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Interpersonal problems and negative affect in Borderline Personality and Depressive Disorders in daily life

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Abstract

Theories of Borderline Personality Disorder (BPD) suggest that interpersonal problems in BPD act as triggers for negative affect and, at the same time, are a possible result of affective dysregulation. Therefore, we assessed the relations between momentary negative affect (hostility, sadness, fear) and interpersonal problems (rejection, disagreement) in a sample of 80 BPD and 51 depressed outpatients at 6 time-points over 28 days. Data were analyzed using multivariate multi-level modeling to separate momentary-, day-, and person-level effects. Results revealed a mutually reinforcing relationship between disagreement and hostility, rejection and hostility, and between rejection and sadness in both groups, at the momentary and day level. The mutual reinforcement between hostility and rejection/disagreement was significantly stronger in the BPD group. Moreover, the link between rejection and sadness was present at all three levels of analysis for the BPD group, while it was localized to the momentary level in the depressed group.

Keywords

Borderline Personality Disorder; Depression; interpersonal problems; negative affect; ambulatory assessment

Introduction

Borderline Personality Disorder (BPD) is a severe mental disorder that affects approximately 1% to 3% of the adult population (Tomko, Trull, Wood, & Sher, 2013; Torgersen, Kringlen, & Cramer, 2001). BPD is characterized by the core symptoms of impulsivity, interpersonal instability, and affective instability (e.g., Clarkin, Hull, & Hurt, 1993; Gunderson, 2007; Sanislow et al., 2002). According to Linehan's biosocial theory, affective instability in BPD is the result of a heightened dispositional sensitivity to emotions that increases individuals'

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propensity to experience negative affect (Crowell, Beauchaine, & Linehan, 2009; Linehan, 1993). Additionally, poorly regulated high levels of negative affect are proposed to underlie many of the problem behaviors observed in those with BPD (e.g., Bateman & Fonagy, 2004; Levy et al., 2006; Linehan, 1993; Putnam & Silk, 2005). Carpenter and Trull (2013) summarize this process in a multi-component model of emotion dysregulation in BPD, and they stress that it is the *combination* of BPD patients' heightened emotional sensitivity with the acute experience of negatively valenced environmental stimuli (or interpreting stimuli in a negative way) that leads to an increase in and instability of negative affect.

To date, little research has explored the nature of the environmental stimuli that lead to increases in negative affect in BPD (see Houben et al., 2016; Santangelo et al., 2014). Knowing more about the nature of these stimuli would benefit treatment approaches by making it easier to predict and target affective changes. In the current study, we focused on negative interpersonal events as potential predictors of increases in negative affect. In general, negative interpersonal events are thought to pose threats to social bonds, which, in turn, generate negative affect (Baumeister & Leary, 1995). Interpersonal problems are a key symptom of BPD (American Psychiatric Association, 2013; Trull, Tomko, Brown, & Scheiderer, 2010), and such events occur frequently in those with the disorder (e.g., Hilsenroth, Menaker, Peters, & Pincus, 2007; Hochschild Tolpin, Cimbolic Gunthert, Cohen, & O'neill, 2004; Russell, Moskowitz, Zuroff, Sookman, & Paris, 2007; Stepp, Hallquist, Morse, & Pilkonis, 2011; Zeigler–Hill & Abraham, 2006).

In addition to negative interpersonal events serving as predictors of heightened negative affect, models of emotion dysregulation in BPD also implicate the opposite process: Heightened negative affect may, by way of increasing emotion sensitivity, increase the likelihood of experiencing negative interpersonal events. This may occur as a result of heightened vigilance for negatively valenced stimuli in the environment, which are then observed more frequently. Negative affect may also influence an interaction partner's behavior and potentially lead to an increase in negative behavior from them (see Ekman, 1993; Keltner & Kring, 1998; Parkinson, 1996; Van Kleef, 2009). Similar ideas have been discussed by Law, Fleeson, Arnold, and Furr (2015), who suggested that the symptoms of BPD (such as interpersonal problems) can cause dysregulated affect and at the same time dysregulated affect can instigate the occurrence of other BPD symptoms. Using rejection as an example of a negative interpersonal event, Pietrzak, Downey, and Ayduk (2005) as well as Rosenbach and Renneberg (2015) discuss that feelings of rejection can be the result of a hyper-vigilance in social interactions, and that negative affect in response to perceived rejection can lead to actual rejection from others, perpetuating the cycle (Downey, Freitas, Michaelis, & Khouri, 1998).

To assess whether a mutually reinforcing relationship between negative affect and interpersonal problems exists, we collected data using ecological momentary assessment (EMA), a means of obtaining data in real-life and real-time via devices that prompt participants to provide self-report responses in daily life (e.g., Trull & Ebner-Priemer, 2013). EMA has been successfully used to identify both affective instability and momentary interpersonal problems in BPD samples (e.g., Coifman, Berenson, Rafaeli, & Downey, 2012; Ebner-Priemer et al., 2007; Gadassi, Snir, Berenson, Downey, & Rafaeli, 2014; Santangelo

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et al., 2014; Trull et al., 2008). Here, we focused on two specific types of negative interpersonal events: rejection and disagreement. We focused specifically on rejection and disagreement because we wanted to assess BPD-relevant events that we expected to occur relatively frequently in the daily lives of BPD individuals, so as to increase the probability of observing a sufficient number of events of interest during the assessment period of the current study (see Carpenter, Wycoff, & Trull, 2016).

Research suggests that BPD patients are strongly characterized by rejection and abandonment-related beliefs (e.g., Butler, Brown, Beck, & Grisham, 2002; Jovev & Jackson, 2004; Specht, Chapman, & Cellucci, 2009), and numerous studies show that BPD patients are particularly sensitive towards rejection (e.g., Berenson, Downey, Rafaeli, Coifman, & Paquin, 2011; Staebler, Helbing, Rosenbach, & Renneberg, 2011). Most importantly, beliefs about rejection differentiate BPD patients from patients with other personality disorders (Arntz, Dreessen, Schouten, & Weertman, 2004). Previous work has shown a positive relationship between rejection and negative affect, particularly hostility, both broadly (for reviews, see Gerber & Wheeler, 2009; Romero-Canyas, Downey, Berenson, Ayduk, & Kang, 2010) and in BPD participants in particular. For example, compared to non-BPD comparisons, BPD participants and participants high in BPD features reported increased negative affect (Dixon-Gordon, Chapman, Lovasz, & Walters, 2011; Dixon-Gordon, Gratz, Breetz, & Tull, 2013) and hostility (Beeney, Levy, Gatzke-Kopp, & Hallquist, 2014; Chapman, Dixon-Gordon, Butler, & Walters, 2015; Chapman, Walters, & Gordon, 2014; Renneberg et al., 2012) following experimentally induced rejection. Similar findings have been observed using EMA methods: BPD participants reported higher levels of negative affect than healthy controls following two different rejection cues, an interaction partner whom they perceived as acting in a cold-quarrelsome (Sadikaj, Moskowitz, Russell, Zuroff, & Paris, 2013) or a non-communal (Sadikaj, Russell, Moskowitz, & Paris, 2010) way. Momentary rejection also predicted increases in aversive tension (Stiglmayr et al., 2005), affective instability, and intense anger (Miskewicz et al., 2015) in BPD, and was associated more strongly with rage in BPD participants compared to healthy controls (Berenson et al., 2011). Hence, there is evidence that rejection serves as a stimulus that increases negative affect in BPD. However, to our knowledge, no previous work has examined whether high levels of negative affect also increase the likelihood of reporting rejection.

The second event we assessed was disagreement, a prototypical negative interpersonal event and important marker of relationship functioning (e.g., Fincham & Beach, 1999; Pasch & Bradbury, 1998). The way interpersonal disagreement is resolved appears to be critical for the development and maintenance of relationships (Laursen & Hafen, 2010; Zacchilli, Hendrick, & Hendrick, 2009), processes which are impaired in BPD (APA, 2013). Previous studies have not assessed the relationship between disagreement and negative affect in a BPD sample, though a number of studies using non-clinical samples have examined this. Daily diary studies of romantic couples have found a positive association of relationship conflict with daily negative affect (Ogolsky & Gray, 2015), anger (Kennedy, Bolger, & Shrout, 2002), and anxiety (Laurenceau, Troy, & Carver, 2005). Furthermore, disagreements with a spouse or other adults were positively associated with same day negative affect (Bolger & Schilling, 1991) and with next day anger and depression (Bolger & Zuckerman, 1995), the latter only for participants high in Neuroticism, a trait common in those with BPD

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(Samuel & Widiger, 2008). Thus, while studies of non-clinical samples suggest a link between daily disagreement and negative affect, studies assessing conflict in BPD samples are lacking at this point.

The present study

Previous research supports the idea that rejection and disagreement serve as environmental stimuli that increase negative affect in BPD, as described in models of emotion dysregulation for BPD (see Carpenter & Trull, 2013; Crowell et al., 2009; Linehan, 1993) and discussed by Law et al. (2015) and Miskewicz et al. (2015). However, this relationship has not been tested in the daily lives of patients. Furthermore, it remains unclear whether negative affect in turn also increases the probability of experiencing negative interpersonal events (see Law et al., 2015; Pietrzak et al., 2005; Rosenbach & Renneberg, 2015). To address these two questions, we measured the associations of rejection and disagreement and three types of negative affect – hostility, sadness, and fear – at the momentary level, using EMA. These three specific negative affects are mentioned in the diagnostic criteria for BPD (APA, 2013). We compared BPD participants to a clinical comparison group of individuals with current depressive disorder (DD) in order to assess whether observed effects are specific to BPD. Like patients suffering from BPD, those with depression show high levels of rejection sensitivity (e.g., Gilbert, Irons, Olsen, Gilbert, & McEwan, 2006), negative affect (aan het Rot, Hogenelst, & Schoevers, 2012; Ebner-Priemer & Trull, 2009), and interpersonal problems (Hammen & Brennan, 2002). Thus, this comparison group allowed for an evaluation of the relative impact on daily life of symptoms theorized to be central to BPD but also implicated in psychopathology more broadly.

We formulated our hypotheses based on evidence suggesting a positive relationship between interpersonal problems and negative affect in BPD (e.g. Beeney et al., 2014; Berenson et al., 2011; Chapman et al., 2015; Chapman et al., 2014; Dixon-Gordon et al., 2011; Dixon-Gordon et al., 2013; Sadikaj et al., 2013; Sadikaj et al., 2010; Stiglmayr et al., 2005). Based on this work we expected negative affect overall (i.e., hostility, sadness, and fear) to be higher on occasions where BPD participants endorsed rejection or disagreement than on those where they did not. We expected this general pattern to hold in the DD group as well, but hypothesized stronger associations in the BPD than the DD group, because BPD is characterized by heightened emotional reactivity to external stimuli (Carpenter & Trull, 2013; Crowell et al., 2009; Linehan, 1993), whereas DD is characterized more by affective inertia, a resistance to affective change that may be reflected by a lower affective reactivity to the interpersonal stimuli we assess in this study (e.g., Koval, Pe, Meers, & Kuppens, 2013; Kuppens, Allen, & Sheeber, 2010).

Looking at the specific types of negative affect included, the case for stronger effects for hostility in the BPD group is especially compelling due to a number of previous studies showing increased hostility following experimentally induced rejection (Beeney, Levy, Gatzke-Kopp, & Hallquist, 2014; Chapman, Dixon-Gordon, Butler, & Walters, 2015; Chapman et al., 2014; Renneberg et al., 2012) and momentary rejection (Berenson et al., 2011) in BPD patients and individuals high in borderline features. Additionally, the DSM describes the experience of intense anger as a defining feature of BPD (APA, 2013) and

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previous studies have found hostility/anger to be highly unstable in BPD (Henry et al., 2001; Koenigsberg et al., 2002; Trull et al., 2008), suggesting that BPD individuals may be prone to react to negative external stimuli with hostility, above and beyond any effects of sadness and fear.

Additionally, we hypothesized that heightened negative affect would increase the probability of experiencing negative interpersonal events (see Law et al., 2015; Pietrzak et al., 2005; Rosenbach & Renneberg, 2015). That is, occasions with high negative affect, versus occasions with reported low negative affect, should be more likely to also feature rejection/disagreement. Because BPD patients were theorized to show high levels of emotion sensitivity (Carpenter & Trull, 2013; Crowell et al., 2009; Linehan, 1993) and to be prone to interpret interpersonal stimuli as negative (Daros, Zakzanis, & Ruocco, 2013; Domes, Schulze, & Herpertz, 2009; Lazarus, Cheavens, Festa, & Rosenthal, 2014; Mitchell, Dickens, & Picchioni, 2014), we expected them to report more negative affect in the context of negative interpersonal events than DD participants overall. Given the description of anger in BPD as being intense and hard to control, we again emphasize our expectation of stronger effects for hostility (above and beyond sadness and fear) in the BPD than the DD group.

Method

Participants

Participants between the age of 18 and 65 were recruited from local psychiatric outpatient clinics serving the community in Columbia, Missouri, USA, for a study examining affective instability in BPD (Hepp, Carpenter, Lane, & Trull, in press; Jahng et al., 2011; Jahng, Wood, & Trull, 2008; Solhan, Trull, Jahng, & Wood, 2009; Tomko et al., 2015; Tomko et al., 2014; Trull et al., 2008)[1]. Table S1 in the supplementary material provides further detail regarding the ethnicity, marital status, and annual income of participants in this sample. Structured diagnostic interviewing was conducted by advanced clinical psychology graduate students that underwent intensive training from the last author. All diagnostic interviews were audio recorded. A second interviewer listened to these recordings and made independent ratings for a subset of 20 participants. The diagnostic interrater reliability was high regarding diagnosis of BPD (κ = .90) and diagnosis of a current depressive disorder (κ = 1.00). General exclusion criteria were the presence of a psychotic disorder, history of severe head trauma or neurological dysfunction, intellectual disability, or severe substance dependence.

A total of 131 participants completed the EMA component of the study. Of these, 80 participants fulfilled the DSM-IV-TR criteria for BPD and 51 fulfilled the criteria for current major depressive disorder and/or dysthymia (DD) according to the Structured Clinical

[1]There are a number of previous publications on this dataset, which are devoted to affective instability (Jahng, Wood, & Trull, 2008; Solhan, Trull, Jahng, & Wood, 2009; Trull et al., 2008), linking affect and alcohol use (Jahng et al., 2011), momentary impulsivity (Tomko et al., 2015; Tomko et al., 2014), the comorbidity between BPD and PTSD (Scheiderer, Wang, Tomko, Wood, & Trull, 2016), and person/situation interactions in predicting momentary BPD symptoms (Hepp, Carpenter, Lane, & Trull, in press). Only one previous publication using this sample included the interpersonal problem variables (Hepp et al., in press), linking these to the personality dimensions of the Five Factor Model and the situational variable close social contact. There is no overlap between the analyses we report in Hepp et al. (in press) and in the present paper. The other published articles using this dataset did not include the interpersonal variables; therefore the analyses we report herein are entirely novel.

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Interview for DSM–IV Axis I Disorders (SCID-I, First, Spitzer, Gibbon, & Williams, 1995) and the Structured Interview for DSM–IV Personality (SIDP-IV, Pfohl, Blum, & Zimmerman, 1994). In the BPD group, 50 individuals (62.5%) met criteria for a current comorbid mood disorder. Specifically, 25 individuals (31.3%) endorsed current major depression, 14 (17.5%) current dysthymia, and 18 (25%) current bipolar disorder. Within the DD group, 20 (39.2%) participants fulfilled criteria for a comorbid personality disorder other than BPD. In the BPD group, 74 participants (92.5%) met criteria for a comorbid personality disorder. Table S2 in the supplementary material provides further details on comorbid conditions for both groups.

Procedure and Measures

Participants carried a palm pilot (Palm Zire 31® handheld computer) for approximately 28 days, which prompted them, via audible alarm, to respond to a set of items assessing their current affect and behavior at six time-points throughout the day. Prompts were spaced across the day by dividing participants' typical waking hours into six equal intervals and then randomly selecting, each day, a time within each interval (see Trull et al., 2008 for more detail). At the beginning of the study, participants were instructed on the use of the palm pilot and completed a number of self-report trait measures not pertinent to the current investigation. The compliance in this sample was high, with an average completion rate of 86.0% of random prompts, and an average of 147.1 completed prompts per person.

Momentary affect assessment—At each occasion, momentary affect was assessed using items from the Positive and Negative Affect Schedule-Extended version (PANAS-X, Watson & Clark, 1999)[2]. Of interest to this study were the hostility scale (6 items), the fear scale (6 items), and the sadness scale (5 items), negative affects implicated in the description of BPD affective instability (APA, 2013). Participants were instructed to rate the extent to which they had experienced a particular affective state since the last prompt on a five point Likert scale (1 = very slightly or not at all, to 5 = extremely; see Tables 1 and 2 for person-level descriptive statistics for the whole sample and split by both groups).

Interpersonal events—At each occasion, participants answered whether, since the last prompt, they had felt rejected by their romantic partner, boss, co-worker, roommate, friend, parent, sibling, child, or any other family member. Participants were further asked whether they had had a disagreement with any of these interaction partners since the last prompt. All rejection and disagreement events, respectively, were aggregated into a single dichotomous variable (yes/no for both interpersonal categories). These variables thus indicated whether *any* rejection or *any* disagreement had taken place since the last prompt (see Table S3 in Supplementary Material for overall endorsement rates, as well as broken down by target).

[2]Reliability estimates were calculated for both between-person differences in negative affect levels and within-person changes in negative affect levels across occasions (Shrout & Lane, 2012) and indicated excellent between-person (R_{KRN}'s > .99) and very good within-person (R_{CN}'s > .84) reliability across all three negative affects (hostility, fear, sadness).

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Data analysis

To assess the effects of momentary interpersonal problems on momentary affect, we employed a linear multivariate multi-level model (MMLM) with the three dependent variables momentary hostility, sadness, and fear[3]. We modelled random intercepts for each person and day. Momentary rejection and disagreement (level 1 predictors, centered on the day mean), daily rejection and disagreement averages (level 2 predictors, centered on the person mean), and the rejection and disagreement person averages (level 3 predictors, centered on the grand mean) were entered as predictors. In addition to the main effects for rejection and disagreement, the model included a main effect of group (level 3 predictor, dummy-coded for BPD vs. DD) and the interactions of group with momentary, daily, and person average rejection and disagreement. The model further included main effects for the covariates weekday, weekend (5PM Friday through 5PM Sunday), study day, and time elapsed since the participant awoke (centered on noon).

To model momentary negative affect predicting interpersonal problems, we employed a logistic MMLM with a logit link function, also including random intercepts for each person and day. Here, we used the binary dependent variables momentary rejection and disagreement. Momentary hostility, sadness, and fear (level 1 predictors, centered on the day mean), daily average hostility, sadness, and fear (level 2 predictors, centered on the person mean), as well as person average hostility, sadness, and fear (level 3 predictors, centered on the grand mean) were entered as predictors. The model further included a main effect of group (level 3 predictor, dummy-coded for BPD vs. DD), and its interaction with all of the affect variables. Lastly, we again adjusted for the effects of the covariates weekday, weekend, study day, and time elapsed since the participant awoke. Analyses were performed in R (R Core Team, 2014) using the **lmer** and **glmer** functions from the package **lme4** (Bates, Maechler, Bolker, & Walker, 2014). Significance tests were conducted using the package **lmerTest** (Kuznetsova, Brockhoff, & Christensen, 2014).

Results

Means, standard deviations and mean ranges for hostility, sadness, and fear and interpersonal problems are presented in Table 1, and the pairwise correlations for these variables at the momentary level are presented in Table 2, separately by group.

Interpersonal problems predicting negative affect

Results for the MMLM using momentary, daily, and person average rejection and disagreement, as well as group and the two-way interaction terms to predict momentary hostility, sadness, and fear are presented in Table 3. The table presents the results dependent on whether BPD or DD was coded as the reference category of the group predictor variable. In the BPD column, the main effects of all other predictors are interpreted for the BPD group, and those in the DD column are interpreted for the DD group. We obtained these

[3]The multivariate analyses allow assessing the unique aspects of hostility vs. sadness vs. fear as well as rejection vs. disagreement, beyond the variance they share as negative affects/ interpersonal problems, and allocate the shared variance to individual differences, daily, and momentary processes. While the negative affects and interpersonal problems are, indeed, robustly correlated (see Table 2), the correlations still afford considerable unique variance to the constructs.

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values by running the analysis twice, once using the BPD group as the reference category of the group predictor variable and once coding DD as the reference.[4] Importantly, since the momentary, daily, and person level manifestations of rejection and disagreement were included in the same model, all significant effects are above and beyond the effects of all other predictors.

At the momentary level, rejection and disagreement had significant positive effects on hostility, sadness, and fear in both groups (see Table 3). A significant interaction between group and momentary disagreement implied stronger effects of disagreement in the BPD than the DD group when predicting momentary hostility: *Est* = 0.06, *SE* = 0.03, *p* = .022.

At the day level, rejection had significant positive effects on all dependent variables in both groups. A significant interaction between group and daily rejection indicated that the positive effect of daily rejection on momentary sadness was significantly stronger in the BPD than in the DD group (*Est* = 0.35, *SE* = 0.10, *p* <.001), as was the interaction effect on momentary hostility (*Est* = 0.16, *SE* = 0.08, *p* = .050). Moreover, daily disagreement predicted hostility and fear in both groups and interacted with group when predicting hostility, indicating stronger effects of disagreement in the BPD group: *Est* = 0.20, *SE* = 0.10, *p* = .041. When predicting sadness, the main effect for daily disagreement was significant only in the DD group (the interaction between group and daily disagreement was, however, not significant: *Est* = −0.12, *SE* = 0.12, *p* = .301).

At the person level, rejection had significant positive effects on momentary hostility, sadness, and fear in both groups, whereas disagreement had no significant effects on any of the dependent variables in either group. Lastly, group did not have a significant main effect on reported levels of hostility (*Est.* = 0.08, *SE* = 0.08, *p* = .348), sadness (*Est.* = −0.17, *SE* = 0.12, *p* = .164), or fear (*Est.* = −0.03, *SE* = 0.10, *p* = .771).

Negative affect predicting interpersonal problems

The results of the logistic MMLM in which rejection and disagreement were predicted by momentary, daily, and person average hostility, sadness, and fear, as well as group, and their two-way interactions are presented in Table 4 separately by group.

At the momentary level, hostility had significant positive effects (i.e. odds ratios greater than 1.00) on rejection and disagreement in both groups. Momentary sadness showed a positive effect on rejection (but not disagreement) in both groups. Momentary fear did not predict rejection in either group but had a significant positive effect on disagreement in the DD group (but not the BPD group), reflected by a significant interaction between momentary fear and group: *OR* =0.67, *95% CI* = [0.48; 0.93], *SE* = 0.17, *p* = .016.

At the day level, hostility showed significant positive effects on rejection and disagreement in both groups. Hostility interacted with group when predicting disagreement, indicating that the observed effect was stronger in the BPD group: *OR* = 1.69, *95% CI* = [1.13; 2.54], *SE* =

[4]Note that these are equivalent models and served only to estimate individual group main effects. Interaction effects in each model are sign complements of one another. Interaction effects and main effects for group that are presented in the text are reported for the model using the DD group as the reference category.

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0.21, $p = .012$. Daily sadness significantly predicted momentary rejection in the BPD group only, which was reflected by a significant interaction between daily sadness and group: *OR* = 1.75, *95% CI* = [1.21; 2.54], *SE* = 0.19, $p = .002$. Daily fear showed significant negative effects on momentary rejection and on momentary disagreement in the BPD group, meaning that greater fear was associated with a *lower* probability of rejection and disagreement in this group. In the DD group, in contrast, the effects of fear were positive for both rejection and disagreement, such that greater fear entailed a *higher* probability of rejection and disagreement. The different directions that the main effect of fear showed in the two groups was reflected by significant interactions between daily fear and group, both when predicting rejection (*OR* = 0.37, *95% CI* = [0.23; 0.61], *SE* = 0.25, $p < .001$) and when predicting disagreement (*OR* = 0.50, *95% CI* = [0.32; 0.80], *SE* = 0.24, $p = .004$).

At the person level, only sadness had a significant (and positive) effect on momentary rejection, and this effect was present only in the BPD group (the interaction between person level sadness and group was, however, not significant: *OR* = 1.85, *95% CI* = [0.63; 5.45], *SE* = 0.54, $p = .236$). Lastly, group did not have a significant main effect on either rejection (*OR* = 1.34, *95% CI* = [0.78; 2.30], *SE* = 0.27, $p = .280$) or disagreement (*OR* = 1.11, *95% CI* = [0.70; 1.76], *SE* = 0.24, $p = .731$).

Discussion

This study was the first to assess the link between interpersonal problems and different types of negative affect in the daily lives of BPD participants. Importantly, by testing hostility, sadness, and fear within the same model and, thus, taking into account covariation between different negative affects, we were able to demonstrate effects of each affect above and beyond the influence of the other negative affects. Furthermore, by including the momentary scores, day averages, and person averages of all predictors, we were able to separate the different levels of influence. The same applied to the analyses using rejection and disagreement as simultaneous predictors. Moreover, by following a multivariate approach we further accounted for the fact that the dependent variables in each model were correlated to some extent (see footnote 3). By including the depressed comparison group, we were able to examine the specificity of effects to BPD. We first summarize and interpret the effects that were present across groups and then highlight associations where the two groups differed significantly.

Across groups, momentary, as well as daily, rejection and disagreement both had positive effects on concurrent hostility, sadness, and fear (except that daily disagreement did not predict sadness). That is, at occasions/on days where participants endorsed rejection or disagreement, hostility, sadness, and fear were higher than at occasions/on days where these interpersonal problems were not endorsed. Note that the effects of rejection were present above and beyond the effects of disagreement (and vice versa) and above all included adjustment variables. These findings support the hypothesis that negative interpersonal events are stimuli that increase negative affect in BPD (see Carpenter & Trull, 2013; Crowell et al., 2009; Law et al., 2015; Linehan, 1993; Miskewicz et al., 2015), as well as in depressive disorders. They further replicate previous findings on rejection as a predictor for hostility in BPD (Beeney et al., 2014; Berenson et al., 2011; Chapman et al., 2015; Chapman

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et al., 2014; Renneberg et al., 2012) and augment them by providing similar findings for sadness and fear.

In a second analysis we used momentary hostility, sadness, and fear to predict momentary rejection and disagreement, reasoning that heightened negative affect can increase the probability of endorsing negative interpersonal events (see Carpenter & Trull, 2013; Law et al., 2015; Pietrzak et al., 2005; Rosenbach & Renneberg, 2015). In both groups, momentary sadness was a significant predictor for rejection. It is important to note that the rejection score reflects participants' subjective self-report of whether they *felt* that a rejection took place or not. It is therefore possible that the observed positive relationship reflects that increased sadness resulted in a state of heightened vigilance towards rejection cues, making participants more prone to report feeling rejection. From a social-functional perspective, sadness signals to other individuals that the individual is hurt, which typically has the function of eliciting comforting behavior from others (e.g., Vingerhoets, Cornelius, Van Heck, & Becht, 2000). However, the absence (or under-fulfilment) of such complementary behavior in the interaction partner could account for an increased feeling of rejection. In contrast to rejection, disagreement was not predicted by momentary, daily, or person level sadness. It is possible that sadness entails such a low level of arousal that – beyond the effects of hostility and fear – it showed no association with disagreement.

Hostility in the moment and daily hostility had positive effects on both rejection and disagreement across groups. In addition to increasing vigilance to rejection and disagreement cues, hostility has the function to signal dominance, in order to make others concede, allowing the individual to re-establish their status and power (Van Beest, Van Kleef, & Van Dijk, 2008). Moreover, on a behavioral level, hostility is associated with approach behaviors such as aggression (Coan & Allen, 2004). It seems likely that the display of hostility or aggression can increase disagreement with others, either through the angry individual instigating disagreement or through negative reactions of the opponent. In previous work from non-clinical samples, individuals faced with an angry opponent showed increased levels of anger (Friedman et al., 2004; Van Kleef, De Dreu, & Manstead, 2004a) and wanted to avoid further interaction with the opponent (e.g., Van Kleef, De Dreu, & Manstead, 2004b).

Group differences in the association between negative affect and interpersonal problems

Although the above described associations were present for both groups, a number of effects were significantly stronger in the BPD than the DD group. The first association that was stronger in the BPD group was that between hostility and disagreement. We observed stronger effects of momentary and daily disagreement on hostility in the BPD group. Thus, these results provide support for our hypothesis that the effects of interpersonal problems on hostility should be stronger in BPD, due to a higher reactivity of this type of affect in BPD. Looking at the other direction, the effects of daily hostility on disagreement were also stronger in the BPD group. Because anger in BPD is described as intense and hard to control (APA, 2013), it is possible that the anger displayed in the BPD group, if built up throughout a day to a certain level, had a different quality from that of DD participants, evoking higher rates of disagreement. Taken together, these results suggest a mutually reinforcing

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relationship between disagreement and hostility in the daily lives of patients that is particularly pronounced in BPD.

To further substantiate the conclusion of a mutually reinforcing relationship between hostility and disagreement that is specifically pronounced in BPD, it was essential to repeat these analyses controlling for any form of comorbid depression in our BPD sample. As described in the method section, 62.5% of participants in the BPD group had some form of current comorbid mood disorder which could have affected the results observed herein. To assess whether accounting for depression in the BPD group would change these results, we repeated all analyses using three groups: a BPD group with comorbid depression (i.e. current major depression, dysthymia or a current depressive episode within a bipolar disorder), a BPD group without comorbid depression, and a DD group. The detailed results are provided in Table S4 and Table S5 of the supplementary online material. The critical test in these new analyses was whether the effects we report above for the whole BPD group would replicate in the BPD without depression group, and whether this group would differ from the DD group in the same way.

For the relationship between hostility and disagreement, the three group analyses confirmed the observed effects, showing a significantly stronger association in the BPD without depression group than in the DD group (but not in the BPD with depression compared to the depressed group). This suggests that, in line with our initial hypotheses, the association between disagreement and hostility is particularly pronounced in BPD and the observed effect was not driven by comorbid depressivity. A similar picture emerged for the effect of rejection on hostility: in the two group analyses, these were stronger in the BPD group at the day level and in the three group analyses the effect was stronger in the BPD without depression group than in the DD group at the momentary level. Therefore, it is possible that the strong effects observed herein for hostility extend to other interpersonal problems beyond disagreement.

The second association that was significantly stronger in the BPD group and present in both directions was that between daily sadness and daily rejection. Daily sadness showed stronger effects on daily rejection in the BPD than the DD group, while adjusting for the influence of hostility and fear, and daily rejection did so while adjusting for daily disagreement. However, when repeating the analyses adjusting for depression in the BPD group, it became evident that these effects were largely driven by those BPD individuals who also suffered from depression: The effects of daily rejection on sadness and vice versa did not differ between the BPD *without* depression and the DD group, but only between the BPD *with* depression and the DD group. This suggests that having depression in addition to BPD compounds the association between sadness and rejection at the day level.

Turning to fear as a predictor, no significant effects were observed for the BPD group at the momentary level, yet daily fear was a significant *negative* predictor for rejection and disagreement in the BPD group. In contrast, daily and momentary fear had significant *positive* effects in the DD group. These contrasting results were further elucidated when repeating the analyses with three groups. Here, fear showed null effects for the BPD without depression group at the momentary, day, and person level. At the same time, the negative

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effects of daily fear on rejection and disagreement that we had previously observed remained significant only in the BPD with depression group. These might reflect a general avoidance of social interaction due to the withdrawal motivation that is associated with fear (Çelik, Lammers, van Beest, Bekker, & Vonk, 2013).

In sum, the three-groups analyses replicated the finding of a stronger relationship between disagreement and hostility in the BPD without depression group and suggested that the stronger association between sadness and rejection that we observed in the whole BPD group was likely driven by those individuals with BPD and co-occurring depression. Regarding any interpretations concerning the BPD with depression group, we must note that the analyses for this group should be considered largely exploratory, for lack of previous evidence on the combined effect of BPD and depression on the variables assessed herein. It is possible that this group falls somewhat in between the BPD and the DD group due to exhibiting both the heightened affective reactivity of BPD and the affective inertia that is part of DD. This could explain the cases where the BPD with depression group does not differ significantly from the other two groups. Likewise, it is possible that the combination of both disorders causes specific problems with the regulation of negative affect and the navigation of interpersonal situations, which could be evident in those cases where the BPD with depression group showed the strongest effects (e.g. between sadness and rejection at the day level). Clearly, the effects of this unique combination warrant further investigation and any conclusions we provide at this point are largely speculatory.

Limitations and implications

The present study is limited in several respects. First is the distinctiveness of the two interpersonal problem events that we assessed. Across both groups, in 23% of all the cases where an interpersonal problem was endorsed, both rejection and disagreement were endorsed. The correlation between rejection and disagreement at the momentary level was larger in the BPD group (r = .45) than in the DD group (r = .25), although this difference was not statistically significant (z = 1.25, p = .210). Nonetheless, this could point to difficulties with distinguishing between different types of negative interactions among those with BPD. If this were the case, the conflation of different negative interpersonal events could prevent BPD individuals from effectively navigating interpersonal situations. Future studies addressing different types of interpersonal problems in BPD should therefore pay attention to the degree to which these are experienced as similar or distinct events by BPD individuals.

Second, we asked participants to report on symptoms “since the last prompt”. Thus, participants reported over (relatively short) time periods and not for exact, specific moments. We therefore cannot know whether affects and interpersonal events actually occurred at the exact same moment or only very closely together. Therefore, there are a number of features we cannot assess, such as, which type of affect immediately followed the occurrence of an interpersonal problem. Furthermore, although we performed analyses treating interpersonal problems and the individual emotions as both independent and dependent variables, we cannot make firm inferences regarding temporal causality and the models ultimately do not allow any conclusions beyond covariation of interpersonal problems and negative affect.[5]

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However, we argue that assessing the relationship between interpersonal problems and affect in both directions, as we did, has incremental value. Finding that occasions with disagreement (while adjusting for rejection) are likely to also be occasions of high hostility does not in turn imply that occasions of high hostility (while adjusting for sadness and fear) are also likely to be occasions with disagreement. Modelling both directions thus makes the most robust associations stand out, which are those that were consistently found in both directions, despite the influence of the other predictors that were included. To additionally assess the timely sequence of events, future studies should employ a higher sampling frequency and sample for specific moments, employing user-initiated reports whenever rejection or disagreement occurs.

A third limitation is that our rejection and disagreement variables were dichotomous in nature, thus indicating only whether rejection or disagreement took place or not. In this way, we did not distinguish between occasions where one versus several rejection or disagreement events took place. It is possible that the accumulation of more than one event would have particularly strong associations with the affective experience. Additionally, we did not distinguish between different interaction partners. Although we collected the data this way, calculating rejection from and disagreement with a romantic partner vs. friend, family member etc., specifically, resulted in proportions of cases that were too small to analyze separately (i.e., and therefore underpowered). We report the percentages of prompts where rejection and disagreement took place for the different interaction partners in the supplementary material (Table S3).

Fourth, this study lacked a healthy control group. Due to this, we cannot comment on whether the associations between negative affect and interpersonal problems observed herein are a result of general psychopathology, with a number of associations being especially relevant to and pronounced in BPD, or whether the associations would hold in healthy individuals as well. Based on previous studies with healthy samples, revealing positive associations between conflict and negative affect (Bolger & Schilling, 1991; Bolger & Zuckerman, 1995; Kennedy et al., 2002; Laurenceau et al., 2005; Ogolsky & Gray, 2015), we presume that the general pattern of effects we observed herein would hold in healthy participants, too. However, we expect this association would be weaker in a number of ways, because healthy participants should have a lower general affective reactivity and lower sensitivity to negative events. Lastly, our sample included predominantly women, with too few men (12%; $n = 17$) to meaningfully test for gender differences, limiting the conclusions that can be drawn for male BPD patients.

[5]As a means for partially addressing this, we conducted analyses using lagged versions of the predictors, corresponding to individuals' reports of interpersonal problems and affects at the previous prompt, for the current prompt's reported affects and interpersonal problems, respectively. The patterns of results and statistical significance were very similar, but the magnitude of the effects was expectedly smaller, given the gap in temporal spacing. Such analyses have the advantage of modeling unique reciprocal effects of interpersonal problems and affects on one another and add a degree of temporal resolution, but have their own limitations. One primary limitation involves the unequal spacing in time of consecutive prompts, which complicates the interpretation and may undermine the validity of lagged analyses (see Jahng, Wood, & Trull, 2008). Given the consistent pattern of results, we choose to present the concurrent analyses for ease of interpretation.

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Conclusion

The present study assessed the association between momentary interpersonal problems and a range of negative affects in BPD, revealing a mutually reinforcing relationship between hostility and sadness with rejection and disagreement that was significantly stronger in BPD, even after adjusting for comorbid depression in this group. Additional studies are needed to replicate the current results and to address the mechanisms underlying the findings presented. The differential effects found highlight the importance of distinguishing between different varieties of negative affects because the interpersonal motivations associated with these may be vastly different (e.g. approach versus avoidance). Future research should include replication of the present results in an EMA study with a higher sampling rate (e.g. every hour or 30 minutes) and/or a combination of random prompts and user-initiated prompts whenever a participant feels rejected or experiences a disagreement with someone. This way, the temporal sequence of the posited mutually reinforcing cycle of interpersonal problems increasing negative affect which in turn increased the rate of interpersonal problems could be tested. Moreover, the present results could be extended to additional interpersonal problems (e.g. abandonment or betrayal, see Miskewicz et al., 2015) and affects (e.g. shame or guilt) relevant to BPD. The finding that the effects pertaining to hostility were significantly stronger in BPD patients underlines the importance of tailoring treatments that pertain to improving emotion regulation skills to anger specifically. Moreover, the finding that interpersonal problems are strong predictors of negative affect in the daily lives of BPD patients reinforces treatments that target the successful navigation of interpersonal situations.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

References

aan het Rot M, Hogenelst K, Schoevers RA. Mood disorders in everyday life: A systematic review of experience sampling and ecological momentary assessment studies. Clinical psychology review. 2012; 32(6):510–523. doi:10.1016/j.cpr.2012.05.007. [PubMed: 22721999]

American Psychiatric Association. Diagnostic and Statistical Manual of Mental Disorders: DSM-5. American Psychiatric Association; Washington, DC: 2013.

Arntz A, Dreessen L, Schouten E, Weertman A. Beliefs in personality disorders: A test with the Personality Disorder Belief Questionnaire. Behaviour research and therapy. 2004; 42(10):1215–1225. doi:10.1016/j.brat.2003.08.004. [PubMed: 15350860]

Bateman AW, Fonagy P. Mentalization-based treatment of BPD. Journal of personality disorders. 2004; 18(1):36–51. doi:10.1521/pedi.18.1.36.32772. [PubMed: 15061343]

Bates D, Maechler M, Bolker B, Walker S. lme4: Linear mixed-effects models using Eigen and S4. R package. 2014 (Version 1.1-7).

Baumeister RF, Leary MR. The need to belong: desire for interpersonal attachments as a fundamental human motivation. Psychological bulletin. 1995; 117(3):497–529. doi: 10.1037/0033-2909.117.3.497. [PubMed: 7777651]

Beeney JE, Levy KN, Gatzke-Kopp LM, Hallquist MN. EEG asymmetry in borderline personality disorder and depression following rejection. Personality Disorders: Theory, Research, and Treatment. 2014; 5(2):178–185. doi:10.1037/per0000032.

Author Manuscript Author Manuscript Author Manuscript Author Manuscript

Berenson KR, Downey G, Rafaeli E, Coifman KG, Paquin NL. The rejection–rage contingency in borderline personality disorder. Journal of Abnormal Psychology. 2011; 120(3):681–690. doi: 10.1037/a0023335. [PubMed: 21500875]

Bolger N, Schilling EA. Personality and the problems of everyday life: the role of neuroticism in exposure and reactivity to daily stressors. Journal of personality. 1991; 59(3):355–386. doi: 10.1111/j.1467-6494.1991.tb00253.x. [PubMed: 1960637]

Bolger N, Zuckerman A. A framework for studying personality in the stress process. Journal of personality and social psychology. 1995; 69(5):890–902. doi:10.1037/0022-3514.69.5.890. [PubMed: 7473036]

Butler AC, Brown GK, Beck AT, Grisham JR. Assessment of dysfunctional beliefs in borderline personality disorder. Behaviour research and therapy. 2002; 40(10):1231–1240. doi:10.1016/S0005-7967(02)00031-1. [PubMed: 12375731]

Carpenter RW, Trull TJ. Components of emotion dysregulation in borderline personality disorder: a review. Current psychiatry reports. 2013; 15(1):1–8. doi:10.1007/s11920-012-0335-2.

Carpenter RW, Wycoff AM, Trull TJ. Ambulatory Assessment: New Adventures in Characterizing Dynamic Processes. Assessment. 2016 1073191116632341.

Çelik P, Lammers J, van Beest I, Bekker MH, Vonk R. Not all rejections are alike; competence and warmth as a fundamental distinction in social rejection. Journal of experimental social psychology. 2013; 49(4):635–642. doi:10.1016/j.jesp.2013.02.010.

Chapman AL, Dixon-Gordon KL, Butler SM, Walters KN. Emotional reactivity to social rejection versus a frustration induction among persons with borderline personality features. Personality Disorders: Theory, Research, and Treatment. 2015; 6(1):88–96. doi:/10.1037/per0000101.

Chapman AL, Walters KN, Gordon KLD. Emotional reactivity to social rejection and negative evaluation among persons with borderline personality features. Journal of personality disorders. 2014; 28(5):720–733. doi:10.1521/pedi_2012_26_068. [PubMed: 23130813]

Clarkin JF, Hull JW, Hurt SW. Factor structure of borderline personality disorder criteria. Journal of personality disorders. 1993; 7(2):137–143.

Coan JA, Allen JJ. Frontal EEG asymmetry as a moderator and mediator of emotion. Biological psychology. 2004; 67(1):7–50. doi:10.1016/j.biopsycho.2004.03.002. [PubMed: 15130524]

Coifman KG, Berenson KR, Rafaeli E, Downey G. From negative to positive and back again: Polarized affective and relational experience in borderline personality disorder. Journal of Abnormal Psychology. 2012; 121(3):668–679. doi:10.1037/a0028502. [PubMed: 22686872]

Crowell SE, Beauchaine TP, Linehan MM. A biosocial developmental model of borderline personality: Elaborating and extending Linehan's theory. Psychological bulletin. 2009; 135(3):495–510. doi: 10.1037/a0015616. [PubMed: 19379027]

Daros A, Zakzanis K, Ruocco A. Facial emotion recognition in borderline personality disorder. Psychological Medicine. 2013; 43(9):1953–1963. doi:10.1017/S0033291712002607. [PubMed: 23149223]

Dixon-Gordon KL, Chapman AL, Lovasz N, Walters K. Too upset to think: The interplay of borderline personality features, negative emotions, and social problem solving in the laboratory. Personality Disorders: Theory, Research, and Treatment. 2011; 2(4):243–260. doi:10.1037/a0021799.

Dixon-Gordon KL, Gratz KL, Breetz A, Tull M. A laboratory-based examination of responses to social rejection in borderline personality disorder: the mediating role of emotion dysregulation. Journal of personality disorders. 2013; 27(2):157–171. doi:10.1521/pedi.2013.27.2.157. [PubMed: 23514181]

Domes G, Schulze L, Herpertz SC. Emotion recognition in borderline personality disorder-a review of the literature. Journal of personality disorders. 2009; 23(1):6–19. doi:10.1521/pedi.2009.23.1.6. [PubMed: 19267658]

Downey G, Freitas AL, Michaelis B, Khouri H. The self-fulfilling prophecy in close relationships: rejection sensitivity and rejection by romantic partners. Journal of personality and social psychology. 1998; 75(2):545–560. [PubMed: 9731324]

Ebner-Priemer UW, Kuo J, Kleindienst N, Welch SS, Reisch T, Reinhard I, Bohus M. State affective instability in borderline personality disorder assessed by ambulatory monitoring. Psychological Medicine. 2007; 37(07):961–970. doi:10.1017/S0033291706009706. [PubMed: 17202005]

Author Manuscript Author Manuscript Author Manuscript Author Manuscript

Ebner-Priemer UW, Trull TJ. Ecological momentary assessment of mood disorders and mood dysregulation. Psychological assessment. 2009; 21(4):463–475. doi:10.1037/a0017075. [PubMed: 19947781]

Ekman P. Facial expression and emotion. American psychologist. 1993; 48(4):384–392. doi: 10.1037/0003-066X.48.4.384. [PubMed: 8512154]

Fincham FD, Beach SR. Conflict in marriage: Implications for working with couples. Annual review of psychology. 1999; 50(1):47–77. doi:0.1146/annurev.psych.50.1.47.

First, MB., Spitzer, RL., Gibbon, M., Williams, JB. Structured Clinical Interview for DSM-IV Axis I disorders - patient ed. Biometrics Research Department, New York State Psychiatric Institute; New York: 1995. (SCID-I/P, version 2)

Friedman R, Anderson C, Brett J, Olekalns M, Goates N, Lisco CC. The positive and negative effects of anger on dispute resolution: evidence from electronically mediated disputes. Journal of Applied Psychology. 2004; 89(2):369–376. doi:10.1037/0021-9010.89.2.369. [PubMed: 15065982]

Gadassi R, Snir A, Berenson K, Downey G, Rafaeli E. Out of the frying pan, into the fire: Mixed affective reactions to social proximity in borderline and avoidant personality disorders in daily life. Journal of Abnormal Psychology. 2014; 123(3):613–622. doi:10.1037/a0036929. [PubMed: 24933280]

Gerber J, Wheeler L. On being rejected a meta-analysis of experimental research on rejection. Perspectives on Psychological Science. 2009; 4(5):468–488. doi:10.1111/j. 1745-6924.2009.01158.x. [PubMed: 26162220]

Gilbert P, Irons C, Olsen K, Gilbert J, McEwan K. Interpersonal sensitivities: Their links to mood, anger and gender. Psychology and Psychotherapy: Theory, Research and Practice. 2006; 79(1):37–51. doi:10.1348/147608305X43856.

Gunderson JG. Disturbed relationships as a phenotype for borderline personality disorder. American Journal of Psychiatry. 2007; 164(11):1637–1640. doi:10.1176/appi.ajp.2007.07071125. [PubMed: 17974925]

Hammen C, Brennan PA. Interpersonal dysfunction in depressed women: Impairments independent of depressive symptoms. Journal of Affective Disorders. 2002; 72(2):145–156. doi:10.1016/ S0165-0327(01)00455-4. [PubMed: 12200205]

Henry C, Mitropoulou V, New AS, Koenigsberg HW, Silverman J, Siever LJ. Affective instability and impulsivity in borderline personality and bipolar II disorders: similarities and differences. Journal of psychiatric research. 2001; 35(6):307–312. doi:10.1016/S0022-3956(01)00038-3. [PubMed: 11684137]

Hepp J, Carpenter RW, Lane SP, Trull TJ. Momentary symptoms of Borderline Personality Disorder as a product of trait personality and social context. Personality Disorders: Theory, Research, and Treatment. in press. doi:10.1037/per0000175.

Hilsenroth MJ, Menaker J, Peters EJ, Pincus AL. Assessment of borderline pathology using the Inventory of Interpersonal Problems Circumplex Scales (IIP-C): a comparison of clinical samples. Clinical psychology & psychotherapy. 2007; 14(5):365–376. doi:10.1002/cpp.549.

Hochschild Tolpin L, Cimbolic Gunthert K, Cohen LH, O'neill SC. Borderline Personality features and instability of daily negative affect and self-esteem. Journal of personality. 2004; 72(1):111–138. doi:10.1111/j.0022-3506.2004.00258.x. [PubMed: 14686886]

Houben M, Vansteelandt K, Claes L, Sienaert P, Berens A, Sleuwaegen E, Kuppens P. Emotional switching in borderline personality disorder: A daily life study. Personality Disorders: Theory, Research, and Treatment. 2016; 7(1):50–60. doi:10.1037/per0000126.

Jahng S, Solhan MB, Tomko RL, Wood PK, Piasecki TM, Trull TJ. Affect and alcohol use: an ecological momentary assessment study of outpatients with borderline personality disorder. Journal of Abnormal Psychology. 2011; 120(3):572. [PubMed: 21823761]

Jahng S, Wood PK, Trull TJ. Analysis of affective instability in ecological momentary assessment: Indices using successive difference and group comparison via multilevel modeling. Psychological methods. 2008; 13(4):354–375. doi:10.1037/a0014173. [PubMed: 19071999]

Jovev M, Jackson HJ. Early maladaptive schemas in personality disordered individuals. Journal of personality disorders. 2004; 18(5):467–478. doi:10.1521/pedi.18.5.467.51325. [PubMed: 15519957]

Author Manuscript Author Manuscript Author Manuscript Author Manuscript

Keltner D, Kring AM. Emotion, social function, and psychopathology. Review of General Psychology. 1998; 2(3):320–342. doi:10.1037/1089-2680.2.3.320.

Kennedy JK, Bolger N, Shrout PE. Witnessing interparental psychological aggression in childhood: Implications for daily conflict in adult intimate relationships. Journal of personality. 2002; 70(6): 1051–1078. doi:10.1111/1467-6494.05031. [PubMed: 12498363]

Koenigsberg HW, Harvey PD, Mitropoulou V, Schmeidler J, New AS, Goodman M, Siever LJ. Characterizing affective instability in borderline personality disorder. American Journal of Psychiatry. 2002; 159(5):784–788. doi:10.1176/appi.ajp.159.5.784. [PubMed: 11986132]

Koval P, Pe ML, Meers K, Kuppens P. Affect dynamics in relation to depressive symptoms: Variable, unstable or inert? Emotion. 2013; 13(6):1132–1141. doi:10.1037/a0033579. [PubMed: 23914765]

Kuppens P, Allen NB, Sheeber LB. Emotional inertia and psychological maladjustment. Psychological Science. 2010:984–991. doi:10.1177/0956797610372634. [PubMed: 20501521]

Kuznetsova A, Brockhoff PB, Christensen RHB. lmerTest: Tests in Linear Mixed Effects Models. 2014 (Version 2.0-20).

Laurenceau J-P, Troy AB, Carver CS. Two distinct emotional experiences in romantic relationships: Effects of perceptions regarding approach of intimacy and avoidance of conflict. Personality and Social Psychology Bulletin. 2005; 31(8):1123–1133. doi:10.1177/0146167205274447. [PubMed: 16000272]

Laursen B, Hafen CA. Future directions in the study of close relationships: Conflict is bad (except when it's not). Social Development. 2010; 19(4):858–872. doi:10.1111/j.1467-9507.2009.00546.x. [PubMed: 20953335]

Law MK, Fleeson W, Arnold EM, Furr RM. Using negative emotions to trace the experience of Borderline Personality pathology: Interconnected relationships revealed in an experience sampling study. Journal of personality disorders. 2015; 30(1):52–70. doi:10.1521/pedi_2015_29_180. [PubMed: 25710731]

Lazarus SA, Cheavens JS, Festa F, Rosenthal MZ. Interpersonal functioning in borderline personality disorder: a systematic review of behavioral and laboratory-based assessments. Clinical psychology review. 2014; 34(3):193–205. doi:10.1016/j.cpr.2014.01.007. [PubMed: 24534643]

Levy KN, Clarkin JF, Yeomans FE, Scott LN, Wasserman RH, Kernberg OF. The mechanisms of change in the treatment of borderline personality disorder with transference focused psychotherapy. Journal of clinical psychology. 2006; 62(4):481–501. doi:10.1002/jclp.20239. [PubMed: 16470612]

Linehan, M. Cognitive-behavioral treatment of borderline personality disorder. Guilford press; New York, NY: 1993.

Miskewicz K, Fleeson W, Arnold EM, Law MK, Mneimne M, Furr RM. A contingency-oriented approach to understanding borderline personality disorder: Situational triggers and symptoms. Journal of personality disorders. 2015; 29(4):486–502. doi:10.1521/pedi.2015.29.4.486. [PubMed: 26200848]

Mitchell AE, Dickens GL, Picchioni MM. Facial emotion processing in borderline personality disorder: a systematic review and meta-analysis. Neuropsychology review. 2014; 24(2):166–184. doi:10.1007/s11065-014-9254-9. [PubMed: 24574071]

Ogolsky BG, Gray CR. Conflict, negative emotion, and reports of partners' relationship maintenance in same-sex couples. Journal of Family Psychlogy. 2015; 30(2):171–180. doi:10.1037/fam0000148.

Parkinson B. Emotions are social. British journal of psychology. 1996; 87(4):663–683. doi:10.1111/j.2044-8295.1996.tb02615.x. [PubMed: 8962482]

Pasch LA, Bradbury TN. Social support, conflict, and the development of marital dysfunction. Journal of consulting and clinical psychology. 1998; 66(2):219–230. doi:10.1037/0022-006X.66.2.219. [PubMed: 9583325]

Pfohl, B., Blum, N., Zimmerman, M. Structured interview for DSM-IV personality disorders. University of Iowa Hospitals and Clinics; Iowa City: 1994.

Pietrzak, J., Downey, G., Ayduk, O. Rejection sensitivity as an interpersonal vulnerability. Guilford Press; New York, NY: 2005.

Author Manuscript Author Manuscript Author Manuscript Author Manuscript

Putnam KM, Silk KR. Emotion dysregulation and the development of borderline personality disorder. Development and Psychopathology. 2005; 17(4):899–925. doi:10.1017/S0954579405050431. [PubMed: 16613424]

R Core Team. R: A language and environment for statistical computing. 2014

Renneberg B, Herm K, Hahn A, Staebler K, Lammers CH, Roepke S. Perception of social participation in borderline personality disorder. Clinical Psychology & Psychotherapy. 2012; 19(6):473–480. [PubMed: 22076727]

Romero-Canyas R, Downey G, Berenson K, Ayduk O, Kang NJ. Rejection sensitivity and the rejection–hostility link in romantic relationships. Journal of personality. 2010; 78(1):119–148. doi: 10.1111/j.1467-6494.2009.00611.x. [PubMed: 20433615]

Rosenbach C, Renneberg B. Remembering rejection: Specificity and linguistic styles of autobiographical memories in borderline personality disorder and depression. Journal of behavior therapy and experimental psychiatry. 2015; 46:85–92. doi:10.1037/a0020572. [PubMed: 25259768]

Russell JJ, Moskowitz D, Zuroff DC, Sookman D, Paris J. Stability and variability of affective experience and interpersonal behavior in borderline personality disorder. Journal of Abnormal Psychology. 2007; 116(3):578–588. doi:10.1037/0021-843X.116.3.578. [PubMed: 17696713]

Sadikaj G, Moskowitz D, Russell JJ, Zuroff DC, Paris J. Quarrelsome behavior in borderline personality disorder: Influence of behavioral and affective reactivity to perceptions of others. Journal of Abnormal Psychology. 2013; 122(1):195–207. doi:10.1037/a0030871. [PubMed: 23231460]

Sadikaj G, Russell JJ, Moskowitz D, Paris J. Affect dysregulation in individuals with borderline personality disorder: Persistence and interpersonal triggers. Journal of Personality Assessment. 2010; 92(6):490–500. doi:10.1080/00223891.2010.513287. [PubMed: 20954051]

Samuel DB, Widiger TA. A meta-analytic review of the relationships between the five-factor model and DSM-IV-TR personality disorders: A facet level analysis. Clinical psychology review. 2008; 28(8):1326–1342. doi:10.1016/j.cpr.2008.07.002. [PubMed: 18708274]

Sanislow CA, Grilo CM, Morey LC, Bender DS, Skodol AE, Gunderson JG, McGlashan TH. Confirmatory factor analysis of DSM-IV criteria for borderline personality disorder: findings from the collaborative longitudinal personality disorders study. American Journal of Psychiatry. 2002 doi:10.1176/appi.ajp.159.2.284.

Santangelo P, Reinhard I, Mussgay L, Steil R, Sawitzki G, Klein C, Ebner-Priemer UW. Specificity of affective instability in patients with borderline personality disorder compared to posttraumatic stress disorder, bulimia nervosa, and healthy controls. Journal of Abnormal Psychology. 2014; 123(1):258–272. doi:10.1037/a0035619. [PubMed: 24661176]

Scheiderer EM, Wang T, Tomko RL, Wood PK, Trull TJ. Negative Affect Instability among Individuals with Comorbid Borderline Personality Disorder and Posttraumatic Stress Disorder. Clinical Psychological Science. 2016; 4(1):78–81.

Shrout, P., Lane, SP. Psychometrics. New York, NY: 2012.

Solhan MB, Trull TJ, Jahng S, Wood PK. Clinical assessment of affective instability: Comparing EMA indices, questionnaire reports, and retrospective recall. Psychological assessment. 2009; 21(3): 425–436. [PubMed: 19719353]

Specht MW, Chapman A, Cellucci T. Schemas and borderline personality disorder symptoms in incarcerated women. Journal of behavior therapy and experimental psychiatry. 2009; 40(2):256–264. doi:10.1016/j.jbtep.2008.12.005. [PubMed: 19159865]

Staebler K, Helbing E, Rosenbach C, Renneberg B. Rejection sensitivity and borderline personality disorder. Clinical psychology & psychotherapy. 2011; 18(4):275–283. doi:10.1002/cpp.705. [PubMed: 21110407]

Stepp SD, Hallquist MN, Morse JQ, Pilkonis PA. Multimethod investigation of interpersonal functioning in borderline personality disorder. Personality Disorders: Theory, Research, and Treatment. 2011; 2(3):175–192. doi:10.1037/a0020572.

Stiglmayr C, Grathwol T, Linehan M, Ihorst G, Fahrenberg J, Bohus M. Aversive tension in patients with borderline personality disorder: a computer-based controlled field study. Acta Psychiatrica

Author Manuscript Author Manuscript Author Manuscript Author Manuscript

Scandinavica. 2005; 111(5):372–379. doi:10.1111/j.1600-0447.2004.00466.x. [PubMed: 15819731]

Tomko RL, Lane SP, Pronove LM, Treloar HR, Brown WC, Solhan MB, Trull TJ. Undifferentiated negative affect and impulsivity in borderline personality and depressive disorders: A momentary perspective. Journal of abnormal psychology. 2015; 124(3):740–753. [PubMed: 26147324]

Tomko RL, Solhan MB, Carpenter RW, Brown WC, Jahng S, Wood PK, Trull TJ. Measuring impulsivity in daily life: the momentary impulsivity scale. Psychological assessment. 2014; 26(2): 339–349. [PubMed: 24274047]

Tomko RL, Trull TJ, Wood PK, Sher KJ. Characteristics of borderline personality disorder in a community sample: comorbidity, treatment utilization, and general functioning. Journal of personality disorders. 2013:1–17. [PubMed: 23342953]

Torgersen S, Kringlen E, Cramer V. The prevalence of personality disorders in a community sample. Archives of general psychiatry. 2001; 58(6):590–596. doi:10.1001/archpsyc.58.6.590. [PubMed: 11386989]

Trull TJ, Ebner-Priemer U. Ambulatory assessment. Annual review of clinical psychology. 2013; 9:151–176. doi:10.1146/annurev-clinpsy-050212-185510.

Trull TJ, Solhan MB, Tragesser SL, Jahng S, Wood PK, Piasecki TM, Watson D. Affective instability: Measuring a core feature of borderline personality disorder with ecological momentary assessment. Journal of Abnormal Psychology. 2008; 117(3):647–661. doi:10.1037/a0012532. [PubMed: 18729616]

Trull TJ, Tomko RL, Brown WC, Scheiderer EM. Borderline Personality Disorder in 3-D: Dimensions, symptoms, and measurement challenges. Social and Personality Psychology Compass. 2010; 4(11):1057–1069. doi:10.1111/j.1751-9004.2010.00312.x.

Van Beest I, Van Kleef GA, Van Dijk E. Get angry, get out: The interpersonal effects of anger communication in multiparty negotiation. Journal of Experimental Social Psychology. 2008; 44(4): 993–1002.

Van Kleef GA. How emotions regulate social life the emotions as social information (EASI) model. Current directions in psychological science. 2009; 18(3):184–188. doi:10.1111/j.1467-8721.2009.01633.x.

Van Kleef GA, De Dreu CK, Manstead AS. The interpersonal effects of anger and happiness in negotiations. Journal of personality and social psychology. 2004a; 86(1):57–76. doi:10.1037/0022-3514.86.1.57. [PubMed: 14717628]

Van Kleef GA, De Dreu CK, Manstead AS. The interpersonal effects of emotions in negotiations: a motivated information processing approach. Journal of personality and social psychology. 2004b; 87(4):510–528. doi:10.1037/0022-3514.87.4.510. [PubMed: 15491275]

Vingerhoets AJ, Cornelius RR, Van Heck GL, Becht MC. Adult crying: A model and review of the literature. Review of General Psychology. 2000; 4(4):354.

Watson D, Clark LA. The PANAS-X: Manual for the positive and negative affect schedule-expanded form. 1999

Zacchilli TL, Hendrick C, Hendrick SS. The romantic partner conflict scale: A new scale to measure relationship conflict. Journal of Social and Personal Relationships. 2009; 26(8):1073–1096. doi:10.1177/0265407509347936.

Zeigler–Hill V, Abraham J. Borderline personality features: Instability of self– esteem and affect. Journal of Social and Clinical Psychology. 2006; 25(6):668–687. doi:10.1521/jscp.2006.25.6.668.

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Table 1

Means, standard deviations, and mean ranges for negative affect and interpersonal problems presented for the total sample and separate for each group.

	Total				BPD				DD			
	M	***bSD***	***wSD***	***Range***	***M***	***bSD***	***wSD***	***Range***	***M***	***bSD***	***wSD***	***Range***
Hostility	1.47	0.53	0.34	1.01; 3.89	1.52	0.60	0.38	1.01; 3.89	1.39	0.40	0.28	1.02; 3.17
Sadness	1.77	0.76	0.44	1.00; 4.76	1.73	0.79	0.44	1.00; 4.76	1.85	0.70	0.43	1.02; 3.85
Fear	1.59	0.62	0.33	1.01; 4.15	1.60	0.65	0.35	1.03; 4.15	1.58	0.57	0.30	1.01; 3.39
Rejection	0.15	0.17	0.16	0.00; 0.93	0.16	0.18	0.17	0.00; 0.93	0.13	0.15	0.15	0.00; 0.63
Disagreement	0.12	0.12	0.14	0.00; 0.76	0.13	0.13	0.15	0.00; 0.76	0.10	0.10	0.13	0.00; 0.38

Note. *bSD* = between person standard deviation, *wSD* = mean of all within person standard deviations. Means for rejection and disagreement indicate the proportion of prompts where these events were endorsed.

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Table 2

Pairwise correlations at the momentary level between types of negative affect and interpersonal problems, presented for the BPD group (above diagonal) and the DD group (below diagonal).

		BPD				
		Hostility	**Sadness**	**Fear**	**Disagreement**	**Rejection**
	Hostility		.73	.70	.28	.35
	Sadness	.44		.64	.16	.35
DD	Fear	.51	.56		.17	.25
	Disagreement	.22	.06	.08		.45
	Rejection	.28	.23	.24	.25	

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Table 3

Estimates, standard errors, and p-values for rejection and disagreement predicting hostility, sadness, and fear in a multivariate multi-level model.

	Hostility						Sadness						Fear					
	BPD			DD			BPD			DD			BPD			DD		
Predictors	***Est.***	***SE***	***P***	***Est***	***SE***	***P***	***Est.***	***SE***	***p***	***Est.***	***SE***	***P***	***Est.***	***SE***	***P***	***Est.***	***SE***	***P***
Mom rej	0.24	0.02	<.001	0.20	0.02	<.001	0.32	0.02	<.001	0.35	0.02	<.001	0.13	0.02	<.001	0.15	0.02	<.001
Day rej	**0.56**	**0.05**	**<.001**	**0.40**	**0.06**	**<.001**	**0.91**	**0.06**	**<.001**	**0.56**	**0.08**	**<.001**	0.39	0.05	<.001	0.40	0.06	<.001
Person rej	1.76	0.38	<.001	1.19	0.47	.012	3.04	0.55	<.001	1.74	0.67	.010	1.36	0.47	.004	1.78	0.57	.002
Mom dis	**0.36**	**0.02**	**<.001**	**0.30**	**0.02**	**<.001**	0.14	0.02	<.001	0.12	0.02	<.001	0.11	0.02	<.001	0.13	0.02	<.001
Day dis	**0.68**	**0.06**	**<.001**	**0.48**	**0.08**	**<.001**	0.12	0.02	.082	0.24	0.09	.008	0.20	0.06	<.001	0.22	0.08	.003
Person dis	−0.00	0.53	.998	0.52	0.71	.470	−1.29	0.76	.092	−1.12	1.02	.273	0.47	0.65	.470	−0.72	0.87	.406

Note. BPD = Borderline Personality Disorder, DD = Depressive Disorder, Est. = estimate, mom rej = momentary rejection, day rej = daily rejection, person rej = person average rejection, mom dis = momentary disagreement, day dis = daily disagreement, person dis = person average disagreement. Momentary rejection/disagreement was centered on the day mean, daily rejection/disagreement was centered on the person mean, and the person level average for rejection/disagreement was centered on the grand mean. Group was coded as BPD = 0 for the BPD column and analyses were repeated coding DD = 0 for the DD column. Significant group differences are highlighted in boldface.

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Table 4

Odds Ratios with 95% confidence intervals, standard errors, and p-values for hostility, sadness, and fear, predicting rejection and disagreement in a multivariate multilevel model.

	Rejection								Disagreement							
	BPD				DD				BPD				DD			
Predictor s	***OR***	***95% CI***	***SE***	***p***	***OR***	***95% CI***	***SE***	***p***	***OR***	***95% CI***	***SE***	***p***	***OR***	***95% CI***	***SE***	***p***
Mom host	2.42	[2.06; 2.85]	0.08	<.001	1.96	[1.58;2.44]	0.11	<.001	4.14	[3.51; 4.88]	0.08	<.001	3.90	[3.09;4.91]	0.12	<.001
Mom sadn	1.97	[1.69; 2.29]	0.08	<.001	2.37	[1.95;2.89]	0.10	<.001	1.13	[0.97; 1.32]	0.08	.126	1.18	[0.96;1.45]	0.11	.115
Mom fear	0.93	[0.76; 1.12]	0.10	.425	0.98	[0.76;1.28]	0.13	.906	**0.88**	**[0.72; 1.06]**	**0.10**	**.185**	**1.32**	**[1.00; 1.73]**	**0.14**	**.048**
Day host	2.12	[1.63; 2.75]	0.13	<.001	1.90	[1.35;2.68]	0.18	<.001	**3.68**	**[2.89; 4.69]**	**0.12**	**<.001**	**2.19**	**[1.58;3.03]**	**0.17**	**<.001**
Day sadn	**2.31**	**[1.87; 2.87]**	**0.11**	**<.001**	**1.32**	**[0.98; 1.78]**	**0.15**	**.072**	0.86	[0.70; 1.06]	0.11	.168	0.95	[0.72;1.25]	0.14	.711
Day fear	**0.65**	**[0.50; 0.86]**	**0.14**	**.002**	**1.75**	**[1.17;2.61]**	**0.20**	**.006**	**0.70**	**[0.54; 0.90]**	**0.13**	**.005**	**1.39**	**[0.94;2.04]**	**0.20**	**.100**
pers host	1.71	[0.53; 5.53]	0.60	.373	3.38	[0.96;11.87]	0.64	.057	1.98	[0.71; 5.50]	0.52	.189	2.29	[0.78;6.73]	0.55	.133
pers sadn	2.19	[1.01; 4.47]	0.39	.048	1.18	[0.56;2.46]	0.38	.663	0.73	[0.37; 1.43]	0.34	.352	0.76	[0.40;1.44]	0.32	.401
pers fear	0.90	[0.38; 2.10]	0.43	.801	1.63	[0.59;4.45]	0.51	.345	1.33	[0.64; 2.77]	0.37	.450	0.79	[0.33;1.89]	0.44	.601

Note. BPD = Borderline Personality Disorder, DD = Depressive Disorder, OR = odds ratio, mom host = momentary hostility, mom sadn = momentary sadness, mom fear = momentary fear; day host = daily hostility, day sadn = daily sadness, day fear= daily fear, pers host = person level hostility, pers sadn = person level sadness, pers fear = person level fear. Momentary affect variables were centered on the day mean, daily affect variables were centered on the person mean, and the person average affect was centered on the grand mean. Group was coded as BPD = 0 for the BPD column and analyses were repeated coding DD = 0 for the DD column. Significant group differences are highlighted in boldface.

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