Published in final edited form as:

J Abnorm Psychol. 2017 July ; 126(5): 531–539. doi:10.1037/abn0000225.

Associations of Borderline Personality Disorder Traits with Stressful Events and Emotional Reactivity in Women with Bulimia Nervosa

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Abstract

Borderline personality disorder (BPD) traits are common among those with bulimia nervosa (BN). However, how these traits impact the state experience of precipitants of BN behavior, such as stressful events and emotional reactivity, has not been determined. Thus, the purpose of this naturalistic study was to examine this trait-state association in BN. Women with DSM-IV BN (N=133) completed a baseline measure of personality pathology traits, and subsequently recorded their affective state and the frequency and perception of three types of stressful events (interpersonal, work/environment, and daily hassles) several times per day for 2 weeks using ecological momentary assessment (EMA). Pearson correlations assessed the associations between BPD traits (affective lability, identity problems, insecure attachment, and cognitive dysregulation) and (a) frequency of stressful events and (b) perception of stressful events. Generalized linear models (GLM) were used to evaluate the relationship between BPD traits and changes in negative affect following stressful events. Results revealed that while all traits were significantly associated with perceived stressfulness, certain BPD traits were significantly associated with the frequency of stressful events. Individuals with higher trait insecure attachment experienced larger increases in negative affect following interpersonal stressful events. These findings suggest that interventions focused on addressing stressful events and enhancing adaptive emotional responses to interpersonal events may be particularly useful for a subset of individuals with BN with BPD-related personality characteristics, including insecure attachment, affective lability, and identity problems.

Keywords

emotional reactivity; bulimia nervosa; stress; negative mood; BPD

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All authors have declared that there are no competing or potential conflicts of interest.

Bulimia nervosa (BN) is characterized by recurrent episodes of binge eating (i.e., consuming an unambiguously large amount of food while feeling a sense of loss of control) and compensatory behaviors (e.g., self-induced vomiting) to minimize weight gain (American Psychiatric Association, 2013). The disorder is associated with a variety of medical and psychiatric comorbidities, including borderline personality disorder (BPD; APA, 2013; Cassin & von Ranson, 2005). Traits related to BPD (e.g., emotion dysregulation) have also been identified as risk and maintenance factors for bulimic behaviors in individuals with BN (Anestis et al., 2010; Lavender et al., 2015; Livesley, Jackson, & Schroeder, 1992; Wonderlich et al., 2007). Importantly, research suggests that individuals with BN and BPD or related symptoms show poorer global functioning and may respond worse to treatment than those with an eating disorder alone (Steiger & Stotland, 1996; Wonderlich, Fullerton, Swift, & Klein, 1994; Stice, Bohon, Marti, & Fischer, 2008). Therefore, to enhance existing interventions, a better understanding of how these traits may be associated with bulimic behaviors is needed. In particular, little is known about how individual differences in BPD traits may be linked to established momentary triggers of bulimic behaviors, such as stressful events and negative affect (Goldschmidt et al., 2014; Smyth et al., 2007). Thus, the purpose of this study was to test this novel trait and state association in a sample of women with BN.

BPD Traits of Emotion Dysregulation in BN

Individuals with BN often share many defining characteristics of BPD; in fact, about 30% of individuals with BN also meet criteria for BPD (Cassin & von Ranson, 2005). BPD, like BN, is often characterized by underlying problems with emotion dysregulation, which broadly defined, refers to the inability to control and modulate one's affective state to such a degree that emotions are experienced as out of control (Shedler & Westen, 2004). Individuals with eating disorders, particularly BN, tend to display levels of emotion dysregulation similar to those of individuals with BPD (e.g., Svaldi, Griepentstroh, Tuschen-Caffier, & Ehring, 2012). Those with "severe" eating disorders also tend to exhibit the most symptoms of BPD, along with the most severe psychopathology (Goldner, Krueger, Andrews, & Hobbs, 1999). Furthermore, empirical classification studies suggest that individuals with BN who fall into an "interpersonal-emotional" personality cluster (e.g., higher scores on emotion dysregulation traits that appear most similar to BPD traits) tend to exhibit the greatest frequency of daily binge eating and purging (Wonderlich et al., 2007). Thus, broad emotion dysregulation traits appear to be important indicators of BPD symptomatology within BN, and are related to greater severity across multiple domains.

Emotion dysregulation, however, is a broad construct that encompasses several traits (Livesley et al., 1992). In considering those emotion dysregulation traits that best reflect BPD, four traits have been identified: (a) affective lability, (b) insecure attachment, (c) identity problems, and (d) cognitive dysregulation (Kendler, Myers, Reichborn-Kjennerud, 2011; Livesley et al., 1992). Not surprisingly, given the overlap between BPD and BN, these traits have also been found to be important for BN. First, trait affective lability, or the tendency to experience emotions that quickly fluctuate both in intensity and valence (Livesley et al., 1992), has been found to significantly predict global eating disorder symptoms even when controlling for depression (Anestis et al., 2010). Second, higher scores

on insecure attachment, which is conceptualized as fear of abandonment and rejection by others (Livesley et al., 1992), was associated with greater global eating disorder psychopathology and greater depressive symptoms in a BN sample (Mason et al., 2016). Third, eating disorder patients score higher on trait identity problems (e.g., the tendency to experience anhedonia, labile self-concept, and marked pessimism; Livesley et al., 1992) than controls and higher scores on this trait in BN are associated with suicide attempts (Pisetsky et al., 2015). Fourth, the trait cognitive dysregulation, which describes a propensity for thinking to become disorganized under stressful situations and when feeling distressed (Livesley et al., 1992), has not been directly examined in relation to bulimic symptoms in BN. However, in cluster analyses, individuals that fell into the “severe” eating disorder category scored higher on trait cognitive dysregulation than controls or those in the other eating disorder groups (identified as rigid and mild: Goldner et al., 1999). Taken together, it appears that BPD-related traits of emotion dysregulation are important indicators of more severe BN symptomatology.

State Precipitants of BN Behaviors: Stress and Emotional Reactivity

Daily diary and ecological momentary assessment (EMA) studies have enhanced our understanding of important antecedents for binge eating and purging behaviors among individuals with BN. Studies have identified two particularly important precipitants: stressful events and negative affect. First, the perceived severity of stressful events increases in the period preceding bulimic behaviors and BN individuals tend to perceive events as more stressful on days when BN behaviors occur than on non-bulimic behavior days (Smyth et al., 2007). However, there are mixed findings regarding whether the frequency of stressful events differs across days with and without bulimic behaviors (Wolff, Crosby, Roberts, & Wittrock, 2000; Smyth et al., 2007). Second, negative affect tends to rise during the hours leading up to a bulimic episode and women with BN report higher levels of negative affect on binge days vs. non-binge days (Haedt-Matt & Keel, 2011; Smyth et al., 2007). Of particular relevance, research integrating these two precipitants provides support for a mechanism in which the occurrence of stressful events, particularly those of an interpersonal nature, prompts bulimic behaviors through an increase in negative affect (Goldschmidt et al., 2014). Furthermore, this connection appears to hold true for both the frequency and perception of the stressful interpersonal event (Goldschmidt et al., 2014). Thus, stressful events, perhaps both the frequency and perception, and negative affect play a particularly important role in triggering bulimic behaviors.

The Current Study

The literature to date has established (a) the relationship between BPD-related emotion dysregulation traits and BN symptomatology and (b) the relationship of state experiences of stressful events and negative affect with bulimic behaviors. What remains less clear, however, is how BPD traits are associated with these state precipitants of BN behavior. This has clinical significance for understanding how to intervene on an individual-level. Rather than combining traits to represent a singular BPD construct, we aimed to test the associations between specific BPD-related emotion dysregulation traits and precipitants of bulimic behaviors. In particular, we tested the associations between each of the four

previously identified BPD-like traits (affective lability, insecure attachment, identity problems, and cognitive dysregulation) and the following state factors: (a) frequency of stressful events, (b) perception of stressful events, and (c) emotional reactivity (e.g., change in negative affect) to stressful events. We examined these relationships for three types of stressful events: (a) interpersonal, (b) work/environment, and (c) general daily hassles. To our knowledge, this is the first test of such trait and state association in BN. We anticipated the following.

BPD traits and frequency of stressful events

Given the theoretically broad impact of affective lability and identity problems on multiple domains of everyday functioning, we anticipated that individuals higher on these BPD traits would report a greater frequency of all types of stressful events. We also anticipated that those higher on insecure attachment, which is characterized by maladaptive reactions to interpersonal relationships, would significantly predict frequency of stressful interpersonal events, but would not significantly predict frequency of other types of stressful events.

BPD traits and perception of stressful events

Because all four BPD traits are associated with emotion dysregulation, which is conceptualized as increasing vulnerability for and sensitivity to stressful events, we anticipated that all traits would be associated with perception of all types of stressful events, with the exception of insecure attachment. For that trait, we anticipated a significant association with the perception of stress related to interpersonal events, but not a significant association with the perception of stress related to other types of events.

BPD traits and emotional reactivity to stressful events

We anticipated that trait affective lability would significantly predict emotional reactivity to all types of stressful events, as the trait reflects a tendency to experience emotional reactivity and volatility. We also anticipated that trait insecure attachment would significantly predict emotional reactivity to stressful interpersonal events, but would not significantly predict emotional reactivity to other types of stressful events.

Method

Participants

Participants were recruited for an EMA study of BN (Smyth et al., 2007) and included 133 females ($M_{age} = 25.3 \pm 7.6$). All participants met the Diagnostic and Statistical Manual of Mental Disorders (4th ed.; APA, 1994) criteria for BN. These EMA data have been used in previous studies focusing primarily on antecedents and consequences of binge eating and purging (e.g., Anestis et al., 2012; Berg et al., 2013; Goldschmidt et al., 2013, 2014; Lavender et al., 2016; Selby et al., 2012; Smyth et al., 2007). The current study builds upon prior findings using this dataset and others; however, it is unique in that it focuses on the link between specific BPD traits shown to be important to BN and established state triggers of BN behavior, which, to our knowledge, has not yet been investigated. For participants to be included in the study, they had to be female, between the ages of 18 and 55, able to read English, and medically stable (e.g., at least 85% of ideal body weight). Participants had an

average body mass index (BMI) of 23.9 ± 5.2 kg/m² and were primarily Caucasian ($n=127$, 95.5%), well-educated ($n=107$, 80.5% had completed at least some college), and single ($n=85$; 63.9%). On average, participants' BN symptoms began at 16.6 (± 3.8) years old, with 40.6% reporting having received mental health treatment in the 6 weeks prior to assessment.

Procedure

Participants were recruited in a Midwestern city through clinic, community, and campus advertisements. Interested participants completed a phone screen to ascertain preliminary BN status. After preliminary eligibility was determined, participants attended an informational session during which they provided written informed consent and were screened for medical stability. Trained research staff also measured height and weight using a calibrated stadiometer and scale, respectively. Participants next completed a baseline assessment battery and received thorough instructions on how to use the handheld computer for the 2-week EMA protocol. They were instructed to complete EMA recordings each time they experienced an eating disorder behavior (e.g., binge eating, purging); before bedtime; and in response to six semi-random prompts that occurred every 2-3 hours during the waking hours of the day (Wheeler & Reis, 1991). Within the semi-random prompts, participants were also given the opportunity to report events (e.g., bulimic behaviors) that had occurred since a prior recording, if they had not already been reported. To ensure that participants understood EMA procedures, each participant completed a 2-day trial period (these data were not included in the analyses). After the 2-day trial and on two additional occasions during the EMA data collection, participants were scheduled to visit the research facility to receive feedback on their compliance. Participants received \$200 for completing the 2-week EMA protocol and an additional \$50 if compliance rates were 85% or better on random signal recordings. The study was approved by the relevant Institutional Review Boards.

Measures

Bulimia nervosa diagnosis—The Structured Clinical Interview for DSM-IV Axis I Disorders/Patient Edition (SCID-I/P; First, Spitzer, Gibbon, & Williams, 1997) was administered at the informational session by trained, doctoral-level psychologists to (a) confirm preliminary BN diagnoses established during the phone screen and (b) assess eating disorder history and other lifetime/current psychiatric diagnoses. The reliability and validity of the SCID-I/P has been demonstrated in a variety of psychiatric populations (First et al., 1997; Lobbetael, Leurgans, & Arntz, 2011). In the current study, interrater reliability for BN diagnoses was 1.0.

Personality traits—At baseline assessment, participants completed the Dimensional Assessment of Personality Pathology-Basic Questionnaire (DAPP-BQ; Livesley & Jackson, 2009), which is a 290-item self-report measure that contains 18 scales assessing traits of personality pathology. These scales fall under four higher-order scales: emotion dysregulation, dissocial behavior, compulsivity, and social avoidance. Items are rated on a 5-point scale ranging from (1) very unlike me to (5) very like me. Scale scores are reported as *T*-scores, with a mean of 50 and a standard deviation of 10. The current study focuses on traits most relevant to BPD, which have previously been identified as affective lability,

insecure attachment, identity problems, and cognitive dysregulation (Kendler et al., 2011; Livesley et al., 1992). All four of these scales fall under the emotion dysregulation higher-order scale, also referred to as the borderline cluster.

The scale for *affective lability* (current sample, $\alpha = .89$) is made up of 16 items that assess labile emotions, emotional over-reactivity, irritability, and threshold for annoyance. An example item is: “At times, my feelings take over and just pour out.” Those with higher scores on this scale tend to experience intense emotions that are easily aroused, as well as frequent mood changes.

The scale *insecure attachment* (current sample, $\alpha = .94$), which is made up of 16 items, assesses fear of abandonment and rejection by others, a need for a secure base, and intolerance of aloneness. For example, one item is “I feel panicky when I am separated from those I love.” Any separation or threatened separation tends to evoke a strong reaction and protest from individuals who score higher on this scale.

The *identity problems* scale (current sample, $\alpha = .93$) is comprised of 16 items which evaluate anhedonia, pessimism, chronic feelings of emptiness, and labile self-image. Those with higher scores tend to feel empty and hopeless, accentuate the negative, and lack clarity about themselves. An example item is: “I often have moments when I feel very empty.”

The scale for *cognitive dysregulation* (current sample, $\alpha = .91$) consists of 16 items to measure the tendency for thoughts to become disorganized and confused when stressed and the tendency to experience dissociative behavior or mild paranoid thought. High scorers tend to have difficulty with logical thinking and problem solving when feeling anxious or distressed. An example item is: “I find it difficult to think clearly when I have a lot of problems.”

EMA stressful events—Selected items from the Daily Stress Inventory (DSI; Brantley, Waggoner, Jones, & Rappaport, 1987) and the Daily Experiences Survey (DES; Hokanson, Stader, Flynn, & Tate, 1992) were used to assess stressful events via EMA. The DSI is a 60-item measure of daily stressful events and has been shown to have good internal consistency (Brantley et al., 1987) and convergent validity (Brantley, Dietz, McKnight, Jones, & Tulley, 1988). The DES is a 60-item scale that measures daily experiences; it also has good internal consistency and concurrent validity (Stader & Hokanson, 1998). For the EMA protocol, a total of 35 items were included, of which 26 were extracted from the DSI, eight from the DES, and one additional item was developed based on its potential relevance for to BN (i.e., “Spent time alone”). Items were chosen on the basis of clinical and/or empirical relevance to women with BN and included by consensus between a group of eating disorder assessors, treatment providers, and the investigators. For more detail, please refer to Smyth and colleagues (2007). Consistent with our previous work (Goldschmidt et al., 2014; Smyth et al., 2009), we created three indices of stressful events: interpersonal ($\alpha = .77$; e.g., “argued with a spouse/lover”), work/environment ($\alpha = .79$; e.g., “didn’t accomplish what you had hoped”), and general daily hassles ($\alpha = .74$; e.g., “had difficulty in traffic”). Using a predetermined selection process, two independent raters assigned items to these scales ($\kappa = .78$). Discrepancies were resolved by consensus with the remaining authors.

During semi-random prompts and after the occurrence of bulimic behaviors, participants indicated the specific stressful events that had occurred since the last signal. They then rated how stressful they found each event on a 5-point scale, from (1) not at all to (5) very much. For the current paper, stressful events were defined as events with corresponding stress ratings of 3 or higher, reflecting moderate to severe stressfulness.

For *frequency of stressful events* (those rated as 3 or higher), we calculated an overall aggregate of the number of interpersonal, work/environment, and general daily hassle stressful events reported per week per participant, corrected for the number of reports each participant made. For *perceptions of stressful events* we calculated the average stress rating for each participant for each category of stressful event (identified as a rating of 3 or higher).

EMA negative affect—Participants completed an abbreviated version of the Positive and Negative Affect Schedule-Expanded Form (PANAS-X; Watson, Clark, & Tellegen, 1988; Watson & Clark, 1994) via EMA to measure momentary negative emotion. Participants rated 11 negative affect items (current study, $\alpha = 0.92$; afraid, lonely, irritable, ashamed, disgusted, nervous, dissatisfied with self, jittery, sad, distressed, angry with self) on a 5-point scale, from (1) not at all to (5) extremely for each emotional state.

EMA propensity for negative affect variability: We operationalized this propensity by calculating the mean square successive difference (MSSD) statistic for each participant's negative affect ratings across the two-week EMA protocol. This statistic reflects the degree of stability or instability across consecutive negative affect ratings, and was included as a covariate in the model testing the association between traits and emotional reactivity.

EMA emotional reactivity: We operationalized emotional reactivity by calculating an average change score in negative affect from Time 0 (time prior to stressful event) to Time 1 (time at which the previously experienced stressful event was reported) for each participant. Because emotional reactivity was defined as a response to stimuli, these two times points were selected to calculate the change score because they represented the levels of negative affect most proximal (i.e., preceding and following) to the stressful event. A change score was calculated for each type of stressful event: interpersonal, work/environmental, and general daily hassle. In total, three change scores (e.g., emotional reactivity variables) were created for each participant. Specifically, the change score was calculated as Time 1 negative affect – Time 0 negative affect; thus a positive value reflected an increase in negative affect following a stressful event (e.g., emotional reactivity).

Statistical Analyses

BPD traits and state stressful events—All analyses were conducted using SPSS 21.0. Pearson correlations were used to assess the associations between the four BPD traits (affective lability, insecure attachment, identity problems, and cognitive dysregulation) and (a) the frequency of each type of stressful event reported per week (interpersonal, work/environment, and general daily hassles) and (b) the mean perception (or rating) of each type of stressful event. This allowed us to test how each BPD trait was related to both the

frequency of different types of stressful events and the degree of stress perceived within different types of stressful events.

BPD traits and state emotional reactivity to stressful events—A series of four generalized linear models (GLM) were used to assess the associations between BPD traits and state emotional reactivity to (a) stressful interpersonal events, (b) stressful work/environmental events, and (c) stressful general daily hassle events. GLM methodology allowed us to model the repeated, within person responses captured by EMA. The independent variable in each analysis was one of the four BPD traits (affective lability, insecure attachment, identity problems, and cognitive dysregulation), and emotional reactivity (i.e., change in EMA negative affect) was the dependent variable. To be certain that we were testing for emotional reactivity specifically and not general emotional variability, we ran the model controlling for overall propensity to experience variability in negative affect. In doing so, we included a variable reflecting propensity for negative affect variability (i.e., the MSSD statistic across the entire EMA period) as a covariate in our model. All variables in the model were continuous. This model allowed us to test if there was an association between scores on a given BPD trait and change in negative affect following a specific type of stressful event (e.g., emotional reactivity), controlling for propensity for negative affective variability.

Results

Descriptive Information

Participants responded to an average of 86% of semi-random prompts, and 75% of participants responded to at least 83% of the prompts. The majority of semi-random prompt recordings (75%) were made within 20 minutes. Table 1 presents descriptive information about stressful events and Table 2 presents descriptive statistics for all study variables. Of note, all available data were used for analyses and missing data were not imputed.

BPD Traits and State Stressful Events

Frequency of stressful events—As shown in Table 3, all BPD traits (*affective lability*, *identity problems*, *insecure attachment*, and *cognitive dysregulation*) were significantly associated with greater frequency of stressful general daily hassles. *Affective lability* and *identity problems* also had a significant positive association with the other two types of stressful events: interpersonal and work/environmental.

Perception of stressful events—As displayed in Table 4, all four BPD traits (*affective lability*, *identity problems*, *insecure attachment*, and *cognitive dysregulation*) were significantly associated with perception of all three types of stressful events.¹

¹We also ran correlations between the full range of perceptions of events (ratings 1-5) and results were unchanged. We report the findings for perceptions of stressful events (ratings 3-5) for two reasons: (a) for continuity in the manuscript and (b) because we were most interested in stressful events, not events in general.

BPD Traits and State Emotional Reactivity to Stressful Events

We examined associations between the four BPD traits and EMA-based emotional reactivity to three different types of stressful events, controlling for the MSSD of negative affect. As anticipated, trait *insecure attachment* significantly predicted changes in negative affect from Time 0 to Time 1 (Wald Chi Square=9.32; $p = .002$). Specifically, higher insecure attachment ($b = .08$, $SE = .03$, 95% CI [.03, .14]) was associated with greater increases in negative emotion following interpersonal stressful events, reflecting greater emotional reactivity, even when controlling for the overall propensity to experience negative affect variability ($b = .001$, $SE = .01$, 95% CI [-.01, .02]). This model accounted for about 1.5% of the variance (pseudo-R-squared is .015). Trait insecure attachment did not significantly predict emotional reactivity to work/environmental or general daily hassle stressful events.

Contrary to expectations, trait *affective lability* did not significantly predict changes in negative affect from Time 0 to Time 1 following any type of stressful event, nor did *identity problems* or *cognitive dysregulation*.

Discussion

In this investigation of the associations between BPD traits with stressful events and emotional reactivity, we found that individual differences in BPD traits predicted the state experience of established triggers of bulimic behaviors among women with BN. Using a baseline assessment of BPD-related personality traits and naturalistic, state-based measures of stressful events and emotional reactivity (e.g., change in negative affect) to stressful events, results revealed that: (a) women with BN who score higher on certain BPD traits are more likely to experience a higher frequency of stressful events; (b) women with BN who score higher on any BPD traits tend to perceive stressful events as especially stressful; and (c) women with BN who score higher on the BPD trait of insecure attachment are more likely to react to interpersonal stressful events with greater negative affect. These findings highlight the importance of including individual difference variables, particularly those related to BPD, in state-based models of BN.

Using an approach combining traditional self-report of BPD traits and momentary, naturalistic assessment established triggers of bulimic behaviors (i.e., stress, negative affect), we found that BPD traits influence not only the frequency of stressful events experienced by individuals with BN, but also the degree of perceived stress associated with those events. These findings provide support for the person-environment theory in which one's disposition influences one's environment (Caspi, 1993; Caspi & Roberts, 2001). Contrary to expectations, it appears that individuals with BN who score higher on any of the four identified BPD traits are more likely to experience a greater frequency of stressful general daily hassles (e.g., unexpected expenses, traffic difficulties) and to experience those events as especially stressful. This may be due to increased sensitivity to recognizing stressors as a result of emotional vulnerability or perhaps underlying problems with impulsivity or recklessness (which are characteristics of BPD: APA, 2013) that predispose individuals with these traits to put themselves in more stressful situations. Further research is needed to determine potential uni- and bidirectional mechanisms of this relationship.

Mostly consistent with expectations, women with BN who scored higher on the BPD traits of affective lability (e.g., unstable affect, reactive) or identity problems (e.g., pessimistic, anhedonic) tended to report more interpersonal and work/environmental stressful events. These two traits are more affectively-oriented than the other two BPD traits. As such, individuals with BN who display elevations on these traits appear to experience more stressful events in various situations, which in turn prompts more emotion dysregulation, thereby perpetuating a cycle between traits and environmental influences. Taking the current findings into account, it may be the case that individuals with BN who score higher on affective lability or identity problems are at particular risk for experiencing interpersonal (or work/environmental) problems given that they experience these events more frequently and report them as particularly stressful.

Despite the lack of a significant association between trait insecure attachment and frequency of stressful interpersonal problems that was anticipated, there was a significant, though modest, association between insecure attachment and emotional reactivity following a stressful interpersonal event (consistent with expectations). These findings suggest that the trait of insecure attachment may be most salient to how individuals with BN respond to interpersonal stressors, rather than influencing the actual occurrence of interpersonal stressors. Specifically, it may be that the fear of abandonment and rejection experienced by those higher in trait insecure attachment does not predispose such individuals to engaging in behaviors that result in more frequent interpersonal stressors. However, when these individuals do experience a stressful interpersonal event, they react strongly with an increase in negative affect. Thus, their insecure attachment may be reinforced: they experience a stressful interpersonal event and they react with an increase in negative affect, which may then impact their relationship and perpetuate the belief that others will abandon them. In order to better understand this relationship, future studies should examine the association between trait insecure attachment and avoidance of conflict in relationships. Surprisingly, we did not find that trait affective lability significantly predicted state emotional reactivity to stressful events. It may be the case that individuals high in this trait react more immediately than the time captured by the current study (around two to three hours).

The current findings are also relevant to consider in the context of previous theoretical and empirical research. For instance, the roles of interpersonal factors and negative affect in relation to bulimic symptoms have been highlighted in theoretical models (e.g., the interpersonal model of binge eating; Wilfley, MacKenzie, Welch, Ayres, & Weissman, 2000; Ansell, Grilo, & White, 2012) and empirical research (e.g., Lunn, Poulsen, & Daniel, 2012; Mason et al., 2016). Of particular note, EMA findings indicate that changes in negative affect mediate the relationship between interpersonal stressful events and BN behaviors (Goldschmidt et al., 2014). Taken together with these prior findings, the current results suggest that the mechanism underlying the occurrence of bulimic behaviors following interpersonal stressful events may be particularly applicable to individuals who score higher on the BPD trait of insecure attachment versus those who score higher on other BPD-related traits. That is, emotional reactivity to an interpersonal stressful event may be a more salient trigger for BN behavior among those high on insecure attachment, whereas the frequency of stressful interpersonal or work/environmental events may be a more relevant trigger for

those individuals with BN who score higher on affective lability and/or identity problems. Future studies are needed to more fully explore these relationships.

Although this study has the particular strength of investigating trait and state associations using a multi-method approach to assessment, the findings should be understood in the context of the study's limitations. First, we could not assess the mechanisms by which personality is associated with stressful events or emotional reactivity to stressful events; thus, we do not know the process by which insecure attachment may put one at risk to be emotionally reactive. Second and relatedly, effects in the current study were small to moderate in size, potentially limiting the clinical significance of the findings. Therefore the present results should not be over-interpreted. Additional research in this area is needed to more fully understand the relationship between the BPD traits of insecure attachment and emotional reactivity to an interpersonal stressful event in those with BN. Third, it is possible that carrying the handheld device and making frequent recordings may have impacted participants' appraisal of stressful events and negative affect. However, evidence from other eating disorder EMA studies suggests that recordings are not reactive to the EMA methodology (Stein & Corte, 2003). Fourth, while the use of EMA in this study allowed for an ecologically valid examination of changes in negative affect surrounding a stressful event, the study design precluded the ability to establish that the negative affect changes were directly caused by the stressful events, in part because we do not know when the stressful event occurred within the 2-3 hours between recordings. Fifth, data collected in this study were based entirely on self-report via EMA. Future research which includes ambulatory psychophysiological assessment with EMA, as well as neuroimaging techniques, would be useful to understand the relationships of stress, affect, and bulimic behavior. Sixth, we did not assess the impact of the trait and state associations examined in this study on the subsequent occurrence of bulimic behavior, which we believe is an important future avenue for research. Finally, it is possible that state effects (especially mood) may have impacted the baseline reports of personality traits (Vitousek & Manke, 1994).

In conclusion, this study is the first, to our knowledge, to use EMA with women with BN to elucidate the relationship between BPD traits and state precipitants of bulimic behavior, including stressful events and emotional lability. The current results help broaden our understanding of BPD personality traits in BN, suggesting that they play an important role in the frequency of stressors experienced, perception of those stressors, and in the case of the trait of insecure attachment, emotional reactivity to those stressors. These findings may also help inform treatment selection for a subset of individuals with BN. For example, those individuals with BN who score higher on trait affective lability or identity problems may benefit from interventions that include a focus on reducing the frequency of stressful events. Additionally, those who are higher on trait insecure attachment may benefit from interventions that focus on addressing stressful events, maladaptive emotional responding, and difficulties in interpersonal functioning, such as Integrative Cognitive-Affective Therapy for BN (ICAT: Wonderlich, Peterson, & Smith, 2015), Dialectical Behavior Therapy (DBT: Safer et al., 2009), or Interpersonal Therapy (IPT: Wilfley et al., 2000).

Acknowledgments

This work was supported by National Institute of Health Grants R01-MH59674, P30-DK50456, and T32-MH-082761.

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Summary

This study suggests that examining BPD-related personality traits including insecure attachment, affective lability, cognitive dysregulation, and identity problems, may be especially useful in understanding the state experiences of stressful events and emotional reactivity in BN.

Table 1
Descriptive Information for EMA Stressful Events (n=133)

	Interpersonal Stressful Event	Work/Environment Stressful Event	General Daily Hassle Stressful Event
Mean (SD) Frequency of Event over 7 days	9.50 (7.40)	9.59 (7.98)	7.12 (5.82)
Mean Perception/Rating of Stressful Event	3.86 (.47)	3.92 (.46)	3.64 (.42)
% Stressful Event Endorsed of all EMA recordings	20.4%	20.7%	15.4%
Mean (SD) time in hours between recordings at T0 and T1	2.63 (1.60)	3.01 (1.94)	2.72 (1.44)

Note: Stressful event is operationalized as a rating of 3 or higher (on scale 1-5). T0 (Time 0) is the most proximal recording prior to the stressful event to T1 (Time 1), which is the most proximal recording following the occurrence of the stressful event.

Table 2
Descriptive Information for Emotional Reactivity to Stressful Events and BPD Traits
(n=133)

	Change in NA - IPS	Change in NA - WES	Change in NA - GDH	Aff. Lab.	Insecure Att.	Identity Prob.	Cog. Dysreg.	MSSD of NA
Mean	2.02	1.43	1.21	55.41	55.02	59.44	54.67	48.83
Standard Deviation	3.04	3.28	3.78	9.03	9.83	9.03	9.04	35.90
Minimum to Maximum	-8.50 to 16.50	-5.50 to 22.00	-5.28 to 25.00	33 to 75	32 to 75	33 to 75	32 to 75	2.77 to 165.89

Note: Variables are abbreviated as follows: NA = negative affect; IPS = interpersonal stressful event; WES = work/environment stressful event; GDH = general daily hassle stressful event; Aff. Lab. = affective lability; Insecure Attach. = insecure attachment; Identity Prob. = identity problems; Cog. Dysreg. = cognitive dysregulation; MSSD = mean square of successive differences. The average change in negative affect from time 0 (T0; most proximal negative affect rating prior to the stressful event) to time 1 (T1; most proximal negative affect rating following the occurrence of the stressful event) was calculated by subtracting T0 negative affect scores from T1 negative affect scores; positive change scores reflect a worsening of negative affect (greater negative affect) from T0 to T1.

Table 3
Pearson Correlations between BPD Traits and Frequency of Stressful Events (n=133)

	Affective Lability	Insecure Attachment	Identity Problems	Cognitive Dysregulation
IPS Frequency	.26**	.14	.38**	.16
WES Frequency	.23**	-.01	.32**	.16
GDH Frequency	.33**	.21*	.32**	.22*

Note: IPS = interpersonal stressful event; WES = work/environment stressful event; GDH = general daily hassle stressful event.

Stressful events are operationalized as ratings of 3 or higher (scale 1-5).

*
 $p < .05$,

**
 $p < .01$.

Table 4
Pearson Correlations between BPD Traits and Perception of Stressful Events (n=133)

	Affective Lability	Insecure Attachment	Identity Problems	Cognitive Dysregulation
Perception of IPS	.34 **	.32 **	.38 **	.27 **
Perception of WES	.27 **	.18 *	.35 **	.25 **
Perception of GDH	.32 **	.25 **	.39 **	.28 **

Note: IPS = interpersonal stressful event; WES = work/environment stressful event; GDH = general daily hassle stressful event.

Stressful events are operationalized as ratings of 3 or higher (scale 1-5).

*
 $p < .05$,

**
 $p < .01$.