	<b>.23*</b> (.06 – .39)	<b>.32*</b> (.12 – .50)			
	<b>.49*</b> (.35 – .63)	<b>.42*</b> (.27 – .56)	<b>.47*</b> (.32 – .58)	<b>.39*</b> (.23 – .51)	<b>.46*</b> (.30 – .60)		
	<b>.19*</b> (.02 – .37)	<b>.29*</b> (.12 – .47)	<b>.26*</b> (.10 – .39)	<b>.20*</b> (.01 – .38)	<b>.14*</b> (–.11 – .37)		
<b>BPD Features</b>							
Affective Inst	<b>.58*</b> (.46 – .69)	<b>.52*</b> (.35 – .67)	<b>.38*</b> (.21 – .51)	<b>.41*</b> (.27 – .56)	<b>.41*</b> (.26 – .56)	<b>.46*</b> (.32 – .56)	<b>.58*</b> (.45 – .70)
	<b>.36*</b> (.20 – .52)	<b>.29*</b> (.12 – .47)	<b>.15*</b> (–.01 – .31)	<b>.18*</b> (.01 – .35)	<b>.14*</b> (–.05 – .32)	<b>.16*</b> (00 – .33)	
Identity Prob	<b>.50*</b> (.36 – .62)	<b>.60*</b> (.46 – .72)	<b>.54*</b> (.40 – .66)	<b>.57*</b> (.43 – .69)	<b>.47*</b> (.32 – .61)	<b>.48*</b> (.34 – .60)	<b>.60*</b> (.48 – .72)
	<b>.23*</b> (.06 – .39)	<b>.40*</b> (.21 – .57)	<b>.38*</b> (.21 – .52)	<b>.39*</b> (.21 – .55)	<b>.22*</b> (.04 – .39)	<b>.18*</b> (–.01 – .33)	
Neg Relation	<b>.59*</b> (.44 – .69)	<b>.52*</b> (.37 – .65)	<b>.42*</b> (.27 – .56)	<b>.45*</b> (.31 – .61)	<b>.55*</b> (.41 – .66)	<b>.44*</b> (.29 – .56)	<b>.57*</b> (.44 – .67)
	<b>.38*</b> (.18 – .53)	<b>.30*</b> (.12 – .47)	<b>.21*</b> (.04 – .38)	<b>.25*</b> (.09 – .41)	<b>.35*</b> (.19 – .51)	<b>.13*</b> (–.06 – .30)	
Self-Dest Beh	<b>.37*</b> (.21 – .54)	<b>.26*</b> (.07 – .44)	<b>.21*</b> (.02 – .38)	<b>.23*</b> (.04 – .37)	<b>.19*</b> (00 – .37)	<b>.28*</b> (.11 – .44)	<b>.24*</b> (.06 – .43)
	<b>.29*</b> (.14 – .44)	<b>.16*</b> (–.05 – .33)	<b>.12*</b> (–.07 – .29)	<b>.13*</b> (–.07 – .32)	<b>.07*</b> (–.10 – .26)	<b>.16*</b> (–.03 – .33)	

	ARS	RSQ	ARQ	SRRS	RIO	PEP-Q	RRQ-rum
<b>Means (SD)</b>	36.36 (11.21)	22.53 (6.50)	48.94 (10.67)	53.46 (17.11)	18.61 (5.68)	24.59 (6.57)	37.63 (8.64)

Note:

\* = 99% CI does not include 0; CIs from bootstrapping presented in parentheses. Shaded rows reflect partial correlations, controlling for RRQ-rum.

ARS = Anger Rumination Scale; RSQ = Response Styles Questionnaire (depressive rumination); ARQ = Anxious Rumination Questionnaire; SRRS = Stress-Reactive Rumination Scale; RIO = Rumination on Interpersonal Offenses Scale; PEPQ-R = Post-Event Processing Questionnaire; RRQ-rum = Rumination and Reflection Questionnaire—Rumination subscale (general rumination); Affective Inst = Affective Instability; Identity Prob = Identity Problems; Neg Relation = Negative Relationships; Self-Dest Beh = Self-Destructive Behavior.

**Table 3**

Partial correlations controlling for general rumination between forms of rumination and affect reported during repetitive thought from the On Your Mind Task (N = 117).

On Your Mind affect ratings	ARS	RSQ	ARQ	SRRS	RIO	PEP-Q
Fear	.02 (-.18 – .21)	.18 (-.02 – .37)	<b>.30*</b> (.06 – .52)	.10 (-.13 – .30)	-.09 (-.26 – .09)	.02 (-.19 – .20)
Hostility	<b>.22*</b> (.02 – .41)	.14 (-.06 – .34)	<b>.28*</b> (.07 – .46)	.08 (-.14 – .28)	.17 (-.05 – .36)	<b>.28*</b> (.07 – .46)
Self-Conscious	.10 (-.10 – .29)	<b>.32*</b> (.15 – .49)	<b>.29*</b> (.09 – .46)	.17 (-.05 – .36)	-.09 (-.27 – .08)	.12 (-.11 – .31)
Sadness	.14 (-.09 – .34)	<b>.50*</b> (.33 – .66)	<b>.45*</b> (.32 – .58)	<b>.27*</b> (.08 – .43)	.13 (-.09 – .35)	.17 (-.04 – .36)
Positive Affect	<b>.24*</b> (.03 – .42)	-.08 (-.30 – .13)	-.03 (-.20 – .13)	.10 (-.07 – .27)	.09 (-.15 – .31)	.06 (-.16 – .28)

Note:

\* = 95% CI does not include 0; CIs from bootstrapping presented in parentheses.

ARS = Anger Rumination Scale; RSQ = Response Styles Questionnaire (depressive rumination); ARQ = Anxious Rumination Questionnaire; SRRS = Stress-Reactive Rumination Scale; RIO = Rumination on Interpersonal Offenses Scale; PEPQ-R = Post-Event Processing Questionnaire

**Table 4**

Bivariate correlations between BPD features and characteristics of thoughts in the On Your Mind writing sample (N = 117).

Thought characteristic	Borderline features			
	Affective Instability	Identity Problems	Negative Relationships	Self-Destructive Behavior
Coder-rated				
Negative valence (vs Positive)	<b>.36*</b> (.20 – .52)	<b>.39*</b> (.23 – .55)	<b>.24*</b> (.06 – .40)	.18 (–.01 – .35)
Other-focus (vs Self)	.17 (–.01 – .38)	.10 (–.08 – .28)	<b>.24*</b> (.01 – .46)	.16 (–.04 – .34)
Searching purpose (vs Solving)	.08 (–.09 – .24)	.14 (–.06 – .32)	.13 (–.03 – .31)	.09 (–.10 – .29)
Self-rated				
Difficult to control	<b>.30*</b> (.14 – .46)	<b>.36*</b> (.20 – .52)	.14 (–.08 – .31)	.11 (–.08 – .28)
Negative	<b>.20*</b> (.02 – .36)	<b>.28*</b> (.09 – .43)	.11 (–.09 – .30)	.11 (–.09 – .30)
Unhelpful	<b>.25*</b> (.05 – .43)	<b>.20*</b> (.01 – .39)	.12 (–.06 – .31)	.03 (–.15 – .21)
Disrupt concentration	–.04 (–.26 – .18)	–.04 (–.27 – .19)	–.03 (–.26 – .18)	.08 (–.15 – .30)
Prolonged	.19 (.00 – .35)	<b>.26*</b> (.05 – .43)	.18 (–.01 – .36)	.05 (–.16 – .22)
Frequent	.12 (–.06 – .30)	.12 (–.07 – .30)	.12 (–.08 – .32)	.12 (–.07 – .29)
About someone else	.12 (–.06 – .31)	.12 (–.09 – .32)	.18 (–.05 – .38)	.08 (–.11 – .25)
Little shift in perspective	.00 (–.23 – .23)	.07 (–.16 – .31)	.00 (–.21 – .21)	.21 (–.01 – .40)
Unresolved	<b>.44*</b> (.31 – .57)	<b>.35*</b> (.19 – .49)	<b>.27*</b> (.09 – .43)	.15 (–.05 – .34)
Uncertain	<b>.21*</b> (.01 – .40)	<b>.21*</b> (.04 – .40)	.05 (–.14 – .26)	.07 (–.12 – .26)
About something important	.13 (–.06 – .32)	.15 (.00 – .31)	.16 (–.03 – .33)	–.04 (–.24 – .16)
Fear	<b>.27*</b> (.08 – .45)	<b>.36*</b> (.18 – .54)	.15 (–.05 – .34)	.07 (–.13 – .29)
Hostility	<b>.29*</b> (.10 – .47)	<b>.32*</b> (.15 – .50)	<b>.26*</b> (.07 – .43)	<b>.29*</b> (.11 – .46)
Self-Conscious	<b>.26*</b> (.08 – .45)	<b>.35*</b> (.18 – .51)	<b>.26*</b> (.08 – .44)	<b>.35*</b> (.19 – .51)
Sadness	<b>.30*</b> (.09 – .48)	<b>.53*</b> (.33 – .67)	<b>.37*</b> (.15 – .55)	.13 (–.09 – .33)
Positive Affect	–.08 (–.28 – .13)	<b>–.19*</b> (–.35 – –.02)	–.09 (–.27 – .08)	–.06 (–.24 – .14)

Note:

\* = 95% CI does not include 0; CIs from bootstrapping presented in parentheses.