Personality Disorders: Theory, Research, and Treatment

The Roles of Personality Traits and Close Social Contact in the Expression of Momentary Borderline Personality Disorder Symptoms in Daily Life

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Abstract

Dimensional models of personality, such as the Five Factor Model (FFM), have demonstrated strong coherence with the presentation of personality disorders, including Borderline Personality Disorder (BPD). Given that select personality trait elevations have been linked to impairments in multiple life domains across diagnostic groups, we sought to replicate findings from a previous investigation of the utility of the FFM in predicting BPD-relevant outcomes (i.e., negative affect [NA] intensity and instability, impulsivity, and interpersonal disagreements) in the daily lives of those with BPD (Hepp et al., 2016) and community participants. As interpersonal context is instrumental in determining the strength of effects observed in studies examining individuals with BPD, we utilized ecological momentary assessment across 3 weeks (6 times daily; n_{total}=15,889) to test whether close social contact (CSC) would moderate the effects of personality on momentary outcomes. Overall, results suggest that CSC is an important moderator between the effects of personality and daily life outcomes for individuals with BPD (N=56), but not for community individuals (N=60). For individuals with BPD, CSC may function as both a protective buffer and a risk factor, depending on outcome. For example, CSC attenuates experience of NA intensity for individuals with elevated neuroticism, but CSC may predict more frequent disagreements for individuals who report lower agreeableness. We replicated approximately half of the original study's findings and results support that FFM personality is predictive of BPD-relevant outcomes broadly. However, interpersonal context is key to understanding these relationships for individuals with BPD.

Keywords: Borderline Personality Disorder, interpersonal difficulties, daily life, negative affect, Five Factor Model

The roles of personality traits and close social contact in the expression of momentary

borderline personality symptoms in daily life

Borderline Personality Disorder (BPD) is a complex, heterogeneous disorder marked by interpersonal reactivity, significant affective instability, and impulsivity. Reports of prevalence rates of BPD in the general population vary, but approximately 2.7% of individuals in the U.S. meet criteria for a diagnosis of BPD, making this disorder one of the more commonly occurring personality disorders (PDs) (Tomko et al., 2014). The seriousness of the impairment experienced by those with BPD and elevated BPD symptoms varies on a continuum, both within individuals and over the lifespan (Saulsman & Page, 2004; Trull et al., 2010). Individuals with the disorder report significant hurdles across multiple domains, from difficulties making and maintaining interpersonal relationships (Lazarus et al., 2014), to struggling with the consequences of impulsive behaviors (Trull et al., 2018), and regulating emotion (Carpenter & Trull, 2013; Salsman & Linehan, 2012). Due to the relative instability in the lives of many of those with BPD, some researchers see impulsivity, heightened negative emotionality and emotional reactivity, and impaired interpersonal functioning as the core of these impairments (Clarkin et al., 1993; Linehan, 1993; Selby et al., 2009; Selby & Joiner, 2009; Trull et al., 2010). Importantly, Importantly, while the presence of negative affect (NA) intensity and instability, impulsivity, and interpersonal difficulties individually can be used to describe many PDs, it is the combination of all three that is unique to BPD (Trull et al., 2010).

Though the presentation of BPD appears multiply determined, with neurobiological (van Zutphen et al., 2015), genetic (Distel et al., 2010), and behavioral (Helle et al., 2018; Hepp et al., 2018) correlates, research has continually linked underlying personality with the expression of BPD, often through the Five-factor model (FFM, Samuel & Widiger, 2008; Saulsman & Page, 2004). The FFM captures personality through five dimensions: neuroticism, extraversion,

openness to experience, agreeableness, and conscientiousness (Costa & McCrae, 1992). Importantly, these traits are multidimensional, representing the bipolar spectrum of each construct, and are comprised of six facets each. For example, the neuroticism domain aims to capture constructs like increased negative emotionality, emotional instability, anxiousness, hostility, self-consciousness, and vulnerability at the high end and emotional stability and low susceptibility to negative emotions and stress at the low end (Costa & McCrae, 1992; Lynam & Widiger, 2007). Each of these domains are relatively heterogeneous and endorsing very high or very low levels of each may imply some dysfunction in its respective domain.

The five FFM domains have repeatedly been linked to BPD and meta-analyses suggest that BPD is characterized by a FFM profile of high neuroticism, low agreeableness, and low conscientiousness (Samuel & Widiger, 2008; Saulsman & Page, 2004). However, less work has been devoted to examining how FFM domains predict behavioral and affective processes in daily life. In one such study, Hepp and colleagues (2016) found that FFM personality trait elevations and depressions in individuals with BPD and individuals with depressive disorders predicted daily life variability of select BPD-relevant outcomes (i.e., impulsivity, interpersonal difficulties, and NA intensity and instability). Specifically, the authors found that higher neuroticism and extraversion and lower agreeableness predicted greater momentary impulsivity and interpersonal difficulties in individuals with BPD, and these associations were especially strong in situations involving close social contact (CSC) with a romantic partner, friend, or family (Hepp et al., 2016).

The present study sought to replicate these findings by examining the utility of the FFM in predicting NA intensity and instability, impulsivity, and interpersonal disagreements in the daily lives of those with BPD and a control group of community participants. Additionally, we aimed to replicate that CSC amplifies these associations.

The reason to explore these relationships in individuals diagnosed with BPD, and in community control individuals who specifically did not report affective instability, was to test 1) whether observed effects for the BPD group in the first paper would replicate and 2) whether BPD-relevant outcomes would emerge as stronger in the BPD group compared to the generally healthy community group as opposed to a clinical comparison group as in past studies. We aimed to replicate the following findings by Hepp and colleagues' (2016) for individuals with BPD: 1) positive association between neuroticism and momentary NA intensity and instability, impulsivity, and disagreements, 2) positive association between extraversion and momentary impulsivity, 3) negative association between agreeableness and interpersonal disagreements, and 4) that social contact with a close other amplifies the associations between neuroticism and NA intensity, NA instability, impulsivity and disagreements, between extraversion and impulsivity, and between agreeableness and disagreements.

Methods

Participants

Data presented here represent a secondary analysis of data originally reported by Lane and colleagues (2016). Participants were 116 individuals, aged 18-45 years old, recruited from outpatient clinics and the community in a midsized Midwestern city in the United States. Participants reported consuming alcohol at least once a week. Exclusion criteria were current treatment for alcohol use, unsuccessful efforts to reduce/stop alcohol use, past-year physiological withdrawal symptoms, current psychosis, intellectual disability, severe neurological dysfunction, or previous head trauma. Fifty-six participants met DSM-IV-TR criteria for BPD, endorsed the affective instability criterion, and were currently in treatment (American Psychiatric Association, 2000). The remaining 60 participants were community adults (COM) who did not meet criteria for BPD or affective instability. Upon selection, subjects were assessed with the Structural Clinical

Interview for *DSM-IV* Axis I disorders (SCID-I; First et al., 1995) and the Structured Interview for *DSM-IV* Personality (SIDP-IV; Pfohl et al.,1994). Interrater reliability was tested using a subsample of 20 interviews previously recorded from the participants' responses. Reliability of BPD diagnosis was κ=0.88; current anxiety disorder, κ= .89; current substance use disorder, κ= 1.00; current alcohol use disorder, κ= 1.00; and a current mood disorder, κ= .77.

As for other endorsed psychopathology, 46 (82%) of participants in the BPD group and 20 (33%) of community individuals met criteria for a current eating, substance, mood, or anxiety disorder. The two groups did not differ regarding age (BPD: $M = 26.0$, SD = 7.2; COM: $M = 26.7$, SD = 7.1), $t(114) = 0.50$, $p = .354$, or gender, with similar percentages of women in both groups (BPD = 82.1% women; COM = 75.0%), $\chi^2 (1) = 0.87$, $p = .350$. Caucasian ethnicity was predominant in both groups (BPD = 83.9%; COM = 85.0%), $\chi^2 (4) = 2.64$, $p = .620$, as was an annual income less than \$25,000 (BPD = 75.0%; COM = 38.3%), $\chi^2 (4) = 16.72$, $p = .002$, and being single or never married (BPD = 73.2%; COM= 63.3 % $\chi^2(4) = 7.56$, $p = .109$). Full demographic and diagnostic characteristics provided in Table S1 of supplementary materials.

Procedure

After clinical interviews, participants filled out multiple self-report measures, including the NEO-PI-R (Costa & McCrae, 1992), though only NEO-PI-R scores were used for this study. After filling out self-report measures, participants were oriented to the EMA protocol. During orientation, selected participants received an electronic diary (Palm Tungsten E2 handheld computer) with instructions as well as completed self-report questionnaires. For 21-days, the electronic diary alerted participants to complete a survey of questions regarding current mood, behavior, and environment six times throughout their day. Prompts were spaced throughout the day by dividing participants' waking hours into 6 equal intervals and sending a prompt at a randomly selected time within each interval to cover the majority of participants' waking hours

and balance data completeness with participant burden. For more detail, see Lane et al. (2016). In addition to the random prompts, event-contingent prompts for alcohol consumption, smoking, and non-suicidal self-injury were included. However, interpersonal difficulties were not assessed at the event-contingent prompts, so relational outcome analyses only included random prompts. After initial payment of $10 from orientation, participants were compensated up to $50 weekly depending on compliance, as well as a final $10 for completed self-reported surveys. Including event contingent prompts, 15,889 observations were gathered across the course of the study. With over 90% completion of random prompts overall, compliance was high in the study, though the completion rate for the COM group (91.8%) was significantly higher than that of BPD group (87.9%; $t(114) = 2.31$, $p = .023$).

Measures

Personality assessment

Participants were assessed using the NEO personality inventory revised (NEO PI-R; Costa & McCrae, 1992). The NEO PI-R consists of 240 items measuring the five personality domains of neuroticism, extraversion, openness to experience, agreeableness, and conscientiousness. Each domain contains six facets that comprise the larger construct, measured with eight items each. Items are answered on a 5-point scale (0 -*strongly disagree* to 4- *strongly agree*) and then summed for each domain. Reliability of this scale was good in this study, with reliabilities for each facet as follows: neuroticism ($\alpha = .97$), extraversion ($\alpha = .92$), openness ($\alpha = .91$), agreeableness ($\alpha = .89$), and conscientiousness ($\alpha = .94$).

Momentary affect assessment

Affect was assessed using items from the Positive and Negative Affect Schedule-Extended version (PANAS-X; Watson & Clark, 1999). Participants rated the extent to which they had experienced a particular affective state in the past 15 minutes on a 5-point Likert scale (1-v*ery*

slightly or not at all to 5-*extremely*). In total, 21 NA trait descriptors were given at each prompt, and these items were averaged to create a general NA indicator. The reliabilities of individuals' average affect ratings across the diary period were excellent ($R_{KF} > .99$), reliabilities of any single time point rating were good (=95R_{IF} = .95), and the reliabilities in the change of subscale ratings across time were adequate to good (=92R_C = .92; Shrout & Lane, 2012). Next, to quantify NA instability, weighted squared successive differences (WSSDs) were computed by subtracting the lagged NA score (of one prompt earlier) from the NA score of the current prompt, squaring this value, and then weighting it using the method described in Jahng et al. (2008).

Momentary impulsivity

Participants' momentary impulsivity scores were assessed at each occasion using 4 items on which participants rate specific impulsive behaviors since the last prompt, using a 5-point Likert scale (1-*very slightly or not at all* to 5-*extremely*). Items were drawn from the UPPS-P, such that the highest-loading item from each scale expect the Positive Urgency scale, was selected (Whiteside & Lynam, 2001). The individual items included were, "I felt and acted on a strong impulse," "I did something without really thinking it through," "I gave up easily," and "I did something for the thrill of it." Reliability of this scale was excellent for average person levels (all R_{KF} = .99) and fair for both individual assessments (all R_{IF} = .62) and change (all R_C = .74). Of note, approximately half (N_{BPD}= 30; N_{COM}= 33) of the sample's impulsivity data is unavailable due to an error which precluded this scale's inclusion in the protocol until midway through data collection. Therefore, there are 7,308 (45.99% of total EMA observations) impulsivity responses, and hypotheses concerning impulsivity are more tentative given the attenuated power.

Interpersonal disagreements

At each random prompt, participants answered whether, since the last prompt, they had had a disagreement with their romantic partner, boss, coworker, roommate, friend, parent, sibling,

child, or any other family member. The number of disagreement instances per occasion were aggregated into a summed score. Base rates of instances of reported disagreement were present in 5.4% of all random prompts in this study, respectively (see Table 1 for group differences).

Close social contact

At every prompt, participants answered whether, since the last prompt, they had "spent time with a romantic partner," "spent time with friends," or whether they had "talked with [their] family." These variables were combined into a single dummy variable that indicated whether close social contact (CSC; i.e., contact with romantic partner, friends, or family) had occurred since the last prompt or not (coded 0-*absent*, 1-*present*). The absence of CSC could indicate either that participants were alone or that they were only in contact with individuals other than those listed above (e.g., coworkers, acquaintances, or strangers). CSC was reported during 47.66% of all EMA prompts in this study and individuals in the COM group ($M = .52$, $SD = .204$) reported more instances of CSC than the BPD group ($M = .43$, $SD = .186$), $t(114) = 2.44$, $p < .05$.

For expanded details regarding EMA design and methodology, please see supplemental materials (*EMA Design Details*).

Data Analysis

The data analytic design for the replication portion of this study was identical to that of the study the authors sought to replicate (Hepp et al., 2016). Data presented here are a secondary analysis of data collected from a previous study (Lane et al., 2016). If a day included more than the pre-specified 6 occasions, as was the case with event-contingent responses, all prompts were used. Given that the replication analyses were constrained by the predefined analytic model and extant dataset with respect to the group sizes and total amount of data collected (including missingness), we conducted a series of multilevel sensitivity power analyses following the EMA example presented by Lane and Hennes (2019) to examine the range of effect sizes for which we

would have adequate power to replicate. Based on previous effect sizes from Hepp and colleagues (2016) and the overall similar number of individuals and total data points (though the current sample consisted of a smaller BPD group), we expected to be similarly powered with respect to their observed power. For their analyses, a $\beta \approx .06$ corresponded to approximately 50% power, and a $\beta \approx .17$ corresponded to approximately 80% power. Our sensitivity analyses paralleled these values, though required effect sizes were larger, such that effect sizes in the current sample of $\beta \approx .10$ corresponded to approximately 50% power, and a $\beta \approx .24$ corresponded to approximately 80% power. Thus, in general, we are well powered to detect effects that are small or larger for both replication and new effects.

Person level

Person-level aggregates of all BPD-relevant outcomes (i.e., impulsivity, disagreement, rejection, fear, hostility, sadness, and NA instability) were obtained by averaging all momentary reports to the person level. Independent samples t-tests were conducted to examine differences in FFM domains and momentary variables by group. To adjust for multiple comparisons, we employed a Bonferroni correction to evaluate *p*-values.

Momentary level

To assess effects of the FFM domains and CSC on momentary outcomes, we employed linear multilevel models (MLM). We modeled a random intercept for each person and a random intercept of days nested within persons (i.e., certain days may be associated with higher overall levels of the outcome that are specific to an individual as opposed to shared across individuals). Predictors included the grand mean centered FFM domain scores, the group membership dummy-variable (0 – COM, 1- BPD), and the CSC dummy-variable. Additionally, the model included main effects for the adjustment variables day of the week, study day, time elapsed since the person awoke, and a person's average amount of social contact experienced throughout the study period

(grand mean centered). Beyond the main effects, the model included all two-way interactions between the FFM and group, between the FFM and CSC, and between group and CSC. All three-way interactions between the FFM, group, and CSC were also modeled simultaneously along main effects and two-way interactions. Outcome variables were modeled separately, with one model as specified above per outcome. Outcome variables were as follows: general NA, impulsivity, disagreements with others, and NA instability (for more detail, see *EMA Design Details* in Supplemental Materials). To account for multiple comparisons, we employed the False Discovery Rate (FDR) correction for *p*-value interpretation (Benjamini & Hochberg, 1995) to adjust for our large number of substantive predictors and their interactions within each family of models. Therefore, for each momentary outcome, we corrected for 11 comparisons within each model with FDR set at 5%, yielding a *p*-value cutoff beginning at .005. For group-wise comparisons examining three-way interactions, we corrected for 12 comparisons within each outcome with FDR set at 5%, yielding a *p*-value cutoff beginning at .004. Due to the large number of interactions, we present in Table 3 the main effects of the FFM on the outcomes of interest by CSC for the BPD and COM groups. In the text, we first report the main effects of CSC and significant CSC•FFM interaction effects for results that replicate findings from the previous paper in the BPD group (Hepp et al., 2016), then exploratory findings for the BPD group and community control groups. Finally, we report significant CSC•FFM•Group interaction effects. Multilevel analyses were performed in SAS using the PROC MIXED procedure (SAS 9.4, 2014).

Results

Person Level

Table 1 presents the means and standard deviations for the FFM personality domains and dependent variables by group. Significant differences between the BPD and COM groups emerged across all personality domains and momentary outcomes except impulsivity and openness (*ps* <

.004). Largely in line with extant literature, the BPD group reported higher neuroticism and lower agreeableness, conscientiousness, and extraversion. Unsurprisingly, the COM group reported fewer disagreements on average, as well as less variability in their report of disagreements relative to the BPD group.

Table 2 presents the bivariate correlations between the FFM domains and person-level aggregates of momentary BPD symptoms by group. Few of the original associations replicated in terms of statistical significance (e.g., $ps > .05$), but the pattern of associations across the two BPD samples were generally consistent both for the person-level and MLM effects ($ICC_{\text{person-level}} = .62$, $ICC_{\text{mlm}} = .66$) (see Figure 1).

Momentary Level – Findings for BPD Group

Figure 2 presents a direct comparison of all associations between FFM-traits and momentary BPD symptoms as reported in the original study by Hepp et al. (2016) and the current replication study. The detailed model results are presented in Table 3.

General Negative Affect. We replicated one effect observed in the original study by Hepp et al. (2016) in regard to general NA. This was a positive association between neuroticism and general NA, which was stronger in the absence of close others. As far as effects that did not replicate, the first of these was that of CSC, such that CSC attenuated NA, whereas it predicted increased NA in the original paper. We additionally observed a number of associations that were not present in the original study by Hepp et al. (2016). First, there was a negative association between openness and momentary NA, which was stronger in the presence of close others. Moreover, extraversion and momentary NA were positively associated in the absence, but not presence, of close others. Finally, agreeableness and neuroticism each interacted with CSC, such that for those higher in agreeableness and neuroticism, presence of close others predicted lower

NA ($Estimate_{agreeableness} = $ -0.022, $SE = 0.008$, $p = .006$; $Estimate_{neuroticism} = $ -0.040, $SE = 0.015$, $p = .007$).

Negative Affect Instability. In line with results from the previous study (Hepp et al., 2016), neuroticism and CSC evidenced a crossover interaction such that for those reporting lower levels of neuroticism, NA instability was higher in absence of close others, but at higher levels of neuroticism, presence of close others predicted increased NA instability ($Estimate = 0.064$, $SE = 0.025$, $p = .011$). We did not replicate the previous paper's findings of positive associations between neuroticism general NA both within and outside the context of CSC. The original paper also evidenced a positive association between extraversion and NA instability when CSC was not endorsed, which we did not find. In terms of additional findings from this sample, we found a positive association between extraversion and NA instability in the presence of close others, as well as a negative association between openness and NA instability when CSC was endorsed. Additionally, extraversion evidenced the same crossover pattern as neuroticism ($Estimate = 0.059$, $SE = 0.015$, $p < .001$), and openness ($Estimate = $ -0.040, $SE = 0.015$, $p = .007$) displayed a reversed crossover pattern.

Impulsivity. Replicating findings from the first study, extraversion was positively associated with impulsivity, which was stronger in the presence of close others. Next, neuroticism was positively associated with impulsivity in the presence of close others. For replicated interactions, CSC and extraversion exhibited a crossover interaction, where at lower levels of extraversion, absence of close others predicted higher impulsivity and at higher levels of extraversion, presence of close others predicted higher impulsivity ($Estimate = 0.078$, $SE = 0.019$, $p < .001$). Neuroticism followed a similar pattern, predicting greater impulsivity in the presence of CSC ($Estimate = 0.364$, $SE = 0.109$, $p = .002$) but having a reverse effect at low levels ($Estimate = 0.121$, $SE = 0.040$, $p = .002$). We did not replicate the following effects: a negative association

between agreeableness and impulsivity, a positive main effect of CSC on impulsivity, a positive association between conscientiousness and impulsivity in the absence of close others, or an interaction between agreeableness and CSC. No additional results were found in present analysis.

      Interpersonal Disagreements. Our findings for disagreements replicated one result from the previous study, such that agreeableness was negatively associated with interpersonal disagreements when CSC was endorsed. Several findings from Hepp and colleagues (2016) were not replicated, including positive associations between extraversion and disagreements and CSC and disagreements. We also did not find replication in interactions between agreeableness and extraversion and CSC each. No additional relationships were uncovered in the current sample.

Group Differences in the Impact of Personality and CSC

      Exploratory three-way interactions examining differences between the BPD and COM groups, identified four effects across NA instability (3) and impulsivity (1). For NA instability, neuroticism ($Estimate_{N*CSC*Group} = -0.105, SE = 0.035, p = .003$) and extraversion ($Estimate_{E*CSC*Group} = -0.089, SE = 0.026, p = .001$) exhibited patterns such that CSC increased the association between the trait and NA instability for individuals with BPD but decreased the association for COM individuals. A consistent, reflected pattern was observed for openness ($Estimate_{O*CSC*Group} = 0.076, SE = 0.023, p = .001$), where higher openness was associated with larger converging NA instability decreases for BPD than COM individuals (Figure 3). Next, extraversion was positively associated with impulsivity among individuals with BPD, especially during CSC ($Estimate_{E*CSC*Group} = -0.097, SE = 0.033, p = .003$).

Discussion

      Dimensional models of personality such as the FFM have established a broad evidence base for modeling personality pathology and, specifically, BPD. As such, differences in personality dimensions as measured by the FFM should contribute to the variance in BPD-relevant

outcomes, including NA intensity and instability, interpersonal difficulties, and impulsivity. Herein, we sought to replicate findings from a previous study on the association between FFM traits and momentary indicators of BPD symptoms (Hepp et al., 2016). We examined associations between the FFM and momentary NA intensity and instability, impulsivity, and interpersonal disagreements, dependent on CSC, among individuals with BPD and community participants. Notably, we replicated 10 of 23 (43%) comparable MLM effects found in the previous study for the BPD group overall, and all momentary effects were in the same direction (see Figure 2).

We did not replicate any of the significant person-level correlations between personality domains and momentary symptoms in the BPD group from the previous study; though smaller in magnitude in our sample, the correlations were almost all in the same direction (see Figure 1). We view this result as a function of two considerations: our comparable sample was smaller and, unlike the previous paper, our sample was recruited on the basis of alcohol use, as well as psychiatric characteristics. We found that the COM group evidenced far stronger correlations between personality and aggregate momentary outcomes, despite individuals with BPD reporting significantly higher neuroticism and lower agreeableness, extraversion, and conscientiousness. Combined with sample differences, this suggests that personality may play a primary role in between-person differences observed for affective and interpersonal outcomes for community individuals. The lack of significant associations at the aggregate level for individuals with BPD may suggest that in order to disentangle affective and interpersonal processes, intensive longitudinal sampling such as EMA is both warranted and perhaps necessary. Indeed, several significant interactions emerged for the BPD group, suggesting that a substantial proportion of perturbations in the daily lives of those with BPD may be a product of personality and interpersonal context together rather than personality alone.

Findings for individuals with BPD

General NA. Combined with the previous paper (Hepp et al., 2016) and extant literature on neuroticism in BPD, we present strong evidence that this domain of personality demonstrates robust associations with negative affect in daily life. Findings further reflect that neuroticism is likely a risk factor for more granular experiences of increased NA in daily life. While openness was not predictive of NA in the previous study, it was predictive of NA and NA instability here. Since openness as a trait includes openness to new, novel experiences (i.e., experiential richness) as well as openness to one's own emotion, it is plausible that greater openness could confer a sense of acceptance or acknowledgement of negative emotion, that in turn reduces the reliance on less effective emotion regulation which has been shown to lead to maintenance and increased intensity of negative mood states (Salsman & Linehan, 2012).

Being around close others (i.e., CSC) exerted a main effect on NA and modified many of the effects of personality for the BPD group. Initially, we hypothesized that CSC would predict increased difficulties for individuals with BPD. For example, we thought that close contact with others would amplify positive associations between neuroticism and momentary outcomes. However, as our results showed the opposite, it could be that social coping is an effective regulation mechanism for individuals with BPD, at least in the short term. Indeed, our results and others' (e.g., Stepp et al., 2009), indicate that individuals with BPD report fewer social interactions than control individuals; therefore, social interactions with close others may be especially protective for individuals with higher neuroticism and BPD due to their relative infrequency.

NA instability. Generally, extraversion and neuroticism predicted increased NA instability and openness predicted decreased NA instability. Moreover, CSC amplified these effects, where those who reported higher extraversion and neuroticism reported higher NA instability in the presence of close others, just as those who reported higher openness reported lower NA instability

when in the presence of close others. These results may suggest that elevated neuroticism and extraversion represent vulnerabilities for stable affective states for those with BPD during times of social contact with others.

Impulsivity. In line with the previous study's results, extraversion and neuroticism predicted increased impulsivity, especially in the presence of close others. This finding lends further support to research that delineates neuroticism and extraversion as particularly important to individuals with BPD (e.g., Samuel & Widiger, 2008). Additionally, it may relate to a body of evidence that suggests that individuals with BPD experience greater sensation or thrill seeking in order to attenuate feelings of boredom and emptiness (Moeller et al., 2001; Whiteside & Lynam, 2001). As these findings replicate what was found in the previous paper, we propose that the observed effects of neuroticism and extraversion on impulsivity, in concert with social context, likely reflect real world points of intervention for problematic behavior arising from increased impulsivity. Specifically, clinicians may be able to leverage personality information to help clients identify when they are most likely to experience increased impulsive action urges. Though there were fewer observations for impulsivity (see *limitations*), these relationships merit more than a cursory inspection in future work.

Interpersonal disagreements. Higher agreeableness predicted fewer disagreements when close others were present. This result was replicated from the previous study and is fairly intuitive, given that interpersonal difficulties are a core symptom of BPD and agreeableness is manifested largely in interpersonal terms. For those with BPD who are more disagreeable and competitive, they may find themselves in the midst of interpersonal conflict more often.

Differences between community individuals and those with BPD

For our exploratory three-way interactions, a few key relationships emerged. Primarily, higher levels of extraversion and neuroticism predicted greater NA instability and impulsivity in

the presence of others for individuals with BPD. In contrast, the opposite pattern was true for openness, as those low on openness in the BPD group reported lower NA instability in the *absence* of close others but for those higher on openness, *presence* of others predicted lower NA instability (see Figure 3). Thus, it appears that the presence of CSC amplifies the effects of specific elevations in personality domains. We may understand these findings in the context of Linehan's Biosocial Model (1993), where personality domains may represent some of the biological, or innate, vulnerabilities of individuals with BPD (e.g., increased neuroticism) and that even into adulthood, transactions with the environment, such as CSC, bring about instability in mood and impulsivity (i.e., dysregulation).

While increased neuroticism and extraversion are not inherently negative, expressions of increased assertiveness and activity, along with vulnerability to negative emotion, may leave individuals vulnerable to the effects of negative emotions and emotional instability (Clarkin et al., 1993). Therefore, examining which aspects of extraversion and neuroticism may drive fewer desirable outcomes is a logical next step in exploring how personality interacts with emotions in daily life. Though our examination of other personality domains and disagreements did not fully reproduce the previous study's results, we interpret this divergence as evidence both for the heterogeneity of BPD across two different, community-based samples and as part of the recruitment between the two samples. For example, in the previous study, individuals were recruited for a study examining affective instability whereas the current sample was recruited and retained based upon alcohol consumption behaviors. Though both samples' comparison groups (i.e., the depressive disorder group from the previous paper and the control group from the present study) were similarly screened for BPD traits and affective instability, the recruitment goals differed. Thus, individuals with BPD recruited for their affective experiences compared to those recruited for their alcohol consumption may exhibit several differences on the outcomes reported

here. Moreover, though both samples' groups with BPD met the same diagnostic criteria, BPD itself is heterogeneous and thus we can expect some variance across individuals' experiences related over the course of one month.

Limitations and Strengths

Two limitations that likely affected our results include the varying sample sizes for select outcome variables (impulsivity) and that some prompts did not feature interpersonal questions due to study design (drinking prompts). Therefore, it is possible that we might be underestimating effects, particularly the replication hypotheses, as Hepp and colleagues (2016) included more individuals with BPD and time points. The approach to measuring impulsivity may also have influenced the direction and precision of results. Specifically, by selecting the highest-loading item from each of the UPPS-P domains and aggregating them, we may have missed important nuance across dimensions. Nevertheless, as our results for impulsivity and extraversion cohere with those of the previous paper, we believe that while tentative, impulsivity results still merit consideration. Lastly, we cannot be confident that CSC influenced symptoms and not the other way around. NA and impulsivity outcomes were assessed with respect to the past 15 minutes and disagreement and CSC were assessed since the last prompt. Therefore, it could be the case that experiencing the various symptoms then influenced individuals to seek out CSC. This is a critical limitation with respect to inferring causality, but the co-occurrence of these experiences is nevertheless useful for converging on when personality will likely have the largest impact.

Despite its limitations, this study features considerable strengths. First, the dynamic, responsive sampling method captures affect and social dynamics as they occurred in relatively real time, as opposed to relying solely on cross-sectional reports of emotions and qualities of social interactions, which are valuable but are also more prone to heuristic-driven recall (Shiffman et al., 2008). Further, our findings justify measuring and comparing between- to within-person

differences, as the community sample in our study exhibited between-person differences that were hypothesized for the clinical sample, and the bulk of replicated results for individuals with BPD is reflected in momentary outcomes. Without disaggregating momentary and higher order components, researchers may miss crucial information that is obscured in aggregate form. Finally, this study featured a clinical sample in comparison to a community control group, where potential shared clinical traits were minimized. By controlling for competing psychopathology and recruiting a clinical sample, we employed rigorous methods to examine our hypotheses.

Conclusion

Overall, we found evidence for relatively stable findings across this and the original study for neuroticism and extraversion in BPD at the momentary level. Our findings are both in line with previous research for the effects of these personality domains and also reflect new avenues for research in the realm of openness, as openness has previously underperformed as a predictor in the literature of PD research (Samuel & Widiger, 2008; Saulsman & Page, 2004).

Clinically, the effect of social support or closeness here is immediately applicable, as it suggests that interpersonal functioning and behaviors that maintain constructive relationships should be considered primary targets for treatment of BPD symptomology and time course. Clinicians and clients alike can leverage the quality and nature of social relationships in concert with clients' personality profiles to inform treatment targets, such as maintaining meaningful romantic relationships and gainful employment. Beyond the importance of attempting to replicate previous findings (e.g., Open Science Collaboration, 2015; Simons, 2014), and given the nature of personality dimensions and their relationship with BPD-relevant outcomes in the context of close social relationships, this paper supports considerations of the intersections between underlying personality traits and situational context (i.e., CSC) in understanding affective processes in BPD.

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