4-2013

Emotion Differentiation as a Protective Factor Against Nonsuicidal Self-Injury in Borderline Personality Disorder

Landon F. Zaki

Karin G. Coifman

Eshkol Rafaeli

See next page for additional authors

Zaki, Landon F., Karin G. Coifman, Eshkol Rafaeli, Kathy R. Berenson, & Geraldine Downey. "Emotion Differentiation as a Protective Factor Against Nonsuicidal Self-Injury in Borderline Personality Disorder." Behavior Therapy 44.3 (2013): 529-540.

Emotion Differentiation as a Protective Factor Against Nonsuicidal Self-Injury in Borderline Personality Disorder

Abstract
Evidence that nonsuicidal self-injury (NSSI) serves a maladaptive emotion regulation function in borderline personality disorder (BPD) has drawn attention to processes that may increase risk for NSSI by exacerbating negative emotion, such as rumination. However, more adaptive forms of emotion processing, including differentiating broad emotional experiences into nuanced emotion categories, might serve as a protective factoragainst NSSI. Using an experience-sampling diary, the present study tested whether differentiation of negative emotion was associated with lower frequency of NSSI acts and urges in 38 individuals with BPD who reported histories of NSSI. Participants completed a dispositional measure of rumination and a 21-day experience-sampling diary, which yielded an index of negative emotion differentiation and frequency of NSSI acts and urges. A significant rumination by negative emotion differentiation interaction revealed that rumination predicted higher rates of NSSI acts and urges in participants with difficulty differentiating their negative emotions. The results extend research on emotion differentiation into the clinical literature and provide empirical support for clinical theories that suggest emotion identification and labeling underlie strategies for adaptive self-regulation and decreased NSSI risk in BPD.

Keywords
negative emotion, psychological process, rumination, behavioral dysregulation

Disciplines
Psychology

Authors
Landon F. Zaki, Karin G. Coifman, Eshkol Rafaeli, Kathy R. Berenson, and Geraldine Downey

Emotion Differentiation as a Protective Factor Against Nonsuicidal Self-injury in Borderline Personality Disorder

Landon F. Zaki, M.A.[a] (corresponding author)

Karin G. Coifman, Ph.D.[b]

Eshkol Rafaeli, Ph.D.[c]

Kathy R. Berenson, Ph.D.[d]

Geraldine Downey, Ph.D.[e]

a. Ferkauf Graduate School of Psychology, Yeshiva University, 1165 Morris Park Avenue, Bronx, NY, 10461, landon.fuhrman@gmail.com, (718) 430-2585, ext. 9104

b. Department of Psychology, Kent State University, 207 Kent Hall Addition, P.O. Box 5190, Kent, OH, 44242, kcoifman@kent.edu

c. Department of Psychology and Gonda Multidisciplinary Brain Research Center, Bar-Ilan University, Ramat-Gan, 52900 Israel, eshkol.rafaeli@gmail.com

d. Department of Psychology, Gettysburg College, 300 North Washington Street, McCreary Hall 322, Campus Box 0407, Gettysburg, PA, 17325, kberenso@gettysburg.edu

e. Department of Psychology, Columbia University, 1190 Amsterdam Avenue, 402C Schermerhorn, MC 5501, New York, NY, 10027, gd20@columbia.edu

Acknowledgements

The authors wish to thank Marget Thomas Fishman, M.A. of Rutgers University for her assistance in data collection, and Jamil Zaki, Ph.D. of Stanford University for his helpful comments on earlier versions of this manuscript.

Abstract

Evidence that nonsuicidal self-injury (NSSI) serves a maladaptive emotion regulation function in borderline personality disorder (BPD) has drawn attention to processes that may increase risk for NSSI by exacerbating negative emotion, such as rumination. However, more adaptive forms of emotion processing, including differentiating broad emotional experiences into nuanced emotion categories, might serve as a protective factor against NSSI. Using an experience-sampling diary, the present study tested whether differentiation of negative emotion was associated with lower frequency of NSSI acts and urges in 38 individuals with BPD who reported histories of NSSI. Participants completed a dispositional measure of rumination and a 21-day experience-sampling diary, which yielded an index of negative emotion differentiation and frequency of NSSI acts and urges. A significant rumination by negative emotion differentiation interaction revealed that rumination predicted higher rates of NSSI acts and urges in participants with difficulty differentiating their negative emotions. The results extend research on emotion differentiation into the clinical literature and provide empirical support for clinical theories that suggest emotion identification and labeling underlie strategies for adaptive self-regulation and decreased NSSI risk in BPD.

Keywords: borderline personality disorder; nonsuicidal self-injury; experience-sampling; rumination; emotion differentiation

Emotion Differentiation as a Protective Factor Against Nonsuicidal Self-injury in Borderline Personality Disorder

Borderline personality disorder (BPD) is characterized by pervasive emotion regulation difficulties and behavioral impulsivity. Nonsuicidal self-injury (NSSI) typifies both of these features, as accumulated evidence documents the emotion regulating properties of this maladaptive behavior (Brown, Comtois, & Linehan, 2002; Kemperman, Russ, & Shearin, 1997; Kleindienst et al., 2008). Although NSSI is estimated to occur in 70-80% of those diagnosed with BPD (Clarkin, Widiger, Frances, Hurt, & Gilmore, 1983), not all individuals with BPD respond to intense negative emotions with self-injury. Understanding the psychological risk and protective factors that contribute to the variability in frequency of NSSI among people with BPD remains an underexplored area with significant implications for treatment.

The present study examined how individual differences in two relevant psychological processes – rumination and emotion differentiation – might elucidate the hypothesized connection between emotional and behavioral dysregulation in adults with BPD who reported histories of NSSI (Linehan, 1993; Selby & Joiner, 2009). Specifically, we predicted that differentiating broad emotional experiences into nuanced emotion categories – termed *emotion differentiation* or *emotional granularity* (Barrett, 1998; Barrett, Gross, Christensen, & Benvenuto, 2001) – would moderate the relationship between rumination and NSSI in those with BPD who reported histories of NSSI.

Rumination as a psychological risk factor for NSSI in BPD

Recent theoretical models implicate the cognitive style of rumination in the link between emotion dysregulation and NSSI in BPD (Selby, Anestis, & Joiner, 2008; Selby & Joiner, 2009). Building on extensive prior work connecting rumination to NSSI and other self-destructive

behaviors (e.g., bulimia, binge eating, and substance abuse; Heatherton & Baumeister, 1991; Nolen-Hoeksema & Harrell, 2002; Nolen-Hoeksema, Stice, Wade, & Bohon, 2007), the emotional cascade model proposed that rumination mediates between emotional and behavioral dysregulation in BPD (Selby & Joiner, 2009). According to this theory, rumination on negative emotion progressively builds emotional intensity in BPD via a positive feedback mechanism. If uninterrupted, emotional intensity continues to increase and ultimately reaches a level at which adaptive emotion coping strategies – such as cognitive reappraisal or behavioral distraction – fail to effectively reduce it. Individuals caught in the height of emotional cascades become increasingly prone to viewing extreme behavioral distractions, including NSSI, as options for short-circuiting the emotional cascade. By engaging in NSSI, individuals with BPD provide negative feedback to the emotional cascade, halt the ruminative process, and reinforce NSSI as an emotion coping tool (Selby & Joiner, 2009).

Consistent with the emotional cascade theory, recent empirical work has linked rumination to NSSI and to BPD more broadly. Investigators have found significantly higher levels of rumination in individuals diagnosed with BPD when compared to individuals diagnosed with depression, and a stronger association between rumination and BPD symptoms than with symptoms of any other personality disorder, even when controlling for depression (Abela, Payne, & Moussaly, 2003; Smith, Alloy, & Abramson, 2006). Rumination has also been specifically related to NSSI. Studies have found that rumination increases vulnerability to NSSI in college students and that rumination moderates the association between depressive symptoms and engaging in NSSI for "automatic positive reinforcement" reasons (e.g., to attain a desired physiological state) in young adolescent girls (Armey & Crowther, 2008; Hilt, Cha, & Nolen-Hoeksema, 2008; Nock & Prinstein, 2004). Taken together, these findings suggest that

ruminative attention to negative emotion is associated with greater risk of dysfunctional self-regulatory strategies including NSSI, perhaps because it taxes the cognitive resources needed for more adaptive emotion regulation and problem solving.

Not all attention to emotion is created equal

Attention to one's negative emotional states, however, does not invariably lead to such maladaptive outcomes. Clinical theories suggest that the specific way in which one attends to negative emotional states can moderate the impact of these emotions on experience and behavior (Beck, Rush, Shaw, & Emery, 1979; Hayes, Strosahl, & Wilson, 1999; Linehan, 1993). Both cognitive-behavioral therapy and emotion-focused therapies (e.g., Dialectical Behavior Therapy, DBT; Acceptance and Commitment Therapy, ACT) teach strategies such as cognitive restructuring and mindfulness to alter one's experience of emotional states. Research supports the notion that specific types of attention to emotion are differentially associated with maladaptive rumination and adaptive reflection. For example, a series of experiments conducted on both clinically depressed and non-clinical populations has demonstrated that when thinking about negative emotional experiences, focusing on the reasons underlying the experience from a "distanced" third-person perspective decreases negative emotion intensity and rumination (Kross, Ayduk, & Mischel, 2005; Kross, Gard, Deldin, Clifton, & Ayduk, 2012). By contrast, re-immersing oneself in the emotional experience while focusing on the descriptive features of the experience increases rumination and negative emotional intensity. These findings offer hope for teaching individuals with BPD methods to interrupt emotional cascades, and by extension, deter the selection of maladaptive strategies like NSSI to manage intense emotional experiences.

Emotion differentiation as a psychological protective factor against NSSI in BPD

One type of attention that may, in fact, help individuals with BPD break the cycle of rumination on negative emotion is *emotion differentiation*. Emotion differentiation, also known as *emotional granularity*, describes the ability to make fine-grained distinctions between similarly valenced states (Barrett, 1998; Barrett et al., 2001). Individuals differ widely in their emotion differentiation capacities; whereas some people frequently distinguish between emotional states with similar valence (e.g., sadness, anger), others tend to describe their emotional experience in more global terms (i.e., feeling "good" vs. feeling "bad"). These tendencies are influenced largely by the degree to which one emphasizes the valence property (pleasantness or hedonic value) versus the arousal property (bodily activation) in their representation of emotion (Barrett, 1998). Individual differences in differentiation can be captured through daily diary methods. Investigators who use such methods assess individuals' experience of multiple discrete emotions, across a period of time, and take the correlations among similarly valenced emotions (e.g., sadness, anger, nervousness) as a single individual difference measure of differentiation (Barrett et al., 2001; Kashdan, Ferssizidis, Collins, & Muraven, 2010; Pond et al., 2012; Tugade, Fredrickson, & Barrett, 2004). High emotion differentiators evidence smaller correlations between negative states such as anger, sadness, and nervousness, while low emotion differentiators demonstrate large positive correlations between such similarly valenced emotions. Critically, low differentiators – who likely focus solely on the valence property (i.e., pleasantness vs. unpleasantness) of their emotional lives – may lose important information about their emotional experiences, and may therefore be less adept at effectively responding to those experiences.

Research on emotion differentiation holds important implications for emotion regulation in BPD because differentiation appears to support emotion regulation, especially at higher levels

of emotional intensity (Barrett et al., 2001; Kang & Shaver, 2004; Tugade et al., 2004). For instance, Barrett and colleagues (2001) found that high differentiators reported more frequent use of several adaptive emotion regulation strategies (e.g., distraction, self-soothing), particularly when emotional intensity was high and the need for emotion regulation was typically greatest. This is consistent with recent work, which demonstrated that emotion differentiation mediated the relationship between emotional lability and mindfulness (Hill & Updegraff, 2012) and that emotion labeling reduced fear responding in spider-fearful individuals during an exposure exercise (Kirchanski, Lieberman, & Craske, 2012).

Despite the growing evidence for an association between emotion differentiation and regulation, the clinical implications of this work have only recently begun to be explored. Recent studies suggest that impairments in negative emotion differentiation characterize individuals with major depressive disorder (Demiralp et al., 2012) and that effective negative emotion differentiation is associated with less frequent maladaptive behaviors, including binge drinking following intense negative affect (Kashdan et al., 2010) and aggression following anger (Pond et al., 2012). These studies suggest that emotion differentiation may offer resiliency against dysregulated behaviors in emotionally at-risk individuals; as such, they seem especially pertinent to the understanding of NSSI in BPD.

To date, only one study has directly examined emotion differentiation in BPD. Suvak and colleagues (2011) found that, relative to controls, females with BPD demonstrated poorer differentiation of emotions, contributing to an "all-or-nothing" pattern of emotional responding common to BPD. These findings dovetail with evidence that individuals with BPD, or those high in BPD traits, are impaired in several constructs related to emotion differentiation – including emotional awareness, emotional clarity, and capacity to coordinate mixed-valence

feelings (Coifman, Berenson, Rafaeli, & Downey, 2012; Conklin, Bradley, & Westen, 2006; Leible & Snell, 2004; Levine, Marziali, & Hood, 1997). Still, the role of emotion differentiation in preventing maladaptive behaviors in BPD, as well as interactions between differentiation and other forms of attention to emotion, have yet to be explored.

Current Investigation

The present study directly assesses the role of rumination and emotion differentiation in predicting NSSI in adults with BPD who reported histories of NSSI, using an experience-sampling method. In addition to providing a standard measure of differentiation (Barrett et al., 2001; Kashdan et al., 2010; Pond et al., 2012; Tugade et al., 2004), experience-sampling methods offer many advantages over traditional self-report studies, in which participants retrospectively report on their experiences. These methods obviate retrospective biases inherent in self-report research and provide greater ecological validity, an issue particularly relevant when studying an emotionally intense and labile population such as BPD.

Three hypotheses guided this study. Our first hypothesis addressed both the group of participants with BPD and histories of NSSI (hereafter labeled the "BPD group") and a non-clinical control group, while the remaining two hypotheses concerned only the BPD group. First, we hypothesized that participants with BPD who reported histories of NSSI would have higher rumination and lower negative emotion differentiation scores than controls. Second, we hypothesized that, within the BPD group, rumination would be associated with a higher frequency of NSSI acts and urges reported across the experience-sampling period. Finally, we hypothesized that negative emotion differentiation would moderate the relationship between rumination and NSSI in the BPD group, in essence buffering ruminating individuals from turning to NSSI as a regulatory strategy.

Though our main hypotheses concern only the BPD group, we elected to include a non-clinical control group in this study for several reasons. The control group not only illuminates differences in rumination between BPD and HC participants, but also assists readers in interpreting differences in emotion differentiation, a relatively novel construct within the clinical literature. Moreover, inclusion of a non-clinical control group replicates the design of the only existing study on emotion differentiation in BPD (Suvak et al., 2011).

Method

Participants

Participants who met criteria for a current *DSM-IV* diagnosis (*DSM-IV-TR*, American Psychiatric Association, 2000) of borderline personality disorder (BPD) and healthy control (HC) participants were recruited as part of a larger study on borderline personality disorder (Berenson, Downey, Rafaeli, Coifman, & Leventhal, 2011; Coifman et al., 2012). In total, 81 individuals who met current diagnostic criteria for BPD were recruited for the larger study. Within this sample, we identified a subsample of 54 individuals with BPD (67%) who met the inclusion criteria for this study and also endorsed a history of NSSI either during the diagnostic interview or on a self-report measure of NSSI (described below). However, because of drop-out, equipment malfunction, and/or insufficient data, 16 of the 54 BPD participants were excluded from this investigation, resulting in a total of 38 BPD participants for the current study sample[1].

[1] Of the 16 participants who were excluded, nine were excluded for insufficient data unrelated to the diary (e.g., drop-out, failure to complete the rumination measure). We followed standard experience-sampling analysis procedures to determine sufficient number of diary entries and excluded four participants for whom the number of completed diary entries was fewer than 25, or two standard deviations below the mean of the original sample (Bolger, Davis, & Rafaeli, 2003). These excluded participants completed zero, six, 15, and 22 entries, respectively. The remaining three excluded participants either failed to complete the diary or experienced equipment malfunction. There were no significant demographic or diagnostic differences between those

This BPD sample was 84% female and had a mean (*SD*) age of 29.89 (10.60). To compare levels of rumination and emotion differentiation in BPD to those found in healthy participants, we also recruited 42 HC participants (83% female) with a mean (*SD*) age of 32.50 (7.53).

Printed flyers, newspaper advertisements, and postings on mental health websites were used to recruit participants. All participants were interviewed with the *Structured Interview for DSM-IV Personality (SIDP-IV;* Pfohl, Blum, & Zimmerman, 1997) to determine the presence of Axis II personality disorders, and with the *Structured Clinical Interview for DSM-IV Axis I Disorders (SCID-I;* First, Gibbon, Spitzer, & Williams, 1996) to assess the presence of Axis I pathology. Exclusion criteria for both groups included evidence of a primary psychotic disorder, current substance intoxication or withdrawal, cognitive impairment, or illiteracy. For the BPD group, relatively few exclusion criteria were used given the high rates of co-occurring disorders in this population (Shea et al., 2004; Skodol et al., 2002), as well as frequent utilization of psychotherapy and psychiatric medication.

For the healthy control (HC) group, several exclusion criteria were used. HC participants were excluded if they met more than two criteria for any personality disorder or more than ten criteria across all personality disorders. In addition, participants were excluded from the HC group if they had current or partially remitted Axis I diagnoses in the year prior to interview date, took psychiatric medication, or had *SCID-I* Global Assessment of Functioning (GAF) scores lower than 80. Finally, HC participants were excluded if they reported any history of self-injurious behavior. The BPD and HC groups did not differ significantly in age, gender, or racial/ethnic composition (Table 1); however, the BPD group completed significantly fewer

---

individuals who were excluded from the final sample because of drop-out, equipment malfunction, or insufficient data.

years of education, *M* (*SD*) = 15.21 (2.30), compared to the HC group, *M* (*SD*) = 17.80 (2.41), $t(78) = 4.92$, $p < .001$. Table 2 lists co-occurring Axis I diagnoses for the BPD group.

Procedure

All callers responding to study ads were prescreened over the phone using questions adapted from the *Structured Clinical Interview for DSM-IV-II (SCID-II;* First, Gibbon, Spitzer, Williams, & Benjamin, 1997). Because preliminary work indicated that requiring six rather than five criteria on the phone screener yielded more true positives during the diagnostic interview, callers were required to endorse six of nine BPD criteria on the phone screener in order to be invited for an in-person diagnostic interview, for which they received compensation ($30). Following the interview session, eligible participants were given a questionnaire packet to complete at home. The packet contained the self-report measures for rumination and NSSI, in addition to measures pertinent to the hypotheses of the larger study. Participants returned their completed questionnaires at a second session and were trained by the study coordinator to use the electronic diary. The study coordinator ensured participants understood all diary instructions and questions by completing their first electronic diary entry in the lab. Participants were additionally given a written manual that provided clarifications to common diary misunderstandings, and they were informed that a research assistant would contact them weekly in order to encourage compliance and answer questions. After the 21-day diary period was completed, participants returned the electronic diary to the lab, were debriefed, and paid for their participation. Participants were paid $1 per diary entry completed, with the possibility of earning a maximum of $100 for the experience-sampling portion of the study. Written informed consent was obtained prior to the diagnostic interview, and all aspects of the research were approved by the University Institutional Review Board.

Diagnostic Interviews. All participants were administered the *SIDP-IV* (Pfohl et al., 1997), a semi-structured interview designed to assess the presence of Axis II personality disorders. Additional evaluation was conducted using the *SCID-I* (First et al., 1996). Participants were included if they met study criteria for BPD and also endorsed a history of NSSI on criterion 5 of the *SIDP-IV* diagnostic interview. To assess self-injury history, participants were asked: "Have you ever been so upset or tense that you deliberately hurt yourself by cutting your skin, putting your hand through a glass window, burning yourself, or anything else like that? What have you done? How often?"

We calculated inter-rater reliability for both diagnostic interview measures as follows: five videotaped interview sessions, including both *SIDP-IV* and *SCID-I* interviews, were randomly selected by the diagnostic interview coordinator, a doctoral-level clinical psychologist with extensive diagnostic interview experience. All other study interviewers, who were doctoral-level clinical psychologists and clinical psychology graduate students, blindly coded both interview measures for these five randomly selected sessions. Interviewer ratings were then compared with the ratings of the diagnostic interview coordinator to calculate a kappa coefficient. Inter-rater reliability was assessed at both the symptom level for BPD ($\kappa = 0.83$) and for all *SCID-I* diagnoses reported in Table 2 ($\kappa = 0.86$).

Inventory of Statements about Self-injury (ISAS). Participants who met study criteria for BPD and endorsed a lifetime history of NSSI on the ISAS (Klonsky & Glenn, 2009) were also included in the BPD group. The ISAS is a self-report measure assessing NSSI methods, lifetime frequency, and NSSI functions. Participants were asked to estimate the number of times in their life they had intentionally (i.e., on purpose) performed twelve types of self-injury (e.g., cutting, burning, banging, or hitting self). This measure defines self-injury for participants as a behavior

done "intentionally" and "without suicidal intent." The ISAS has demonstrated excellent internal consistency, concurrent validity, and adequate test-retest reliability for the NSSI behaviors assessed (Glenn & Klonsky, 2011; Klonsky & Glenn, 2009).

Ruminative Responses Scale (RRS). Rumination was assessed with items from the brooding subscale of the Ruminative Responses Scale (RRS; Nolen-Hoeksema & Morrow, 1991; Treynor, Gonzalez, & Nolen-Hoeksema, 2003). Participants rated on a 4-point Likert scale (1 = *almost never*, 4 = *almost always*) how often they engaged in a list of thoughts and behaviors when feeling down or depressed. Recent re-analysis of the RRS indicated that the brooding subscale alone uniquely captures the process of passive, maladaptive rumination on the causes and consequences of one's distress (Armey et al., 2009; Treynor et al., 2003). The five items comprising this subscale ($\alpha = .89$) assess how often individuals engage in behaviors such as, "Thinking 'what am I doing to deserve this?" when feeling down or depressed.

Experience-Sampling Diary

Negative Emotion Differentiation. Differentiation of negative emotion was assessed using a 21-day computerized experience-sampling diary. Handheld Zire 21 personal digital assistants configured with the Intel adaptation (iESP) of the Experience Sampling Program software (ESP; Barrett & Barrett, 2000) emitted signals at random intervals five times daily for a period of 21 days. All responses were automatically dated and time-stamped by the software program.

At each electronic diary entry, participants rated on a 5-point Likert scale (1 = *not at all*, 5 = *extremely*) the extent to which they were currently experiencing a list of distinct negative emotions. The emotions included *afraid, angry, ashamed, disappointed, irritated, sad,* and *tense*. Intermixed with these emotion words, participants also rated a number of positive

emotions (e.g., *satisfied, energetic, happy, enthusiastic, relaxed, grounded, calm,* and *self-confident*), which were not included in the calculation of the negative emotion differentiation index. These particular negative and positive emotion terms were selected to account for varying levels of activation across positive and negative valences, as suggested by affective circumplex models (e.g., Rafaeli, Rogers, & Revelle, 2007; Russell, 1980). From the ratings of the negative emotion terms, we derived a negative emotion differentiation index for each participant by calculating the within-person average inter-item correlations (AICs) between all possible pairs of emotion items across all diary entries (Barrett et al., 2001; Kashdan et al., 2010; Pond et al., 2012; Tugade et al., 2004). The AICs were then normalized using Fisher r-to-z transformations and reversed so that large correlations would correspond to high emotion differentiation and small correlations would correspond to low emotion differentiation (Kashdan et al., 2010). Reliability coefficients for the negative emotion differentiation index were computed at the between-subject level, .90 (i.e., reflecting the ability to reliably differentiate between participant scores during a single fixed diary entry) and at the within-subject level, .82 (i.e., reflecting the ability to reliably detect change in a participant's scores across assessments; see Cranford et al., 2006).

NSSI Acts and Urges. NSSI acts and urges were also assessed at each electronic diary entry with the following prompt: *"Please indicate whether you injured yourself directly since the last diary."* Participants were then asked to select a response from the following options: *"No", "No, but I thought about it", "No, but I had a strong urge",* or *"Yes."* Self-injury was defined for participants as "any behavior that causes direct tissue damage such as cutting, banging, burning, or scratching." During the diary training session, the study coordinator ensured that participants understood this behavior to be distinct from both suicidal behavior and accidental

self-injurious behavior. In addition, all participants were given a written document containing the exact diary questions in the study, along with definitions and explanations for each question. A single mean NSSI variable combining both NSSI acts *and* NSSI urges was then calculated for each participant by summing all reported NSSI acts and urges for that participant across the diary period. Thoughts about NSSI were not included in our dependent variable.

Results

Analyses Involving the BPD and HC Groups

The BPD and HC groups completed a mean (*SD*) of 75.71 (20.51) out of a possible 105 diary entries (range 27 – 105). The number of diary entries completed by the BPD group (M = 75.47, SD = 22.12) did not differ significantly from the HC group (M = 75.93, SD = 19.20), $t(70) = 0.10$, *n.s.*, nor did the number of days in which participants actively responded to the diary prompts across the 21-day period (BPD: M = 19.89 days, SD = 2.17; HC: M = 20.19 days, SD = 1.97, $t(78) = .64$, *n.s.*).

Our first hypothesis proposed that the BPD group would be higher in rumination and lower in negative emotion differentiation relative to the HC group. As predicted, we found that the BPD group reported significantly higher levels of rumination (M = 3.22, SD = 0.64) than the HC group (M = 1.71, SD = 0.60), $t(78) = -11.06$, $p < .001$. The BPD group also evidenced significantly lower negative emotion differentiation scores (M = 0.55, SD = 0.15), reflecting poorer discrimination of negative emotions relative to the HC group (M = 0.81, SD = 0.13), $t(78) = 8.32$, $p < .001$. Across the diary period, the BPD group reported a mean (*SD*) of 1.03 (2.06; range 0-8) NSSI acts, a mean (*SD*) of 1.53 (3.49; range 0-15) NSSI urges, and a combined NSSI acts and urges mean (*SD*) of 2.55 (4.83; range 0-23). As we anticipated, there were no reports of NSSI acts or urges from the HC group.

Analyses Involving the BPD Group Only

Our remaining two hypotheses solely concerned the BPD group. Within this group, we proposed that higher rumination would be associated with a greater frequency of NSSI acts and urges and that negative emotion differentiation would moderate the association between rumination and NSSI. We first examined the variables of interest using bi-variate correlations and found a non-significant correlation between rumination and negative emotion differentiation, r = -.13, *n.s.* In addition, we systematically checked that assumptions of regression were not violated, including visually inspecting residuals and confirming the linearity and normality of the distribution for all relevant variables. Moreover, we used a square root transformation on the dependent variable (summed NSSI acts and urges), which was skewed, so that these data approximated a normal distribution (e.g., NSSI acts and urges skewness = 1.08). We then centered rumination, negative emotion differentiation, and the interaction of rumination by negative emotion differentiation and tested our hypothesis using one hierarchical regression. In the first step, we entered rumination, negative emotion differentiation, and number of diary entries as predictor variables, with the log transformation of NSSI acts and urges as our dependent variable. In the second step, we added the interaction term of rumination and negative emotion differentiation. Contrary to our prediction, we did not find a significant main effect for rumination. However, as expected, the results indicated a significant interaction between rumination and negative emotion differentiation, β = -0.47, p < .01 (Table 3), which we then probed by graphing the predicted values at one standard deviation above and below the mean for both rumination and negative emotion differentiation (Figure 1).

A follow-up test of the simple slopes indicated that the association between rumination and NSSI under high negative emotion differentiation (one standard deviation above the mean

for the BPD group) was significantly different from zero, β = -0.35, p < .001. The association between rumination and NSSI under moderate negative emotion differentiation (one standard deviation below the mean for the BPD group and therefore not considered "low" per se) was also significant, β = 0.22, p < .05, demonstrating the inverse relationship. Thus, for participants with high rumination, high differentiation of negative emotion was associated with significantly decreased frequency of NSSI, whereas low differentiation of negative emotion was associated with significantly increased frequency of NSSI. In effect, negative emotion differentiation protected these individuals from the behavioral costs of rumination.

Finally, we examined the effects of potential third variables that could have important associations with NSSI acts and urges. These included mean levels of negative affect across the diary[2], current diagnosis of major depressive disorder or dysthymic disorder, as well as age, years of education, and current treatment with psychotherapy or psychiatric medication. None of these variables had any meaningful effect on our results and were therefore not considered further.

Discussion

The present study clarifies the role played by two psychological processes – rumination and emotion differentiation – in predicting self-injury in adults with BPD who reported histories of NSSI. Specifically, the interaction between the two processes was significantly associated with self-injurious acts and urges in BPD participants with histories of NSSI. These results held even when controlling for important covariates such as mean levels of negative affect and current

[2] We were particularly interested in ruling out the effect of mean levels of negative affect, since one alternative explanation for our findings was that individuals more able to differentiate negative emotion would also report lower levels of negative affect. However, when we entered this variable into our regression analysis, it was not a significant predictor, β = .23, p = .16, and did not influence the significance or strength of the interaction between rumination and negative emotion differentiation when predicting NSSI acts and urges.

diagnosis of depression or dysthymia. Whereas prior research has implicated rumination in NSSI, our data suggest that the combination of these two emotional processes may better account for the frequency of NSSI in BPD. Specifically, our findings suggest that the association between rumination and NSSI acts and urges is moderated by negative emotion differentiation. Indeed, the ability to differentiate negative emotional experiences may be protective, as participants who demonstrated greater differentiation among their various negative emotions reported fewer self-injurious acts and urges, even when prone to high levels of rumination.

Building upon the growing literature linking rumination to self-injury (Armey & Crowther, 2008; Hilt et al., 2008), the present study provides preliminary evidence that the association between rumination and NSSI may be contingent on other emotional processes, such as emotion differentiation. Although a significant main effect of rumination on NSSI was predicted, this prediction was not supported. Insufficient variance due to elevated levels of rumination in nearly all of the BPD participants, compared to the controls, may have masked a main effect for rumination. Nonetheless, this study helps further elucidate the nature of the relationship between rumination and NSSI, and represents the first study to examine rumination in tandem with the process of emotion differentiation.

These data also extend recent demonstrations of a link between high levels of rumination and BPD (Abela et al., 2003; Smith et al., 2006). Our work builds on Selby and Joiner's (2009) emotional cascade model of BPD by proposing one method of attending to emotions – emotion differentiation – that may protect ruminating individuals with BPD from engaging in NSSI. Specifically, we posit that when individuals are immersed in an emotional cascade, the extent to which they label and distinguish the specific negative emotions experienced may decrease the likelihood that they will use NSSI to break this recursive ruminative cycle. This hypothesis is

supported by a wealth of experimental and neuroimaging work suggesting that the simple act of putting one's feelings into words may possess emotion-regulating properties superior to other emotion regulation strategies (Pennebaker, 1997; Lieberman et al., 2007). For instance, a recent study found that verbalizing fear and anxiety during exposure to fear-inducing stimuli was superior to reappraisal and distraction in reducing skin conductance response in individuals suffering from phobias (Kircanski et al., 2012). Furthermore, the greater use of fear and anxiety words during exposure was correlated with greater reductions in fear responding. These findings suggest that the act of labeling one's emotional experience in itself attenuates the intensity of that emotion, serving a powerful emotion regulation function. For individuals with BPD enmeshed in emotional cascades, the momentary ability to label and distinguish one's emotional experience may reduce emotional intensity and help obviate the perceived need to engage maladaptive strategies such as NSSI to manage these intense emotions. Future research should test this prediction by examining the relationship between emotion labeling interventions and NSSI risk in BPD.

The present findings are also consistent with research suggesting that emotion differentiation is associated with adaptive emotion regulation in non-clinical populations (Barrett et al., 2001; Kang & Shaver, 2004) and with recent clinical research demonstrating negative emotion differentiation deficits in major depressive disorder (Demiralp et al., 2012). Our study unites these two lines of inquiry by demonstrating the beneficial effects of negative emotion differentiation against NSSI in BPD, a clinical population characterized by maladaptive responses to negative emotions. Given the prominence of emotion disturbances in many psychological disorders (Barlow, Allen, & Choate, 2004; Kring, 2008; Watson, 2005), as well as the presence of NSSI in other clinical disorders and populations (e.g., adolescents, military

recruits; Hilt, Nock, Lloyd-Richardson, & Prinstein, 2008; Klonsky, Oltmanns, & Turkheimer, 2003), investigating the salutary effect of emotion differentiation in other clinical disorders represents an important area for future investigation. One possibility may be that emotion differentiation deficits represent an index of severity for clinical disorders characterized by intense negative emotions. Future research should investigate this possibility by exploring emotion differentiation in diverse psychopathologies.

In addition, our findings contribute to a growing body of work suggesting that emotion differentiation provides specific resiliency against maladaptive behavioral outcomes in emotionally at risk individuals (e.g., binge drinking, aggression; Kashdan et al., 2010; Pond et al., 2012). Precisely how emotion differentiation protects against dysregulated behaviors deserves further attention. For example, is the effect due to one's specificity in the use of language, or might it be attributed to a more general ability to make fine-grained distinctions in one's experience? Although definitive answers to this question remain elusive, evidence suggests that as an individual's linguistic ability to describe emotional experiences evolves from broad categories (e.g., good vs. bad) to more discrete entities across development, so too does self-regulation ability (Widen & Russell, 2010). Thus, the precise nature of the language used to describe one's emotional experiences may provide critical knowledge needed to help ensure effective behavioral responses to those experiences.

Another possibility may be that emotion differentiation provides a type of "psychological distance" from "hot" emotions that allows the individual to more adaptively reflect on emotional experiences, thereby decreasing rumination and negative affect intensity (Metcalfe & Mischel, 1999). This hypothesis is supported by research conducted in non-clinical and clinically depressed populations, which demonstrated that focusing on the reasons underlying a negative

emotional experience – as opposed to the details of what one has experienced – reduces rumination and negative affect intensity when individuals also reflect on their experience from a third-person perspective (Kross et al., 2005; Kross et al., 2012). Using this strategy, individuals are able to process negative emotional experiences without becoming overwhelmed by them. It is possible that emotion differentiation may interrupt emotional cascades via a similar distancing mechanism that allows for processing of negative emotional experiences without further increasing distress, thereby reducing the likelihood of engaging maladaptive behaviors to short-circuit one's distress.

Finally, the current study enriches the growing literature on emotion-focused treatments by providing support for the assumption that accurate emotion identification and labeling may underlie more adaptive self-regulation. Several approaches (e.g., Dialectical Behavior Therapy, Schema Therapy, Emotionally Focused Therapy) call for accurate observation and labeling of emotional states as the first step towards effective regulation (Greenberg & Johnson, 1988; Linehan, 1993; Young, Klosko, & Weishaar, 2003). This guiding assumption, while accepted and widely implemented has been difficult to investigate empirically. The current study provides initial empirical support for this widespread belief and practice in the treatment of BPD.

There are several notable limitations to this study. Given the well-documented challenges in conducting research on BPD in general, addressing sensitive topics such as NSSI in particular, and using lengthy experience-sampling protocols (Prinstein, 2008; Sung et al., 2003), it is not surprising that the sample size was relatively small. However, our sample was comparable in size to similar experience-sampling studies on BPD (Russell, Moskowitz, Zuroff, Sookman, & Paris, 2007; Trull et al., 2008; Wolff, Stiglmayr, Bretz, Lammers, & Auckenthaler, 2007; for review, see Nica & Links, 2009), and – more importantly – adequate to detect the *a*

priori interaction. Of course, given the clinical and the theoretical relevance of the findings, it will be important to replicate these results in future studies.

Another limitation was the lack of a clinical control condition in the present study. Future research should compare emotion differentiation in diverse clinical populations in order to more precisely understand the correlates and functions of this construct in psychopathology. Moreover, participants with BPD who did not endorse histories of NSSI were excluded from the final study sample. Thus, the population to which the findings may be generalized remains restricted to the subset of individuals with BPD who report NSSI histories, rather than to individuals diagnosed with BPD more broadly.

Participants in this study reported low rates of NSSI acts and urges, consistent with the understanding of NSSI as a low base rate behavior (Meehl & Rosen, 1955). We attempted to address this challenge in advance by including only those BPD participants who reported a lifetime history of NSSI during the diagnostic interview (e.g., on BPD criterion 5) or on a self-report measure of NSSI (ISAS), thereby theoretically increasing the chance of observing NSSI over the three-week diary period. Despite this effort, the rate of reported NSSI acts was still low, necessitating the combination of NSSI acts and urges into a single self-injury variable. Consequently, this study does not address the link between negative emotion differentiation and actual self-injury. The low rate of NSSI may reflect the narrow unselected time period across which this study was conducted (i.e., three weeks). Alternatively, the act of daily self-monitoring in itself may have influenced the reported rate of NSSI acts and urges. Finally, it remains possible that, given the demands of the study protocol, individuals with BPD who were undergoing particularly stressful periods or who were more severely impaired never enrolled.

Despite these limitations, the current study deepens the understanding of emotion processes and NSSI in BPD. By extending basic research on emotion differentiation into the clinical literature, this study builds on growing evidence for the protective effect of emotion differentiation, demonstrating that emotion differentiation buffers against NSSI in ruminating individuals with BPD who report histories of NSSI. Moreover, the results provide empirical support for mainstream clinical theories of BPD suggesting that emotion identification and labeling are associated with more adaptive regulatory strategies. These findings have implications for the understanding and treatment of BPD and potentially for other emotional disorders and populations, in which significant behavioral dysregulation is observed. We hope this research inspires clinical investigators to further examine emotion differentiation and its relation to emotion regulation in diverse psychopathologies.

References

Abela, J. R., Payne, A. V., & Moussaly, N. (2003). Cognitive vulnerability to depression in individuals with borderline personality disorder. *Journal of Personality Disorders, 17*(4), 319-329.

American Psychiatric Association. (2000). *Diagnostic and Statistical Manual of Mental Disorders, 4th ed., Text Revision*. Washington, DC: American Psychiatric Association.

Armey, M. F., & Crowther, J. H. (2008). A comparison of linear versus non-linear models of aversive self-awareness, dissociation, and non-suicidal self-injury among young adults. *Journal of Consulting and Clinical Psychology, 76*(1), 9-14.

Armey, M. F., Fresco, D. M., Moore, M. T., Mennin, D. S., Turk, C. L., Heimberg, R. G., . . . Alloy, L. B. (2009). Brooding and pondering: Isolating the active ingredients of depressive rumination with exploratory factor analysis and structural equation modeling. *Assessment, 16*(4), 315-327.

Barlow, D. H., Allen, L. B., & Choate, M. L. (2004). Toward a unified treatment for emotional disorders. *Behavior Therapy, 35*(2), 205-230.

Barrett, D. J., & Barrett, L. F. (2000). The Experience-Sampling Program (ESP). Retrieved April 21, 2011, from http://www.experience-sampling.org/

Barrett, L. F. (1998). Discrete emotions or dimensions?: The role of valence focus and arousal focus. *Cognition and Emotion*, *12*(4), 579-599.

Barrett, L. F., Gross, J., Christensen, T. C., & Benvenuto, M. (2001). Knowing what you're feeling and knowing what to do about it: Mapping the relation between emotion differentiation and emotion regulation. *Cognition and Emotion*, *15*(6), 713-724.

Beck, A. T., Rush, A. J., Shaw, B. F. & Emery, G. (1979). *Cognitive therapy of depression*. New York: Guilford Press.

Berenson, K. R., Downey, G., Rafaeli, E., Coifman, K. G., & Leventhal, N. (2011). The rejection-rage contingency in borderline personality disorder. *Journal of Abnormal Psychology, 120*(3), 681-690.

Bolger, N., Davis, A., & Rafaeli, E. (2003). Dairy methods: Capturing life as it is lived. *Annual Review of Psychology, 54*, 579-616.

Brown, M. Z., Comtois, K. A., & Linehan, M. M. (2002). Reasons for suicide attempts and nonsuicidal self-injury in women with borderline personality disorder. *Journal of Abnormal Psychology, 111*(1), 198-202.

Clarkin, J. F., Widiger, T. A., Frances A., Hurt, S. W., & Gilmore, M. (1983). Prototypic typology and the borderline personality disorder. *Journal of Abnormal Psychology, 92*(3), 263-275.

Coifman, K. G., Berenson, K. R., Rafaeli, E., & Downey, G. (2012). From negative to positive and back again: Polarized affective and relational experience in borderline personality disorder. *Journal of Abnormal Psychology, 121*(3), 668-679.

Conklin, C. Z., Bradley, R., & Westen, D. (2006). Affect regulation in borderline personality disorder. *Journal of Nervous and Mental Disease, 194*, 69-77.

Cranford, J. A., Shrout, P. E., Iida, M., Rafaeli, E., Yip, T, & Bolger, N. (2006). A procedure for evaluating sensitivity to within-person change: Can mood measures in diary studies detect change reliably? *Personality and Social Psychology Bulletin*, *32*(7), 917-929.

Demiralp, E., Thompson, R. J., Mata, J., Jaeggi, S.M., Buschkuehl, M., & Barrett, L. F.…Jonides, J. (2012). Feeling blue or turquoise? Emotional differentiation in major

depressive disorder. *Psychological Science, 23*(11), 1410-1416.

First, M., Gibbon, M., Spitzer, R. L., & Williams, J. B. W. (1996). *User's guide for the Structured Clinical Interview for the DSM-IV Axis I Research Version.* Washington, DC: American Psychiatric Press.

First, M., Gibbon, M., Spitzer, R. L., Williams, J. B. W., & Benjamin, L. S. (1997). *User's guide for the Structured Clinical Interview for the DSM-IV Axis II Personality Disorders (SCID-II).* Washington, DC: American Psychiatric Press.

Glenn, C. R., & Klonsky, E. D. (2011). One-year test-retest reliability of the Inventory of Statements about Self-injury (ISAS). *Assessment, 18*(3), 375-378.

Greenberg, L. S., & Johnson, S. M. (1988). *Emotionally Focused Therapy for Couples.* New York: Guilford Press.

Hayes, S. C., Strosahl, K. D., & Wilson, K. G. (1999). *Acceptance and Commitment Therapy: An experiential approach to behavior change.* New York: Guilford Press.

Heatherton, T. F., & Baumeister, R. F. (1991). Binge eating as escape from self-awareness. *Psychological Bulletin, 110,* 86-108.

Hill, C. L. M., & Updegraff, J. A. (2012). Mindfulness and its relationship to emotion regulation. *Emotion, 12*(1), 81-90.

Hilt, L. M., Cha, C. B., & Nolen-Hoeksema, S. (2008). Nonsuicidal self-injury in young adolescent girls: Moderators of the distress-function relationship. *Journal of Consulting and Clinical Psychology, 76*(1), 63-71.

Hilt, L. M., Nock, M. K., Lloyd-Richardson, E. E., & Prinstein, M. J. (2008). Longitudinal study of nonsuicidal self-injury among young adolescents: Rates, correlates, and preliminary test of an interpersonal model. *The Journal of Early Adolescence, 28*(3), 455-469.

Kang, S. M., & Shaver, P. R. (2004). Individual differences in emotional complexity: Their

psychological implications. *Journal of Personality*, *72*(4), 687-726.

Kashdan, T. B., Ferssizidis, P., Collins, R. L., & Muraven, M. (2010). Emotion differentiation as resilience against excessive alcohol use: An ecological momentary assessment in underage social drinkers. *Psychological Science, 21*(9), 1341-1347.

Kemperman, I., Russ, M. J., & Shearin, E. (1997). Self-injurious behavior and mood regulation in borderline patients. *Journal of Personality Disorders, 11*(2), 146-157.

Kircanski, K., Lieberman, M. D. & Craske, M. G. (2012). Feelings into words: Contributions of language to exposure therapy. *Psychological Science, 23,* 1086-1091.

Kleindienst, N., Bohus, M., Ludäscher, P., Limberger, M. F., Kuenkele, K., Ebner-Priemer, U. W., . . . Schmahl, C. (2008). Motives for nonsuicidal self-injury among women with borderline personality disorder. *Journal of Nervous and Mental Disease*, *196*(3), 230-236.

Klonsky, E. D., & Glenn, C. R. (2009). Assessing the functions of nonsuicidal self-injury: Psychometric properties of the Inventory of Statements about Self-injury (ISAS). *Journal of Psychopathology and Behavioral Assessment, 31*, 215-219.

Klonsky, E. D., Oltmanns, T. F., & Turkheimer, E. (2003). Deliberate self-harm in a nonclinical population: Prevalence and psychological correlates. *American Journal of Psychiatry, 160,* 1501-1508.

Kring, A. M. (2008). Emotion disturbances as transdiagnostic processes in psychopathology. In M. Lewis, J. Haviland-Jones, & L. F. Barrett (Eds.), *Handbook of emotion, 3rd edition* (pp. 691-705). New York: Guilford Press.

Kross, E., Ayduk, O., & Mischel, W. (2005). When asking "why" does not hurt: Distinguishing

rumination from reflective processing of negative emotions. *Psychological Science, 16,* 709-715.

Kross, E. Gard, D., Deldin, P., Clifton, J., & Ayduk, O. (2012). Asking "why" from a distance: Its cognitive and emotional consequences for people with depression. *Journal of Abnormal Psychology*, *121*(3), 559-569.

Leible, T., & Snell, W. (2004). Borderline personality disorder and multiple aspects of emotional intelligence. *Personality and Individual Differences, 37,* 393-404.

Levine, D., Marziali, E., & Hood, J. (1997). Emotion processing in borderline personality disorders. *Journal of Nervous and Mental Disease, 185,* 240-246.

Lieberman, M. D., Eisenberger, N. I., Crockett, M. J., Tom, S. M., Pfeifer, J. H., & Way, B. M. (2007). Putting feelings into words: Affect labeling disrupts amygdala activity in response to affective stimuli. *Psychological Science, 18*(5), 421-428.

Linehan, M. M. (1993). *Cognitive-behavioral treatment of borderline personality disorder*. New York: Guilford Press.

Meehl, P. E., & Rosen, A. (1955). Antecedent probability and the efficiency of psychometric signs, patterns, or cutting scores. *Psychological Bulletin, 52,* 194-216.

Metcalfe, J., & Mischel, W. (1999). A hot/cool-system analysis of delay of gratification: Dynamics of willpower. *Psychological Review, 106,* 3-19.

Nica, E. I., & Links, P. S. (2009). Affective instability in borderline personality disorder: Experience sampling findings. *Current Psychiatric Reports, 11,* 74-81.

Nock, M. K., & Prinstein, M. J. (2004). A functional approach to the assessment of self-mutilative behavior. *Journal of Consulting and Clinical Psychology, 72,* 885-890.

Nolen-Hoeksema, S., & Harrell, A. (2002). Rumination, depression, and alcohol use: Tests of gender differences. *Journal of Cognitive Psychotherapy, 16*(4), 391-403.

Nolen-Hoeksema, S., & Morrow, J. (1991). A prospective study of depression and posttraumatic stress symptoms after a natural disaster: The 1989 Loma Prieta earthquake. *Journal of Personality and Social Psychology, 61*(1), 115-121.

Nolen-Hoeksema, S., Stice, E., Wade, E., & Bohon, C. (2007). Reciprocal relations between rumination and depressive, bulimic, and substance abuse symptoms. *Journal of Abnormal Psychology, 116,* 198-207.

Pennebaker, J. W. (1997). Writing about emotional experiences as a therapeutic process. *Psychological Science, 8,* 162–166.

Pfohl, B., Blum, N., & Zimmerman, M. (1997). *Structured interview for DSM-IV personality.* Washington, DC: American Psychiatric Association.

Pond, R. S., Kashdan, T. B., DeWall, C. N., Savostyanova, A., Lambert, N. M., & Fincham, F. D. (2012). Emotion differentiation moderates aggressive tendencies in angry people: A daily diary analysis. *Emotion. 12*(2), 326-337.

Prinstein, M. J. (2008). Introduction to the special section on suicide and nonsuicidal self-injury: A review of unique challenges and important directions for self-injury science. *Journal of Consulting and Clinical Psychology, 76*(1), 1-8.

Rafaeli, E., Rogers, G. M., & Revelle, W. (2007). Affective synchrony: Individual differences in mixed emotions. *Personality and Social Psychology Bulletin, 33,* 915-932.

Russell, J. A. (1980). A circumplex model of affect. *Journal of Personality and Social Psychology, 39,* 1161-1178.

Russell, J. J., Moskowitz, D. S., Zuroff, D. C., Sookman, D., & Paris, J. (2007). Stability and variability of affective experience and interpersonal behavior in borderline personality disorder. *Journal of Abnormal Psychology, 116,* 578-588.

Selby, E. A., Anestis, M. D., & Joiner, T. E. (2008). Understanding the relationship between

emotional and behavioral dysregulation: Emotional cascades. *Behaviour Research and Therapy, 46*(5), 593-611.

Selby, E. A., & Joiner, T. E. (2009). Cascades of emotion: The emergence of borderline personality disorder from emotional and behavioral dysregulation. *Review of General Psychology, 13*(3), 219-229.

Shea, M. T., Stout, R. L., Yen, S., Pagano, M. E., Skodol, A. E., & Morey, L. C., . . . Zanarini, M. C. (2004). Associations in the course of personality disorders and Axis I disorders over time. *Journal of Abnormal Psychology, 113*(4), 499-508.

Skodol, A. E., Gunderson, J. G., Pfohl, B., Widiger, T. A., Livesley, W. J., & Siever, L. J. (2002). The borderline diagnosis I: Psychopathology, comorbidity, and personality structure. *Biological Psychiatry, 51*(12), 936-950.

Smith, J. M., Alloy, L. B., & Abramson, L. Y. (2006). Cognitive vulnerability to depression, rumination, hopelessness, and suicidal ideation: Multiple pathways to self-injurious thinking. *Suicide and Life-Threatening Behavior, 36*(4), 443-454.

Sung, N. S., Crowley, W. F., Genel, M., Salber, P., Sandy, L., Sherwood, L. M., et al. (2003). Central challenges facing the national clinical research enterprise. *Journal of the American Medical Association, 289,* 1278-1287.

Suvak, M. K., Litz, B. T., Sloan, D. M., Zanarini, M. C., Barrett, L. F., & Hofmann, S. G. (2011). Emotional granularity and borderline personality disorder. *Journal of Abnormal Psychology, 120,* 414-426.

Treynor, W., Gonzalez, R., & Nolen-Hoeksema, S. (2003). Rumination reconsidered: A psychometric analysis. *Cognitive Therapy and Research, 27*(3), 247-259.

Trull, T. J., Solhan, M. B., Tragesser, S. L., Jahng, S., Wood, P. K., Piasecki, T. M., et al. (2008). Affective instability: Measuring a core feature of borderline personality disorder with

ecological momentary assessment. *Journal of Abnormal Psychology, 117,* 647-661.

Tugade, M. M., Fredrickson, B. L., & Barrett, L. F. (2004). Psychological resilience and emotional granularity: Examining the benefits of positive emotions on coping and health. *Journal of Personality, 72,* 1161–1190.

Watson, D. (2005). Rethinking the mood and anxiety disorders: A quantitative hierarchical model for the *DSM-V. Journal of Abnormal Psychology, 114*(4), 522-536.

Widen, S. C., & Russell, J. A. (2010). Differentiation in preschoolers' categories for emotion. *Emotion, 10,* 651-661.

Wolff, S., Stiglmayr, C., Bretz, H. J., Lammers, C. H., & Auckenthaler, A. (2007). Emotion identification and tension in female patients with borderline personality disorder. *British Journal of Clinical Psychology, 46,* 347-360.

Young, J. E., Klosko, J. S., & Weishaar, M. (2003). *Schema Therapy: A Practitioner's Guide.* New York: Guilford Press.

Table 1

Characteristics of study participants (N = 80)

Characteristic	BPD (n = 38)		HC (n = 42)		
Race/ethnicity	*N*	%	*N*	%	$x^2(4) = 5.32$
White/European	23	61	17	41	
Black/African	7	18	15	36	
Asian	3	8	4	10	
Hispanic	7	18	5	12	
Other	2	5	0	0	
Currently on psychiatric medication	16	42			
Currently in therapy	19	50			

Table 2

Current co-occurring Axis I diagnoses for the BPD group

Axis I diagnosis	BPD (*n* = 38)	
	n	%
Major depressive episode	19	50
Bipolar I or II disorder	4	11
Dysthymic disorder	7	18
Social phobia	18	47
Posttraumatic stress disorder	11	29
Panic disorder, agoraphobia, or both	5	13
Obsessive-compulsive disorder	3	8
Generalized anxiety disorder	17	45
Bulimia nervosa	2	5
Binge eating disorder	2	5
Substance dependence or abuse[a]	12	32

[a]Includes the following: Alcohol, cannabis, cocaine, hallucinogen, opioid, sedative/hypnotic/anxiolytic, stimulant

Table 3

Hierarchical regression predicting diary-reported NSSI in the BPD group (N = 38)

		B	*SE*	*β*	sr^2	R^2	ΔR^2
Step 1	Rumination – brooding subscale	-.00	.10	-.01	.00	.13	--
	Negative emotion differentiation	-.41	.42	-.16	.02		
	Number of diary entries	.01*	.00	.36	.12		
Step 2	Rumination – brooding subscale	-.06	.09	-.10	.01	.32	.19**
	Negative emotion differentiation	-.81*	.40	-.32	.09		
	Number of diary entries	.01*	.00	.40	.15		
	Rumination X negative emotion differentiation	-1.96**	.65	-.47	.19		
	$F(4, 33) = 3.86$, $p < .05$						

*$p < .05$; **$p < .01$.

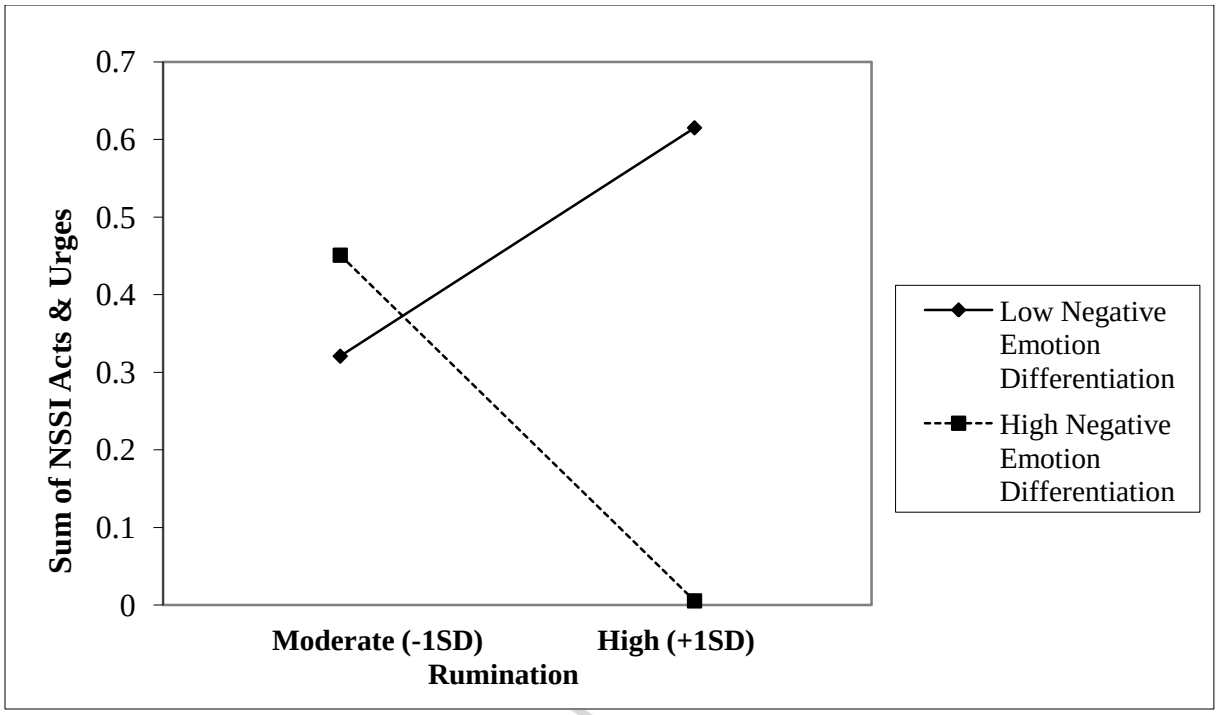

Figure 1

Figure 1: The interaction of rumination and negative emotion differentiation when predicting the sum of NSSI acts and urges across the three-week diary period in BPD participants who reported histories of NSSI.

Highlights

- Examined link between emotion differentiation and nonsuicidal self-injury (NSSI) in adults with BPD who have NSSI histories.
- Using a daily diary, measured emotion differentiation and NSSI over a three-week period.
- Emotion differentiation moderated the relationship between rumination and NSSI.
- Results suggest that emotion differentiation may improve self-regulation in BPD.