Aus der Klinik für Psychosomatik und Psychotherapeutische Medizin

des Zentralinstituts für Seelische Gesundheit

der Medizinischen Fakultät Mannheim

der Universität Heidelberg

(Direktor: Prof. Dr. med. Christian Schmahl)

Interpersonal problems in Borderline Personality Disorder: Antecedents, manifestations, and consequences

Inauguraldissertation

zur Erlangung des Doctor scientiarum humanarum (Dr.sc.hum.)

an der

Medizinischen Fakultät Mannheim

der Ruprecht-Karls-Universität

zu

Heidelberg

vorgelegt von

Johanna Hepp

aus

Rüsselsheim

2019

Dekan: Prof. Dr. med. Sergij Goerdt

Referentin: PD Dr. Inga Niedtfeld

Table of Contents

Abbreviations

AA	Ambulatory assessment
BPD	Borderline Personality Disorder
BSL	Borderline symptom list
COM	Community control participants
dACC	Dorsal anterior cingulate cortex
DBT	Dialectical Behavior Therapy
DD	Depressive disorder
DSM-IV-TR	Diagnostic and Statistical Manual of Mental Disorders, 4th edition, text revision
DSM-5	Diagnostic and Statistical Manual of Mental Disorders, 5th edition
Es.	Model estimate
FFM	Fife factor model of personality
HC	Healthy control participants
ICD-11	International Classification of Diseases, 11th edition
IPDE	International Personality Disorder Examination
JZS	Jeffreys-Zellner-Siow Bayes factor
MMLM	Multivariate multi-level model
PANAS-X	Positive and negative affect schedule, extended version
PID-5	Self-report personality inventory for DSM-5
SCID-I	Structured clinical interview for DSM–IV axis I disorders
SIDP-IV	Structured interview for DSM–IV personality disorders
VEI	Verhaltens-Erlebens-Inventar

Theoretical Background

CHAPTER I

1.1 Borderline Personality Disorder

The fifth edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-5) defines personality disorders as pervasive, inflexible, and stable patterns of thinking, feeling, behaving, and interacting with others that cause significant distress or impairment in interpersonal or professional functioning (American Psychiatric Association, 2013). The importance of interactions with others is highlighted even more explicitly in section III of the DSM-5, which underlines the presence of 'significant impairments in interpersonal functioning' for all personality disorders. As outlined above, this impairment is expected to be "inflexible and pervasive across a broad range of personal and social situations" (APA, 2013, p. 646). Contrary to this definition, a recent meta- analysis (Wilson, Stroud, & Durbin, 2017) has demonstrated that, for almost all personality disorders, interpersonal dysfunction was not as pervasive as theorized, often not extending to interactions with romantic partners. The only exception to this, showing interpersonal dysfunction across all assessed contexts and interaction partners, was Borderline Personality Disorder (BPD).

Interpersonal dysfunction in BPD is specifically highlighted in two of its nine criteria, detailing the presence of frantic efforts to avoid real or imagined abandonment and a pattern of unstable relationships that is characterized by 'ups and downs' of idealizing and devaluating others. Beyond interpersonal dysfunction, the BPD diagnosis includes three affect related criteria. These consist of affective instability (especially with regard to anger-, sadness-, and fear- related affect), the experience of intense anger and difficulties controlling it, and the experience of aversive inner emptiness. Beyond interpersonal and affective symptoms, BPD entails identify disturbance, marked impulsivity (e.g. with regard to substance use or high risk behavior), transient, stress-related dissociative or paranoid symptoms, and self-injurious or suicidal behavior, including threats thereof. BPD starts to develop in late childhood or early

adolescence and affects women and men in equal measure with a lifetime prevalence of approximately 3% (Grant et al., 2004; Lenzenweger, Lane, Loranger, & Kessler, 2007; Tomko, Trull, Wood, & Sher, 2014). In clinical settings, the vast majority of patients with BPD are women, and BPD is the most prevalent type of personality disorder that is treated (Grant et al., 2004; Korzekwa, Dell, Links, Thabane, & Webb, 2008; Skodol, Siever, et al., 2002).

Due to the severity and clinical prevalence of BPD, it accounts for as much as 25% of the total cost for psychiatric inpatient care in Germany per year (Bohus, 2007) and creates a high burden on health care systems around the globe (Comtois et al., 2003; Frankenburg & Zanarini, 2004; Soeteman, Roijen, Verheul, & Busschbach, 2008; Van Asselt, Dirksen, Arntz, & Severens, 2007). Beyond the symptomatic impairment due to mental illness, BPD is also associated with substantial physical illness (Fok et al., 2014; Grant et al., 2008) and chronic conditions (El-Gabalawy, Katz, & Sareen, 2010; Frankenburg & Zanarini, 2004; Keuroghlian, Frankenburg, & Zanarini, 2013), including chronic pain (e.g., Heath, Paris, Laporte, & Gill, 2017; Sansone & Sansone, 2012). Together with this high degree of physical morbidity, suicide rates as high as 10% (Black, Blum, Pfohl, & Hale, 2004), contribute to the vastly decreased life expectancies that have been reported for this population. Life expectancies for those with BPD are estimated to be up to 22 years shorter than those for the general population (Chesney, Goodwin, & Fazel, 2014), which again underlines the particular severity of this disorder.

Longitudinal studies of BPD have observed remission rates of around 80% after 10 years and showed that the criteria reflecting interpersonal dysfunction remit at similar rates to other symptoms (Choi-Kain, Zanarini, Frankenburg, Fitzmaurice, & Reich, 2010; Gunderson et al., 2011; Skodol, Gunderson, et al., 2002; Zanarini, Frankenburg, Reich, & Fitzmaurice, 2010a, 2010b). However, total recovery (including good social and vocational functioning) has been observed in only about 35% of those affected by BPD (Zanarini et al., 2010b). Poor social functioning is predicted by interpersonal problems (Pagano et al., 2004) and interpersonal problems were shown to even exacerbate the course of the other BPD symptoms (Powers,

Gleason, & Oltmanns, 2013). Interpersonal problems thereby contribute to non-recovery from BPD and consequently also to the societal costs associated with the disorder. BPD has repeatedly been demonstrated to be among the most costly mental disorders, based on extensive utilization of health care services (Bohus, 2007; Feenstra et al., 2012; Salvador-Carulla et al., 2014; Wagner et al., 2013), productivity losses (Soeteman et al., 2008) and disability pensions (Østby et al., 2014).

Beyond the importance of interpersonal problems for the long-term development of BPD and their prominent role in diagnostic systems, factor analytic studies have identified interpersonal problems as a core symptom or even phenotype of BPD (Clarkin, Hull, & Hurt, 1993; Gunderson, 2007; Sanislow et al., 2002). Adding to this evidence, two recent studies have assessed the interdependency and centrality of each of the nine BPD symptoms via network analysis. The studies were able to show that, at a cross-sectional level, interpersonal problems have a high centrality for the syndrome BPD, meaning that they are strongly associated with the other symptoms of the disorder (Richetin, Preti, Costantini, & De Panfilis, 2017; Southward & Cheavens, 2018). This cross-sectional perspective is augmented by longitudinal studies, which have demonstrated that interpersonal problems also prospectively predict non-suicidal self-injury (Nock, Prinstein, & Sterba, 2009; Snir, Rafaeli, Gadassi, Berenson, & Downey, 2015; Turner, Cobb, Gratz, & Chapman, 2016; Welch & Linehan, 2002) and suicide attempts in BPD (Brodsky, Groves, Oquendo, Mann, & Stanley, 2006; Victor, Scott, Stepp, & Goldstein, in press; Yen et al., 2005). In addition to this empirical evidence, theoretical models of models of BPD also emphasize the centrality of interpersonal problems for the disorder. In the following paragraphs, I briefly outline how theories from cognitive-behavioral, psychoanalytic, and attachment theory backgrounds explain interpersonal problems in BPD.

The arguably most prominent model in the current literature on BPD is the Biosocial Model by Linehan (1993), which stems from a cognitive-behavioral tradition. In broad terms, the model posits that biological vulnerabilities interact with a problematic family environment in

the development of emotion dysregulation, which, in turn, leads to interpersonal dysfunction. In detail, Linehan assumes that a biological predisposition towards a child temperament that is characterized by negative affectivity, high emotional sensitivity, and impulsiveness interacts with a dysfunctional family environment. She describes a family environment where emotions are invalidated, for instance by parental disinterest in emotions, instruction to suppress emotions, or verbalizations that the child's emotions are inadequate. In addition to emotional invalidation, she supposes that the family environment does not provide an adequate model for emotion regulation. This includes parents who themselves rarely show emotions, who show only a restricted emotional range, or who have poor emotion vocabulary and differentiation. In an updated version of her model (Crowell, Beauchaine, & Linehan, 2009), Linehan notes that ineffective parenting in this family environment can also be the result of insufficient family resources (e.g. time, money, external support systems) or a poor fit between child temperament and parenting style. With regard to interpersonal problems, Linehan suggests that these result from a failure to cope with strong emotions. Specifically, her model details that in a (dysregulated) emotional state, the individual cannot achieve non-mood dependent goals (e.g. end a fight to maintain a relationship even though still angry), exhibits distorted information processing (e.g. misinterprets social cues as threatening), or cannot control mood-dependent behavior (e.g. is unable to suppress aggressive impulses in response to feeling angry).

A second theoretical model is the Mentalization-based Theory of BPD. It is rooted in Attachment Theory (Bowlby, 1973) and sees interpersonal problems in BPD as a direct consequence of failed mentalization processes (Bateman & Fonagy, 2004; Fonagy, Target, Gergely, Allen, & Bateman, 2003). Attachment Theory in general posits that, through interacting with parents, a child develops internalized ideas of the self and of others that influence its tendencies to behave in social interactions. With regard to BPD, it has been posited that insecure or disorganized attachment styles are prevalent, manifesting in an incoherent and negative sense of self and negative, inconsistent expectations of the behavior of others (Fonagy et al., 2003;

Holmes, 2004). Rooted in these assumptions about attachment, the Mentalization-based Model of BPD suggests that caregivers of those with the disorder typically show poor mentalization skills and pass these on to their children (Bateman & Fonagy, 2004; Fonagy et al., 2003). Poor mentalization skills in this context comprise a low capacity to understand own mental processes and to infer those of others. It is this failure to perform successful mentalization that is thought to result in interpersonal problems (e.g. through misunderstanding of the intentions of others) in the course of BPD.

Lastly, psychoanalytic models of BPD also put great emphasis on interpersonal problems, seeing them as an indicator of disturbed object relations (Clarkin, Lenzenweger, Yeomans, Levy, & Kernberg, 2007). Object-relations Models posit that representations of self-other dyads form based on experiences in the infant-caregiver relationship and heavily influence functioning in later relationships. In the case of BPD, these self-other representations are thought to be "split" into all-positive or all-negative representations, lacking a nuanced representation of the other (the object) and the individual's relationship with it (the object relation). Since actual relationships tend to not always be all-good or all-bad, this polarized introject of what others are like and how they will behave often has a poor fit with the actual environment, which is theorized to result in all kinds of interpersonal problems.

In sum, interpersonal dysfunction in BPD was shown to be pervasive and consistent across contexts and interaction partners, and its importance for the syndrome BPD has been recognized by theoretical models as well as factor analytic and network studies. In addition to creating suffering directly for those that experience interpersonal problems, they also negatively affect the course of BPD and are related to negative outcomes such as non-suicidal self-injury and suicide attempts. By impeding recovery, interpersonal problems further contribute to the substantial societal and economic cost of BPD. It is for these reasons that I have chosen to study interpersonal problems in BPD within this thesis. Specifically, I have intended to better characterize the manifestation of interpersonal problems in daily life and to identify potential

causes or antecedents of them, hoping to ultimately identify specific targets for interventions, as well assess consequences of interpersonal problems. In the following two sections, I will first outline previous research on the different manifestations of interpersonal problems in BPD. I will then describe prior studies that have investigated factors contributing to the manifestation of interpersonal problems. From significant gaps in each of these fields of literature, I will then derive the central research questions for my thesis and outline these in detail.

1.2 The Manifestation of Interpersonal Problems in BPD

In order to speak about the diverse ways in which interpersonal dysfunction manifests in BPD, it is important to consider the different research methods with which it has been assessed. When speaking about interpersonal dysfunction based on the two diagnostic criteria detailing frantic efforts to avoid abandonment and unstable relationships (APA, 2013), the assessment normatively includes a clinical interview such as the International Personality Disorder Examination, IPDE (Loranger et al., 1998). Beyond the DSM-5 criteria, different types of interpersonal dysfunction have also been assessed at a more fine-grained level using self-report questionnaires and laboratory measures. More recently, several studies have also started to use experience sampling methods such as daily diaries or Ambulatory Assessment. Ambulatory Assessment (AA) comprises the assessment of constructs in real-life and near real-time via data collection on a handheld device or smartphone that prompts participants to report on phenomena as they are happening (event-based design) or that signals participants to enter data at other fixed or random time-points throughout the day (Trull & Ebner-Priemer, 2013). Compared to cross-sectional and retrospective reports, AA minimizes recall biases and can reveal dynamic processes, including frequencies, intensities and instability of constructs of interest (Solhan, Trull, Jahng, & Wood, 2009). In the following paragraphs, I outline previous findings from each source of information, summarizing findings on interpersonal dysfunction based on self-report measures, laboratory measures, and AA.

A major focus of studies using questionnaires to assess self-reported interpersonal dysfunction has been the assessment of maladaptive interpersonal styles as they map onto the Interpersonal Circumplex Model (Horowitz, 2004; Kiesler, Schmidt, & Wagner, 1997; Wilson et al., 2017). The Interpersonal Circumplex Model describes interpersonal behavior on an *agency* dimension, marked by dominance and submissiveness on the extreme poles, and a *communion* dimension, ranging from warmth to coldness. A recent meta-analysis has summarized findings using the circumplex model and demonstrated that interpersonal styles in BPD tend to be most strongly characterized by a high degree of agency, manifesting in vindictive, intrusive, and domineering behavior, and cold behavior on the communion dimension (Wilson et al., 2017). These interpersonal styles are likely to entail a high degree of interpersonal problems and difficulties with establishing social bonds. Corroborating this notion, other studies have shown that the self-reported relationship quality of those with BPD tends to be poor (Daley, Burge, & Hammen, 2000; Miano, Dziobek, & Roepke, in press). Further studies have pointed out that romantic relationships in BPD may be particularly dysfunctional. Based on self-reports, romantic relationships of those with BPD tend to be characterized by low relationship satisfaction, frequent breakups, and verbal as well as physical fights (Bouchard, Godbout, & Sabourin, 2009; Bouchard & Sabourin, 2009; Bouchard, Sabourin, Lussier, & Villeneuve, 2009; Hill et al., 2011). Moreover, recent studies have accumulated evidence on high levels of self-reported loneliness as well as small social networks (Liebke et al., 2017). Specifically, BPD individuals describe their networks as characterized by few positive interactions (Clifton, Pilkonis, & McCarty, 2007), low levels of perceived support, and high levels of perceived conflict and criticism (Beeney, Hallquist, Clifton, Lazarus, & Pilkonis, 2018; Lazarus & Cheavens, 2017; Lazarus, Southward, & Cheavens, 2016).

A second major aspect of interpersonal dysfunction in BPD that has been assessed via self-reports questionnaires is rejection sensitivity (Downey & Feldman, 1996; Downey, Freitas, Michaelis, & Khouri, 1998). Rejection sensitivity comprises the tendency to anxiously expect,

readily perceive, and intensely react to perceived rejection from others. Individuals with BPD report remarkably high levels of rejection sensitivity (Bungert et al., 2015; Chesin, Fertuck, Goodman, Lichenstein, & Stanley, 2015; Peters, Smart, & Baer, 2015; Rosenbach & Renneberg, 2014), even more so than individuals who suffer from other personality disorders or depression (Staebler, Helbing, Rosenbach, & Renneberg, 2011). Adding to this picture, self-reported beliefs about rejection also differentiate BPD patients from patients with other personality disorders (Arntz, Dreessen, Schouten, & Weertman, 2004; Butler, Brown, Beck, & Grisham, 2002; Specht, Chapman, & Cellucci, 2009). Importantly, this high degree of rejection sensitivity is thought to entail a higher rate of actual rejection from others in the sense of a self-fulfilling prophecy (Downey et al., 1998; Pietrzak, Downey, & Ayduk, 2005; Romero-Canyas, Downey, Berenson, Ayduk, & Kang, 2010).

Rejection is also a central construct that has been assessed in laboratory studies on interpersonal dysfunction in BPD. The vast majority of studies investigating rejection have used the Cyberball Paradigm to experimentally induce a rejection experience and have then measured participants' reaction to the rejection. Cyberball is a virtual ball tossing game in which, through ball passes of a certain rate, participants are included in or excluded (rejected) from the game to a certain degree (Williams & Jarvis, 2006). Cyberball studies have shown that participants with BPD tend to feel more excluded/rejected overall, even during the inclusion or neutral conditions (Domsalla et al., 2013; Ruocco et al., 2010). Moreover, studies have assessed BPD participants' affective reaction to rejection during Cyberball and found evidence for an increase in general negative affect (Dixon-Gordon, Gratz, Breetz, & Tull, 2013) and also specifically in anger-hostility like affect (Beeney, Levy, Gatzke-Kopp, & Hallquist, 2014; Renneberg et al., 2012; Staebler, Renneberg, et al., 2011). Two further studies have induced a rejection experience by giving participants negative feedback on their personal profile, claiming that another participant had rated them as uninteresting, did not want to be friends with them, and did not ever want to

meet them (Chapman, Dixon-Gordon, Butler, & Walters, 2015; Chapman, Walters, & Dixon-Gordon, 2014). These studies, too, observed an increase in anger/hostility post rejection.

This laboratory research is rather well paralleled by an emerging body of recent studies using AA to assess rejection and other types of interpersonal problems in daily life. These studies have shown that individuals with high levels of borderline personality features reported experiencing more negative interpersonal events in their everyday-life than individuals with low levels of borderline personality features (Hochschild Tolpin, Cimbolic Gunthert, Cohen, & O'neill, 2004; Zeigler–Hill & Abraham, 2006), as did individuals with a formal BPD diagnosis versus individuals with other personality disorders (Stepp, Pilkonis, Yaggi, Morse, & Feske, 2009). Beyond rejection, these events also included arguments/conflicts or feeling let down by someone. A growing body of studies using AA has further assessed the association between rejection and negative affect that laboratory studies have hinted at. These studies found perceived rejection or rejection cues to be associated with increased overall negative affect (Chaudhury et al., 2017; Sadikaj, Moskowitz, Russell, Zuroff, & Paris, 2013; Sadikaj, Russell, Moskowitz, & Paris, 2010), anger (Berenson, Downey, Rafaeli, Coifman, & Paquin, 2011; Lazarus et al., 2018; Miskewicz et al., 2015), and aversive inner tension (Stiglmayr et al., 2005). Paralleling these findings for rejection, a recent AA study has assessed disagreements with others in the daily lives of participants with BPD and also found these to be frequent and associated with negative affect (Chaudhury et al., 2017).

In sum, interpersonal dysfunction in BPD has previously been assessed using structured clinical interviews, self-report questionnaires, performance in laboratory experiments, and by AA studies using self-reports in daily life. These studies have found that interpersonal dysfunction manifests in high self-reported agency and coldness on the interpersonal circumplex model, in poor self-reported relationship quality, and in small social networks that are marked by high levels of conflict and low levels of support. Moreover, individuals with BPD have repeatedly self-reported high levels of rejection sensitivity, and negative affective reactions to

rejection have been demonstrated in both laboratory experiments and in daily-life studies. As a result of these marked interpersonal difficulties, many studies have aimed to identify what lies beneath interpersonal dysfunction in BPD, hoping to reveal the mechanisms that drive these problems. In the following section, I will review the previous literature on potential mechanisms that underlie interpersonal dysfunction in BPD, including studies that have approximated antecedents or causes for interpersonal problems in BPD.

1.3 Mechanisms Underlying Interpersonal Problems

As described above, interpersonal dysfunction is central to the diagnosis, course, and impact of BPD. Therefore, the field of BPD research has already devoted manifold studies to identifying factors that underlie interpersonal dysfunction in BPD, eventually aiming to identify causes for the manifestation of interpersonal problems. Factors that have been investigated span social cognitive processes, cooperative behavior, personality traits, and biological factors. I will briefly outline the previous research in each of these areas in the following paragraphs.

The aspects that have likely received the most attention in the past as a potential factor underlying interpersonal dysfunction are altered social cognitive processes, including emotion recognition, social problem solving, and interpersonal perception. The numerous studies on emotion recognition in BPD have been summarized in two comprehensive literature reviews (Domes, Schulze, & Herpertz, 2009; Lazarus, Cheavens, Festa, & Rosenthal, 2014) as well as two meta-analyses (Daros, Zakzanis, & Ruocco, 2013; Mitchell, Dickens, & Picchioni, 2014). These suggest that individuals with BPD tend to over attribute negative affect in photographs of ambiguous faces and that they have an emotion categorization deficit across all emotions and selective deficits for differentiating between disgust and anger. With regard to interpersonal dysfunction, it has been discussed that the failure to adequately infer an interaction partner's current emotional state is likely to lead to non-complementary behavior on the part of the BPD

individual, thus contributing to interpersonal problems (Bateman & Fonagy, 2004; Crowell et al., 2009; Lazarus et al., 2014; Linehan, 1993).

A related streak of research has assessed how individuals with BPD perceive others, but, in contrast to the emotion recognition literature, has mostly moved away from focusing exclusively on the perception of facial affect in static photographs. These studies instead applied the Thin Slices paradigm. In the Thin Slices paradigm, rater participants are presented with a short behavior excerpt (a 'Thin Slice') from a target participant, often a short video sequence (Ambady & Rosenthal, 1992). Raters are then asked to evaluate the target, typically on a range of personality dimensions. Previous studies using BPD participants as raters in the Thin Slices paradigm have demonstrated that BPD individuals tend to evaluate targets systematically negatively based on video clips (Arntz & Veen, 2001; Barnow et al., 2009; Sieswerda, Barnow, Verheul, & Arntz, 2013). Specifically, BPD raters gave negative evaluations in an open response format (Arntz & Veen, 2001), evaluated targets more negatively than healthy control participants (HCs) with regard to the Five Factor Model (FFM, McCrae & Costa Jr, 2008) personality dimensions (Barnow et al., 2009), and gave especially negative evaluations when targets showed behavior that was related to BPD-relevant themes such as abandonment (Sieswerda et al., 2013). Beyond evaluations in the Thin Slices paradigm based on film clips, studies asking BPD participants to rate photographs of faces have revealed that BPD individuals also tend to evaluate target faces as less trustworthy than HCs do (Fertuck, Grinband, & Stanley, 2013; Miano, Fertuck, Arntz, & Stanley, 2013; Nicol, Pope, Sprengelmeyer, Young, & Hall, 2013). Similar to the processes discussed with regard to emotion recognition, these broad negative evaluations of others may also serve as an explanation for the high levels of loneliness and small social networks BPD individuals report, by way of keeping them from approaching others. At the same time, a tendency to attribute negative traits to others may also impede harmonic social interactions and increase the probability of interpersonal conflict.

Beyond negative evaluations of affect, personality, and trustworthiness in others, which likely contribute to interpersonal problems, BPD individuals have also demonstrated difficulties in solving difficult social situations. In other words, once interpersonal problems arise, BPD individuals may be ill-equipped to resolve these. Studies using the Means-end Problem-solving Task (Platt, Spivack, & Bloom, 1971), in which participants have to derive a solution for an interpersonal problem given the beginning and the end of a problem scenario, have revealed poor social problem solving abilities. In BPD participants, solutions to the scenarios were less relevant, effective, specific, and active than those of healthy and clinical comparison groups (Bray, Barrowclough, & Lobban, 2007; Kehrer & Linehan, 1996; Kremers, Spinhoven, Van der Does, & Van Dyck, 2006; Maurex et al., 2010). Importantly, these difficulties were exacerbated under emotional stress (Dixon-Gordon, Chapman, Lovasz, & Walters, 2011), which is frequent in BPD.

In addition to the above described studies on social cognitive processes, a second line of research has investigated cooperation in BPD as a potential factor that contributes to interpersonal dysfunction. To investigate cooperation in BPD, these studies have relied on both economic games and the assessment of relatively stable personality dimensions that indicate dispositional tendencies towards cooperation. Studies assessing cooperative behavior in economic games including the Prisoner's Dilemma (Flood, 1958), Ultimatum Game (Güth, Schmittberger, & Schwarze, 1982), Trust Game (Berg, Dickhaut, & McCabe, 1995), and Punishment Game (Eckel & Grossman, 1996), have demonstrated that individuals with BPD have trouble re-establishing cooperation once cooperative behavior by an interaction partner is ceased (for a review, see Jeung, Schwieren, & Herpertz, 2016). Instead, they show a pattern of negative reciprocity and an inability to forgive unfairness, which, again, contributes to interpersonal dysfunction by way of impeding reconciliation efforts and destabilizing relationships.

In additions to studies assessing cooperative behavior using economic games, there is also a vast literature on the association between BPD and basic personality dimensions that indicate a general tendency for cooperation, for instance Agreeableness. These studies have largely focused on Agreeableness as it is mapped in the FFM (McCrae & Costa Jr, 2008) and were summarized in two large scale meta-analyses (Samuel & Widiger, 2008; Saulsman & Page, 2004). The meta-analyses showed that BPD is characterized by low levels of Agreeableness, which (paralleling the economic game research presented above) was theorized to contribute to interpersonal dysfunction by way of increasing interpersonal conflict. In a previous study, I was able to show that BPD individuals' levels of Agreeableness were indeed predictive of the experience of interpersonal problems, especially disagreements, in daily life (Hepp, Carpenter, Lane, & Trull, 2016). Going beyond the FFM, a small, but growing number of recent studies have used the HEXACO model of personality (Ashton & Lee, 2007) as a framework for studying cooperativeness in BPD. The HEXACO model separates cooperative tendencies into active and reactive cooperativeness. Active cooperativeness is subsumed under the Honestly-Humility factor and describes ''the tendency to be fair and genuine in dealing with others, in the sense of cooperating with others even when one might exploit them without suffering retaliation'' (p.156). Reactive cooperativeness, in contrast, is subsumed under the Agreeableness factor as ''the tendency to be forgiving and tolerant of others, in the sense of cooperating with others even when one might be suffering exploitation by them'' (p.156). Previous studies using the HEXACO framework have demonstrated that BPD features are associated with lower levels of Agreeableness but are not associated with decreased Honesty-Humility levels (Hepp et al., 2014; Thielmann, Hilbig, & Niedtfeld, 2014). In other words, BPD individuals likely show the described lack of reactive cooperation and interpersonal problems arise once they perceive a rupture in cooperation, but, at the same time, their active cooperation appears intact.

Beyond deficits related to social cognition or cooperation, more and more research is also being conducted with the aim of identifying a neurobiological basis for interpersonal dysfunction. However, most of the empirical research on neurobiological alterations in BPD still focuses on emotion processing (for a meta-analysis of neuroimaging findings, see Schulze, Schmahl, & Niedtfeld, 2016) and shows little specificity to interpersonal dysfunction. Nonetheless, the past years have seen an increase in theoretical models about a possible neurobiological basis for interpersonal dysfunction. One focus of these models has been potential alterations in the neuropeptide oxytocin. Since oxytocin has been associated with attachment, pro-social behavior, and the modulation of stress responses in social scenarios (Meyer-Lindenberg, Domes, Kirsch, & Heinrichs, 2011) it has been theorized to potentially contribute to interpersonal dysfunction in BPD (Herpertz & Bertsch, 2015; Stanley & Siever, 2009). An increasing number of empirical studies have set out to test this theory and were summarized in a recent systematic review (Servan, Brunelin, & Poulet, 2018). Results show evidence that plasma levels of oxytocin are lowered in individuals with BPD (Bertsch, Schmidinger, Neumann, & Herpertz, 2013), yet a simple intranasal substitution of oxytocin did not seem to reduce interpersonal problems. Instead, intranasally administered oxytocin reduced (rather than induced) trust, cooperation, and prosocial behavior in individuals with BPD (Servan et al., 2018) and the picture remains thus far unclear.

In addition to oxytocin, a dysregulation of the endogenous opioid system has also been discussed as a potential contributor to interpersonal dysfunction in BPD (Bandelow, Schmahl, Falkai, & Wedekind, 2010; Stanley & Siever, 2009), though this model remains largely untested empirically. Theories on the endogenous opioid system generally assume that individuals with BPD exhibit chronically lowered levels of endogenous opioids and that interpersonally problematic behavior such as frantic efforts to avoid abandonment may stimulate the endogenous opioid system and therefore reinforce and maintain interpersonal dysfunction. While preliminary evidence points toward altered μ-opioid receptor concentrations and an

increased reactivity of the endogenous opioid system to negative affect induction (Prossin, Love, Koeppe, Zubieta, & Silk, 2010), much more research is needed to determine whether the endogenous opioid system indeed contributes to interpersonal dysfunction in BPD.

Lastly, there are a small number of studies that have identified functional-neurological correlates of perceived social exclusion in BPD. These studies used the previously described Cyberball paradigm and found that BPD participants showed increased dorsal anterior cingulate cortex (dACC) activation when feeling excluded in two fMRI studies (R. C. Brown et al., 2017; Domsalla et al., 2013), and increased P3b potentials in an electroencephalography study, which are thought to reflect dACC activity (Gutz, Renneberg, Roepke, & Niedeggen, 2015). This increased dACC activity is reasoned to reflect the increased feelings of rejection and social exclusion that have been observed in BPD individuals at a self-report level.

In sum, previous studies have demonstrated that individuals with BPD have specific deficits in emotion recognition, in cooperating with others, in trusting others, and in solving social problems. Moreover, BPD individuals tend to evaluate others as hostile and untrustworthy in first-acquaintance type situations. All of these processes have been proposed to potentially underlie interpersonal dysfunction in BPD, along with possible alterations in the endogenous opioid or oxytocin systems or in neurological activation patterns.

1.4 Research Questions

Above, I have reviewed studies that demonstrate the pervasiveness and negative outcomes of interpersonal dysfunction in BPD, underlining how it contributes to the psychological and physical morbidity and socioeconomic burden of the disorder. I next summarized studies that showed different manifestations of interpersonal dysfunction in those with BPD, including maladaptive interpersonal styles characterized by high agency and coldness, poor relationship quality, small and conflictual social networks, high levels of

rejection sensitivity, and negative affective reactions to rejection in the laboratory and in daily life.

Taken together, the studies assessing affective reactions to rejection suggest that interpersonal events can serve as a trigger for increases in negative affect (including in daily life), and thereby likely contribute to the affective instability observed in BPD. Consequently, these studies conceptualize interpersonal events as an antecedent or trigger for negative affect. However, the Biosocial Model (Crowell et al., 2009; Linehan, 1993) as well as newly proposed neurobiological models of BPD (Stanley & Siever, 2009) also imply the opposite direction for this relationship. Linehan specifically purports that a state of dysregulated affect can also cause interpersonal problems, for example dysregulated anger leading to aggressive outbursts or conflicts. However, this part of the biosocial model has not been tested empirically.

In light of the above, I derived the first research question for the current thesis. Specifically, I aimed to ascertain whether interpersonal problems in daily life not only predict negative affect, as previous laboratory and AA studies suggest (Beeney et al., 2014; Berenson et al., 2011; Chapman et al., 2015; Chapman et al., 2014; Chaudhury et al., 2017; Dixon-Gordon et al., 2013; Lazarus et al., 2018; Miskewicz et al., 2015; Renneberg et al., 2012; Sadikaj et al., 2013; Sadikaj et al., 2010; Staebler, Helbing, et al., 2011; Stiglmayr et al., 2005), but whether being in a negative affective state also increases the likelihood of experiencing interpersonal problems. If both were true, interpersonal problems and negative affect could be at play in a mutually reinforcing way (a 'vicious cycle'). I addressed this question in study 1, within a sample of 80 BPD participants and 51 depressed clinical control participants. Participants completed an AA study for 28 days and entered data on negative affect and interpersonal problems six times daily. Using multi-level modeling, I aimed to determine whether interpersonal problems not only predict negative affect but whether negative affect in turn also predicts and increased probability of (later) reporting interpersonal problems. In study 2, I aimed

to replicate the findings from study 1 in a sample of 56 BPD and 60 community control participants, who participated for 21 days.

The research question I aimed address in studies 1 and 2 is part of a general effort to identify mechanisms that underlie interpersonal dysfunction in BPD, the previous evidence of which I summarized in section 1.3. What all of the previous research has in common is that is assesses impaired processes on the part of the BPD individual. However, interpersonal interaction is per se a process that plays out within dyads or in even larger groups of individuals. Therefore, processes pertaining to potential interaction partners of those with BPD should not be neglected, yet this has rarely been addressed (but see Dixon-Gordon, Whalen, Scott, Cummins, & Stepp, 2016; Miano et al., in press; Whalen et al., 2014). With study 3, I aimed to fill this gap, assessing how potential interaction partners view those with BPD. For this purpose I created a videoset of 26 individuals with BPD and 26 healthy control participants and showed these videos to several groups of raters. I hypothesized that raters would perceive individuals with BPD more negatively on a range of dimensions and argued that this could contribute to the interpersonal dysfunction in BPD by way of a reduced approach behavior or more negative interpersonal style from others towards the BPD individual. Thus, it is possible that how other see those with BPD and how they behave towards them interacts with the above processes on the part of the BPD individual in creating interpersonal dysfunction.

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

CHAPTER II

An adapted version of this chapter has been published as 'Hepp, J., Lane, S. P., Carpenter, R. W., Niedtfeld, I., Brown, W. C., & Trull, T. J. (2017). Interpersonal problems and negative affect in borderline personality and depressive disorders in daily life. *Clinical Psychological Science*, *5*(3), 470-484. doi:10.1177/2167702616677312'

2.1 Abstract

Theories of 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.

2.2 Introduction

Borderline Personality Disorder is a severe mental disorder that affects approximately 1% to 3% of the adult population (Tomko, Trull, et al., 2014; Torgersen, Kringlen, & Cramer, 2001). BPD is characterized by the core symptoms of impulsivity, interpersonal instability, and affective instability (e.g., Clarkin et al., 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' propensity to experience negative affect (Crowell et al., 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 et al., 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 et al. (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 et al., 1998).

To assess whether a mutually reinforcing relationship between negative affect and interpersonal problems exists, we collected data using AA, 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). Ambulatory Assessment 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 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 et al., 2002; Jovev & Jackson, 2004; Specht et al., 2009), and numerous studies show that BPD patients are particularly sensitive towards rejection (e.g., Berenson et al., 2011; Staebler, Helbing, et al., 2011). Most importantly, beliefs about rejection differentiate BPD patients from patients with other personality disorders (Arntz et al.,

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 et al., 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 et al., 2011; Dixon-Gordon et al., 2013) and hostility (Beeney et al., 2014; Chapman et al., 2015; Chapman et al., 2014; Renneberg et al., 2012) following experimentally induced rejection. Similar findings have been observed using AA 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 et al., 2013) or a non-communal (Sadikaj et al., 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 (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 AA. 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 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 et al., 2013; Domes et al., 2009; Lazarus et al., 2014; Mitchell et al., 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.

2.3 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 et al., 2016; Jahng et al., 2011; Jahng, Wood, & Trull, 2008; Solhan et al., 2009; Tomko et al., 2015; Tomko, Solhan, et al., 2014; Trull et al., 2008)[1]. Table 1 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 ($\kappa = .90$) and diagnosis of a current depressive disorder (κ

[1] There are a number of previous publications on this dataset, which are devoted to affective instability (Jahng et al., 2008; Solhan et al., 2009; Trull et al., 2008), linking affect and alcohol use (Jahng et al., 2011), momentary impulsivity (Tomko et al., 2015; Tomko, Solhan, 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 et al., 2016). Only one previous publication using this sample included the interpersonal problem variables (Hepp et al., 2016), 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. (2016) 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.

= 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 AA 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 according to the Structured Clinical 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 2 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.

Table 1

Demographic data by group (N = 131)

		BPD (*n* = 80)		*DD* (*n* = 51)	
		n	%	*n*	%
Ethnicity					
	African-American	5	6.3%	4	7.8%
	Hispanic	3	3.8%	2	3.9%
	Caucasian	67	83.3%	44	86.3%
	Native American	0	0%	1	2.0%
	Asian-American	2	2.5%	0	0%
	Other	1	1.3%	0	0%
Marital Status					
	Single, Never Married	41	51.3%	23	45.1%
	Married	13	16.3%	13	25.5%
	Cohabitating	9	11.3%	6	11.8%
	Divorced or Separated	17	21.3%	9	17.7%
Annual Income					
	$0 to $25,000	57	71.3%	35	68.6%
	$25,001 to $50,000	12	15.0%	10	19.6%
	$50,001 to $75,000	5	6.3%	3	5.9%
	$75,001 to $100,000	4	5.0%	1	1.9%
	Above $100,000	2	2.5%	2	3.9%
	Currently Employed[a]	39	48.8%	24	47.1%

Note. BPD = Borderline Personality Disorder; DD = Depressive Disorder.

[a] Employment information was unavailable for 2 individuals in the DD group and 1 individual in the BPD group.

Table 2

Current co-morbid disorders by group (N = 131)

	BPD (*n* = 80)		*DD* (*n* = 51)	
	n	%	*n*	%
Any mood disorder[a]	50	62.5%	51	100%
Major Depression	25	31.3%	42	82.4%
Depressive Disorder NOS	1	1.3%	0	0.0%
Dysthymia	14	17.5%	22	43.1%
Bipolar I disorder	14	17.5%	0	0.0%
Bipolar II disorder	2	2.5%	0	0.0%
Bipolar disorder - other	4	5.0%	0	0.0%
Any anxiety disorder	63	78.8%	34	66.7%
Panic Disorder	20	25.0%	8	15.7%
Agoraphobia	3	3.8%	2	3.9%
Social Phobia	24	30.0%	17	33.3%
Specific Phobia	17	21.3%	7	13.7%
Obsessive-Compulsive Disorder	20	25.0%	5	9.8%
Posttraumatic Stress Disorder	27	33.8%	11	21.6%
Generalized Anxiety Disorder	32	40.0%	16	31.4%
Anxiety Disorder NOS	3	3.8%	4	7.8%
Any eating disorder	18	22.5%	3	5.9%
Any substance use disorder	14	17.5%	3	5.9%
Any PD other than Borderline	74	92.5%	20	39.2%
Narcissistic PD	8	10.0%	0	0.0%
Histrionic PD	7	8.8%	0	0.0%
Antisocial PD[b]	18	22.5%	2	3.9%
Schizotypal PD	2	2.5%	0	0.0%
Schizoid PD	0	0.0%	0	0.0%
Paranoid PD	11	13.8%	1	2.0%
Avoidant PD	28	35.0%	16	31.4%
Dependent PD	8	10.0%	2	3.9%
Obsessive Compulsive PD	19	23.8%	6	11.8%

Note. BPD = Borderline Personality Disorder; DD = Depressive Disorder; PD = Personality Disorder; NOS = not otherwise specified. There were no cases of mood or anxiety disorders due to a general medical condition or substance induced.

[a] There were 3 BPD individuals with unavailable Axis I and II diagnostic data, with the exception, for 2 of these individuals, of the mood disorder category.

[b] For Antisocial PD, only Criterion A was assessed.

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).

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.

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

[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.

[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, and allocate the shared variance to individual differences, daily, and momentary processes. While the negative affects and interpersonal problems are, indeed, robustly correlated, the correlations still afford considerable unique variance to the constructs.

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 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 adjusted for the covariates weekday, weekend, study day, and time since the participant awoke. Analyses were performed in R (R Core Team, 2018) using the *lmer* and *glmer* functions from the package *lme4* (Bates, Maechler, Bolker, & Walker, 2015). Significance tests were conducted using the package *lmerTest* (Kuznetsova, Brockhoff, & Christensen, 2017).

2.4 Results

Means, standard deviations and mean ranges for hostility, sadness, and fear and interpersonal problems are presented in Table 3. Table 4 presents the endorsement of rejection and disagreement, broken down by interaction partner. The pairwise correlations for the affect variables and interpersonal problems at the momentary level are presented in Table 5, separately by group.

Table 3

Means, standard deviations, and mean ranges for negative affect and interpersonal problems for the total sample and by 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. BPD = borderline personality disorder, DD = depressive disorder. *bSD* = between person standard deviation, *wSD* = mean of all within p erson standard deviations. Means for rejection and disagreement indicate the proportion of prompts where these events were endorsed.

Table 4

Breakdown of percentage of all reports in which individuals indicated contact with and rejection and/or disagreement by various targets, split by specific targets and presented separately for the BPD and DD group

	BPD			DD		
	Contact	*Reject*	*Disagree*	*Contact*	*Reject*	*Disagree*
Any	65.84	16.04	13.14	64.44	12.85	10.47
Partner	28.72	9.38	6.66	23.83	5.87	5.11
Work	3.35	1.12	1.02	4.66	1.57	1.93
Friends	27.58	3.71	2.44	21.15	1.98	1.56
Family	37.04	4.70	5.09	39.76	5.48	3.81

Note. BPD = borderline personality disorder, DD = depressive disorder. Percentages represent the total proportion of occasions where individuals reported having contact with, feeling rejected by, and having a disagreement with each target.

Table 5

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

Note. BPD = borderline personality disorder, DD = depressive disorder.

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 6. 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 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 6). 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

[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.

(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 7 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* = 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).

2.5 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.

Table 6

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.

Table 7

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			
Predictors	*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 = momentary, host = hostility, sadn = sadness, fear = fear; day = day level, pers = person level. 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

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 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 (R. Friedman et al., 2004; Van Kleef, De Dreu, & Manstead, 2004) and wanted to avoid further interaction with the opponent (e.g., Van Kleef et al., 2004).

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 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 S1 and Table S2 of the appendix. 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 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 to some extent 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 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] 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,

[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.

resulted in proportions of cases that were too small to analyze separately (i.e., and therefore underpowered, see Table 4).

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.

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 AA 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.

2.6 Supplemental Materials

Table S1

Estimates, standard errors, and p-values for rejection and disagreement predicting hostility, sadness, and fear in Borderline Personality Disorder without comorbid Depression, with comorbid Depression, and a depressed group, using a multivariate multi-level model

	BPD without DD			BPD with DD			DD		
				Hostility					
Predictors	*Est.*	*SE*	*p*	*Est.*	*SE*	*p*	*Est*	*SE*	*p*
Mom rej	**0.27**	**0.02**	**<.001**	0.22	0.03	<.001	0.20	0.02	<.001
Day rej	0.58	0.08	<.001	0.54	0.07	<.001	0.40	0.06	<.001
Person rej	0.82	0.68	.237	1.82	0.48	<.001	1.19	0.46	.010
Mom dis	**0.38**	**0.02**	**<.001**	0.34	0.03	<.001	0.30	0.02	<.001
Day dis	**0.76**	**0.08**	**<.001**	0.61	0.08	<.001	0.48	0.08	<.001
Person dis	1.23	0.84	.147	-0.88	0.86	.305	0.52	0.70	.460
				Sadness					
Mom rej	0.33	0.02	<.001	0.31	0.03	<.001	0.35	0.02	<.001
Day rej	0.75	0.10	<.001	1.03	0.08	<.001	*0.55*	*0.08*	*<.001*
Person rej	2.67	0.99	.008	2.76	0.68	<.001	1.74	0.67	.009
Mom dis	0.14	0.02	<.001	0.13	0.03	<.001	0.12	0.02	<.001
Day dis	0.20	0.10	.049	0.06	0.10	.579	0.24	0.09	.008
Person dis	-0.71	1.20	.556	-1.80	1.23	.148	-1.12	1.00	.267
				Fear					
Mom rej	0.16	0.02	<.001	0.12	0.03	<.001	0.15	0.02	<.001
Day rej	0.43	0.08	<.001	0.37	0.07	<.001	0.40	0.06	<.001
Person rej	0.43	0.84	.611	1.31	0.58	.025	1.78	0.56	.002
Mom dis	0.14	0.02	<.001	0.08	0.03	.002	0.13	0.02	<.001
Day dis	0.25	0.09	.004	0.17	0.08	.047	0.22	0.08	.003
Person dis	**2.01**	**1.03**	**.052**	-1.50	1.05	.155	-0.72	0.85	.399

Note. BPD = Borderline Personality Disorder, DD = Depressive Disorder, Est. = estimate, mom = momentary, rej = rejection, dis = disagreement, day = day level, person = person level. Significant differences between the groups BPD without depression and DD are highlighted in boldface. Significant differences between the groups BPD with depression and DD are italicized. Significant differences between the groups BPD without depression and BPD with depression are underlined.

Table S 2

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								
	BPD without DD			*BPD with DD*			*DD*		
Predictors	*OR*	*SE*	*p*	*OR*	*SE*	*p*	*OR*	*SE*	*p*
Mom host	2.10	0.11	<.001	2.81	0.12	<.001	*1.95*	*0.11*	*<.001*
Mom sadn	2.43	0.12	<.001	1.70	0.10	<.001	*2.35*	*0.10*	*<.001*
Mom fear	1.02	0.14	.879	0.84	0.13	.196	0.99	0.13	.958
Day host	2.54	0.20	<.001	1.67	0.18	.005	1.90	0.18	<.001
Day sadn	1.61	0.17	.004	3.13	0.15	<.001	*1.33*	*0.15*	*.059*
Day fear	0.98	0.24	.921	0.53	0.18	<.001	*1.72*	*0.20*	*.008*
pers host	5.01	1.16	.165	1.56	0.67	.505	3.23	0.60	.051
pers sadn	2.43	0.63	.158	2.25	0.50	.107	1.16	0.36	.671
pers fear	0.87	0.63	.826	0.40	0.64	.156	1.66	0.49	.296
	Disagreement								
Mom host	3.77	0.11	<.001	4.54	0.13	<.001	3.83	0.12	<.001
Mom sadn	1.21	0.12	.107	1.08	0.11	.480	1.18	0.11	.115
Mom fear	0.96	0.14	.777	0.80	0.14	.119	*1.34*	*0.14*	*.037*
Day host	**3.78**	**0.17**	**<.001**	3.45	0.18	<.001	2.21	0.17	<.001
Day sadn	0.79	0.17	.158	0.93	0.14	.625	0.95	0.14	.701
Day fear	**0.78**	**0.21**	**.243**	0.67	0.16	.011	*1.38*	*0.20*	*.103*
pers host	10.82	0.95	.012	1.48	0.56	.480	2.17	0.50	.121
pers sadn	0.67	0.52	.447	0.87	0.42	.751	0.76	0.30	.358
pers fear	1.08	0.52	.878	0.56	0.53	.279	0.81	.40	.596

Note. BPD = Borderline Personality Disorder, DD = Depressive Disorder, Est. = estimate, mom = momentary, rej = rejection, dis = disagreement, day = day level, person = person level. Significant differences between the groups BPD without depression and DD are highlighted in boldface. Significant differences between the groups BPD with depression and DD are italicized. Significant differences between the groups BPD without depression and BPD with depression are underlined.

Study II: Interpersonal stressors and negative affect in individuals with borderline personality disorder and community adults in daily life: A replication and extension

CHAPTER III

An adapted version of this chapter has been published as 'Hepp, J., Lane, S. P., Wycoff, A. M., Carpenter, R. W., & Trull, T. J. (2018). Interpersonal stressors and negative affect in individuals with borderline personality disorder and community adults in daily life: A replication and extension. *Journal of Abnormal Psychology*, *127*(2), 183-189. doi:10.1037/abn0000318

3.1 Abstract

Affective instability and interpersonal problems are key features of BPD. They were shown to co-vary in the daily lives of patients in a recent ambulatory assessment study (Hepp et al., 2017) that observed comparatively larger positive associations between interpersonal problems and negative affect in individuals with BPD than those with depressive disorders. The present study sought to replicate these findings, collecting data on hostility, sadness, fear, and rejection or disagreement events from 56 BPD and 60 community control participants for twenty-one days, six times a day. Using identical statistical procedures, the positive associations between momentary rejection/disagreement and hostility, sadness, and fear were replicated. Again replicating the original study, the rejection-hostility, rejection-sadness, and disagreement-hostility associations were significantly stronger in the BPD group. Time-lagged analyses extended the original study, revealing that rejection was associated with subsequent hostility and sadness more strongly in the BPD group, as was disagreement with subsequent hostility and fear. Though small, we argue that the observed group differences reflect meaningful pervasive responses in a daily life context. Future research should consider these when implementing affect regulation strategies that are applicable in interpersonal contexts for all individuals, but particularly those with BPD.

3.2 Introduction

Affective instability is a hallmark feature of BPD that is theorized to result from a combination of heightened dispositional sensitivity to emotions and marked affective reactivity to external and internal stressors (American Psychiatric Association, 2013; Crowell et al., 2009). Previous studies have identified negative interpersonal events (especially rejection) as external stressors that are associated with affective instability in BPD. In experimental studies, BPD participants reported stronger increases in negative affect following experimentally induced rejection compared to control participants (Dixon-Gordon et al., 2011; Dixon-Gordon et al., 2013). Ambulatory Assessment studies (see Trull & Ebner-Priemer, 2013 for a review) that collected data in BPD individuals' daily lives showed stronger associations between momentary rejection and NA in BPD than in control participants (Sadikaj et al., 2013; Sadikaj et al., 2010) and positive associations between rejection and aversive tension (Stiglmayr et al., 2005) as well as between rejection, disagreement and negative affect (Chaudhury et al., 2017). Importantly, both experimental (Beeney et al., 2014; Chapman et al., 2015; Renneberg et al., 2012) and AA studies (Berenson et al., 2011; Miskewicz et al., 2015) also provide evidence for a more specific association between rejection and hostility/anger-like constructs.

A recent study (Hepp et al., 2017) sought to examine the specificity of such associations by simultaneously modeling three subtypes of negative affect (hostility, sadness, fear) and two different interpersonal problems (rejection, disagreement) in 80 individuals with BPD and 51 depressed individuals using ambulatory assessment. In both groups, disagreement and rejection were positively associated with concurrent hostility, sadness, and fear at the momentary- and day-levels. Importantly, the disagreement-hostility associations were significantly stronger in the BPD group at both levels, as were the rejection-hostility and rejection-sadness associations at the day level. This suggests that hostile affect is particularly reactive to interpersonal problems in those with BPD.

The present study sought to replicate these findings in a separate BPD sample and a community control group. Mirroring the original study, hostility, sadness, fear, rejection and disagreement were assessed. The three affects were selected because they are explicitly mentioned in the DSM-5 affective instability criterion of BPD, which requires "a marked reactivity of mood (e.g., intense episodic dysphoria, irritability, or anxiety […]" (APA, 2013, p. 663). Beyond replication of the findings of Hepp et al. (2017), we aimed to extend the original study by providing replication with a different control group and extending the findings to lagged relationships. The original study demonstrated associations between negative affect and interpersonal problems only in the same time-period, whereas the present study employed a modified data collection protocol that allowed us to assess the temporal ordering of negative affect and interpersonal problems.

Hypotheses

H1: Previous AA studies have shown positive associations between momentary rejection or disagreement and general negative affect in BPD (Chaudhury et al., 2017; Sadikaj et al., 2013; Sadikaj et al., 2010), and Hepp et al. (2017) extended these findings to specific types of negative affect. We expected to replicate the positive concurrent associations of rejection and disagreement with hostility, sadness, and fear that Hepp et al. (2017) reported.

H2: Previous studies using experimental (Chapman et al., 2015; Renneberg et al., 2012) and AA methods (e.g., Berenson et al., 2011; Miskewicz et al., 2015) have shown a positive association between hostility/anger-like constructs and rejection. Hepp et al. (2017) extended this to disagreement and showed some specificity for BPD. We thus similarly expected to find significantly stronger associations of hostility with rejection and disagreement in those with BPD.

H3: Hepp et al. (2017) focused on concurrent relationships between negative affect and interpersonal problems, while the present study aimed to extend these to lagged relationships. We expected rejection and disagreement events to positively predict hostility, sadness, and fear

at the following time-point (on average 2 hours later). We further expected this effect to be stronger in the BPD group because affect in BPD is more likely to be influenced by past interpersonal problems due to affective instability (APA, 2013).

3.3 Method

Participants

A total of 116 participants aged 18 to 45 who reported consuming alcohol at least once a week were recruited from local psychiatric outpatient clinics and community advertisements. 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. Further details are reported in Lane, Carpenter, Sher, and Trull (2016).

The BPD group included 56 individuals who met criteria for BPD, endorsed the affective instability criterion, and were currently in treatment. The 60 community control participants (COM) did not meet criteria for BPD or affective instability. BPD participants did not differ from COM participants regarding age (BPD: M = 26.0, SD = 7.2; COM: M = 26.7, SD = 7.1; $t(114) = 0.50$, $p = .618$) or gender, with similar percentages of women in both groups (BPD = 82.1% women; COM = 75.0%, $\chi^2(1) = 0.87$, $p = .350$). The majority of participants in both groups were of Caucasian ethnicity (BPD = 83.9%; COM = 85.0%, $\chi^2(4) = 2.64$, $p = .620$), had an annual income less than $25,000 (BPD = 75.0%; COM = 38.3%, $\chi^2(4) = 16.72$, $p = .002$), and were single or never married (BPD = 73.2%; COM = 64.4%, $\chi^2(4) = 7.56$, $p = .109$).

Thirteen COM participants (21.7%) had a current anxiety disorder, nine (15.0%) a current substance use disorder, one (1.7%) a current mood disorder, and one (1.7%) met criteria for avoidant personality disorder. Thirty-six BPD participants (64.3%) had a current anxiety disorder, twenty-nine (51.8%) another personality disorder, twenty-two (39.3%) a current mood disorder, twenty-two (39.3%) a current substance use disorder, and four (7.1%) a current eating

disorder. BPD participants were more likely than COM participants to meet criteria for all of the aforementioned comorbid diagnostic categories (all *p*s < .035).

Procedure

Study procedures were approved by the Institutional Review Board of the University of Missouri (protocol 1133597), and written informed consent was provided prior to in-person participation. Diagnoses were determined using the Structured Clinical Interview for DSM-IV-TR Axis-I Disorders (First et al., 1995) and the Structured Interview for DSM-IV-TR Personality Disorders (Pfohl et al., 1994). Interrater reliabilities, computed for a subsample of 20 participants, were strong for the diagnosis of BPD (κ = 0.88), a current anxiety disorder (κ = .89), a current substance use disorder (κ = 1.00), a current alcohol use disorder (κ = 1.00), and moderate for any current mood disorder (κ = .77).

Eligible participants completed self-report questionnaires and were taught the AA procedures during an orientation session for which they were paid $10. AA data were then collected via electronic diaries (Palm Tungsten™ E2 handheld computer) that participants carried for approximately 21 days (*M* = 21.6, *SD* = 2.1). The electronic diaries prompted participants to answer questions randomly six times a day. In addition to the random prompts, event-contingent prompts for alcohol consumption, smoking, and non-suicidal self-injury were included. As interpersonal problems were not assessed at the event-contingent prompts, these were not included in the present analyses. For information regarding the content of these event-related prompts, see Lane et al. (2016). Participants were paid up to $50 after each week in the study depending on compliance, and were also paid $10 for completing additional self-report questionnaires at the end of the study. Compliance in this sample was high; participants on average completed 90.3% of the random prompts.

Measures

Negative affect: At each random prompt, participants rated their momentary affect on the PANAS-X items (Watson & Clark, 1999). Participants indicated the level of their affect within the past 15 minutes (1 = very slightly/not at all, 5 = extremely). Beyond the general negative/positive affect items, an additional 11 items to complete the hostility (6 items), sadness (5 items), and fear (6 items) scales were presented and items within each of the three scales were aggregated into mean scores for each person at any given prompt. For each person, individual day means were computed by averaging all the momentary scores within a day. These day means were then averaged into a person mean. Following Shrout and Lane (2012), we estimated multilevel reliability coefficients for each NA subscale. The reliabilities of individuals' average affect ratings across the diary period were excellent (all R_{KF}s >.88), reliabilities of any single time point rating were good (all R_{KR}s >.84), and the reliabilities in the change of subscale ratings across time were adequate to good (all R_{C}s >.72).

Interpersonal problems: At each random prompt, participants indicated if they had felt rejected by or had had a disagreement with their romantic partner, boss/teacher, co-worker, roommate, friend, parent, sibling, child, or any other family member since last prompted (yes/no answer). The endorsements were aggregated into two dichotomous variables, indicating whether *any* rejection or *any* disagreement had occurred (as soon as participants selected rejection/disagreement for at least one interaction partner, this variable became 1, otherwise it was coded 0). The two momentary variables were aggregated by day to obtain two variables indicating the proportion of prompts where disagreement/rejection was endorsed. Lastly, these day means were aggregated by person to obtain two variables indicating the proportion of days on which disagreement/rejection was endorsed. In the BPD group, 359 rejection (7.9% of prompts) and 349 disagreement events (7.7% of prompts) were reported in total. COM participants reported a total of 110 rejections (2.2% of prompts) and 167 disagreements (3.3% of

prompts). Between and within-person correlations for the negative affect scales and interpersonal events are presented in Table S3.

Data analysis

The data analytic design for the replication part of the study was identical to that of the original study (Hepp et al., 2017), employing a multivariate multi-level model. In model 1, momentary hostility, sadness, and fear were (simultaneously) predicted by momentary rejection and disagreement, interacted with group. Model 2 used the lagged scores of momentary rejection and disagreement (lagged by one prompt) and the difference score between current and lagged rejection/disagreement to predict current hostility, sadness, and fear (simultaneously). The lagged score was included to assess the effects of previous rejection/disagreement on current NA (which was assessed on average 2 hours later). The difference score was included because it mathematically adjusts for the current value of rejection/disagreement and thus helps to isolate the actual lagged effects of interest. The lagged and difference scores were interacted with a group dummy.

Both models statistically adjusted for the day- and person-level scores of rejection and disagreement, to ensure that we were able to isolate the momentary effects as intended. The day- and person level predictors were also interacted with the group variable. Both models further adjusted for the lagged criterion scores and included the covariates weekday, weekend (5PM Friday through 5PM Sunday), study day, and time elapsed since the participant awoke.

Momentary predictors were centered on the participant's day mean, daily predictors on the person mean, and person-level predictors on the sample mean. Random intercepts were modelled for each person and day for each of the multivariate criteria. Analyses were performed in R using the *lmer* function from the package *lme4* (Bates et al., 2015). Significance tests were conducted using the package *lmerTest* (Kuznetsova et al., 2017). Model equations and results from power analyses for these models are provided in the Supplementary Materials.

3.4 Results

Replication

The concurrent effects of rejection, disagreement, and group on negative affect are presented in Table 8 and illustrated in Figure 1. Momentary rejection showed a positive association with hostility and sadness in both groups, and these associations were significantly stronger for BPD individuals (rejection×Group on hostility: *Est* = 0.13, β = 0.04, *SE* = 0.05, *p* = .009; rejection×Group on sadness: *Est* = 0.21, β = 0.06, *SE* = 0.05, *p* <.001). Momentary disagreement was positively associated with hostility and sadness in both groups, and the association with hostility was significantly stronger for BPD individuals (disagreement×Group: *Est* = 0.17, β = 0.07, *SE* = 0.04, *p* <.001). Pseudo R^2 values, computed following Snijders and Bosker (2012), indicated that 21-26% of random effects and residual variance in the negative affects was explained by the predictors ($R^2_{\text{hostility}}$ = .21, R^2_{fear} = .21, R^2_{sadness} = .26).

Extension

Table 9 presents the effects of the lagged scores of rejection and disagreement (adjusted for their difference scores) on negative affect. Lagged rejection showed a positive association with hostility and sadness in both groups, with significantly stronger associations in the BPD group (lagged_rejection×Group on hostility: *Est* = 0.24, β = 0.08, *SE* = 0.08, *p* = .002; lagged_rejection×Group on sadness: *Est* = 0.32, β = 0.09, *SE* = 0.08, *p* <.001). Lagged disagreement was positively associated with hostility and sadness in both groups, and the association with hostility was significantly stronger in the BPD group (lagged_disagreement×Group: *Est* = 0.21, β = 0.08, *SE* = 0.07, *p* = .002). The association between lagged disagreement and fear was positive only in the BPD group (lagged_disagreement×Group: *Est* = 0.14, β = 0.05, *SE* = 0.07, *p* = .046). Pseudo R^2 was .22 for hostility, R^2 = .26 for sadness, and R^2 = .21 for fear. We repeated both the concurrent and lagged model adjusting for comorbid anxiety disorders in both groups and for drinking events during the random prompts and all results replicated (see Tables S4 –S7).

Table 8

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

	Hostility								Sadness								Fear							
	Borderline				Community				Borderline				Community				Borderline				Community			
Predictors	*b*	β	*SE*	*p*	*b*	β	*SE*	*p*	*b*	β	*SE*	*p*	*b*	β	*SE*	*p*	*b*	β	*SE*	*p*	*b*	β	*SE*	*p*
Mom rej	**0.24**	**0.09**	**0.03**	**<.001**	**0.12**	**0.04**	**0.04**	**.004**	**0.55**	**0.15**	**0.03**	**<.001**	**0.34**	**0.04**	**0.09**	**<.001**	0.06	0.02	0.02	.019	0.08	0.04	0.03	.067
Day rej	0.41	0.10	0.06	<.001	0.35	0.08	0.10	<.001	**1.25**	**0.23**	**0.07**	**<.001**	**0.80**	**0.13**	**0.14**	**<.001**	**0.46**	**0.06**	**0.11**	**<.001**	**0.20**	**0.10**	**0.05**	**.037**
Person rej	**0.41**	**0.10**	**0.69**	**.556**	**3.72**	**0.54**	**1.39**	**.009**	2.24	0.25	0.85	.010	3.12	1.72	0.35	.068	0.88	0.75	0.13	.241	3.08	1.51	0.45	.044
Mom dis	**0.50**	**0.19**	**0.02**	**<.001**	**0.32**	**0.12**	**0.03**	**<.001**	0.21	0.06	0.03	<.001	0.15	0.03	0.04	<.001	0.07	0.02	0.03	.003	0.04	0.04	0.02	.259
Day dis	**0.84**	**0.20**	**0.06**	**<.001**	**0.45**	**0.11**	**0.08**	**<.001**	0.30	0.05	0.08	<.001	0.30	0.11	0.05	.006	0.26	0.06	0.06	<.001	0.10	0.08	0.03	.226
Person dis	0.77	0.10	0.72	.295	0.42	0.06	1.18	.718	0.45	0.05	0.91	.621	0.06	1.46	0.01	.965	0.78	0.79	0.11	.324	0.68	1.28	0.09	.596
BPD group	0.19	0.41	0.07	.004					0.32	0.52	0.08	<.001					0.26	0.07	0.55	<.001				

Note. Mom = momentary, rej = rejection, dis = disagreement. The model adjusted for lagged hostility, sadness, and fear and the covariates weekday, weekend, study day, and time since participant awoke. Group was coded Borderline = 0 for the Borderline columns and community = 0 for the community columns. Significant group differences are highlighted in boldface.

Table 9

Estimates, standard errors, and p-values for group, lagged rejection and lagged disagreement predicting hostility, sadness, and fear (simultaneously) in a multivariate multi-level model

	Hostility								Sadness								Fear							
	Borderline				Community				Borderline				Community				Borderline				Community			
Predictors	*b*	β	*SE*	*p*	*b*	β	*SE*	*p*	*b*	β	*SE*	*p*	*b*	β	*SE*	*p*	*b*	β	*SE*	*p*	*b*	β	*SE*	*p*
Rej lag	**0.39**	**0.13**	**0.04**	**<.001**	**0.14**	**0.05**	**0.07**	**.030**	**0.79**	**0.21**	**0.04**	**<.001**	**0.47**	**0.12**	**0.07**	**<.001**	0.07	0.02	0.04	.088	0.07	0.02	0.07	.314
Dis lag	**0.63**	**0.24**	**0.04**	**<.001**	**0.42**	**0.16**	**0.06**	**<.001**	0.33	0.10	0.04	<.001	0.20	0.06	0.06	<.001	**0.13**	**0.05**	**0.04**	**.001**	**-0.01**	**0.00**	**0.06**	**.909**
Rej diff	**0.26**	**0.14**	**0.03**	**<.001**	**0.12**	**0.07**	**0.04**	**.004**	**0.58**	**0.24**	**0.03**	**<.001**	**0.36**	**0.15**	**0.04**	**<.001**	0.06	0.03	0.03	.028	0.07	0.04	0.04	.082
Dis diff	**0.52**	**0.32**	**0.03**	**<.001**	**0.34**	**0.21**	**0.03**	**<.001**	0.23	0.11	0.03	<.001	0.16	0.08	0.03	<.001	0.08	0.05	0.03	<.001	0.03	0.02	0.03	.430
BPD	0.20	0.41	0.07	.004					0.32	0.52	0.08	<.001					0.26	0.55	0.07	<.001				

Note. Mom = momentary, rej = rejection, dis = disagreement. The model adjusted for lagged hostility, sadness, and fear and the covariates weekday, weekend, study day, and time since participant awoke. Group was coded Borderline = 0 for the Borderline columns and community = 0 for the community columns. Significant group differences are highlighted in boldface.

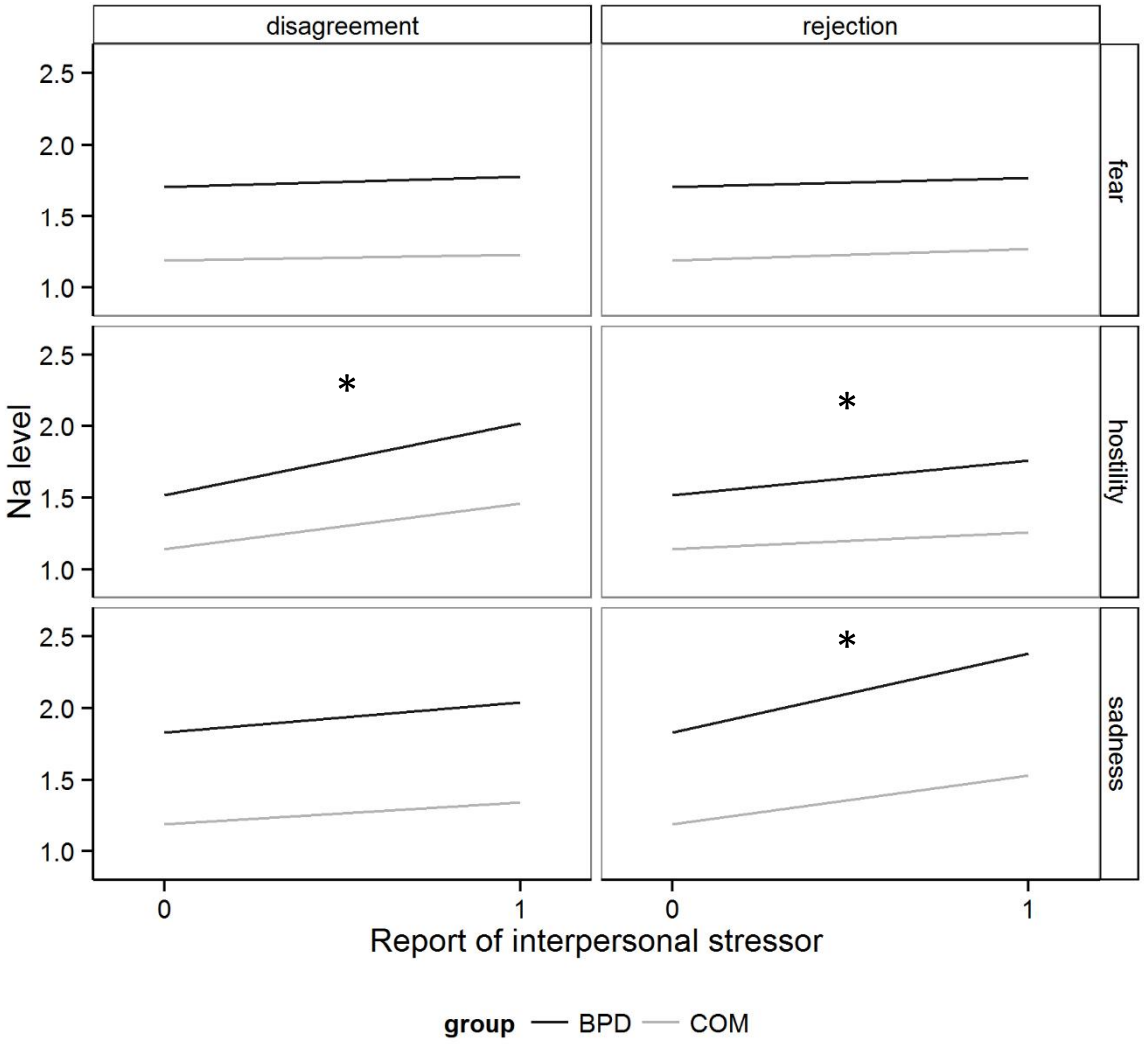

Figure 1. Illustration of the concurrent effects of momentary interpersonal problems on negative affect, presented by group and separately for rejection and disagreement and for each of the negative affect criteria. Parameters used to generate the plot where extracted from Table 8. Na level = level of negative affect, BPD = Borderline Personality Disorder, COM = community controls. A '*' indicates a significant difference between BPD and COM slopes.

3.5 Discussion

The present study replicated an independent study (Hepp et al., 2017), which demonstrated positive associations of momentary hostility, sadness, and fear with rejection and disagreement in BPD individuals' daily lives. All six positive associations at the momentary level (rejection/disagreement each predicting hostility/sadness/fear) were replicated. These findings corroborate previous experimental and AA evidence of a positive relationship between negative affect and rejection (Dixon-Gordon et al., 2011; Dixon-Gordon et al., 2013; Sadikaj et al., 2013; Sadikaj et al., 2010) and between negative affect and disagreement (Chaudhury et al., 2017) in BPD. Extending previous work, Hepp et al. (2017) and the present study included both different subtypes of negative affect and different types of interpersonal problems. Importantly, we employed a multivariate model, testing the effects of rejection and disagreement on all three affects simultaneously. This not only isolates unique variance attributable to rejection and disagreement as in models with a single criterion, but also adjusts model estimates and standard errors due to measurement correlation within and across the three criteria. Note that all interaction effects except person-level rejection×group on hostility (concurrent model) remained significant after correcting for multiple testing, following Benjamini and Hochberg (1995). The original study used a depressed control group, whereas BPD individuals in the present study were compared to community controls. Regarding group differences, the disagreement-hostility association was replicated most closely; it was stronger in the BPD group at the momentary and day-level in both the original and current study. We further replicated a stronger day-level rejection-sadness association for BPD individuals, which extended to the momentary level in the current study, where the groups also differed. Lastly, we observed a stronger rejection-hostility association for BPD individuals at the momentary level, while the original study found this at the day level, corroborating previous evidence from experimental and AA studies (Beeney et al.,

2014; Berenson et al., 2011; Chapman et al., 2015; Miskewicz et al., 2015; Renneberg et al., 2012).[6]

In the additional lagged models, lagged rejection and disagreement showed positive associations with subsequent hostility and sadness in both groups and lagged disagreement with fear in the BPD group. Importantly, the associations for rejection-hostility, rejection-sadness, disagreement-hostility and disagreement-fear were significantly stronger in the BPD group. Thus, in addition to the concurrent effects, interpersonal problems were likely to impact negative affect that occurred on average 2 hours later. These stronger effects for the BPD group may illustrate the increased affective reactivity of BPD individuals that is postulated in theories of BPD (Crowell et al., 2009).

It is important to note that the effect sizes for group differences in the stressor-affect associations (reported in an *r* metric) ranged from very small to small when considering the total variation observed across moments, days, and persons. As such, one may interpret these effects as having relatively little impact, in an absolute sense, given the myriad people, places, and contexts individuals encounter in their everyday lives. While this is a valid interpretation, we would hesitate to minimize their meaningfulness. Hox (2010), Snijders and Bosker (2012) and Nezlek (2012) warn against strict reliance on effect size estimates in clustered designs because the relative variances of the different levels are lost upon standardization. In the current data, there was generally three times the variability at the momentary level compared to the person level, and two times the variability at the daily level compared to the person level. Therefore, accounting for even small amounts of variability (e.g., 1-2% each) at a level of analysis where situations are constantly changing can be quite meaningful because such effects bring continuity and consistency to otherwise diverse and random contexts (cf. Bolger, Davis, & Rafaeli, 2003). Indeed, though BPD individuals exhibit greater reactivity to interpersonal problems to a

[6] A more detailed discussion of day-and person-level effects is provided in the Supplementary Materials.

relatively small extent compared to community individuals, the finding that they do so consistently across contexts illustrates that it is pervasive and could contribute to their overall generalized dysfunction.

Also noteworthy is that there were a number of associations that were not significantly different across groups, namely (concurrent and lagged) rejection-fear and disagreement-sadness. Nevertheless, a majority of these associations were statistically significant for both groups individually. These patterns similarly parallel the findings of Hepp et al. (2017) despite different comparison groups, suggesting that while there are robust associations in a transdiagnostic sense, there are certain combinations of interpersonal problems and coupled emotional reactions that are stronger for those with BPD. Further investigation regarding whether such effects are similar across other comparison groups or are indeed different is needed.

Limitations and Implications

A major limitation of this study is that while the lagged models helped establish a time-sequence of events, we cannot say that interpersonal problems are the *cause* for the observed negative affect increases at the following time-points. It is possible that other types of stressors (e.g. *intra*personal stressors such as negative memories) or those that occurred when data were not sampled account for a proportion of the observed affective changes. The different time frames of assessment for NA and rejection/disagreement also play into this limitation: negative affect was assessed for "the past 15 minutes", whereas interpersonal problems were reported "since the last prompt", rendering the temporal ordering less clear than if both had been assessed with regard to "right now" (but likely at the cost of missing the majority of interpersonal problems). A study design with more frequent or event-contingent sampling may further elucidate this relationship, and the combination of clinical and healthy control groups could establish further specificity for BPD. Future studies should also consider assessing the strength or impact of interpersonal problems, as this may explain the magnitude of the affective change.

It is possible that BPD individuals encounter more severe stressors or appraise them as such. Relatedly, the set of targeted interpersonal problems should be extended beyond rejection and disagreement.

A further potential limitation is the inclusion criterion of weekly alcohol consumption, as alcohol use may have impacted the association of interpersonal stress and negative affect. Likewise, the high rate of comorbidity in BPD individuals and the presence of some psychopathology in COM individuals is a potential limitation, as it is thus unclear how psychopathology other than BPD may have contributed to the observed results. To account for potential influences of alcohol use and psychopathology beyond BPD, we repeated our analyses adjusting for current anxiety disorders (the most prominent psychopathology in both groups) as well as alcohol use. In both cases the results replicated (see Supplementary Material). Nonetheless, even with regard to BPD pathology our sample was somewhat selective because it included BPD individuals that were currently in treatment. Thus, we may have sampled BPD individuals that were at the more severe end of the BPD continuum, who likely exhibit the strongest associations between the constructs of interest. If we had assessed BPD pathology dimensionally, the effects might have been smaller than the interaction effects we report. Ultimately, it would be instructive to replicate the present findings using a dimensional approach to BPD pathology.

In sum, the current results and Hepp et al. (2017) suggest that rejection and disagreement are positively associated with hostility, sadness, and fear in BPD. We demonstrated this relationship in BPD individuals' daily lives at the momentary level, showing that negative affect is relatively higher at the same occasions that rejection/disagreement is reported, but also that negative affect remains elevated at follow-up prompts that occur on average two hours later.

3.6 Supplemental Materials

Person-level bivariate correlations

The original study by Hepp et al. (2017) provided bivariate correlations between the negative affects and interpersonal problems. Table S3 presents these for the current dataset, showing bivariate correlations between hostility, sadness, fear, rejection and disagreement at the within-person and between-person level. In contrast to the multivariate multilevel models presented in the main manuscript, these are not adjusted for the influence of the other predictors and covariates that the models included.

Table S3

Within-person correlations and between-person correlations (in brackets) between types of negative affect and interpersonal problems, presented for the BPD group (above diagonal) and the COM group (below diagonal)

		BPD				
		Hostility	Sadness	Fear	Disagreement	Rejection
	Hostility		.45 (.61)	.39 (.77)	.37 (.29)	.29 (.27)
	Sadness	.34 (.86)		.42 (.67)	.18 (.32)	.32 (.41)
COM	Fear	.21 (.84)	.20 (.80)		.12 (.34)	.12 (.31)
	Disagreement	.35 (.33)	.24 (.42)	.07 (.25)		.32 (.74)
	Rejection	.20 (.75)	.28 (.77)	.09 (.71)	.34 (.58)	

Power analysis

Based on power analyses conducted before the current data collection, which were themselves based on published findings from the data reported in Hepp and colleagues (2017), a

priori power to detect small interaction effects (β = .10) between the groups, specifically at the momentary level, were >90% for the current sample size and multiple assessment protocol (i.e. ~126 assessments per person). Power was >80% for day level interaction effects, and was >50% for person level interaction effects (though these were not of primary interest in the current investigation).

Model equations

To test the association between reports of rejection and disagreement and affective ratings of hostility, sadness, and fear simultaneously, we used the multivariate approach described by Raudenbush and Bryk (2002). The concurrent analysis model is described in Equation 1. In this equation $Mood_{ijk}$ is the mood rating for participant *i*, on day *j*, for prompt *k*, and mood type ***H**ostile*, ***S**ad*, or ***F**ear*. Each mood type is fit with random person and day level random intercepts (b_{H0i}, b_{S0i}, b_{F0i}, and b_{H0j}, b_{S0j}, b_{F0j}, respectively). Of primary interest are the *m*omentary-, *d*ay-, and *p*erson-level measures of rejection (*Rej*) and disagreement (*Dis*), and the main effect and interactions with BPD status. Also included are the lagged criterion, covariates, and residuals specific to each mood type. H_{ijk} is an indicator that takes a value of 1 for participants' hostility reports and 0 for sadness and fear reports. Similarly, S_{ijk} takes a value of 1 for participants' sadness reports and 0 for hostility and fear reports, and F_{ijk} takes a value of 1 for participants' fear reports and 0 for hostility and sadness reports. This allows each sub-equation to be estimated simultaneously.

The lagged analysis model is described in Equation 2. This equation is largely the same as Equation 1, except we now include measures for lagged rejection and disagreement at the momentary level (*k*-1) where they were previously concurrent. In addition, we include measures for the change in rejection and disagreement from times *k*-1 to *k*, as indexed by Δ, as well as their interactions with BPD.

Equation 1

$$
\begin{aligned}
Mood_{ijk} = H_{ijk} \cdot & \begin{pmatrix} b_{H0i} + b_{H0j} \\ +b_{H1} \cdot mRej_{ijk} + b_{H2} \cdot dRej_{ijk} + b_{H3} \cdot pRej_{ijk} \\ +b_{H4} \cdot mDis_{ijk} + b_{H5} \cdot dDis_{ijk} + b_{H6} \cdot pDis_{ijk} \\ +b_{H7} \cdot BPD_i \\ +b_{H8} \cdot BPD_i \cdot mRej_{ijk} + b_{H9} \cdot BPD_i \cdot dRej_{ijk} + b_{H10} \cdot BPD_i \cdot pRej_{ijk} \\ +b_{H11} \cdot BPD_i \cdot mRej_{ijk} + b_{H12} \cdot BPD_i \cdot dRej_{ijk} + b_{H13} \cdot BPD_i \cdot pRej_{ijk} \\ +b_{H15} \cdot Mood_{ijk-1} + b_{H16-H23} \cdot Cov_{ijk} + e_{Hijk} \end{pmatrix} \\
+S_{ijk} \cdot & \begin{pmatrix} b_{S0i} + b_{S0j} \\ +b_{S1} \cdot mRej_{ijk} + b_{S2} \cdot dRej_{ijk} + b_{S3} \cdot pRej_{ijk} \\ +b_{S4} \cdot mDis_{ijk} + b_{S5} \cdot dDis_{ijk} + b_{S6} \cdot pDis_{ijk} \\ +b_{S7} \cdot BPD_i \\ +b_{S8} \cdot BPD_i \cdot mRej_{ijk} + b_{S9} \cdot BPD_i \cdot dRej_{ijk} + b_{S10} \cdot BPD_i \cdot pRej_{ijk} \\ +b_{S11} \cdot BPD_i \cdot mRej_{ijk} + b_{S12} \cdot BPD_i \cdot dRej_{ijk} + b_{S13} \cdot BPD_i \cdot pRej_{ijk} \\ +b_{S15} \cdot Mood_{ijk-1} + b_{S16-S23} \cdot Cov_{ijk} + e_{Sijk} \end{pmatrix} \\
+F_{ijk} \cdot & \begin{pmatrix} b_{F0i} + b_{F0j} \\ +b_{F1} \cdot mRej_{ijk} + b_{F2} \cdot dRej_{ijk} + b_{F3} \cdot pRej_{ijk} \\ +b_{F4} \cdot mDis_{ijk} + b_{F5} \cdot dDis_{ijk} + b_{F6} \cdot pDis_{ijk} \\ +b_{F7} \cdot BPD_i \\ +b_{F8} \cdot BPD_i \cdot mRej_{ijk} + b_{F9} \cdot BPD_i \cdot dRej_{ijk} + b_{F10} \cdot BPD_i \cdot pRej_{ijk} \\ +b_{F11} \cdot BPD_i \cdot mRej_{ijk} + b_{F12} \cdot BPD_i \cdot dRej_{ijk} + b_{F13} \cdot BPD_i \cdot pRej_{ijk} \\ +b_{F15} \cdot Mood_{ijk-1} + b_{F16-F23} \cdot Cov_{ijk} + e_{Fijk} \end{pmatrix}
\end{aligned}
$$

Equation 2

$$
\begin{aligned}
Mood_{ijk} = H_{ijk} \cdot \Big(& b_{H0i} + b_{H0j} \\
& + b_{H1} \cdot mRej_{ijk-1} + b_{H2} \cdot dRej_{ijk} + b_{H3} \cdot pRej_{ijk} \\
& + b_{H4} \cdot mDis_{ijk-1} + b_{H5} \cdot dDis_{ijk} + b_{H6} \cdot pDis_{ijk} \\
& + b_{H7} \cdot BPD_i \\
& + b_{H8} \cdot BPD_i \cdot mRej_{ijk-1} + b_{H9} \cdot BPD_i \cdot dRej_{ijk} + b_{H10} \cdot BPD_i \cdot pRej_{ijk} \\
& + b_{H11} \cdot BPD_i \cdot mRej_{ijk-1} + b_{H12} \cdot BPD_i \cdot dRej_{ijk} + b_{H13} \cdot BPD_i \cdot pRej_{ijk} \\
& + b_{H24} \cdot \Delta Rej_{ijk} + b_{H25} \cdot \Delta Dis_{ijk} \\
& + b_{H26} \cdot BPD_i \cdot \Delta Rej_{ijk} + b_{H27} \cdot BPD_i \cdot \Delta Dis_{ijk} \\
& + b_{H15} \cdot Mood_{ijk-1} + b_{H16-H23} \cdot Cov_{ijk} + e_{Hijk} \Big) \\
+ S_{ijk} \cdot \Big(& b_{S0i} + b_{S0j} \\
& + b_{S1} \cdot mRej_{ijk-1} + b_{S2} \cdot dRej_{ijk} + b_{S3} \cdot pRej_{ijk} \\
& + b_{S4} \cdot mDis_{ijk-1} + b_{S5} \cdot dDis_{ijk} + b_{S6} \cdot pDis_{ijk} \\
& + b_{S7} \cdot BPD_i \\
& + b_{S8} \cdot BPD_i \cdot mRej_{ijk-1} + b_{S9} \cdot BPD_i \cdot dRej_{ijk} + b_{S10} \cdot BPD_i \cdot pRej_{ijk} \\
& + b_{S11} \cdot BPD_i \cdot mRej_{ijk-1} + b_{S12} \cdot BPD_i \cdot dRej_{ijk} + b_{S13} \cdot BPD_i \cdot pRej_{ijk} \\
& + b_{S24} \cdot \Delta Rej_{ijk} + b_{S25} \cdot \Delta Dis_{ijk} \\
& + b_{S26} \cdot BPD_i \cdot \Delta Rej_{ijk} + b_{S27} \cdot BPD_i \cdot \Delta Dis_{ijk} \\
& + b_{S15} \cdot Mood_{ijk-1} + b_{S16-S23} \cdot Cov_{ijk} + e_{Sijk} \Big) \\
+ F_{ijk} \cdot \Big(& b_{F0i} + b_{F0j} \\
& + b_{F1} \cdot mRej_{ijk-1} + b_{F2} \cdot dRej_{ijk} + b_{F3} \cdot pRej_{ijk} \\
& + b_{F4} \cdot mDis_{ijk-1} + b_{F5} \cdot dDis_{ijk} + b_{F6} \cdot pDis_{ijk} \\
& + b_{F7} \cdot BPD_i \\
& + b_{F8} \cdot BPD_i \cdot mRej_{ijk-1} + b_{F9} \cdot BPD_i \cdot dRej_{ijk} + b_{F10} \cdot BPD_i \cdot pRej_{ijk} \\
& + b_{F11} \cdot BPD_i \cdot mRej_{ijk-1} + b_{F12} \cdot BPD_i \cdot dRej_{ijk} + b_{F13} \cdot BPD_i \cdot pRej_{ijk} \\
& + b_{F24} \cdot \Delta Rej_{ijk} + b_{F25} \cdot \Delta Dis_{ijk} \\
& + b_{F26} \cdot BPD_i \cdot \Delta Rej_{ijk} + b_{F27} \cdot BPD_i \cdot \Delta Dis_{ijk} \\
& + b_{F15} \cdot Mood_{ijk-1} + b_{F16-F23} \cdot Cov_{ijk} + e_{Fijk} \Big)
\end{aligned}
$$

Discussion of Day and Person-level effects

Due to the brief report format of the main manuscript, we did not discuss the day and person-level effects in depth but focused on the momentary associations as these depict the affective dynamics in BPD at the most fine-grained level. Here we discuss the day- and person-level effects reported in the main manuscript, and relate them to the findings reported in Hepp et al. (2017).

The original study (Hepp et al., 2017) reported stronger day-level associations for disagreement-hostility and for rejection-sadness, which were both replicated in the current study and which corroborate findings at the momentary level. Momentary and daily rejection showed

the strongest associations with sadness, whereas momentary and daily disagreement was most strongly associated with hostility. This is interesting insofar as most previous studies have heavily focused on relating rejection in BPD to anger-like constructs (e.g., Berenson et al., 2011; Chapman et al., 2015; Miskewicz et al., 2015; Renneberg et al., 2012), whereas the dominant affect associated with rejection in the moment seems to be sadness in our two studies. Disagreement, as an exemplary event representing interpersonal conflict, was associated most closely with hostility at the momentary and day-level, which is well in line with BPD individuals being theorized to have highly reactive and difficult to control anger (APA, 2013).

One day-level effect that we observed as stronger in the BPD group in the present study but that was not significantly different between the groups in the original study is the rejection-fear association. This is somewhat in line with studies on rejection sensitivity in BPD, which suggest that part of BPD individual's tendency to react to rejection is also with a fearful expectation of future rejection (e.g., Staebler et al., 2011). The only effect in the present analyses that was contrary to the original study was the association between person-level rejection and hostility, which was significantly larger in the COM group. This effect was unexpected and not otherwise consistent with predictions we would make under the theoretical framework of our other hypotheses. In light of the less than ideal power of the person-level effects, we hesitate to interpret this effect as a meaningful contrast to the other person-level associations and believe further investigation with substantially larger samples of individuals is warranted. The other person-level associations did not differ in the original study or the current one, potentially owing to a similar lack of power, again suggesting a need for additional large-sample studies.

Analyses adjusting for current anxiety disorders

Beyond the models comparing individuals with BPD to individuals with depression, Hepp et al. (2017) presented additional models that statistically adjusted for any depression in the BPD group and were able to demonstrate the stability of their main findings. For the current

study, we repeated all analyses adjusting for any current anxiety disorder in both groups. This was done to account for the fact that the COM group did not represent a classic "healthy" control group. The way this group was recruited allowed for some psychopathology to be present and current anxiety disorders were the most prevalent diagnoses, endorsed by thirteen COM participants (21.7%). Tables S4 and S5 present the concurrent and the lagged model including a dummy variable that was 1 if the participants fulfilled a current anxiety disorder diagnosis and 0 if they did not. The results for both the concurrent and the lagged model, which are reported in the main manuscript, remained essentially unchanged when including this additional anxiety disorder diagnosis predictor.

Analyses adjusting for alcohol consumption

The sample we reported was collected based on the inclusion criterion of alcohol consumption at least once a week, since the dataset was originally collected for a study on affect and alcohol use in BPD. To ensure that the results we observed were not influenced by potential effects of alcohol consumption, we repeated both the concurrent and lagged models adjusting for alcohol consumption reported during the random prompts (dichotomous variable that was 1 if any alcohol was consumed and 0 if no alcohol was consumed). For each person, the momentary variable was aggregated by day to obtain a variable indicating the proportion of prompts where alcohol was consumed. Lastly, these day means were aggregated by person to obtain a variable indicating the proportion of days on which alcohol was consumed. The momentary variable was centered on the participant's day mean, the day-level variable on the person mean, and the person-level variable on the sample mean. We added these three variables as predictors to the model to adjust for alcohol consumption. The results are presented in Table S6 and Table S7. All results that we report in the main manuscript replicated when adjusting for alcohol consumption.

Table S4

Estimates, standard errors, and p-values for group, current anxiety disorder diagnosis, rejection, and disagreement predicting hostility, sadness, and fear in a multivariate multilevel model

	Hostility						Sadness						Fear					
	BPD			COM			BPD			COM			BPD			COM		
Predictors	*Est.*	*SE*	*p*	*Est*	*SE*	*p*	*Est.*	*SE*	*p*	*Est.*	*SE*	*p*	*Est.*	*SE*	*p*	*Est.*	*SE*	*p*
Mom rej	**0.24**	**0.03**	**<.001**	**0.12**	**0.04**	**.004**	**0.55**	**0.03**	**<.001**	**0.34**	**0.04**	**<.001**	0.06	0.03	.019	0.08	0.04	.067
Day rej	0.41	0.06	<.001	0.35	0.10	<.001	**1.25**	**0.07**	**<.001**	**0.80**	**0.13**	**<.001**	**0.46**	**0.06**	**<.001**	**0.20**	**0.10**	**.037**
Person rej	**0.38**	**0.69**	**.578**	**3.63**	**1.40**	**.011**	2.20	0.86	.011	3.03	1.74	.084	0.08	0.75	.250	3.04	1.52	.049
Mom dis	**0.50**	**0.02**	**<.001**	**0.33**	**0.03**	**<.001**	0.21	0.03	<.001	0.15	0.03	<.001	0.07	0.02	.003	0.04	0.03	.259
Day dis	**0.84**	**0.06**	**<.001**	**0.45**	**0.08**	**<.001**	0.30	0.08	<.001	0.30	0.11	.006	0.26	0.06	<.001	0.10	0.08	.226
Person dis	0.79	0.73	.282	-0.45	1.18	.702	-0.41	0.91	.649	-0.11	1.28	.590	0.80	0.80	.320	-0.69	1.28	.590
group	0.18	0.07	.010				0.30	0.09	<.001				0.25	0.08	.001			
anxiety	0.04	0.06	.542				0.06	0.08	.445				0.02	0.07	.787			

Note. The multivariate model included the three criteria hostility, sadness, and fear simultaneously. In addition to the presented predictors, the model adjusted for the lagged criterion scores and the covariates weekday, weekend, study day, and time elapsed since the participant awoke. BPD = Borderline Personality Disorder, COM = Community Controls, Est. = estimate. Group was coded BPD = 0 for the BPD column and COM = 0 for the COM column. Significant group differences are highlighted in boldface.

Table S5

Estimates, standard errors, and p-values for group, current anxiety disorder diagnosis, lagged/change rejection and lagged/change disagreement predicting hostility, sadness, and fear in a multivariate multilevel model

	Hostility						Sadness						Fear					
	BPD			COM			BPD			COM			BPD			COM		
Predictors	*Est.*	*SE*	*p*	*Est*	*SE*	*p*	*Est.*	*SE*	*p*	*Est.*	*SE*	*p*	*Est.*	*SE*	*p*	*Est.*	*SE*	*p*
Rej lag	**0.39**	**0.04**	**<.001**	**0.15**	**0.07**	**.030**	**0.79**	**0.04**	**<.001**	**0.47**	**0.07**	**<.001**	0.07	0.04	.088	0.07	0.07	.315
Dis lag	**0.63**	**0.04**	**<.001**	**0.42**	**0.06**	**<.001**	0.33	0.04	<.001	0.20	0.06	<.001	**0.13**	**0.04**	**.001**	**0.01**	**0.06**	**.910**
Rej diff	**0.26**	**0.03**	**<.001**	**0.12**	**0.04**	**.004**	**0.58**	**0.03**	**<.001**	**0.36**	**0.04**	**<.001**	0.06	0.03	.028	0.07	0.04	.081
Dis diff	**0.53**	**0.03**	**<.001**	**0.34**	**0.03**	**<.001**	0.23	0.03	<.001	0.16	0.04	<.001	0.08	0.03	<.001	0.03	0.03	.430
BPDgroup	0.18	0.07	.011				0.30	0.09	<.001				0.25	0.08	.002			
anxiety	0.04	0.06	.544				0.06	0.08	.448				0.02	0.07	.787			

Note. The multivariate model included the three criteria hostility, sadness, and fear simultaneously. In addition to the presented predictors, the model adjusted for the day and person level scores of rejection and disagreement, the lagged criterion scores and the covariates weekday, weekend, study day, and time elapsed since the participant awoke. Results for all adjustment variables and the model equation are presented in the online supplement. BPD = Borderline Personality Disorder, COM = Community Controls, Est. = estimate. Group was coded BPD = 0 for the BPD column and COM = 0 for the COM column. Significant group differences are highlighted in boldface.

Table S6

Estimates, standard errors, and p-values for group, alcohol consumption, rejection, and disagreement predicting hostility, sadness, and fear in a multivariate multilevel model

	Hostility						Sadness						Fear					
	BPD			COM			BPD			COM			BPD			COM		
Predictors	*Est.*	*SE*	*p*	*Est*	*SE*	*p*	*Est.*	*SE*	*p*	*Est.*	*SE*	*p*	*Est.*	*SE*	*p*	*Est.*	*SE*	*p*
Mom drink	0.00	0.02	.974				-0.02	0.02	.212				0.03	0.02	.149			
Day drink	-0.06	0.05	.259				-0.09	0.07	.175				-0.08	0.05	.117			
Pers drink	-0.24	0.62	.693				-0.47	0.76	.542				-0.62	0.67	.354			
Mom rej	**0.24**	**0.03**	**<.001**	**0.12**	**0.04**	**.004**	**0.55**	**0.03**	**<.001**	**0.34**	**0.04**	**<.001**	0.06	0.03	.021	0.08	0.04	.065
Day rej	0.41	0.06	<.001	0.35	0.10	.001	**1.25**	**0.07**	**<.001**	**0.80**	**0.13**	**<.001**	**0.46**	**0.06**	**<.001**	**0.20**	**0.10**	**.039**
Person rej	**0.34**	**0.71**	**.632**	**3.59**	**1.43**	**.014**	2.11	0.88	.018	2.92	1.78	.103	0.72	0.77	.350	2.76	1.55	.078
Mom dis	0.49	0.03	<.001	0.32	0.03	<.001	0.21	0.03	<.001	0.15	0.03	<.001	0.07	0.02	.003	0.04	0.04	.280
Day dis	**0.84**	**0.06**	**<.001**	**0.45**	**0.08**	**<.001**	0.30	0.08	<.001	0.30	0.11	.005	0.26	0.06	<.001	0.10	0.08	.215
Person dis	0.87	0.78	.265	-0.34	1.20	.774	-0.25	0.96	.792	0.09	1.49	.950	1.03	0.83	.221	-0.48	1.30	.708
group	0.19	0.07	.004				0.32	0.08	<.001				0.25	0.07	<.001			

Note. The multivariate model included the three criteria hostility, sadness, and fear simultaneously. In addition to the presented predictors, the model adjusted for the lagged criterion scores and the covariates weekday, weekend, study day, and time elapsed since the participant awoke. BPD = Borderline Personality Disorder, COM = Community Controls, Est. = estimate. Group was coded BPD = 0 for the BPD column and COM = 0 for the COM column. Significant group differences are highlighted in boldface.

Table S7

Estimates, standard errors, and p-values for momentary alcohol consumption, group, lagged/change rejection and lagged/change disagreement predicting hostility, sadness, and fear in a multivariate multilevel model

	Hostility						Sadness						Fear					
	BPD			COM			BPD			COM			BPD			COM		
Predictors	*Est.*	*SE*	*p*	*Est.*	*SE*	*p*	*Est.*	*SE*	*p*	*Est.*	*SE*	*p*	*Est.*	*SE*	*p*	*Est.*	*SE*	*p*
Alcohol	0.00	0.02	.890	0.00	0.02	.890	-0.02	0.02	.305	-0.02	0.02	.305	0.03	0.02	.137	0.03	0.02	.137
Rej lag	**0.39**	**0.04**	**<.001**	**0.15**	**0.07**	**.030**	**0.79**	**0.04**	**<.001**	**0.47**	**0.07**	**<.001**	0.07	0.04	.088	0.07	0.07	.315
Dis lag	**0.63**	**0.04**	**<.001**	**0.42**	**0.06**	**<.001**	0.33	0.04	<.001	0.20	0.06	<.001	**0.13**	**0.04**	**.001**	**-0.01**	**0.06**	**.875**
Rej diff	**0.26**	**0.03**	**<.001**	**0.12**	**0.04**	**.004**	**0.58**	**0.03**	**<.001**	**0.36**	**0.04**	**<.001**	0.05	0.03	.031	0.08	0.04	.080
Dis diff	**0.53**	**0.03**	**<.001**	**0.34**	**0.03**	**<.001**	0.23	0.03	<.001	0.16	0.04	<.001	0.09	0.03	<.001	0.03	0.03	.462
BPDgroup	0.19	0.07	.005				0.32	0.08	<.001				0.25	0.07	<.001			

Note. The multivariate model included the three criteria hostility, sadness, and fear simultaneously. In addition to the presented predictors, the model adjusted for the day and person level scores of alcohol, rejection, and disagreement, the lagged criterion scores and the covariates weekday, weekend, study day, and time elapsed since the participant awoke. Results for all control variables and the model equation are presented in the online supplement. BPD = Borderline Personality Disorder, COM = Community Controls, Est. = estimate. Group was coded BPD = 0 for the BPD column and COM = 0 for the COM column. Significant group differences are highlighted in boldface.

Study III: Negative evaluation of individuals with Borderline Personality Disorder at zero acquaintance

CHAPTER IV

An adapted version of this chapter has been published as 'Hepp, J., Störkel, L. M., Kieslich, P. J., Schmahl, C., & Niedtfeld, I. (2018). Negative evaluation of individuals with borderline personality disorder at zero acquaintance. *Behaviour Research and Therapy*, *111*, 84-91. doi:10.1016/j.brat.2018.09.009'

4.1 Abstract

Previous research suggests that individuals with BPD tend to evaluate other people as untrustworthy or hostile, which could contribute to the marked interpersonal problems in BPD. In contrast, alterations in first impressions of potential interaction partners of those with BPD remain under-researched and poorly understood. Herein, we focused on how naïve raters evaluate BPD individuals, hypothesizing that raters would tend to evaluate them negatively. To test this hypothesis, we recruited 26 BPD and 26 HC participants (46% male) as targets in the 'Thin Slices' paradigm. Targets were video-taped while talking about their personal preferences (e.g. hobbies). Subsequently, these short videos ('Thin Slices') were presented to two rater samples (n = 92 and n = 44), who evaluated targets' likeability, trustworthiness, and cooperative behavior in an economic game. In both samples, raters evaluated BPD targets as less likeable and trustworthy, and in one study also as less cooperative. These findings are contrasted with results from an economic game, in which BPD targets behaved no less cooperatively than controls. We discuss limitations with regard to socioeconomic differences between the target groups and explore how negative evaluations by others may contribute to the interpersonal difficulties in BPD. We suggest that - given future replication with more strictly matched target groups- interventions aimed at improving impression management could be beneficial for BPD patients.

4.2 Introduction

Borderline Personality Disorder is a serious mental health condition that affects between 1% and 3% of the general population (e.g., Tomko, Trull, et al., 2014). Individuals with BPD suffer from intense and rapidly changing emotions and difficulties with impulse control and interpersonal relationships (APA, 2013; Linehan, 1993). Interpersonal relationships in those with BPD are characterized by a pattern of instability and an alternation between idealization and devaluation of others (APA, 2013), which often entails small social networks and a lack of long-term relationships (e.g., Liebke et al., 2017). Lately, interpersonal instability has been recognized as a core feature or even phenotype of BPD (e.g., Gunderson, 2007) and multiple studies have demonstrated that interpersonal problems are highly prevalent in the daily lives of individuals with BPD (e.g., Russell et al., 2007; Stepp et al., 2011).

In an effort to identify factors that drive interpersonal problems in BPD, previous research has amassed evidence on alterations in areas ranging from social cognition to cooperative behavior that could contribute to interpersonal difficulties. Studies on social cognitive processes in BPD have demonstrated that BPD individuals show a negative bias in the interpretation of facial affect and trustworthiness (for a review, see Daros et al., 2013; Fertuck et al., 2013), and that those with BPD tend to evaluate other people as more hostile when presented with short film clips of different characters (Arntz & Veen, 2001). In further studies, this evaluation bias was shown to differ from biased information processing in depression (Barnow et al., 2009) and to be strongly connected to BPD-related cognitive schemas (Sieswerda et al., 2013). Beyond this, numerous studies have demonstrated that people with BPD suffer from an exceptionally high rejection sensitivity (Staebler, Helbing, et al., 2011) and thus tend to anxiously expect and readily perceive rejection, and to react to it with intense negative affect (Berenson et al., 2011; Hepp et al., 2017; Hepp, Lane, Wycoff, Carpenter, & Trull, 2018). On a behavioral level, studies using economic games have demonstrated that BPD individuals show

difficulties in forgiving unfairness and maintaining cooperation with others (for a review, see Jeung et al., 2016).

While these studies paint a compelling picture of altered or disrupted social cognitive and behavioral processes, which, to some extent, explain how interpersonal difficulties in BPD come to play, they focus only on the BPD individuals *themselves*. We, however, argue that the nature of social interaction demands a similar focus on processes pertaining to the *interaction partner*. Adopting the perspective of potential interaction partners could be beneficial for understanding interpersonal problems in BPD in a more holistic way. At this point, it is largely unknown how non-BPD afflicted interaction partners evaluate and act towards those with the disorder. If interaction partners showed negatively altered perceptions or action tendencies towards BPD individuals, these could substantially contribute to interpersonal difficulties in BPD. Consequently, the present study aimed to shed light on interpersonal problems in BPD by focusing on how (non-clinical) individuals perceive those with BPD. Thus, the central research question of the present study was how potential interaction partners evaluate individuals with BPD with regard to their first impression.

Only a very small number of studies have previously investigated how individuals with BPD are perceived by others. The main evidence on this comes from the field of stigma research and studies assessing how people perceive those with BPD when the BPD diagnosis is known. Aviram, Brodsky, and Stanley (2006) review this literature, summarizing studies in which health professionals were asked to evaluate patients with BPD. The authors conclude that health professionals evaluate patients labelled as having BPD in a markedly negative way. For instance, individuals with BPD were seen as significantly less ‘likeable’ than those suffering from schizophrenia or depression, and were described as ‘manipulative and attention seeking’. While this evidence points to a pattern of negative evaluations of BPD individuals, all of these studies confronted participants with the label ‘BPD’, and participants already had a predefined (possibly ‘stigmatized’) concept of the disorder and what it entails. In the present study, we

instead wanted to assess how BPD individuals are perceived when their mental illness label is unknown. This way, we hoped to discover whether BPD individuals show any specific behavior that is perceived negatively by naïve raters, and therefore could be addressed in a therapeutic context (e.g. by helping BPD individuals to improve impression management) or whether, once their diagnosis is unknown, BPD participants would not be evaluated differently from healthy individuals.

The present study

The present study employed the Thin Slices paradigm to address the question of how BPD individuals are perceived by others. In the Thin Slices paradigm, participants ('raters') are asked to provide personality judgments of other persons ('targets') on the basis of photographs or short video sequences (Ambady & Rosenthal, 1992). Evidence from studies on non-clinical samples using this paradigm suggests that raters are not only able to infer certain personality traits from thin slices (e.g. intelligence or extraversion; see Borkenau, Mauer, Riemann, Spinath, & Angleitner, 2004) but that they are also able to make predictions regarding the altruistic behavior of the target (Fetchenhauer, Groothuis, & Pradel, 2010).

There are – to the best of our knowledge – only two studies that have previously included individuals with BPD as targets in the Thin Slices paradigm. The first study reports data from military recruits that were nominated by their peers for fulfilling personality disorder features and completed clinical interviews (Oltmanns, Friedman, Fiedler, & Turkheimer, 2004). Short videos from the clinical interview process, during which participants responded to the question 'What do you enjoy doing?', were presented to a student rater sample that evaluated targets on a number of personality dimensions. Students tended to evaluate those who were nominated by their peers as showing BPD features low on likeability, extraversion, agreeableness, openness, and conscientiousness, and high on neuroticism. In contrast, the student ratings did not correlate with the diagnostic status derived from the clinical interviews.

However, these results have to be considered with care, since the study comprised only a small number of six targets who fulfilled a full BPD diagnosis according to the clinical interviews. The second study that included BPD individuals as targets in the Thin Slices paradigm used cropped photographs of 30 BPD and 30 HC participants as stimulus material and presented these to seven different samples recruited through Amazon's Mechanical Turk (Daros, Ruocco, & Rule, 2016). The authors found that those with a BPD diagnosis were rated as more likely to be mentally ill overall and more depressed in specific. They were also attributed more negative emotions (e.g. anger, disgust, distress) and less happiness than HC targets.

In our study, we asked raters to evaluate targets with BPD and HCs regarding their likeability and trustworthiness, and to estimate how cooperatively the target behaved in an economic game. We chose these variables for two central reasons: First, we deemed judgments of how likeable, trustworthy, and cooperative one finds another person to be relevant indicators for the likelihood and quality of potential future interactions (see Bond, 1972). That is, if I, as a rater, deem someone to be untrustworthy, if I do not find them likeable, and do not expect them to cooperate with me, I would likely either try to avoid an interaction with this person overall, or adapt my behavior accordingly, for instance adopting a reserved or hostile interactional style. In other words, low expectations of likeability, trustworthiness and cooperation in the BPD target could be relevant dimensions that lead to problems in social interaction in the future (Snyder, 1984). Second, we included the measure of likeability because it was a central dimension on which BPD patients were evaluated negatively in stigma studies (see Aviram et al., 2006) and in a previous Thin Slices study with BPD individuals (Oltmanns et al., 2004). We further included trustworthiness because it has an immense effect in impression formation (Wojciszke, Bazinska, & Jaworski, 1998), and previous Thin Slices studies have demonstrated that people readily judge this trait based on minimal information (e.g., Fertuck et al., 2013). Additionally, we included a behavioral measure of cooperation to add another level beyond subjective ratings of likeability and trustworthiness. That is, we did not only want to ask raters how targets appear to

them but also how they think targets actually acted in an economic game. Importantly, the latter could then be compared to the actual behavior of targets in the economic game. Consequently, by including a behavioral measure, we could differentiate whether raters picked up on actual behavioral tendencies in the BPD targets or whether they provided biased evaluations.

Based on the clearly sparse yet relatively uniform previous evidence, showing that raters tend to evaluate BPD individuals in a negative way, we expected that BPD targets would be rated more negatively than HC targets on the dimensions a) cooperative behavior in an economic game, b) trustworthiness, and c) likeability. Importantly, we expected these effects for a scenario in which raters are entirely unaware of the BPD diagnosis of the target, that is, we did not inform raters that targets included people with a mental illness. To test these assumptions, we report three studies. In study 1, we describe the collection and characteristics of the target sample. In studies 2 and 3, we report results from two rater samples, which evaluated targets based on the recorded videos.

4.3 Experiment 1

4.3.1 Methods

Target Participants

Ethics approval for this study was granted by the Medical Ethics Committee II of the medical faculty Mannheim at Heidelberg University (protocol no. 2013-654N-MA)[7]. For the target sample, we recruited 26 individuals with BPD (46% male) from the inpatient and outpatient unit at the Central Institute for Mental Health in Mannheim, Germany. We further recruited 26 (46% male) HC participants with the help of an existing participant database. All healthy participants were diagnosed by trained Master's level psychologists, patients by licensed and trained clinicians working in the outpatient unit or within the clinical research group (www.kfo256.de) at the Central Institute for Mental Health. Axis-I diagnoses were assessed

[7] The ethics approval was amended for all following experiments, which are listed under the same protocol number.

using the German version of the structured clinical interview for DSM-IV (SKID-I; Wittchen, Zaudig, & Fydrich, 1997) and personality disorders were assessed with the German adaptation of the International Personality Disorder Examination (IPDE; Loranger et al., 1998).

Inclusion criteria were a current DSM-IV BPD diagnosis for the BPD group and the absence of any current or lifetime mental disorder or personality disorder for the HC group. General exclusion criteria were a current psychosis, neurological dysfunction or severe head trauma. Both groups comprised 14 female and 12 male participants. Age ranged from 18 to 49 (M = 32.2, SD = 7.7) in the BPD group, and from 18 to 50 (M = 31.9, SD = 8.0) in the HC group, and did not differ significantly between the groups $t(50) = -0.11$, $p = .916$. Participants with BPD attended school for an average of 11.2 years (SD = 1.8), thus significantly shorter that HC participants with an average of 12.1 years (SD = 1.3), $t(50) = 2.18$, $p = .034$, $d = 0.57$. The majority of participants in both groups were single or never married (61.5% in the BPD group, 57.7% in the HC group). The most frequently endorsed monthly income range was less than 1000 € in both groups (69.2% in BPD group, 38.5% in the HC group), and the most frequently endorsed employment status was current employment (38.5% in the BPD group, 57.7% in the HC group). Table 10 provides a detailed overview of the demographic data by group. We note that BPD participants completed fewer years of education, and had lower overall employment and lower income rates than HC participants, resulting in a lack of matching between the target groups on these dimensions.

BPD participants had on average 2.4 comorbid disorders, including mood disorders (n = 23), alcohol use disorders (n = 9), post-traumatic stress disorder (n = 8), other anxiety disorders (n = 7), eating disorders (n = 6), obsessive-compulsive disorder (n = 4), attention deficit disorder (n = 5) and other personality disorders (n = 4). The majority of BPD participants took psychopharmaceutic medication at the time of participation (n = 22, 84.6%). Thirteen BPD participants (49.9%) were taking selective serotonin reuptake inhibitors, 4 participants (15.4%)

were taking tricyclic antidepressants, 9 participants (34.6%) took other antidepressant medication, and a total of 12 participants took atypical neuroleptics (46.1%).

To assess the severity of BPD symptomatology in the target sample, we administered the Borderline Symptom List- 23 (BSL-23; Bohus et al., 2009). The BSL is a self-rating scale that is based on the DSM-IV-TR criteria for BPD. Participants responded to 23 items on a 5-point scale from "not at all" (0) to "absolutely true" (4). The BSL-23 showed an excellent internal consistency of $\alpha = .97$ in the present sample. Patients mean score of 1.69 ($SD = 0.89$) on the Borderline-Symptom-List-23 indicated a symptom severity that is similar to that observed in other patient samples (Bohus et al., 2009). A BSL mean score of 0.16 ($SD = 0.13$) indicated absence of clinically significant BPD symptoms in the HC group. In addition to the BSL, we administered the Borderline Scale of the Verhaltens-Erlebens-Inventar (VEI; Groves & Engel, 2007), which is the German adaptation of the Personality Assessment Inventory (PAI; Morey, 1991). The VEI is a dimensional measure of BPD symptoms and comprises the four facets affective instability, identity problems, negative relationships, and self-harm. Each facet is measured with 6 items on a 4-point Likert-type scale from "false" (0) to "absolutely true" (3). The scores on the 24 items are summed up and scores above a cut-off of 38 indicate clinically significant BPD symptoms. The BPD scale of the VEI scale yielded an excellent internal consistency of $\alpha = .96$ in the present sample. The average sum score of 51.7 ($SD = 8.3$) on the VEI-BOR scale was above the clinical cutoff of 38 and indicated substantial BPD symptomatology for the BPD group. An average VEI-BOR score of 16.2 ($SD = 6.0$) indicated absence of clinically significant BPD symptoms in the HC group.

Table 10.

Demographic data by group.

	BPD (*n* = 26)	HC (*n* = 26)
Income per month[a]		
< 1000 €	18 (69.2%)	10 (38.5%)
1000-2000 €	2 (7.7%)	6 (23.1%)
2000-3000 €	2 (7.7%)	6 (23.1%)
> 3000 €	0 (0.0%)	3 (11.5%)
Relationship status		
Single/ never married	16 (61.5%)	15 (57.7%)
Married/long-term relationship	6 (23.1%)	8 (30.7%)
Divorced	3 (11.5%)	3 (11.5%)
Widowed	1 (3.8%)	0 (0.0%)
Occupation		
Employed	10 (38.5%)	15 (57.7%)
Student	4 (15.4%)	11 (42.3%)
Unemployed	9 (34.6%)	0 (0.0%)
On pension	3 (11.5%)	0 (0.0%)
Education		
Without graduation	2 (7.7%)	0 (0.0%)
Graduation after 9 yrs	3 (11.5%)	2 (7.7%)
Graduation after 10 yrs	12 (46.2%)	7 (26.9%)
Graduation after 12-13 yrs	7 (26.9%)	6 (23.1%)
University degree	2 (7.7%)	11 (42.3%)

Note. BPD = Borderline Personality Disorder, HC = healthy control participants. Graduation after 9 years = "Hauptschulabschluss" in Germany, graduation after 10 years = "Realschulabschluss", graduation after 12-13 years = "Abitur".

[a] Four participants in the BPD group and one participant in the HC group did not provide data on their monthly income.

Procedure

At the beginning of the session, target participants received detailed information about the study procedure and provided written informed consent. Subsequently, they filled out a number of questionnaires not pertinent to the current investigation, and provided demographic information. Based on the instructions by Oltmanns et al. (2004), who used film clips during which targets explained what they 'enjoy doing', we asked participants to take notes about their favorite meal, color, hobby, book, movie, animal, car, and holiday destination, and talk about these during a short video sequence. Target participants were filmed by one of three female experimenters in front of a white wall. Participants were told to freely decide whether they wanted to just name their answer to each category or provide further explanation. After recording, videos were cut at two minutes and edited in order to have the same brightness, coloring, audio volume, and image section in each frame.

Following the video recording, participants played the *dictator game*, an economic game to assess cooperative behavior (Forsythe, Horowitz, Savin, & Sefton, 1994). Participants acted as *allocator* in the dictator game. They were given an envelope containing 5 Euros in 50 cent coins and were instructed to divide this money between themselves and an unknown third person, the *recipient*. The amount of money shared in the dictator game is used as an indicator of active cooperation. The instruction emphasized that the experimenters would give the remaining money to an unknown recipient without ever revealing the allocator's identity. Thus, allocators could freely decide how much money they would like to keep for themselves, while the recipient had no opportunity to react to this decision. The experimenter left the room (until called back in by the participant) so that allocators could extract the money under anonymity and place the envelope (marked only with their participant code) in a ballot box. Participants were ensured that a research assistant unknown to them (i.e. not the person who served as their experimenter) would open all envelopes at the end of the study to count the remaining money to

be analysed later. In addition to whatever amount participants extracted in the dictator game, they were paid 12 Euros per hour to compensate them for participation.

4.3.2 Results

BPD participants shared on average 2.92 € (*SD* = 1.53) in the dictator game and HC participants shared on average 2.79 € (*SD* = 1.22). The difference between groups was not significant in a between groups *t*-test, $t(50) = 0.35$, $p = .727$, $d = 0.10$, and a two-sided Jeffreys-Zellner-Siow (JZS) Bayes factor (Rouder, Speckman, Sun, Morey, & Iverson, 2009) of 0.29 indicated evidence for the null hypothesis (no difference between groups).

In the HC group, 11 participants (42.3%) shared exactly 50% of the money (i.e. 2.5 €) and in the BPD group 9 participants (34.6%) did so. No one in the HC group shared 0 €, whereas one person in the BPD group shared 0 € (3.8%). In the HC group, 4 participants (15.4%) shared the entire 5 €, and 7 participants in the BPD group (26.9%) did so.

4.3.3 Discussion

In experiment 1, we recruited individuals with BPD and gender- and age-matched HC participants as targets in the Thin Slices paradigm. Only two previous studies (Daros et al., 2016; Oltmanns et al., 2004) have included BPD individuals as targets in the Thin Slices paradigm and the present study extends these studies in important ways. The sample by Oltmanns and colleagues adopted a broader focus and included individuals with a range of personality disorders, which is commendable but resulted in only six participants eventually fulfilling the BPD diagnosis, so that conclusions based on this sample size are limited. In addition to including a larger sample of BPD targets, it is noteworthy that 46% of the targets in the present study were men. The inclusion of male participants is particularly important to the field of BPD research, because so far it tends to heavily rely on female samples as a result of men with BPD being underrepresented in clinical settings and thus harder to recruit. For this

reason, many findings in the field of BPD research are currently restricted to women with BPD, as are the previous findings by Daros and colleagues with the Thin Slices paradigm.

In addition to being filmed for the Thin Slices paradigm, participants further played a dictator game. Only one other study has reported dictator game data for individuals with a formal BPD diagnosis and real incentives. Preuss et al. (2016) compared 17 women with BPD to 24 women with major depressive disorder and 36 HC participants and found no differences in mean contributions in the dictator game between the groups. Adding to this, another study reported that there were no associations between dimensional BPD features and allocations from a hypothetical dictator game (i.e. without real incentives) (Thielmann et al., 2014). The authors demonstrated that the amount of money shared in the dictator game did not correlate with the amount of BPD features endorsed in their sample of 556 participants. This is well in line with the findings in the current sample, where we observed no difference in dictator game allocations between the target groups. The result that BPD participants did not share less money than HC participants in this sample is important when considering rater judgments in the studies that we report subsequently. Thus, if raters judged BPD targets overall as less cooperative than HC targets, these judgments would not reflect sensitivity for identifying low-cooperative individuals but rather a negative evaluation bias.

With regard to limitations, the restricted sample size with 26 participants per group can be mentioned. This limits the statistical power for detecting differences between the target groups, such as the difference in the money shared in the dictator game. The achieved power to detect a small effect (d = .2) in a between groups t-test was .18, for a medium sized effect (d = .5) it was .55, and for a large effect (d = .8) it was .88. Thus, we did not have sufficient statistical power to detect anything but a large effect with regard to differences in the actual dictator game allocations. Nonetheless, the Bayes factor indicated evidence against a difference between groups, and that the average contribution of BPD patients was descriptively even

slightly larger than the average contribution of HC participants (i.e. BPD participants definitely did not share less than HCs).

A further limitation is the lack of matching between the groups on a number of dimensions. While BPD and HC targets did not differ in age or gender, BPD participants reported on average one year of education less, had a lower overall income, higher rates of unemployment, and the majority of BPD participants took either antidepressant or neuroleptic medication. A closer matching between the groups would have been advantageous with regard to experimental control, allowing a closer pinpointing of any difference between the groups to BPD diagnostic status. It is possible that these demographic differences between the groups have influenced ratings in the following studies, such that, for instance, the lower socioeconomic status of BPD targets was associated with poorer ratings of cooperativeness, trustworthiness, and likeability. At the same time, we believe that the discrepancies in educational attainment, employment status, and income reflect actual differences between the BPD and the healthy population. Epidemiological studies have demonstrated that the majority of BPD individuals do take medication on a regular basis and that education levels, employment rates, and income level are typically lower in this group (Tomko, Trull, et al., 2014). Thus, in a real life zero-acquaintance situation, it is fairly likely that the BPD interaction partner does take medication, has a lower education and income level, and a lower chance of being employed. However, we acknowledge that recruiting HC participants that better match the BPD group in these dimensions would have been preferable with regard to experimental and statistical control.

4.4 Experiment 2

4.4.1 Methods

Participants

Participants in experiment 2 were recruited via the participant pool of Heidelberg University. The sample comprised 92 participants between the ages of 18 and 62 (M = 24.5, SD

= 6.3). The majority of participants were female (75%), held a university entrance level degree (98.9%), and were students (88.4%) with a monthly income of less than 1000 Euros (90.1%). Participants reported on average 12.6 years (*SD* = 0.8) of education.

Procedure

Participants provided written informed consent before completing the experiment and were paid 8€ for their participation. The experiment was created using the open-source experiment builder *OpenSesame* (Mathôt, Schreij, & Theeuwes, 2012). In a first step, participants filled out self-report questionnaires to provide demographic data and played a hypothetical dictator game. Participants received instructions for the dictator game on their screens and were then asked to decide how much money they would (hypothetically) allocate to a recipient and entered their decision via keyboard. The hypothetical dictator game was included only to ensure that participants fully understood the game. This was vital, because participants were subsequently asked to estimate the amount of money that target participants had extracted in the dictator game. Specifically, each rater saw 20 randomly selected videos of the target sample[8]. After each video, raters provided an estimate of how much money they thought the target person extracted in the dictator game, ranging from 0 to 5 € in 50-Cent steps. Additionally, raters indicated how trustworthy and likeable they found the target person on a 4-point Likert-type scale ranging from 0 'not at all' to 3 'very much'. On average, each video showing a BPD target was rated 35.5 (*SD* = 4.2) times, and each video showing a HC participant was rated 33.7 (SD = 4.9) times.

4.4.2 Results

Group means and standard deviations for estimated trustworthiness, likeability, and cooperative behavior are presented in Table 11.

[8] While the majority of raters (83.7 %) rated exactly 20 videos, the number of videos varied slightly for the remaining raters due to technical problems. On average, each rater saw 19.6 videos (*SD* = 1.4).

Table 11.

Means and standard deviations for targets' trustworthiness, likeability, similarity, and amount of money extracted in the dictator game as estimated by participants, presented by target group for experiments 2 and 3. In addition, the results of between group t-tests are reported including two-sided Jeffrey-Zellner-Siow Bayes factors for evidence of H1 over H0 (H0: difference between groups = 0).

	BPD		HC					
Criteria	*M*	SD	*M*	*SD*	*t*(50)	*p*	*d*	BF_{10}
				Experiment 2				
Money shared	1.95	0.37	2.01	0.29	-0.63	.532	0.17	0.33
Trustworthiness	1.99	0.36	2.25	0.28	-2.90	.006	0.80	7.68
Likeability	1.70	0.36	2.02	0.38	-3.09	.003	0.86	11.77
				Experiment 3				
Money shared	2.02	0.27	2.27	0.31	-3.17	.003	0.88	14.25
Trustworthiness	2.32	0.48	2.93	0.51	-4.44	<.001	1.23	408.19
Likeability	2.16	0.60	2.78	0.71	-3.40	.001	0.94	24.71
Similarity	1.01	0.47	1.58	0.55	-4.02	<.001	1.11	122.36

Note. BPD = Participants with Borderline Personality Disorder, HC = Healthy Control Participants, BF_{10} = Bayes factor for evidence of H1 over H0. Money shared = Estimate of how much money target participants shared in the dictator game. The scales for trustworthiness and likeability ranged from 0 to 3 in experiment 1 and from 0 to 5 in experiment 2.

To test whether participants judged BPD targets as less trustworthy, less likeable, and less cooperative (in the sense of sharing less money in the dictator game), we conducted three linear mixed effects models. Estimated trustworthiness, likeability, and cooperativeness were each predicted by a group dummy variable (HC = 0, BPD = 1), and we modelled a random intercept for each target and each rater, treating targets and raters as crossed. Analyses were conducted in R (R Core Team, 2018) using the *lmer* function from the *lme4* package (Bates et al., 2015), and *p* values were computed using the *lmerTest* package (Kuznetsova et al., 2017).

BPD Group membership did not significantly predict rater estimates of the amount of money that targets shared in the dictator game (b = -0.06, β = -0.06, SE = 0.10, t(50.1) = -0.63, p = .534). In contrast, BPD group membership had a significant negative effect on ratings of trustworthiness (b = -0.26, β = -0.32, SE = 0.09, t(50.1) = -2.89, p = .006) and likeability (b = -0.31, β = -0.33, SE = 0.11, t(50.0) = -2.91, p = .005). That is, BPD targets were rated as significantly less trustworthy and less likeable than HC targets. These results were replicated when conducting between group *t*-tests based on the per-target aggregated values (cf. Table 11).

4.4.3 Discussion

In experiment 2, we presented video sequences of 26 BPD and 26 HC targets to a group of 92 naïve student raters. On the basis of these videos, raters evaluated 20 randomly selected targets with regard to likeability, trustworthiness, and cooperative behavior in the dictator game. As discussed previously, this was the first study to include a target sample with both male and female BPD individuals and age- and gender-matched HCs. We were interested in how raters might perceive BPD and HC targets differently, expecting that raters would evaluate BPD individuals more negatively than HC targets (see Aviram et al., 2006; Daros et al., 2016; Oltmanns et al., 2004). We deemed this question important because interpersonal relationships are a central problem of those with BPD. Surprisingly, previous research has focused almost exclusively on how BPD individuals - but not potential interaction partners - perceive and act in

interpersonal contexts. As hypothesized, raters evaluated BPD targets more negatively on the dimensions likeability and trustworthiness, but they did not see BPD targets as less cooperative than HCs (regarding money shared in the dictator game). Thus, raters evaluated BPD targets more negatively on trait-like qualities but not when they had to give an estimate of actual *behavior* in the dictator game.

While these findings give a first hint at raters having a somewhat negative view of BPD individuals, a major limitation of the current study design is that we cannot identify which factors led to the negative evaluations. Since we did not provide any information about part of the target sample suffering from a mental illness, effects of stigma associated with mental health in general or with BPD in specific, which seemed to drive effects in previous studies (see Aviram et al., 2006), were excluded. Hence, raters must have based their judgment on other information that was presented in the videos.

Potential cues that raters could have used to form their judgments include verbal information (speech, content and prosody) as well as non-verbal information such as mimics, gestures, and general appearance. Clearly, this is a very large number of potential influencing factors that are difficult to disentangle. However, it could be beneficial for those suffering from BPD if cues which lead to negative evaluations by others were identified and potentially addressed in treatment contexts. To further approximate which cues raters likely used to form their judgments, we decided to attempt replication of our results and presented the videos to a second rater sample, this time without the audio trace. By eliminating the audio trace, factors influencing raters' judgments would be limited to visual cues, which myriad studies from personality psychology suggest are strongly used to form first impressions. For instance, it has been demonstrated that cues ranging from the degree of smiling or of how well made-up the target is to the facial width-to-height ratio correlate with raters' judgments of non-clinical targets in the Thin Slices paradigm (e.g., Borkenau & Liebler, 1992; Borkenau et al., 2004; Nestler, Egloff, Küfner, & Back, 2012; Stirrat & Perrett, 2010).

In addition to presenting the videos without the audio trace and thus eliminating content or prosody effects as explanatory variables for the group differences, we also intended to adjust for similarity. The similarity effect is well researched in the field of social psychology and describes that higher similarity to a target entails greater attraction and more positive evaluation of the target (Byrne, 1997). Since we presented the target videos to a student sample, it is possible that raters evaluated HC targets more positively simply because the HC targets were more similar to themselves, for instance with regard to education level or physical appearance. To adjust for this, we decided to include a rating of subjective similarity in the following replication.

In sum, we attempted a replication of the results observed in experiment 2 by presenting the target videos to a second rater sample in experiment 3. To eliminate the influence of speech content and prosody, we presented the videos without the audio trace. Additionally, we asked raters to indicate the perceived similarity between themselves and the targets, so we could just adjust for subjective similarity in our analyses. This way, differences in the evaluation of the two target groups in experiment 3 should be attributable to differences in visual cues, such as mimics, gesture or physical appearance of the targets.

4.5 Experiment 3

4.5.1 Method

Participants

We recruited 44 participants[9] through the participant pool of the University of Mannheim, who were between 18 and 58 years of age (M = 23.8, SD = 6.4). The majority of participants were female (56.8%), held a university entrance level degree (95.5%), and were

[9] Note that experiment 2 comprised 92 participants but each participant rated only a subset of the full length videos to reduce participant burden. For this reason, each video was eventually rated about 35 times, which essentially constitutes the relevant sample size for experiment 2.

students (88.6%). Participants reported on average 12.6 years (*SD* = 0.8) of education. The majority of participants were single or never married (88.6%) and had a monthly income of less than 1000 Euros (68.2%).

Procedure

The procedure in experiment 3 was mostly identical to that in experiment 2, except using a modified video material. Herein, participants saw all 52 videos without sound, and videos were cut to 30 seconds in order to reduce participant burden. Videos were again presented in a randomized order and after each video participants evaluated target participants' trustworthiness and likeability on a scale from 0 "not at all" to 5 "very much" and the amount of money they shared in the dictator game. In addition to experiment 2, participants further rated the subjective similarity between themselves and the target person on a scale from 0 to 5.

4.5.2 Results

Means and standard deviations for estimated trustworthiness, likeability, money shared, and similarity are presented in table 11. Aiming to replicate the analyses reported in experiment 2, we used the exact same statistical procedures to test whether raters judged BPD targets as less trustworthy, likeable, and cooperative. That is, we again conducted three linear mixed effects models with random intercepts for target and rater (crossed), and included target group as the predictor variable.

In line with the results from experiment 2, BPD group membership had a significant negative effect on ratings of likeability (b = -0.62, β = -0.47, SE = 0.18, t(50.0) = -3.40, p = .001) and trustworthiness (b = -0.61, β =, -0.50, SE = 0.14, t(50.0) = -4.44, p < .001). In this experiment, BPD group membership also had a significant negative effect on the rater estimates of the amount of money that targets shared in the dictator game (b = -0.25, β = -0.23, SE = 0.08, t(50.0) = -3.17, p = .003) – an effect that was not significant in experiment 2. In sum, raters in this experiment evaluated BPD targets as significantly less likeable, trustworthy and cooperative

than HC targets. These results were replicated when conducting between group *t*-tests based on the per-target aggregated values (cf. Table 11).

Going beyond experiment 2, herein we further asked participants to rate the similarity between themselves and the target participants. In a linear mixed model using group to predict similarity ratings and again including random intercepts for each target and rater (crossed) we observed that raters judged BPD targets as significantly less similar to themselves than HC targets (b = -0.57, β = -0.45, SE = 0.14, $t(50.0)$ = -4.02, $p < .001$). To adjust for the effect of similarity, we repeated the previous linear mixed models with trustworthiness, likeability, and cooperativeness as criteria, including both target group and rated similarity as predictors. This was done to rule out the possibility that BPD targets were judged more negatively simply on the basis of lower similarity to the student rater sample. The results for these analyses are presented in Table 12. While similarity had a positive effect on each criterion, the effect of the target group predictor remained significant when adjusting for similarity in all analyses.

4.5.3 Discussion

In experiment 3, we aimed to replicate the results reported in experiment 2 and to additionally rule out potential confounding factors. First, we decided to present the videos without audio trace to exclude the possibility that BPD participants were evaluated negatively on the basis of speech content or prosody. Additionally, we adjusted for potential similarity effects in this sample. Since we presented the videos to student raters, we wanted to adjust for the possibility that students in experiment 2 rated HC targets as more positive simply because these were more similar to the raters in their appearance and preferences (see Byrne, 1997). Eliminating speech content and adjusting for similarity, we were able to replicate the findings from experiment 2 that BPD targets were seen as less trustworthy and less likeable than HC targets. Notably, even beyond effects of similarity, the group membership of the target still explained significant variance in trustworthiness and likeability ratings.

Table 12.

Results from random effects models using money shared in the dictator game, trustworthiness, and likeability (separately) as criteria, predicted by similarity ratings and group membership in experiment 3, including random intercepts for target and rater

	b	β	*SE*	*t*	*df*	*p*
			Estimate of money shared			
Similarity	0.14	0.16	0.02	7.21	2025.6	<.001
Group	-0.17	-0.16	0.07	-2.35	51.8	.023
			Trustworthiness			
Similarity	0.38	0.39	0.02	20.38	2264.8	<.001
Group	-0.40	-0.32	0.10	-3.98	49.8	<.001
			Likeability			
Similarity	0.43	0.41	0.02	22.51	2280.5	<.001
Group	-0.38	-0.29	0.13	-2.87	49.3	.006

Note. Group was coded borderline personality disorder = 1 and healthy controls = 0.

Additionally, in this sample, raters also estimated that BPD targets shared less money in the dictator game than HC targets (this effect was not significant in experiment 2). Notably, the effect sizes for the differences in trustworthiness and likeability between groups were also substantially larger than in experiment 2 (see Table 11).

Our results strongly suggest that raters relied on visual cues to make their judgments regarding likeability, trustworthiness and cooperativeness of the targets. However, even though we excluded auditory information as an information source and adjusted statistically for subjective similarity, the exact nature of the visual cues still remains unclear. As outlined above, studies from personality psychology present a wide range of candidate cues, some of which are stable attributes of the individual (e.g. facial width-to-height ratio) and some of which are variable factors (e.g. degree of smiling) that could be altered (e.g., Borkenau & Liebler, 1992; Borkenau et al., 2004; Nestler et al., 2012; Stirrat & Perrett, 2010). The level of positive affect

expression is a particularly likely candidate to explain the link between BPD group membership and low estimates of trustworthiness, likeability, and cooperative behavior, since most mental illnesses are associated with a reduced expression of positive affect, and previous studies have shown that a low level of positive emotional expressivity is linked to negative interpersonal judgments and low trustworthiness appraisals (Boone & Buck, 2003; Sabatelli & Rubin, 1986). Previous findings by Daros et al. (2016) in fact show that BPD targets were attributed less positive and more negative affect, but these findings were based on photographs. Future studies aiming to identify central cues for likeability, trustworthiness, and cooperativeness evaluations could thus assess facial affect expression as a central cue.

4.6 General Discussion

Herein, we presented three studies in which we first created a target video set of men and women with and without BPD and then showed these videos to two samples of raters who evaluated target participants' trustworthiness, likeability, and their cooperative behavior in a dictator game. Notably, the ratings were based on video sequences in which target participants spoke about their favorite things, such as their favorite books or hobbies. Despite the generally positive frame of the thin slice, BPD targets were evaluated more negatively than HCs. That is, BPD targets were seen as significantly less trustworthy and less likeable than HCs in both studies. Moreover, while BPD and HC targets shared on average comparable amounts in the dictator game, raters in one of the two samples estimated that BPD participants shared less money than HCs (while there was no significant difference in the other sample). Videos in the second experiment were presented without the audio trace to rule out possible effects of speech content and prosody, so that raters could rely solely on visual information. This led to substantially larger effect sizes in all our dependent variables, hinting at an important role of nonverbal cues in first impressions of BPD patients. Additionally, we adjusted for perceived similarity between raters and targets, but BPD targets were still evaluated more negatively.

In search of possible factors underlying the effects we found in our study, we assume that nonverbal behavior of BPD patients in situations implicating social evaluation might be influenced by underlying dysfunctional beliefs in BPD. Studies on dysfunctional cognitive schemas suggest that BPD is characterized by beliefs that others are hostile and untrustworthy, that they themselves will be rejected and abandoned, and that they have to protect themselves to prevent negative events (Butler et al., 2002; Staebler, Helbing, et al., 2011). Most importantly, it was shown experimentally in healthy individuals that the expectation of negative evaluation by another person leads to a less friendly and warm communication, a negative tone of voice, less self-disclosure, more disagreement, and more expression of dissimilarity (Curtis & Miller, 1986). There may be a link between dysfunctional beliefs in BPD and the results of our study, pointing to a self-fulfilling prophecy in impression management in BPD.

An important next step for future research will be to assess how exactly impression management in BPD is impaired or, in other words, which information BPD targets in this study "sent" that led to negative evaluations. As discussed above, this might be achieved by isolating specific visual cues that explain variance in the raters' estimates. Previous studies in social and personality psychology with non-clinical samples have already suggested a number of likely candidate cues. These studies have often assessed cooperative or altruistic behavior or the personality trait agreeableness as criteria, which might correspond well with the behavior in the dictator game we assessed here (e.g., Reed, Zeglen, & Schmidt, 2012). Others have directly measured trustworthiness and likeability ratings mirroring the present study (e.g., Todorov & Olson, 2008). One central cue that emerged repeatedly was low negative and high positive affect expression. It was a cue for cooperative behavior in economic games (Reed et al., 2012), for likeability (Naumann, Vazire, Rentfrow, & Gosling, 2009; Todorov & Olson, 2008), and for trustworthiness ratings (Caulfield, Ewing, Bank, & Rhodes, 2016; Ma, Correll, & Wittenbrink, 2015; Oosterhof & Todorov, 2009; Todorov & Olson, 2008; Todorov, Said, Engell, & Oosterhof, 2008). Beyond these, there are numerous further cues that have been researched,

ranging from static features such as hard facial lineaments (Borkenau & Liebler, 1995) to more complex variables such as perceived attractiveness or confidence of the target (Borkenau & Liebler, 1992, 1995). These cues are typically rated by a sample that is independent of the sample that provided the criteria estimates (in the present case the trustworthiness, likeability, and cooperativeness ratings). The cue ratings are then used to predict criteria ratings to determine which cue explains significant variance. Beyond employing a second rater sample, the use of speech analysis or facial emotion detection software provides a further option and a potentially more objective way of quantifying cue expression. Future psychopathology studies may rely on these well established procedures to research cues that predict negative evaluations of individuals with mental illness.

In addition to identifying visual cues that explain the difference in ratings between BPD and HC targets we observed in our study, future studies should also address the question of diagnostic specificity. In the present study, we did not include clinical control groups but only filmed participants with BPD and HCs. Moreover, the target sample we report suffered from a range of comorbid conditions, which is common in BPD samples (e.g., Tomko, Trull, et al., 2014) but also entails the limitation that comorbidity could have contributed to the observed effects. Thus, at this point we cannot conclude whether our findings are specific to the BPD population or whether they are a marker of (personality) psychopathology in general. Indeed, the findings might be relevant to a range of other mental illnesses, since interpersonal problems afflict patients of various disorders. For instance, it seems very likely that other personality disorder (PD) populations could be similarly affected, since current diagnostic systems place interpersonal dysfunction at the core of all PDs. In detail, the fifth version of the DSM (APA, 2013) defines PDs as a class of mental disorders characterized by overarching impairments in interpersonal and self-related functioning and the presence of pathological personality traits. Additionally, interpersonal dysfunction is also specifically included in criterion A of the DSM-5 section III conceptualization of PDs, again suggesting its central importance to this diagnostic

group. Thus, extending the present findings to samples beyond BPD could be promising, as would the comparison of different clinical groups.

Before detailed clinical implications can be derived from the present findings, replication with more closely matched target groups (especially on socioeconomic variables such as education and income) and studies that account for a broader range of psychopathology to address diagnostic specificity are clearly needed. Therefore, any suggestions me make at this point are necessarily tentative but may give rise to future investigations and spark further hypotheses. We suggest that the central finding of BPD individuals being seen more negatively by others than HCs in two samples warrants further consideration of how interaction partners perceive BPD individuals and how this could contribute to interpersonal difficulties. At present, this is something that is hardly considered in conceptualizations and treatments of BPD. Our findings – while of course still preliminary – would suggest that interventions specifically targeting impression management could help BPD patients to present themselves in a better light. Relating this idea back to the present results, it is important to note that we did not observe that BPD individuals behaved any less cooperatively than HCs in the dictator game - raters merely falsely thought that they shared less money in one of the two samples. So this is likely not a case of 'covering up' negative traits but rather of teaching BPD individuals means to better bring across their positive traits. How exactly this can be achieved will be determined by future studies that – building on evidence from non-clinical samples (Borkenau & Liebler, 1992; Borkenau et al., 2004; Nestler et al., 2012; Stirrat & Perrett, 2010) – aim to identify relevant cues and include closely matched target groups. Notably, based on the present results we would not infer generic deficits on the side of the BPD individual, but rather negatively biased interpretations of potential interaction partners. Therefore, providing those with BPD with techniques to counter potential negative biases in others could improve their relationships. Clearly, further investigation of which exact cues contribute to negative evaluations must come first and pave the way for specific interventions.

Thesis Discussion

CHAPTER V

For this doctoral thesis, I have presented three empirical studies, all of which were devoted to furthering the understanding of interpersonal dysfunction in BPD. I first presented a study in which I assessed interpersonal problems (rejection and disagreements) and their interplay with negative affect (hostility, sadness, and fear) in daily life, using an AA method. By employing AA, I was able to capture interpersonal problems and negative affect in participants' natural environments and tease apart their temporal relationship. Moreover, employing AA minimizes recall biases that typically affect retrospective reports (when participants have to aggregate across lengthy periods of time versus only minutes or at most 2 hours in this AA study) (Solhan et al., 2009). Beyond further characterizing the manifestation of interpersonal problems in daily life in those with BPD, I was also able to examine a central assumption of the Biosocial Model of BPD (Linehan, 1993) that remained largely untested: I demonstrated that, as theorized, heightened states of negative affect increase the likelihood of encountering later interpersonal problems. Overall, the data suggested a mutually reinforcing relationship between negative affect and interpersonal problems, such that both are predictive of each other. The rejection-hostility, rejection-sadness, and disagreement-hostility associations were significantly stronger in the BPD than in the depressed control group.

Importantly, I replicated these findings in a second sample, now comparing BPD participants to a control group with individuals from the community who regularly consume alcohol. In light of the growing awareness about non-replicability of central findings in the psychological sciences (e.g., Open Science Collaboration, 2015; Simmons, Nelson, & Simonsohn, 2011), I deemed it particularly important to demonstrate the robustness of the findings by submitting them to testing in a second sample. Within study 2, I also extended the findings from study 1 by adding lagged analyses to more clearly characterize the temporal relationship between interpersonal problems and negative affect. I was able to replicate the

central findings from study 1 and also demonstrate that interpersonal problems and negative affect predict later occurrences or levels of each other. As in study 1, I was able to demonstrate that the rejection-hostility, disagreement-hostility and rejection-sadness associations were significantly stronger in BPD compared to control participants.

In study 3, I shifted away from looking at daily life and assessed a possible underlying process of interpersonal dysfunction in the laboratory. I further changed the focus from assessing intrapersonal processes of the BPD individual (i.e. *their* experience of rejection/ disagreement and affective precursors and responses thereof) to a more interpersonal perspective, assessing how others evaluate those with BPD. For this purpose, I created a video set of individuals with BPD and HCs and showed these to two student rater samples and asked them to evaluate the target individuals in the videos. I expected that targets with BPD would be evaluated more negatively by others based on these short behavior excerpts ('Thin Slices'), which could help explain some of the interpersonal dysfunction observed in BPD (e.g. unstable relationships, difficulties establishing social bonds, small social networks). As hypothesized, participants in both samples evaluated BPD targets more negatively, specifically on the dimensions trustworthiness, likeability, and cooperativeness (the latter differed significantly only in one of the two samples).

In the following sections, I will integrate the findings from these three studies into the vast literature on interpersonal dysfunction in BPD. Specifically, I aim to demonstrate how they agree or disagree with previous evidence and how they extend previous work. Afterward, I discuss limitations of the three studies and finally derive implications for future research and clinical practice.

5.1 Summary and Integration of Study Findings

Previous studies on the link between interpersonal problems and negative affect in BPD have largely focused on rejection, linking it to specific types of negative affect such as anger,

and have contrasted BPD individuals to healthy control participants (Berenson et al., 2011; Chaudhury et al., 2017; Lazarus et al., 2018; Miskewicz et al., 2015; Sadikaj et al., 2013; Sadikaj et al., 2010; Stiglmayr et al., 2005). Consequently, there has been a lack of work focusing on interpersonal problems beyond rejection and comparing different types of negative affect. Additionally, due to the lack of clinical control groups, it remained unclear whether the previous findings had any specificity for the BPD population or applied more globally to individuals affected by psychopathology. Studies 1 and 2 filled these gaps by assessing the link between different types of interpersonal problems (i.e. rejection and disagreement) and negative affect (i.e. hostility, sadness, and fear) in the daily lives of BPD participants, and contrasting them to relevant clinical comparison groups of depressed participants and community controls with alcohol use.

Moreover, while the impact of interpersonal problems on negative affect has been assessed previously, the opposite direction – whether negative affect also has effects on the likelihood of encountering future interpersonal problems – remained unexplored. This question is particularly relevant with regard to BPD, since central etiological theories of the disorder suggest that negative affective states can also trigger interpersonal problems (Clarkin et al., 2007; Crowell et al., 2009; Fonagy et al., 2003). Therefore, in studies 1 and 2, I adopted both perspectives, examining whether interpersonal problems predict increased negative affect and, likewise, whether negative affect predicts a higher likelihood of (later) experiencing interpersonal problems. By collecting data at six time-points over 28 days (study 1) and 21 days (study 2) and employing multivariate multi-level models to analyze the data, I was able to separate effects at the momentary, day, and person level.

The results revealed a pattern of positive associations between disagreement and hostility, rejection and hostility, and between rejection and sadness for the BPD group that was suggestive of a mutually reinforcing relationship at the momentary as well as the day-level. This adds to knowledge about the manifestation of BPD symptoms, specifically suggesting that

hostility and sadness (that are implicated in the affective instability and intense anger criteria of BPD) and interpersonal problems can influence each other in the daily lives of BPD individuals. By contrasting BPD individuals to a group of depressed participants and to individuals from the community who drink, I was able to show that the effects pertaining to hostility are significantly stronger in BPD individuals.

These results are in line with previous work suggesting that rejection is closely associated with angry or hostile affect in both laboratory (Beeney et al., 2014; Chapman et al., 2015; Chapman et al., 2014; Renneberg et al., 2012; Staebler, Renneberg, et al., 2011) and daily life scenarios (Berenson et al., 2011; Lazarus et al., 2018; Miskewicz et al., 2015). They further support assumptions based on the Biosocial Theory (Crowell et al., 2009; Linehan, 1993) that dysregulated states of negative affect can lead to interpersonal problems, because the individual fails to act in a non-mood dependent way (e.g. fails to down-regulate anger and thus escalates a situation into a disagreement). The findings also agree with the Mentalization-based Theory of BPD (Fonagy et al., 2003). It suggests that mentalization is impaired in dysregulated affective states and posits failed mentalization processes as the basis for interpersonal problems. In other words, mentalization-based theory assumes that the ability to infer thoughts, intentions, and feelings in the self and others is impaired under distress, which leads to over-reliance on internal working models and renders interpersonal behavior somewhat erratic and non-complimentary to the interaction partner (Bateman & Fonagy, 2004). The implications with regard to object-relations theory (Clarkin et al., 2007) follow a similar line of reasoning, suggesting that individuals with BPD may be particularly prone to split object-relations under negative affect and tend to attribute all-negative characteristics and intentions to the object, which then leads to interpersonal problems.

In studies 1 and 2, I demonstrated that the interpersonal problems rejection and disagreement are frequent in the daily lives of individuals with BPD and that they are closely associated with negative affect, in particular with hostility and sadness, and that both

interpersonal problems and negative affect predict later occurrences of the other. In these studies, the BPD individual's affect and perception of interpersonal problems were the focus. However, interpersonal interactions are by nature dyadic (or involve even more than two people). Therefore, the sole focus on processes pertaining to the BPD individual may be too narrow when thinking about interpersonal dysfunction in BPD. Consequently, in study 3, I extended the perspective and examined how potential interaction partners may perceive individuals with BPD differently than they would perceive healthy individuals. In this study, I used the 'Thin Slices' paradigm (Ambady & Rosenthal, 1992), and presented short videos of 52 BPD and age- and gender-matched HC targets to two groups of student raters. These raters evaluated targets on the dimensions trustworthiness, likeability, and cooperativeness. In both samples, BPD targets were rated as significantly less trustworthy and less likeable, and in one sample also as less cooperative.

The findings from study 3 are in line with a series of studies by Daros et al. (2016), who demonstrated that BPD targets were evaluated more negatively on a range of dimensions based on photographs of their faces. Similarly, the results corroborate findings by Oltmanns et al. (2004) and Friedman, Oltmanns, Gleason, and Turkheimer (2006) who found that the personalities of military personnel with BPD features were evaluated more negatively overall. The results suggest that not only processes of the BPD individuals themselves, such as social cognitive processes or current affective states, may influence the interpersonal disturbances these individuals experience, but that processes that play out in the interaction partner also could play a role. If BPD individuals tend to appear lest trustworthy, cooperative, and likeable to others, BPD individuals may experience less approach behavior and positive interpersonal interaction from others. This may very well contribute to the small and conflictual social networks and poor relationship quality that BPD individuals report (Beeney et al., 2018; Clifton et al., 2007; Lazarus & Cheavens, 2017; Lazarus et al., 2016; Liebke et al., 2017).

5.2 Limitations

Since study 2 was a replication of study 1, many of the central limitations that I identified apply to both studies and I will therefore discuss both AA studies together. First, there are several methodological limitations with regard to how interpersonal problems were assessed in these two studies. In both studies, we assessed only a limited set of interpersonal problems, focusing on rejection and disagreement, and, clearly, these do not provide an exhaustive set of possible interpersonal problems. Previous studies have included other aspects of interpersonal dysfunction in daily life, for instance assessing interpersonal aggression (Scott et al., 2017), perceived lack of support (Turner et al., 2016), level of acceptance from others (Lazarus et al., 2018) or closeness to others (Gadassi et al., 2014). However, most previous daily life studies have also exclusively focused on assessing rejection (Berenson et al., 2011; Lazarus et al., 2018; Miskewicz et al., 2015; Sadikaj et al., 2013; Sadikaj et al., 2010) and, to date, there is a lack of inventories that are designed to assess the wide range of interpersonal problems in BPD in an AA context.

A further limitation of the way interpersonal problems were assessed is that we only assessed whether they occurred or not, but did not assess their severity or perceived impact. This could be problematic because it may not only be the mere occurrence of an event but also the severity and how it is appraised that impacts affect. Reversely, different levels of negative affect may also be predictive of more or less impact in interpersonal events. Thus, based on the present data, it remains unclear whether individuals with BPD experienced more severe rejection and disagreement (and thus showed stronger associations between these events and hostility and sadness), or whether similarly intense events entail stronger levels of negative affect in this group than in the depressed or community group. A closely related problem is that, based on findings about high rejection sensitivity in BPD (e.g., Staebler, Helbing, et al., 2011), one could assume that BPD participants were more prone to reporting rejection overall, maybe also at

levels that were relatively mild but still apparent to them. Likewise, BPD participants may have appraised all rejection events as more severe due to rejection sensitivity.

In addition to limitations in the assessment of interpersonal problems, a further limitation is that the daily life context does not allow for causal inferences about how interpersonal problems and negative affect are related. By using lagged analyses in study 2, I was able to better approximate the temporal relationship of these constructs, but potential confounding variables in daily life are manifold and may also have affected negative affect and interpersonal problems. By adjusting for prominent context variables (e.g. time), I have tried to account for some of these but the set of candidate covariates in AA studies is essentially endless. Additionally, one could criticize the studies by saying that both negative affect and interpersonal problems have many different, negative outcomes in the BPD population. Both negative affect and interpersonal problems have been associated with a range of other problem behaviors, such as non-suicidal self-injury (Snir et al., 2015; Turner et al., 2016; Victor et al., in press) or alcohol consumption (Jahng et al., 2011; Lane et al., 2016). Therefore, it seems unlikely that interpersonal problems are a specific outcome of negative affect or the other way around.

Turning to study 3, a central limitation is that we do not really know why BPD individuals were evaluated more negatively by the two groups of student raters. In both samples, BPD targets were rated as significantly less trustworthy and less likeable, and in one study also as less cooperative. Notably, these findings were present without raters knowing anything about the targets' mental health status, and therefore the influence of top-down processes such as stereotypes about mental illness was excluded. Additionally, BPD targets did not behave less cooperatively than HC targets in the dictator game, hence raters likely did not pick up on any actual differences in cooperativeness between the groups. Moreover, the effects were markedly larger when videos were presented without (vs. with) the audio trace. Based on this observation, I would conclude that raters must have primarily relied on visual cues to form their judgments, but within the scope of study 3 I was not able to identify which visual information was drawn

on. It also remains an open question whether raters actually distinguished much between the constructs they were asked to evaluate, that is, whether they specifically distinguished trustworthiness, cooperativeness, and likeability. The alternative explanation would be that the three criteria just reflect a global good-bad dimension and that raters placed targets on this dimension, without much specificity for each construct.

A further limitation of study 3 is the sample size of the target dataset, which resulted from the effortful recruiting of participants that were willing to be filmed. Since all central analyses eventually pertained to a comparison of the target groups, statistical power to detect small to medium differences between BPD and HC targets was generally limited. Empirically, however, all differences between groups corresponded to large effects (with the exception of the non-significant difference in perceived cooperativeness in one of the studies). Another limitation pertaining to the target sample is the lack of matching between the target groups, with BPD targets having a lower socioeconomic status and fewer years of education. Once could argue that these differences may also manifest in an individual's appearance and may have influenced raters' evaluations.

For all three studies, there is also a potential limitation with regard to diagnostic specificity. In study 1 we included a clinical control group and in study 2 we recruited individuals from the community who drink regularly. For these comparison groups, we were able to show that some associations (most notably the rejection/disagreement-hostility associations) were stronger in the BDP group. However, this did not imply that the depressed participants and community drinkers were not also affected by a close association between interpersonal problems and negative affect. Indeed, in many analyses a significant, albeit weaker, relationship between interpersonal problems and negative affect was also observed for these populations. This association would likely even translate to the healthy population, where an association between rejection and negative affect (for reviews, see Gerber & Wheeler, 2009; Romero-Canyas et al., 2010) and disagreement and negative affect (Bolger & Schilling, 1991;

Bolger & Zuckerman, 1995; Kennedy et al., 2002; Laurenceau et al., 2005; Ogolsky & Gray, 2015) was previously shown. Thus, the positive associations between rejection/disagreement and hostility, sadness, and fear that we observed in studies 1 and 2 appear not to be unique to the BPD population. Rather, it seems that some associations are more pronounced in this group which is uniquely affected by both affective and interpersonal disturbance. With regard to study 3, we are unable to determine whether the observed effects are specific to BPD or a marker of general psychopathology, since we only included a healthy control group.

In addition to the question of diagnostic specificity, the field is currently also debating the personality disorder concept overall and reforms are shifting away from a categorical to a dimensional model. For instance, in the eleventh version of the International Classification of Diseases (ICD-11), personality disorders will be diagnosed on a severity dimension ranging from mild to severe personality disorder. Likewise, in section III of the DSM-5 (which delineates the research criteria for personality disorders) personality disorders are conceptualized on a severity continuum for impairment in the self-related and interpersonal domain (criterion A). In light of this development, one could argue that the categorical approach that was taken in the presented studies does not fit the latest conceptualization of personality disorders and that future studies should instead incorporate a dimensional measure of personality disorders. At the time of data collection (especially for the data in studies 1 and 2, which was originally collected for another purpose and re-analyzed by me), there was a lack of inventories with established reliability and validity for the scoring of personality disorders in a dimensional fashion. Consequently, a dimensional approach was not incorporated herein, but I would recommend that future studies should at least include (if not fully rely on) a dimensional measure, for instance the self-report Personality Inventory for DSM-5 (PID-5, Krueger, Derringer, Markon, Watson, & Skodol, 2012).

A further limitation of the presented studies is the focus on negative affect and interpersonal problems, while omitting positive affect and positive interpersonal events. Recent

research suggests that individuals with BPD may not only show increased negative affect in association with interpersonal problems but also less positive affect in association to positive interpersonal events such as compliments and social support (Lazarus et al., 2018; Liebke et al., 2018) or social proximity (Gadassi et al., 2014). A more holistic perspective on interpersonal functioning in BPD would entail both: a perspective on positive and negative interpersonal events and affect, and mechanisms that explain the manifestation and effects of each.

5.3 Research Implications

The presented studies have several implications for future research that can be directly derived from the limitations that were addressed above. First, there is a group of implications for assessing interpersonal dysfunction in daily life. While the presented studies have extended previous studies by going beyond just looking at rejection and including disagreement, they assess only a very limited set of interpersonal problems. Future studies should extend the set of interpersonal problems that are being assessed, either by drawing on previously published inventories that have been used in cross-sectional studies (e.g., Kiesler et al., 1997; Zacchilli et al., 2009) or by developing new sets of items that are applicable in a daily-life context. In that respect, the set of interpersonal events should also include positive interpersonal events to broaden the perspective on interpersonal functioning in BPD by including measures of intact or adaptive functioning.

Beyond extending the set of interpersonal events, future studies should also include an assessment of the event's impact. This appears necessary because participants may report a wide range of interpersonal problems (e.g. disagreements) that all differ in their severity (e.g. having a disagreement that culminates in physical aggression versus disagreement within a minor discussion) and differ in their meaningfulness or impact for the participant (e.g. a disagreement with a spouse about major life goals versus a disagreement with a colleague about lunch options). In that respect, the assessment of a participant's appraisal of an interpersonal event

may also be helpful in further explaining their affective reaction to it (Houben, Claes, Sleuwaegen, Berens, & Vansteelandt, 2018). Some recent studies (e.g., Lazarus et al., 2018) also suggest that the type of interaction partner may be relevant for the affective response in BPD, specifically suggesting that reactions are intensified when looking at romantic partners. Due to the relatively low rate of reported events by each different interaction partner we initially captured (romantic partner, parent, child, sibling, other family member, friend, roommate, coworker, boss) we did not analyze these separately but collapsed interpersonal events across all participants. Specifically recruiting participants for a study that fulfill certain criteria, for instance those that are currently in a romantic relationship to look more closely at romantic interactions or those that are employed fulltime to maximize the likelihood of observing events with coworkers or employers, may help remedy this.

Moreover, to better parse apart the timing of interpersonal events and affect, it might be helpful to assess interpersonal events in an event-contingent way (versus a random time schedule as in study 1 and 2). Specifically, one could ask participants to enter data into the app whenever they experience an interpersonal event (or, realistically, right thereafter). Then one could sample affect items right at that time-point and possibly include a number of narrowly-spaced follow-up prompts (e.g. 4 additional prompts every 15 minutes) to more closely assess the dynamic of the affective response to the event (also by asking specifically "in response to [the event] I felt…"). This could be a way of collecting data that is particularly suitable for assessing the affect dynamic in BPD in relation to interpersonal events. Specifically, such data could be used to test aspects of the biosocial theory of BPD, which posits that beyond a strong negative reaction to interpersonal problems (which was somewhat captured in studies 1 and 2), participants should also need a long time to return to their affective baseline. A close-knit sampling after interpersonal events may allow modeling this process.

An alternative approach would be to employ a more intense sampling scheme overall, for instance sampling interpersonal events and affect every hour or even more frequently. Some

evidence suggests that the fast-changing and volatile affectivity of those with BPD may be best captured by sampling as often as every 15 minutes (Ebner-Priemer, Eid, Kleindienst, Stabenow, & Trull, 2009; Ebner-Priemer et al., 2007). However, this could come at the cost of the length of the overall study period. In study 1, participants were enrolled in the study for 28 days and in study 2 for 21 days, responding six times daily. A more frequent sampling scheme implemented over such a long study period would most likely have entailed too much participant burden. Thus, the frequency of the sampling within a day and the number of days that can be sampled has to be weighed against each other. If deciding for a more intense sampling within days, it would be important to recruit participants based on some type of screening criterion (the simplest way would be to rely on fulfillment of the two interpersonal DSM-criteria) to ensure that interpersonal problems are sufficiently frequent so that they could be observed in a shorter study period.

Beyond implications for the assessment of interpersonal problems via self-report in AA studies, future studies could also aim to more directly test biological theories of interpersonal dysfunction in BPD (Herpertz & Bertsch, 2015; Servan et al., 2018; Stanley & Siever, 2009). Biological markers that are assessed prior to the study (e.g. oxytocin receptor levels assessed through blood samples) could be combined with the AA data by modelling them as person-level variables that moderate the momentary association between interpersonal problems and negative affect. Similar approaches are possible with regard to other biological/physiological markers, for instance indices for reactivity to rejection in an fMRI paradigm (e.g Cyberball) or measures of peripheral-physiological arousal to an interpersonal stressor in the laboratory. More recently, some endeavors have also been made to include physiological sensors in the daily life context, for instance through smartwatches or shirts with implemented sensors that measure heart rate, respiration and electrodermal response and that connect to the study phone via Bluetooth (for a review, see Adams et al., 2017). This way, physiological arousal in interpersonally stressful contexts could be captured in real-time.

Thinking about endocrinological processes, the collection of saliva samples could also be included in the AA context (see Störkel, Hepp, Kieslich, Schmahl, & Niedtfeld, 2018). This could help testing whether the relationship repair after interpersonal problems does indeed entail an increased secretion of endogenous opioids or oxytocin as it has been suggested (Stanley & Siever, 2009). These samples could be modelled at the momentary level (level 1) of the multilevel model, whereas parameters obtained from one-shot blood or hair samples or indices derived from laboratory paradigms have to be modelled at the person level at the cost of statistical power. Nonetheless, the AA context seems ideally suited to address how well trait-like parameters (such as oxytocin receptor levels or baseline opioid levels in hair) relate to daily life processes.

In addition to these implications that are derived from the AA studies 1 and 2, the experimental study 3 also has a range of implications. The central question that remained unanswered by this study was what exact visual information participants may have used to form their negative evaluations of BPD targets (even though diagnostic status was unknown) and future studies may want to assess this. Previous studies that have assessed nonverbal behavior in those with BPD suggest that affect display could be a cue that differed between the BPD and HC targets. BPD individuals showed low levels of positive affect display in experimental contexts, such as in reaction to positive affect induction (Renneberg, Heyn, Gebhard, & Bachmann, 2005), during a cyberball game (Staebler, Renneberg, et al., 2011), or in response to emotional pictures (Matzke, Herpertz, Berger, Fleischer, & Domes, 2014). Likewise, BPD individuals displayed more negative affect (measured using facial electromyography) in previous studies when viewing emotional pictures (Davies et al., 2016; Herpertz et al., 2001; Matzke et al., 2014) and during a problem-focused interview (Peham et al., 2015).

Both, positive and negative affect display were also independently linked to trustworthiness, likeability and cooperativeness judgments in studies from the fields of personality and social psychology. Specifically, these studies found that the intensity and

frequency of positive affect expression (especially overt smiling) predicted agreeableness and altruism ratings (Borkenau & Liebler, 1992, 1995; W. M. Brown, Palameta, & Moore, 2003; Kenny, Horner, Kashy, & Chu, 1992; Naumann et al., 2009; Reed et al., 2012; Tackman & Srivastava, 2016), and also estimations of cooperative behavior in economic games (Reed et al., 2012). Likewise, positive affect display was associated with how likeable a target person appeared to others (Naumann et al., 2009; Todorov & Olson, 2008), and how trustworthy they seemed (Caulfield et al., 2016; Ma et al., 2015; Oosterhof & Todorov, 2009; Todorov & Olson, 2008; Todorov et al., 2008). Other nonverbal behaviours that were identified as potential cues for trustworthiness, likeability and cooperativeness, include the level of eye contact, which was positively associated with agreeableness (Borkenau & Liebler, 1992; Larsen & Shackelford, 1996), likeability (Argyle, Lefebvre, & Cook, 1974; Kendon & Cook, 1969; Mason, Tatkow, & Macrae, 2005) and trustworthiness ratings (Bayliss & Tipper, 2006), or having a feminine appearance (Borkenau & Liebler, 1992, 1995), which was also associated with these constructs.

Future studies should aim to measure observable cues such as negative/ positive affect display and eye contact and use them as mediators to explain the association between target group (BPD vs. HC herein) and Thin Slices ratings such as trustworthiness, cooperativeness, and likeability. Even more suited would be approaches that allow for an objective (i.e. non-reliant on participant ratings) measure of cues such as facial affect display. This could be obtained by using software that detects facial affect display based on patterns of muscle activation in the face, or the actual facial activity of targets could be measured, for instance by using electromyography. The identification of modifiable behaviors that are cues for negative evaluations of those with BPD like the ones observed in study 3 would be the necessary next step for identifying potential targets for therapeutic interventions.

5.4 Clinical Implications

Before discussing potential clinical implications, I would like to emphasize that (especially with regard to study 3) further replication of the present results is the necessary first step and clinical implications should only be implemented once the robustness of the observed effects has been demonstrated. Nonetheless, I believe that the findings have several potential clinical implications that may spark future interest in the matter, and hence I will discuss them in the following.

A central implication from study 1 and 2 is that interpersonal problems are likely triggers for negative affect. This may seem somewhat obvious: one has a negative interaction and that creates bad feelings. However, having identified two specific interpersonal problems (rejection and disagreement) may be very helpful to patients with BPD. In Dialectical Behavior Therapy (DBT, Linehan, 1993), patients usually start their treatment with identifying typical triggers and 'early warning signs' for high levels of distress and the subjective experience of rejection and disagreement could be important triggers for many patients. Also, it could be helpful to educate patients about the concept of rejection sensitivity to make them more aware of the fact that they may be particularly perceptive of and reactive to rejection. There is a chance (and I have actually received this feedback from my own patients) that BPD patients perceive this as very validating as it gives them a different framework with which to understand interpersonal situations and their own reactions. It could also be a helpful first step in introducing cognitive interventions, such as reinterpreting statements by others that were subjectively perceived as rejecting. Knowing that they could have a 'sharpened sense' for rejection may help patients question their initial appraisal of a situation and ultimately dampen the negative affective reaction.

At the same time, it is my opinion that many of the 'classic' distress tolerance skills that are taught in DBT (Linehan, 1993) to reduce negative affect rely too heavily on items that are meant to provide strong stimulation and momentarily distraction from aversive inner tension

(e.g. biting on a chili). Based on the present findings, which are well in line with basic theories of BPD (Bateman & Fonagy, 2004; Clarkin et al., 2007; Crowell et al., 2009; Fonagy et al., 2003; Linehan, 1993), it seems highly likely that BPD individuals experience a majority of high distress situations while they are in a social situation. Depending on the type of situation, it may often not be possible to use distress tolerance skills that include items (like someone biting on a chili) because they would seem strange or unusual to the interaction partner and disrupt the further flow of the social interaction. Based on the present results, I see reason to focus more explicitly on skills that patients can easily apply in interpersonal situations, be it during a conflict with their romantic partner or while being criticized by a supervisor at work. This could include cognitive skills, breathing exercises, mindful listening, or subtle physical skills such as subtly tensing or releasing certain muscle groups. Likewise, it could be a very worthwhile endeavor to prepare strategies that patients can apply before entering a potentially difficult interpersonal situation.

Moreover, the results from study 1 and 2 would also suggest that, when in a negative mood, participants are particularly vulnerable towards running into interpersonal problems. As discussed above, the link here is still not entirely clear. It may be possible that participants show negative affectivity either through their mimic, gestures, or voice and thus elicit more negative behavior from others, or they may merely be more prone to perceiving negative interpersonal events. Here, I think DBT (Linehan, 1993) already has a lot of excellent suggestions how to decrease overall emotional vulnerability and how to reduce stress (e.g. “Strong skills” or “ABC Gesund” in the German version).

The question of whether the fact that a patient is showing the negative affective state he or she is currently experiencing could lead to further interpersonal problems relates well to study 3. Above, I discussed that raters have likely relied on targets’ facial affect display to come to their judgments on trustworthiness, cooperativeness, and likeability. In reverse, this could imply that others actually do perceive the facial affect and possibly react to patients with BPD more

negatively when they are signaling a bad mood. This would imply that a modulation of affect display could help elicit a more positive reaction from interaction partners. The topic of affect display could be integrated in existing treatments of BPD, either in group settings such as skills training in DBT, or within social competence modules in individual therapy. In any scenario, the inclusion of video-feedback could be particularly beneficial when working with affect display. In this respect, the fostering of positive affect display should be a relatively unproblematic and promising intervention. In contrast, the suppression of negative affect display may be somewhat more risky, since suppression of negative affect is (even outside of clinical samples) largely considered to be a poorly effective emotion regulation strategy that can actually increase subjective and physiological arousal (e.g., Gross & Levenson, 1993).

All in all, the present results underline the specific importance of interpersonal problems for the BPD syndrome. They suggest that future studies and the development of specific interventions hold great potential for improving care for those affected, and even include the possibility that such interventions may be well applicable to other patient groups that are also affected by interpersonal problems.

Summary

Individuals with Borderline Personality Disorder (BPD) suffer from interpersonal problems, such as frequent conflicts, low levels of relationship satisfaction, and high levels of loneliness. Interpersonal problems in BPD are pervasive and create both a personal and societal burden (e.g. through health care costs and productivity losses). Previous empirical studies suggest that impaired social cognitive processes, an inability to maintain interpersonal cooperation, and functional neurological alterations may underlie these problems. Theories of BPD, such as the Biosocial Model, further emphasize the interplay between interpersonal problems and affective instability, both of which represent core symptoms of the disorder. Specifically, theories of BPD suggest that negative affect can be both an antecedent and a consequence of interpersonal problems.

Within this thesis, I conducted two studies to test whether this proposed association holds in the daily lives of individuals with BPD. For this purpose, I utilized Ambulatory Assessment, a method of collecting data in real-life and near real-time via handheld devices such as smartphones. I specifically assessed perceived rejection and disagreement events as manifestations of interpersonal problems. For study 1, I recruited 80 participants with BPD and a clinical control group of 51 participants with depression of dysthymia. Participants were in the study for 28 days and provided data through a handheld device at 6 random time-points throughout the day. At each time-point, participants reported whether they had experienced a rejection or disagreement event since last prompted and rated their level of negative affect, specifically hostility, sadness, and fear. Using multivariate multi-level modeling, I analyzed the concurrent momentary relationship between interpersonal problems and negative affect. Results showed that the rejection-hostility, rejection-sadness, and disagreement-hostility associations were significantly stronger in the BPD than in the depressed control group.

In an effort to determine the replicability and thus robustness of these findings and to further detail a potential specificity for the BPD population, I attempted replication of these findings in a second study. I again recruited a group of participants with BPD (n = 56) and this time included a control group of individuals from the community with alcohol use (n = 60). The study ran for 21 days with 6 random daily assessments of interpersonal problems and negative affect. Replicating findings from study 1, the rejection-hostility, rejection-sadness, and disagreement-hostility associations were again significantly stronger in the BPD group. Additionally, study 2 extended the first study by including time-lagged analyses. That is, I modelled whether interpersonal problems also predict later levels of negative affect (i.e. on average 2 hours later). Results from the lagged analyses revealed that rejection was associated with subsequent hostility and with subsequent sadness more strongly in the BPD group, as was disagreement with subsequent hostility and fear. Overall, the results from these two studies suggest that interpersonal problems and negative affect may be associated in a mutually reinforcing way (a 'vicious cycle') in the daily lives of those with BPD. Future studies could extend these results to further types of negative affect and a broader range of interpersonal problems. They could also consider a potential protective role of positive events and affect. With regard to clinical practice, the results suggest a need for teaching emotion regulation strategies that are applicable in interpersonal contexts and a potential benefit of identifying specific interpersonal events as typical triggers for negative affect.

In addition to these two daily life studies, I conducted a third study in which I shifted the focus away from assessing intrapersonal processes of the BPD individual. I posited that interpersonal problems in BPD are not only affected by the BPD individuals themselves but also by their interaction partners. However, processes pertaining to interaction partners have rarely been addressed empirically. In order to fill this gap, I assessed how participants evaluate those with BPD in a first-impression type situation using the 'Thin Slices' paradigm. I reasoned that if participants evaluated those with BPD in a systematically negative way, this could contribute to

the lack of social bonds and high rates of interpersonal problems. I created a video set of 26 target participants with BPD and 26 healthy control participants who briefly speak about their personal preferences during the video. Next, these videos were shown to two student rater samples, who evaluated targets on the dimensions likeability, trustworthiness, and cooperativeness. Regarding cooperativeness, we specifically asked raters to estimate how much money targets had shared in an economic game ('dictator game'). We collected actual dictator game contributions from all targets and these did not differ between the groups. Sample 1 saw the videos with audio and sample 2 without audio, so that raters in this sample had to rely solely on visual information. Notably, raters did not have any further information about the targets, including that some of them had BPD. Results showed that raters evaluated BPD targets as less likeable and less trustworthy in both samples and in the second sample also as less cooperative (in the absence of an actual difference in cooperative behavior between the target groups). I concluded that raters must have relied on visual cues to form their evaluations of the presented targets. Based on empirical findings from social and personality psychology, I discussed facial affect display as a likely cue for likeability, trustworthiness, and cooperativeness. Since previous empirical studies have shown that individuals with BPD tend to show little positive and frequent negative facial affect, it is possible that BPD targets in this sample did so, too, and that raters have used this to inform their judgments. Future studies are needed to determine whether facial affect is indeed the mediating cue in this relationship and whether this effect has any specificity for the BPD population by including clinical control groups. If this is the case, individuals with BPD (and other types of psychopathology) might greatly benefit from interventions tailored towards increasing positive affect display and overall impression management.

References

aan het Rot, M., Hogenelst, K., & Schoevers, R. A. (2012). Mood disorders in everyday life: A systematic review of experience sampling and ecological momentary assessment studies. *Clinical Psychology Review, 32*(6), 510-523. doi:10.1016/j.cpr.2012.05.007

Adams, Z. W., McClure, E. A., Gray, K. M., Danielson, C. K., Treiber, F. A., & Ruggiero, K. J. (2017). Mobile devices for the remote acquisition of physiological and behavioral biomarkers in psychiatric clinical research. *Journal of Psychiatric Research, 85*, 1-14. doi:10.1016/j.jpsychires.2016.10.019

Ambady, N., & Rosenthal, R. (1992). Thin slices of expressive behavior as predictors of interpersonal consequences: A meta-analysis. *Psychological Bulletin, 111*(2), 256-274. doi:10.1037/0033-2909.111.2.256

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

Argyle, M., Lefebvre, L., & Cook, M. (1974). The meaning of five patterns of gaze. *European Journal of Social Psychology, 4*(2), 125-136. doi:10.1002/ejsp.2420040202

Arntz, A., Dreessen, L., Schouten, E., & Weertman, A. (2004). Beliefs in personality disorders: A test with the Personality Disorder Belief Questionnaire. *Behaviour Research and Therapy, 42*(10), 1215-1225. doi:10.1016/j.brat.2003.08.004

Arntz, A., & Veen, G. (2001). Evaluations of others by borderline patients. *The Journal of Nervous and Mental Disease, 189*(8), 513-521. doi:10.1097/00005053-200108000-00004

Ashton, M. C., & Lee, K. (2007). Empirical, theoretical, and practical advantages of the HEXACO model of personality structure. *Personality and Social Psychology Review, 11*(2), 150-166. doi:10.1177/1088868306294907

Aviram, R. B., Brodsky, B. S., & Stanley, B. (2006). Borderline personality disorder, stigma, and treatment implications. *Harvard Review of Psychiatry, 14*(5), 249-256. doi:10.1080/10673220600975121

Bandelow, B., Schmahl, C., Falkai, P., & Wedekind, D. (2010). Borderline personality disorder: A dysregulation of the endogenous opioid system? *Psychological Review, 117*(2), 623. doi:10.1037/a0018095

Barnow, S., Stopsack, M., Grabe, H. J., Meinke, C., Spitzer, C., Kronmuller, K., & Sieswerda, S. (2009). Interpersonal evaluation bias in borderline personality disorder. *Behaviour Research and Therapy, 47*(5), 359-365. doi:10.1037/a0018095

Bateman, A. W., & Fonagy, P. (2004). Mentalization-based treatment of BPD. *Journal of Personality Disorders, 18*(1), 36-51. doi:10.1521/pedi.18.1.36.32772

Bates, D., Maechler, M., Bolker, B., & Walker, S. (2015). Fitting linear mixed-effects models using lme4. *Journal of Statistical Software, 67*(1), 1-48. doi:10.18637/jss.v067.i01

Baumeister, R. F., & Leary, M. R. (1995). The need to belong: Desire for interpersonal attachments as a fundamental human motivation. *Psychological Bulletin, 117*(3), 497-529. doi:10.1037/0033-2909.117.3.497

Bayliss, A. P., & Tipper, S. P. (2006). Predictive gaze cues and personality judgments: Should eye trust you? *Psychological Science, 17*(6), 514-520. doi:10.1111/j.1467-9280.2006.01737.x

Beeney, J. E., Hallquist, M. N., Clifton, A. D., Lazarus, S. A., & Pilkonis, P. A. (2018). Social disadvantage and borderline personality disorder: A study of social networks. *Personality Disorders: Theory, Research, and Treatment, 9*(1), 62-72. doi:10.1037/per0000234

Beeney, J. E., Levy, K. N., Gatzke-Kopp, L. M., & Hallquist, M. N. (2014). EEG asymmetry in borderline personality disorder and depression following rejection. *Personality Disorders: Theory, Research, and Treatment, 5*(2), 178-185. doi:10.1037/per0000032

Benjamini, Y., & Hochberg, Y. (1995). Controlling the false discovery rate: A practical and powerful approach to multiple testing. *Journal of the Royal Statistical Society, 57*(1), 289-300. doi:10.2307/2346101

Berenson, K. R., Downey, G., Rafaeli, E., Coifman, K. G., & Paquin, N. L. (2011). The rejection–rage contingency in borderline personality disorder. *Journal of Abnormal Psychology, 120*(3), 681-690. doi:10.1037/a0023335

Berg, J., Dickhaut, J., & McCabe, K. (1995). Trust, reciprocity, and social history. *Games and Economic Behavior, 10*(1), 122-142. doi:10.1006/game.1995.1027

Bertsch, K., Schmidinger, I., Neumann, I. D., & Herpertz, S. C. (2013). Reduced plasma oxytocin levels in female patients with borderline personality disorder. *Hormones and Behavior, 63*(3), 424-429. doi:10.1016/j.yhbeh.2012.11.013

Black, D. W., Blum, N., Pfohl, B., & Hale, N. (2004). Suicidal behavior in borderline personality disorder: Prevalence, risk factors, prediction, and prevention. *Journal of Personality Disorders, 18*(3), 226-239. doi:10.1521/pedi.18.3.226.35445

Bohus, M. (2007). Zur Versorgungssituation von Borderline-Patienten in Deutschland. *Deutsches Ärzteblatt, 11*(3), 149-153.

Bohus, M., Kleindienst, N., Limberger, M. F., Stieglitz, R.-D., Domsalla, M., Chapman, A. L., . . . Wolf, M. (2009). The short version of the Borderline Symptom List (BSL-23): Development and initial data on psychometric properties. *Psychopathology, 42*(1), 32-39. doi:10.1159/000173701

Bolger, N., Davis, A., & Rafaeli, E. (2003). Diary methods: Capturing life as it is lived. *Annual Review of Psychology, 54*(1), 579-616. doi:10.1146/annurev.psych.54.101601.145030

Bolger, N., & Schilling, E. A. (1991). Personality and the problems of everyday life: The role of neuroticism in exposure and reactivity to daily stressors. *Journal of Personality, 59*(3), 355-386. doi:10.1111/j.1467-6494.1991.tb00253.x

Bolger, N., & Zuckerman, A. (1995). A framework for studying personality in the stress process. *Journal of Personality and Social Psychology, 69*(5), 890-902. doi:10.1037/0022-3514.69.5.890

Bond, M. H. (1972). Effect of an impression set on subsequent behavior. *Journal of Personality and Social Psychology, 24*(3), 301-305. doi:10.1037/h0033716

Boone, R. T., & Buck, R. (2003). Emotional expressivity and trustworthiness: The role of nonverbal behavior in the evolution of cooperation. *Journal of Nonverbal Behavior, 27*(3), 163-182. doi:10.1023/A:1025341931128

Borkenau, P., & Liebler, A. (1992). Trait inferences: Sources of validity at zero acquaintance. *Journal of Personality and Social Psychology, 62*(4), 645-657. doi:10.1037/0022-3514.62.4.645

Borkenau, P., & Liebler, A. (1995). Observable attributes as manifestations and cues of personality and intelligence. *Journal of Personality, 63*(1), 1-25. doi:10.1111/j.1467-6494.1995.tb00799.x

Borkenau, P., Mauer, N., Riemann, R., Spinath, F. M., & Angleitner, A. (2004). Thin slices of behavior as cues of personality and intelligence. *Journal of Personality and Social Psychology, 86*(4), 599-614. doi:10.1037/0022-3514.86.4.599

Bouchard, S., Godbout, N., & Sabourin, S. (2009). Sexual attitudes and activities in women with borderline personality disorder involved in romantic relationships. *Journal of Sex & Marital Therapy, 35*(2), 106-121. doi:10.1080/00926230802712301

Bouchard, S., & Sabourin, S. (2009). Borderline personality disorder and couple dysfunctions. *Current Psychiatry Reports, 11*(1), 55-62. doi:10.1007/s11920-009-0009-x

Bouchard, S., Sabourin, S., Lussier, Y., & Villeneuve, E. (2009). Relationship quality and stability in couples when one partner suffers from borderline personality disorder. *Journal of Marital and Family Therapy, 35*(4), 446-455.

Bowlby, J. (1973). *Attachment and loss: Separation, anxiety, and anger* (Vol. 2). New York, NY: Basic Books.

Bray, S., Barrowclough, C., & Lobban, F. (2007). The social problem-solving abilities of people with borderline personality disorder. *Behaviour Research and Therapy, 45*(6), 1409-1417. doi:10.1016/j.brat.2006.06.011

Brodsky, B. S., Groves, S. A., Oquendo, M. A., Mann, J. J., & Stanley, B. (2006). Interpersonal precipitants and suicide attempts in borderline personality disorder. *Suicide and Life-Threatening Behavior, 36*(3), 313-322. doi:10.1521/suli.2006.36.3.313

Brown, R. C., Plener, P. L., Groen, G., Neff, D., Bonenberger, M., & Abler, B. (2017). Differential neural processing of social exclusion and inclusion in adolescents with non-suicidal self-injury and young adults with borderline personality disorder. *Frontiers in Psychiatry, 8*(267), 1-5. doi:10.3389/fpsyt.2017.00267

Brown, W. M., Palameta, B., & Moore, C. (2003). Are there nonverbal cues to commitment? An exploratory study using the zero-acquaintance video presentation paradigm. *Evolutionary Psychology, 1*(1), 42-69. doi:10.1177/147470490300100104

Bungert, M., Liebke, L., Thome, J., Haeussler, K., Bohus, M., & Lis, S. (2015). Rejection sensitivity and symptom severity in patients with borderline personality disorder: Effects of childhood maltreatment and self-esteem. *Borderline Personality Disorder and Emotion Dysregulation, 2*(1), 1-13. doi:10.1186/s40479-015-0025-x

Butler, A. C., Brown, G. K., Beck, A. T., & Grisham, J. R. (2002). Assessment of dysfunctional beliefs in borderline personality disorder. *Behaviour Research and Therapy, 40*(10), 1231-1240. doi:10.1016/S0005-7967(02)00031-1

Byrne, D. (1997). An overview (and underview) of research and theory within the attraction paradigm. *Journal of Social and Personal Relationships, 14*(3), 417-431. doi:10.1177/0265407597143008

Carpenter, R. W., & Trull, T. J. (2013). Components of emotion dysregulation in borderline personality disorder: A review. *Current Psychiatry Reports, 15*(1), 1-8. doi:10.1007/s11920-012-0335-2

Carpenter, R. W., Wycoff, A. M., & Trull, T. J. (2016). Ambulatory assessment: New adventures in characterizing dynamic processes. *Assessment, 23*(4), 414-424. doi:10.1177/1073191116632341

Caulfield, F., Ewing, L., Bank, S., & Rhodes, G. (2016). Judging trustworthiness from faces: Emotion cues modulate trustworthiness judgments in young children. *British Journal of Psychology, 107*(3), 503-518. doi:10.1111/bjop.12156

Çelik, P., Lammers, J., van Beest, I., Bekker, M. H., & Vonk, R. (2013). Not all rejections are alike; competence and warmth as a fundamental distinction in social rejection. *Journal of Experimental Social Psychology, 49*(4), 635-642. doi:10.1016/j.jesp.2013.02.010

Chapman, A. L., Dixon-Gordon, K. L., Butler, S. M., & Walters, K. N. (2015). Emotional reactivity to social rejection versus a frustration induction among persons with borderline personality features. *Personality Disorders: Theory, Research, and Treatment, 6*(1), 88-96. doi:/10.1037/per0000101

Chapman, A. L., Walters, K. N., & Dixon-Gordon, K. L. (2014). Emotional reactivity to social rejection and negative evaluation among persons with borderline personality features. *Journal of Personality Disorders, 28*(5), 720-733. doi:10.1521/pedi_2012_26_068

Chaudhury, S. R., Galfalvy, H., Biggs, E., Choo, T.-H., Mann, J. J., & Stanley, B. (2017). Affect in response to stressors and coping strategies: An ecological momentary assessment study of borderline personality disorder. *Borderline Personality Disorder and Emotion Dysregulation, 4*(8), 1-9. doi:10.1186/s40479-017-0059-3

Chesin, M., Fertuck, E., Goodman, J., Lichenstein, S., & Stanley, B. (2015). The interaction between rejection sensitivity and emotional maltreatment in borderline personality disorder. *Psychopathology, 48*(1), 31-35. doi:10.1159/000365196

Chesney, E., Goodwin, G. M., & Fazel, S. (2014). Risks of all-cause and suicide mortality in mental disorders: A meta-review. *World Psychiatry, 13*(2), 153-160. doi:10.1002/wps.20128

Choi-Kain, L. W., Zanarini, M. C., Frankenburg, F. R., Fitzmaurice, G. M., & Reich, D. B. (2010). A longitudinal study of the 10-year course of interpersonal features in borderline personality disorder. *Journal of Personality Disorders, 24*(3), 365-376. doi:10.1521/pedi.2010.24.3.365

Clarkin, J. F., Hull, J. W., & Hurt, S. W. (1993). Factor structure of borderline personality disorder criteria. *Journal of Personality Disorders, 7*(2), 137-143. doi:10.1521/pedi.1993.7.2.137

Clarkin, J. F., Lenzenweger, M. F., Yeomans, F., Levy, K. N., & Kernberg, O. F. (2007). An object relations model of borderline pathology. *Journal of Personality Disorders, 21*(5), 474-499. doi:10.1521/pedi.2007.21.5.474

Clifton, A., Pilkonis, P. A., & McCarty, C. (2007). Social networks in borderline personality disorder. *Journal of Personality Disorders, 21*(4), 434-441. doi:10.1521/pedi.2007.21.4.434

Coan, J. A., & Allen, J. J. (2004). Frontal EEG asymmetry as a moderator and mediator of emotion. *Biological Psychology, 67*(1), 7-50. doi:10.1016/j.biopsycho.2004.03.002

Coifman, K. G., Berenson, K. R., Rafaeli, E., & Downey, G. (2012). From negative to positive and back again: Polarized affective and relational experience in borderline personality disorder. *Journal of Abnormal Psychology, 121*(3), 668-679. doi:10.1037/a0028502

Comtois, K. A., Russo, J., Snowden, M., Srebnik, D., Ries, R., & Roy-Byrne, P. (2003). Factors associated with high use of public mental health services by persons with borderline personality disorder. *Psychiatric Services, 54*(8), 1149-1154. doi:10.1176/appi.ps.54.8.1149

Crowell, S. E., Beauchaine, T. P., & Linehan, M. M. (2009). A biosocial developmental model of borderline personality: Elaborating and extending Linehan's theory. *Psychological Bulletin, 135*(3), 495-510. doi:10.1037/a0015616

Curtis, R. C., & Miller, K. (1986). Believing another likes or dislikes you: Behaviors making the beliefs come true. *Journal of Personality and Social Psychology, 51*(2), 284-290. doi:10.1037/0022-3514.51.2.284

Daley, S. E., Burge, D., & Hammen, C. (2000). Borderline personality disorder symptoms as predictors of 4-year romantic relationship dysfunction in young women: Addressing issues of specificity. *Journal of Abnormal Psychology, 109*(3), 451. doi:10.1037/0021-843X.109.3.451

Daros, A. R., Ruocco, A. C., & Rule, N. O. (2016). Identifying mental disorder from the faces of women with borderline personality disorder. *Journal of Nonverbal Behavior, 40*(4), 255-281. doi:10.1007/s10919-016-0237-9

Daros, A. R., Zakzanis, K. K., & Ruocco, A. C. (2013). Facial emotion recognition in borderline personality disorder. *Psychological Medicine, 43*(9), 1953-1963. doi:10.1017/S0033291712002607

Davies, H., Wolz, I., Leppanen, J., Fernandez-Aranda, F., Schmidt, U., & Tchanturia, K. (2016). Facial expression to emotional stimuli in non-psychotic disorders: A systematic review and meta-analysis. *Neurosci Biobehav Rev, 64*, 252-271. doi:10.1016/j.neubiorev.2016.02.015

Dixon-Gordon, K. L., Chapman, A. L., Lovasz, N., & Walters, K. (2011). 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, 2*(4), 243-260. doi:10.1037/a0021799

Dixon-Gordon, K. L., Gratz, K. L., Breetz, A., & Tull, M. (2013). A laboratory-based examination of responses to social rejection in borderline personality disorder: the

mediating role of emotion dysregulation. *Journal of Personality Disorders, 27*(2), 157-171. doi:10.1521/pedi.2013.27.2.157

Dixon-Gordon, K. L., Whalen, D. J., Scott, L. N., Cummins, N. D., & Stepp, S. D. (2016). The main and interactive effects of maternal interpersonal emotion regulation and negative affect on adolescent girls' borderline personality disorder symptoms. *Cognitive Therapy and Research, 40*(3), 381-393. doi:10.1007/s10608-015-9706-4

Domes, G., Schulze, L., & Herpertz, S. C. (2009). Emotion recognition in borderline personality disorder-A review of the literature. *Journal of Personality Disorders, 23*(1), 6-19. doi:10.1521/pedi.2009.23.1.6

Domsalla, M., Koppe, G., Niedtfeld, I., Vollstädt-Klein, S., Schmahl, C., Bohus, M., & Lis, S. (2013). Cerebral processing of social rejection in patients with borderline personality disorder. *Social Cognitive and Affective Neuroscience, 9*(11), 1789-1797. doi:10.1093/scan/nst176

Downey, G., & Feldman, S. I. (1996). Implications of rejection sensitivity for intimate relationships. *Journal of Personality and Social Psychology, 70*(6), 1327-1343. doi:10.1037/0022-3514.70.6.1327

Downey, G., Freitas, A. L., Michaelis, B., & Khouri, H. (1998). The self-fulfilling prophecy in close relationships: Rejection sensitivity and rejection by romantic partners. *Journal of Personality and Social Psychology, 75*(2), 545-560. doi:10.1037/0022-3514.75.2.545

Ebner-Priemer, U. W., Eid, M., Kleindienst, N., Stabenow, S., & Trull, T. J. (2009). Analytic strategies for understanding affective (in) stability and other dynamic processes in psychopathology. *Journal of Abnormal Psychology, 118*(1), 195. doi:10.1037/a0014868

Ebner-Priemer, U. W., Kuo, J., Kleindienst, N., Welch, S. S., Reisch, T., Reinhard, I., . . . Bohus, M. (2007). State affective instability in borderline personality disorder assessed by ambulatory monitoring. *Psychological Medicine, 37*(07), 961-970. doi:10.1017/S0033291706009706

Ebner-Priemer, U. W., & Trull, T. J. (2009). Ecological momentary assessment of mood disorders and mood dysregulation. *Psychological Assessment, 21*(4), 463-475. doi:10.1037/a0017075

Eckel, C. C., & Grossman, P. J. (1996). The relative price of fairness: Gender differences in a punishment game. *Journal of Economic Behavior & Organization, 30*(2), 143-158. doi:10.1016/S0167-2681(96)00854-2

Ekman, P. (1993). Facial expression and emotion. *American Psychologist, 48*(4), 384-392. doi:10.1037/0003-066X.48.4.384

El-Gabalawy, R., Katz, L. Y., & Sareen, J. (2010). Comorbidity and associated severity of borderline personality disorder and physical health conditions in a nationally representative sample. *Psychosomatic Medicine, 72*(7), 641-647. doi:10.1097/PSY.0b013e3181e10c7b

Feenstra, D. J., Hutsebaut, J., Laurenssen, E. M., Verheul, R., Busschbach, J. J., & Soeteman, D. I. (2012). The burden of disease among adolescents with personality pathology: Quality of life and costs. *Journal of Personality Disorders, 26*(4), 593-604. doi:10.1521/pedi.2012.26.4.593

Fertuck, E. A., Grinband, J., & Stanley, B. (2013). Facial trust appraisal negatively biased in borderline personality disorder. *Psychiatry Research, 207*(3), 195-202. doi:10.1016/j.psychres.2013.01.004

Fetchenhauer, D., Groothuis, T., & Pradel, J. (2010). Not only states but traits—Humans can identify permanent altruistic dispositions in 20 s. *Evolution and Human Behavior, 31*(2), 80-86. doi:10.1016/j.evolhumbehav.2009.06.009

Fincham, F. D., & Beach, S. R. (1999). Conflict in marriage: Implications for working with couples. *Annual Review of Psychology, 50*(1), 47-77. doi:0.1146/annurev.psych.50.1.47

First, M. G., Spitzer, R. L., Gibbon, M., & Williams, J. B. (1995). *Structured clinical interview for DSM-IV Axis I disorder–patient ed. (SCID-I/P, Version 2)*. New York: New York State Psychiatric Institute, Biometrics Research Department.

Flood, M. M. (1958). Some experimental games. *Management Science, 5*(1), 5-26. doi:10.1287/mnsc.5.1.5

Fok, M., Hotopf, M., Stewart, R., Hatch, S., Hayes, R., & Moran, P. (2014). Personality disorder and self-rated health: A population-based cross-sectional survey. *Journal of Personality Disorders, 28*(3), 319-333. doi:10.1521/pedi_2013_27_119

Fonagy, P., Target, M., Gergely, G., Allen, J. G., & Bateman, A. W. (2003). The developmental roots of borderline personality disorder in early attachment relationships: A theory and some evidence. *Psychoanalytic Inquiry, 23*(3), 412-459. doi:10.1080/07351692309349042

Forsythe, R., Horowitz, J. L., Savin, N. E., & Sefton, M. (1994). Fairness in simple bargaining experiments. *Games and Economic Behavior, 6*(3), 347-369. doi:10.1006/game.1994.1021

Frankenburg, F. R., & Zanarini, M. C. (2004). The association between borderline personality disorder and chronic medical illnesses, poor health-related lifestyle choices, and costly forms of health care utilization. *The Journal of Clinical Psychiatry, 65*(12), 1660-1665. doi:10.4088/JCP.v65n1211

Friedman, J. N., Oltmanns, T. F., Gleason, M. E., & Turkheimer, E. (2006). Mixed impressions: Reactions of strangers to people with pathological personality traits. *Journal of Research in Personality, 40*(4), 395-410. doi:10.1016/j.jrp.2005.01.005

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

Gadassi, R., Snir, A., Berenson, K., Downey, G., & Rafaeli, E. (2014). 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, 123*(3), 613-622. doi:10.1037/a0036929

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

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

Grant, B. F., Chou, S. P., Goldstein, R. B., Huang, B., Stinson, F. S., Saha, T. D., . . . Pickering, R. P. (2008). Prevalence, correlates, disability, and comorbidity of DSM-IV borderline personality disorder: results from the Wave 2 National Epidemiologic Survey on Alcohol and Related Conditions. *Journal of Clinical Psychiatry, 69*(4), 533-545.

Grant, B. F., Hasin, D. S., Stinson, F. S., Dawson, D. A., Chou, S. P., Ruan, W., & Pickering, R. P. (2004). Prevalence, correlates, and disability of personality disorders in the United States: Results from the National Epidemiologic Survey on Alcohol and Related Conditions. *Journal of Clinical Psychiatry, 65*(7), 948-958. doi:10.4088/JCP.v65n0711

Gross, J. J., & Levenson, R. W. (1993). Emotional suppression: Physiology, self-report, and expressive behavior. *Journal of Personality and Social Psychology, 64*(6), 970-986. doi:10.1037/0022-3514.64.6.970

Groves, J. A., & Engel, R. R. (2007). The German adaptation and standardization of the Personality Assessment Inventory (PAI). *Journal of Personality Assessment, 88*(1), 49-56. doi:10.1080/00223890709336834

Gunderson, J. G. (2007). Disturbed relationships as a phenotype for borderline personality disorder. *American Journal of Psychiatry, 164*(11), 1637-1640. doi:10.1176/appi.ajp.2007.07071125

Gunderson, J. G., Stout, R. L., McGlashan, T. H., Shea, M. T., Morey, L. C., Grilo, C. M., . . . Skodol, A. E. (2011). Ten-year course of borderline personality disorder: Psychopathology and function from the collaborative longitudinal personality disorders study. *Archives of General Psychiatry, 68*(8), 827-837. doi:10.1001/archgenpsychiatry.2011.37

Güth, W., Schmittberger, R., & Schwarze, B. (1982). An experimental analysis of ultimatum bargaining. *Journal of Economic Behavior & Organization, 3*(4), 367-388. doi:10.1016/0167-2681(82)90011-7

Gutz, L., Renneberg, B., Roepke, S., & Niedeggen, M. (2015). Neural processing of social participation in borderline personality disorder and social anxiety disorder. *Journal of Abnormal Psychology, 124*(2), 421-331. doi:10.1037/a0038614

Hammen, C., & Brennan, P. A. (2002). Interpersonal dysfunction in depressed women: Impairments independent of depressive symptoms. *Journal of Affective Disorders, 72*(2), 145-156. doi:10.1016/S0165-0327(01)00455-4

Heath, L. M., Paris, J., Laporte, L., & Gill, K. J. (2017). High prevalence of physical pain among treatment-seeking individuals with borderline personality disorder. *Journal of Personality Disorders, 32*(3), 414-420. doi:10.1521/pedi_2017_31_302

Henry, C., Mitropoulou, V., New, A. S., Koenigsberg, H. W., Silverman, J., & Siever, L. J. (2001). Affective instability and impulsivity in borderline personality and bipolar II disorders: Similarities and differences. *Journal of Psychiatric Research, 35*(6), 307-312. doi:10.1016/S0022-3956(01)00038-3

Hepp, J., Carpenter, R. W., Lane, S. P., & Trull, T. J. (2016). Momentary symptoms of borderline personality disorder as a product of trait personality and social context.

Personality Disorders: Theory, Research, and Treatment, 7(4), 384-393. doi:10.1037/per0000175

Hepp, J., Hilbig, B. E., Moshagen, M., Zettler, I., Schmahl, C., & Niedtfeld, I. (2014). Active versus reactive cooperativeness in Borderline psychopathology: A dissection based on the HEXACO model of personality. *Personality and Individual Differences, 56*(1), 19-23. doi:10.1016/j.paid.2013.08.013

Hepp, J., Lane, S. P., Carpenter, R. W., Niedtfeld, I., Brown, W. C., & Trull, T. J. (2017). Interpersonal problems and negative affect in borderline personality and depressive disorders in daily life. *Clinical Psychological Science, 5*(3), 470-484. doi:10.1177/2167702616677312

Hepp, J., Lane, S. P., Wycoff, A. M., Carpenter, R. W., & Trull, T. J. (2018). Interpersonal stressors and negative affect in individuals with borderline personality disorder and community adults in daily life: A replication and extension. *Journal of Abnormal Psychology, 127*(2), 183-189. doi:10.1037/abn0000318

Herpertz, S. C., & Bertsch, K. (2015). A new perspective on the pathophysiology of borderline personality disorder: A model of the role of oxytocin. *American Journal of Psychiatry, 172*(9), 840-851. doi:10.1176/appi.ajp.2015.15020216

Herpertz, S. C., Werth, U., Lukas, G., Qunaibi, M., Schuerkens, A., Kunert, H.-J., . . . Osterheider, M. (2001). Emotion in criminal offenders with psychopathy and borderline personality disorder. *Archives of General Psychiatry, 58*(8), 737-745. doi:10.1001/archpsyc.58.8.737

Hill, J., Stepp, S. D., Wan, M. W., Hope, H., Morse, J. Q., Steele, M., . . . Pilkonis, P. A. (2011). Attachment, borderline personality, and romantic relationship dysfunction. *Journal of Personality Disorders, 25*(6), 789-805. doi:10.1521/pedi.2011.25.6.789

Hilsenroth, M. J., Menaker, J., Peters, E. J., & Pincus, A. L. (2007). Assessment of borderline pathology using the Inventory of Interpersonal Problems Circumplex Scales (IIP-C): A

comparison of clinical samples. *Clinical Psychology & Psychotherapy, 14*(5), 365-376. doi:10.1002/cpp.549

Hochschild Tolpin, L., Cimbolic Gunthert, K., Cohen, L. H., & O'neill, S. C. (2004). Borderline Personality features and instability of daily negative affect and self-esteem. *Journal of Personality, 72*(1), 111-138. doi:10.1111/j.0022-3506.2004.00258.x

Holmes, J. (2004). Disorganized attachment and borderline personality disorder: A clinical perspective. *Attachment & Human Development, 6*(2), 181-190. doi:10.1080/14616730410001688202

Horowitz, L. M. (2004). *Interpersonal Foundations of Psychopathology*. Washington, DC: American Psychological Association.

Houben, M., Claes, L., Sleuwaegen, E., Berens, A., & Vansteelandt, K. (2018). Emotional reactivity to appraisals in patients with a borderline personality disorder: A daily life study. *Borderline Personality Disorder and Emotion Dysregulation, 5*, 1-18. doi:10.1186/s40479-018-0095-7

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

Hox, J. (2010). *Multilevel analysis: Techniques and applications* (2nd ed.). New York, NY: Routledge.

Jahng, S., Solhan, M. B., Tomko, R. L., Wood, P. K., Piasecki, T. M., & Trull, T. J. (2011). Affect and alcohol use: An ecological momentary assessment study of outpatients with borderline personality disorder. *Journal of Abnormal Psychology, 120*(3), 572-584. doi:10.1037/a0024686

Jahng, S., Wood, P. K., & Trull, T. J. (2008). Analysis of affective instability in ecological momentary assessment: Indices using successive difference and group comparison via multilevel modeling. *Psychological Methods, 13*(4), 354-375. doi:10.1037/a0014173

Jeung, H., Schwieren, C., & Herpertz, S. C. (2016). Rationality and self-interest as economic-exchange strategy in borderline personality disorder: Game theory, social preferences, and interpersonal behavior. *Neuroscience & Biobehavioral Reviews, 71*, 849-864. doi:10.1016/j.neubiorev.2016.10.030

Jovev, M., & Jackson, H. J. (2004). Early maladaptive schemas in personality disordered individuals. *Journal of Personality Disorders, 18*(5), 467-478. doi:10.1521/pedi.18.5.467.51325

Kehrer, C. A., & Linehan, M. M. (1996). Interpersonal and emotional problem solving skills and parasuicide among women with borderline personality disorder. *Journal of Personality Disorders, 10*(2), 153-163. doi:10.1521/pedi.1996.10.2.153

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

Kendon, A., & Cook, M. (1969). The consistency of gaze patterns in social interaction. *British Journal of Psychology, 60*(4), 481-494. doi:10.1111/j.2044-8295.1969.tb01222.x

Kennedy, J. K., Bolger, N., & Shrout, P. E. (2002). Witnessing interparental psychological aggression in childhood: Implications for daily conflict in adult intimate relationships. *Journal of Personality, 70*(6), 1051-1078. doi:10.1111/1467-6494.05031

Kenny, D. A., Horner, C., Kashy, D. A., & Chu, L.-C. (1992). Consensus at zero acquaintance: Replication, behavioral cues, and stability. *Journal of Personality and Social Psychology, 62*(1), 88-97. doi:10.1037/0022-3514.62.1.88

Keuroghlian, A. S., Frankenburg, F. R., & Zanarini, M. C. (2013). The relationship of chronic medical illnesses, poor health-related lifestyle choices, and health care utilization to

recovery status in borderline patients over a decade of prospective follow-up. *Journal of Psychiatric Research, 47*(10), 1499-1506. doi:10.1016/j.jpsychires.2013.06.012

Kiesler, D. J., Schmidt, J. A., & Wagner, C. C. (1997). A circumplex inventory of impact messages: An operational bridge between emotional and interpersonal behavior. In R. Plutchik & H. R. Conte (Eds.), *Circumplex models of personality and emotions* (pp. 221–244). Washington, DC: American Psychological Association.

Koenigsberg, H. W., Harvey, P. D., Mitropoulou, V., Schmeidler, J., New, A. S., Goodman, M., . . . Siever, L. J. (2002). Characterizing affective instability in borderline personality disorder. *American Journal of Psychiatry, 159*(5), 784-788. doi:10.1176/appi.ajp.159.5.784

Korzekwa, M. I., Dell, P. F., Links, P. S., Thabane, L., & Webb, S. P. (2008). Estimating the prevalence of borderline personality disorder in psychiatric outpatients using a two-phase procedure. *Comprehensive Psychiatry, 49*(4), 380-386. doi:10.1016/j.comppsych.2008.01.007

Koval, P., Pe, M. L., Meers, K., & Kuppens, P. (2013). Affect dynamics in relation to depressive symptoms: Variable, unstable or inert? *Emotion, 13*(6), 1132-1141. doi:10.1037/a0033579

Kremers, I., Spinhoven, P., Van der Does, A., & Van Dyck, R. (2006). Social problem solving, autobiographical memory and future specificity in outpatients with borderline personality disorder. *Clinical Psychology & Psychotherapy, 13*(2), 131-137. doi:10.1002/cpp.484

Krueger, R. F., Derringer, J., Markon, K. E., Watson, D., & Skodol, A. E. (2012). Initial construction of a maladaptive personality trait model and inventory for DSM-5. *Psychological Medicine, 42*(9), 1879-1890. doi:10.1017/S0033291711002674

Kuppens, P., Allen, N. B., & Sheeber, L. B. (2010). Emotional inertia and psychological maladjustment. *Psychological Science, 21*(7), 984-991. doi:10.1177/0956797610372634

Kuznetsova, A., Brockhoff, P. B., & Christensen, R. H. B. (2017). lmerTest package: Tests in linear mixed effects models. *Journal of Statistical Software, 82*(13), 1-26. doi:10.18637/jss.v082.i13

Lane, S. P., Carpenter, R. W., Sher, K. J., & Trull, T. J. (2016). Alcohol craving and consumption in borderline personality disorder: When, where, and with whom. *Clinical Psychological Science, 4*(5), 775-792. doi:10.1177/2167702615616132

Larsen, R. J., & Shackelford, T. K. (1996). Gaze avoidance: Personality and social judgments of people who avoid direct face-to-face contact. *Personality and Individual Differences, 21*(6), 907-917. doi:10.1016/S0191-8869(96)00148-1

Laurenceau, J.-P., Troy, A. B., & Carver, C. S. (2005). Two distinct emotional experiences in romantic relationships: Effects of perceptions regarding approach of intimacy and avoidance of conflict. *Personality and Social Psychology Bulletin, 31*(8), 1123-1133. doi:10.1177/0146167205274447

Laursen, B., & Hafen, C. A. (2010). Future directions in the study of close relationships: Conflict is bad (except when it's not). *Social Development, 19*(4), 858-872. doi:10.1111/j.1467-9507.2009.00546.x

Law, M. K., Fleeson, W., Arnold, E. M., & Furr, R. M. (2015). Using negative emotions to trace the experience of Borderline Personality pathology: Interconnected relationships revealed in an experience sampling study. *Journal of Personality Disorders, 30*(1), 52-70. doi:10.1521/pedi_2015_29_180

Lazarus, S. A., & Cheavens, J. S. (2017). An examination of social network quality and composition in women with and without borderline personality disorder. *Personality Disorders: Theory, Research, and Treatment, 8*(4), 1-9. doi:10.1037/per0000201

Lazarus, S. A., Cheavens, J. S., Festa, F., & Rosenthal, M. Z. (2014). Interpersonal functioning in borderline personality disorder: A systematic review of behavioral and laboratory-

based assessments. *Clinical Psychology Review, 34*(3), 193-205. doi:10.1016/j.cpr.2014.01.007

Lazarus, S. A., Scott, L. N., Beeney, J. E., Wright, A. G., Stepp, S. D., & Pilkonis, P. A. (2018). Borderline personality disorder symptoms and affective responding to perceptions of rejection and acceptance from romantic versus nonromantic partners. *Personality Disorders: Theory, Research, and Treatment, 9*(3), 197-206. doi:10.1037/per0000289

Lazarus, S. A., Southward, M. W., & Cheavens, J. S. (2016). Do borderline personality disorder features and rejection sensitivity predict social network outcomes over time? *Personality and Individual Differences, 100*, 62-67. doi:10.1016/j.paid.2016.02.032

Lenzenweger, M. F., Lane, M. C., Loranger, A. W., & Kessler, R. C. (2007). DSM-IV personality disorders in the National Comorbidity Survey Replication. *Biological Psychiatry, 62*(6), 553-564. doi:10.1016/j.biopsych.2006.09.019

Levy, K. N., Clarkin, J. F., Yeomans, F. E., Scott, L. N., Wasserman, R. H., & Kernberg, O. F. (2006). The mechanisms of change in the treatment of borderline personality disorder with transference focused psychotherapy. *Journal of Clinical Psychology, 62*(4), 481-501. doi:10.1002/jclp.20239

Liebke, L., Bungert, M., Thome, J., Hauschild, S., Gescher, D. M., Schmahl, C., . . . Lis, S. (2017). Loneliness, social networks, and social functioning in borderline personality disorder. *Personality Disorders: Theory, Research, and Treatment, 8*(4), 349-356. doi:10.1037/per0000208

Liebke, L., Koppe, G., Bungert, M., Thome, J., Hauschild, S., Defiebre, N., . . . Lis, S. (2018). Difficulties with being socially accepted: An experimental study in borderline personality disorder. *Journal of Abnormal Psychology, 127*(7), 670-682. doi:10.1037/abn0000373

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

Loranger, A. W., Sartorius, N., Andreoli, A., Berger, P., Buchheim, P., Channabasavanna, S., . . . Ferguson, B. (1998). *Deutschsprachige Fassung der International Personality Disorder Examination: IPDE*. Geneva, Switzerland: WHO.

Ma, D. S., Correll, J., & Wittenbrink, B. (2015). The Chicago face database: A free stimulus set of faces and norming data. *Behavior Research Methods, 47*(4), 1122-1135. doi:10.3758/s13428-014-0532-5

Mason, M. F., Tatkow, E. P., & Macrae, C. N. (2005). The look of love: Gaze shifts and person perception. *Psychological Science, 16*(3), 236-239. doi:10.1111/j.0956-7976.2005.00809.x

Mathôt, S., Schreij, D., & Theeuwes, J. (2012). OpenSesame: An open-source, graphical experiment builder for the social sciences. *Behavior Research Methods, 44*(2), 314-324. doi:10.3758/s13428-011-0168-7

Matzke, B., Herpertz, S. C., Berger, C., Fleischer, M., & Domes, G. (2014). Facial reactions during emotion recognition in borderline personality disorder: a facial electromyography study. *Psychopathology, 47*(2), 101-110. doi:10.1159/000351122

Maurex, L., Lekander, M., Nilsonne, Å., Andersson, E. E., Åsberg, M., & Öhman, A. (2010). Social problem solving, autobiographical memory, trauma, and depression in women with borderline personality disorder and a history of suicide attempts. *British Journal of Clinical Psychology, 49*(3), 327-342. doi:10.1348/014466509X454831

McCrae, R. R., & Costa Jr, P. T. (2008). A five-factor theory of personality. In O. P. John, R. W. Robins, & L. A. Pervin (Eds.), *Handbook of Personality: Theory and Research* (Vol. 3, pp. 139-153).

Meyer-Lindenberg, A., Domes, G., Kirsch, P., & Heinrichs, M. (2011). Oxytocin and vasopressin in the human brain: Social neuropeptides for translational medicine. *Nature Reviews Neuroscience, 12*(9), 524-538. doi:10.1038/nrn3044

Miano, A., Dziobek, I., & Roepke, S. (in press). Characterizing couple dysfunction in borderline personality disorder. *Journal of Personality Disorders*. doi:10.1521/pedi_2018_32_388

Miano, A., Fertuck, E. A., Arntz, A., & Stanley, B. (2013). Rejection sensitivity is a mediator between borderline personality disorder features and facial trust appraisal. *Journal of Personality Disorders, 27*(4), 442-456. doi:10.1521/pedi_2013_27_096

Miskewicz, K., Fleeson, W., Arnold, E. M., Law, M. K., Mneimne, M., & Furr, R. M. (2015). A contingency-oriented approach to understanding borderline personality disorder: Situational triggers and symptoms. *Journal of Personality Disorders, 29*(4), 486–502. doi:10.1521/pedi.2015.29.4.486

Mitchell, A. E., Dickens, G. L., & Picchioni, M. M. (2014). Facial emotion processing in borderline personality disorder: A systematic review and meta-analysis. *Neuropsychology Review, 24*(2), 166-184. doi:10.1007/s11065-014-9254-9

Morey, L. C. (1991). *Personality assessment inventory*. Odessa, FL: Psychological Assessment Resources

Naumann, L. P., Vazire, S., Rentfrow, P. J., & Gosling, S. D. (2009). Personality judgments based on physical appearance. *Personality and Social Psychology Bulletin, 35*(12), 1661-1671. doi:10.1177/0146167209346309

Nestler, S., Egloff, B., Küfner, A. C., & Back, M. D. (2012). An integrative lens model approach to bias and accuracy in human inferences: Hindsight effects and knowledge updating in personality judgments. *Journal of Personality and Social Psychology, 103*(4), 689-717. doi:10.1037/a0029461

Nezlek, J. B. (2012). Multilevel modeling analyses of diary-style data. In M. R. Mehl & T. S. Conner (Eds.), *Handbook of research methods for studying daily life* (pp. 357-383). New York, NY: Guilford Press.

Nicol, K., Pope, M., Sprengelmeyer, R., Young, A. W., & Hall, J. (2013). Social judgement in borderline personality disorder. *PloS one, 8*(11), 1-6. doi:10.1371/journal.pone.0073440

Nock, M. K., Prinstein, M. J., & Sterba, S. K. (2009). Revealing the form and function of self-injurious thoughts and behaviors: A real-time ecological assessment study among adolescents and young adults. *Journal of Abnormal Psychology, 118*(4), 816. doi:10.1037/a0016948

Ogolsky, B. G., & Gray, C. R. (2015). Conflict, negative emotion, and reports of partners' relationship maintenance in same-sex couples. *Journal of Family Psychlogy, 30*(2), 171-180. doi:10.1037/fam0000148

Oltmanns, T. F., Friedman, J. N., Fiedler, E. R., & Turkheimer, E. (2004). Perceptions of people with personality disorders based on thin slices of behavior. *Journal of Research in Personality, 38*(3), 216-229. doi:10.1016/S0092-6566(03)00066-7

Oosterhof, N. N., & Todorov, A. (2009). Shared perceptual basis of emotional expressions and trustworthiness impressions from faces. *Emotion, 9*(1), 128-132. doi:10.1037/a0014520

Open Science Collaboration. (2015). Estimating the reproducibility of psychological science. *Science, 349*(6251), 943-951. doi:10.1126/science.aac4716

Østby, K. A., Czajkowski, N., Knudsen, G. P., Ystrom, E., Gjerde, L. C., Kendler, K. S., . . . Reichborn-Kjennerud, T. (2014). Personality disorders are important risk factors for disability pensioning. *Social Psychiatry and Psychiatric Epidemiology, 49*(12), 2003-2011. doi:10.1007/s00127-014-0878-0

Pagano, M. E., Skodol, A. E., Stout, R. L., Shea, M. T., Yen, S., Grilo, C. M., . . . Zanarini, M. C. (2004). Stressful life events as predictors of functioning: Findings from the Collaborative Longitudinal Personality Disorders Study. *Acta Psychiatrica Scandinavica, 110*(6), 421-429. doi:10.1111/j.1600-0447.2004.00398.x

Parkinson, B. (1996). Emotions are social. *British Journal of Psychology, 87*(4), 663-683. doi:10.1111/j.2044-8295.1996.tb02615.x

Pasch, L. A., & Bradbury, T. N. (1998). Social support, conflict, and the development of marital dysfunction. *Journal of Consulting and Clinical Psychology, 66*(2), 219-230. doi:10.1037/0022-006X.66.2.219

Peham, D., Bock, A., Schiestl, C., Huber, E., Zimmermann, J., Kratzer, D., . . . Benecke, C. (2015). Facial affective behavior in mental disorder. *Journal of Nonverbal Behavior, 39*(4), 371-396. doi:10.1007/s10919-015-0216-6

Peters, J. R., Smart, L. M., & Baer, R. A. (2015). Dysfunctional responses to emotion mediate the cross-sectional relationship between rejection sensitivity and borderline personality features. *Journal of Personality Disorders, 29*(2), 231-240. doi:10.1521/pedi_2014_28_151

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

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

Platt, J., Spivack, G., & Bloom, M. (1971). *Means-end problem solving procedure (MEPS): Manual and tentative norms*. Philadelphia, PA: Hahnemann Medical College and Hospital.

Powers, A. D., Gleason, M. E., & Oltmanns, T. F. (2013). Symptoms of borderline personality disorder predict interpersonal (but not independent) stressful life events in a community sample of older adults. *Journal of Abnormal Psychology, 122*(2), 469-474. doi:10.1037/a0032363

Preuss, N., Brändle, L. S., Hager, O. M., Haynes, M., Fischbacher, U., & Hasler, G. (2016). Inconsistency and social decision making in patients with borderline personality disorder. *Psychiatry Research, 243*, 115-122. doi:/10.1016/j.psychres.2016.06.017

Prossin, A. R., Love, T. M., Koeppe, R. A., Zubieta, J.-K., & Silk, K. R. (2010). Dysregulation of regional endogenous opioid function in borderline personality disorder. *American Journal of Psychiatry, 167*(8), 925-933. doi:10.1176/appi.ajp.2010.09091348

Putnam, K. M., & Silk, K. R. (2005). Emotion dysregulation and the development of borderline personality disorder. *Development and Psychopathology, 17*(4), 899-925. doi:10.1017/S0954579405050431

R Core Team. (2018). *R: A language and environment for statistical computing*. Vienna, Austria: R Foundation for Statistical Computing.

Reed, L. I., Zeglen, K. N., & Schmidt, K. L. (2012). Facial expressions as honest signals of cooperative intent in a one-shot anonymous Prisoner's Dilemma game. *Evolution and Human Behavior, 33*(3), 200-209. doi:10.1016/j.evolhumbehav.2011.09.003

Renneberg, B., Herm, K., Hahn, A., Staebler, K., Lammers, C. H., & Roepke, S. (2012). Perception of social participation in borderline personality disorder. *Clinical Psychology & Psychotherapy, 19*(6), 473-480. doi:10.1002/cpp.772

Renneberg, B., Heyn, K., Gebhard, R., & Bachmann, S. (2005). Facial expression of emotions in borderline personality disorder and depression. *Journal of Behavior Therapy and Experimental Psychiatry, 36*(3), 183-196. doi:10.1016/j.jbtep.2005.05.002

Richetin, J., Preti, E., Costantini, G., & De Panfilis, C. (2017). The centrality of affective instability and identity in borderline personality disorder: Evidence from network analysis. *PloS one, 12*(10), 1-14. doi:10.1371/journal.pone.0186695

Romero-Canyas, R., Downey, G., Berenson, K., Ayduk, O., & Kang, N. J. (2010). Rejection sensitivity and the rejection–hostility link in romantic relationships. *Journal of Personality, 78*(1), 119-148. doi:10.1111/j.1467-6494.2009.00611.x

Rosenbach, C., & Renneberg, B. (2014). Rejection sensitivity as a mediator of the relationship between experienced rejection and borderline characteristics. *Personality and Individual Differences, 69*, 176-181. doi:10.1016/j.paid.2014.05.032

Rosenbach, C., & Renneberg, B. (2015). Remembering rejection: Specificity and linguistic styles of autobiographical memories in borderline personality disorder and depression. *Journal of Behavior Therapy and Experimental Psychiatry, 46*, 85-92. doi:10.1037/a0020572

Rouder, J. N., Speckman, P. L., Sun, D., Morey, R. D., & Iverson, G. (2009). Bayesian t tests for accepting and rejecting the null hypothesis. *Psychonomic Bulletin & Review, 16*(2), 225-237. doi:10.3758/PBR.16.2.225

Ruocco, A. C., Medaglia, J. D., Tinker, J. R., Ayaz, H., Forman, E. M., Newman, C. F., . . . Onaral, B. (2010). Medial prefrontal cortex hyperactivation during social exclusion in borderline personality disorder. *Psychiatry Research: Neuroimaging, 181*(3), 233-236. doi:/10.1016/j.pscychresns.2009.12.001

Russell, J. J., Moskowitz, D., Zuroff, D. C., Sookman, D., & Paris, J. (2007). Stability and variability of affective experience and interpersonal behavior in borderline personality disorder. *Journal of Abnormal Psychology, 116*(3), 578-588. doi:10.1037/0021-843X.116.3.578

Sabatelli, R. M., & Rubin, M. (1986). Nonverbal expressiveness and physical attractiveness as mediators of interpersonal perceptions. *Journal of Nonverbal Behavior, 10*(2), 120-133. doi:10.1007/BF01000008

Sadikaj, G., Moskowitz, D., Russell, J. J., Zuroff, D. C., & Paris, J. (2013). Quarrelsome behavior in borderline personality disorder: Influence of behavioral and affective reactivity to perceptions of others. *Journal of Abnormal Psychology, 122*(1), 195-207. doi:10.1037/a0030871

Sadikaj, G., Russell, J. J., Moskowitz, D., & Paris, J. (2010). Affect dysregulation in individuals with borderline personality disorder: Persistence and interpersonal triggers. *Journal of Personality Assessment, 92*(6), 490-500. doi:10.1080/00223891.2010.513287

Salvador-Carulla, L., Bendeck, M., Ferrer, M., Andión, O., Aragonès, E., & Casas, M. (2014). Cost of borderline personality disorder in Catalonia (Spain). *European Psychiatry, 29*(8), 490-497. doi:10.1016/j.eurpsy.2014.07.001

Samuel, D. B., & Widiger, T. A. (2008). 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, 28*(8), 1326-1342. doi:10.1016/j.cpr.2008.07.002

Sanislow, C. A., Grilo, C. M., Morey, L. C., Bender, D. S., Skodol, A. E., Gunderson, J. G., . . . McGlashan, T. H. (2002). Confirmatory factor analysis of DSM-IV criteria for borderline personality disorder: findings from the collaborative longitudinal personality disorders study. *American Journal of Psychiatry, 159*(2), 284-290. doi:10.1176/appi.ajp.159.2.284

Sansone, R. A., & Sansone, L. A. (2012). Chronic pain syndromes and borderline personality. *Innovations in Clinical Neuroscience, 9*(1), 10-14.

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

Saulsman, L. M., & Page, A. C. (2004). The five-factor model and personality disorder empirical literature: A meta-analytic review. *Clinical Psychology Review, 23*(8), 1055-1085. doi:10.1016/j.cpr.2002.09.001

Scheiderer, E. M., Wang, T., Tomko, R. L., Wood, P. K., & Trull, T. J. (2016). Negative affect instability among individuals with comorbid borderline personality disorder and posttraumatic stress disorder. *Clinical Psychological Science, 4*(1), 68-81. doi:10.1177/2167702615573214

Schulze, L., Schmahl, C., & Niedtfeld, I. (2016). Neural correlates of disturbed emotion processing in borderline personality disorder: A multimodal meta-analysis. *Biological Psychiatry, 79*(2), 97-106. doi:10.1016/j.biopsych.2015.03.027

Scott, L. N., Wright, A. G., Beeney, J. E., Lazarus, S. A., Pilkonis, P. A., & Stepp, S. D. (2017). Borderline personality disorder symptoms and aggression: A within-person process model. *Journal of Abnormal Psychology, 126*(4), 429-440. doi:10.1037/abn0000272

Servan, A., Brunelin, J., & Poulet, E. (2018). The effects of oxytocin on social cognition in borderline personality disorder. *L'Encéphale, 44*(1), 46-51. doi:10.1016/j.encep.2017.11.001

Shrout, P., & Lane, S. P. (2012). Psychometrics. In M. R. Mehl & T. S. Conner (Eds.), *Handbook of research methods for studying daily life* (pp. 302-320). New York, NY: Guilford Press.

Sieswerda, S., Barnow, S., Verheul, R., & Arntz, A. (2013). Neither dichotomous nor split, but schema-related negative interpersonal evaluations characterize borderline patients. *Journal of Personality Disorders, 27*(1), 36-52. doi:10.1521/pedi.2013.27.1.36

Simmons, J. P., Nelson, L. D., & Simonsohn, U. (2011). False-positive psychology: Undisclosed flexibility in data collection and analysis allows presenting anything as significant. *Psychological Science, 22*(11), 1359–1366. doi:10.1177/0956797611417632

Skodol, A. E., Gunderson, J. G., McGlashan, T. H., Dyck, I. R., Stout, R. L., Bender, D. S., . . . Morey, L. C. (2002). Functional impairment in patients with schizotypal, borderline, avoidant, or obsessive-compulsive personality disorder. *American Journal of Psychiatry, 159*(2), 276-283. doi:10.1176/appi.ajp.159.2.276

Skodol, A. E., Siever, L. J., Livesley, W. J., Gunderson, J. G., Pfohl, B., & Widiger, T. A. (2002). The borderline diagnosis II: Biology, genetics, and clinical course. *Biological Psychiatry, 51*(12), 951-963. doi:10.1016/S0006-3223(02)01325-2

Snijders, T., & Bosker, R. (2012). *Multilevel analysis: An introduction to basic and advanced multilevel modeling* (2nd ed.). Thousand Oaks, CA: Sage.

Snir, A., Rafaeli, E., Gadassi, R., Berenson, K., & Downey, G. (2015). Explicit and inferred motives for nonsuicidal self-injurious acts and urges in borderline and avoidant personality disorders. *Personality Disorders: Theory, Research, and Treatment, 6*(3), 267-277. doi:10.1037/per0000104

Snyder, M. (1984). When belief creates reality. *Advances in Experimental Social Psychology, 18*, 247-305. doi:10.1016/S0065-2601(08)60146-X

Soeteman, D. I., Roijen, L. H.-v., Verheul, R., & Busschbach, J. J. (2008). The economic burden of personality disorders in mental health care. *Journal of Clinical Psychiatry, 69*(2), 259-265. doi:10.4088/JCP.v69n0212

Solhan, M. B., Trull, T. J., Jahng, S., & Wood, P. K. (2009). Clinical assessment of affective instability: Comparing EMA indices, questionnaire reports, and retrospective recall. *Psychological Assessment, 21*(3), 425-436. doi:10.1037/a0016869

Southward, M. W., & Cheavens, J. S. (2018). Identifying core deficits in a dimensional model of borderline personality disorder features: A network analysis. *Clinical Psychological Science, 6*(5), 685-703. doi:10.1177/2167702618769560

Specht, M. W., Chapman, A., & Cellucci, T. (2009). Schemas and borderline personality disorder symptoms in incarcerated women. *Journal of Behavior Therapy and Experimental Psychiatry, 40*(2), 256-264. doi:10.1016/j.jbtep.2008.12.005

Staebler, K., Helbing, E., Rosenbach, C., & Renneberg, B. (2011). Rejection sensitivity and borderline personality disorder. *Clinical Psychology & Psychotherapy, 18*(4), 275-283. doi:10.1002/cpp.705

Staebler, K., Renneberg, B., Stopsack, M., Fiedler, P., Weiler, M., & Roepke, S. (2011). Facial emotional expression in reaction to social exclusion in borderline personality disorder. *Psychological Medicine, 41*(9), 1929-1938. doi:10.1017/S0033291711000080

Stanley, B., & Siever, L. J. (2009). The interpersonal dimension of borderline personality disorder: toward a neuropeptide model. *American Journal of Psychiatry, 167*(1), 24-39. doi:10.1176/appi.ajp.2009.09050744

Stepp, S. D., Hallquist, M. N., Morse, J. Q., & Pilkonis, P. A. (2011). Multimethod investigation of interpersonal functioning in borderline personality disorder. *Personality Disorders: Theory, Research, and Treatment, 2*(3), 175-192. doi:10.1037/a0020572

Stepp, S. D., Pilkonis, P. A., Yaggi, K. E., Morse, J. Q., & Feske, U. (2009). Interpersonal and emotional experiences of social interactions in borderline personality disorder. *The Journal of Nervous and Mental Disease, 197*(7), 484-491. doi:10.1097/NMD.0b013e3181aad2e7

Stiglmayr, C., Grathwol, T., Linehan, M. M., Ihorst, G., Fahrenberg, J., & Bohus, M. (2005). Aversive tension in patients with borderline personality disorder: a computer-based controlled field study. *Acta Psychiatrica Scandinavica, 111*(5), 372-379. doi:10.1111/j.1600-0447.2004.00466.x

Stirrat, M., & Perrett, D. I. (2010). Valid facial cues to cooperation and trust: Male facial width and trustworthiness. *Psychological Science, 21*(3), 349-354. doi:10.1177/0956797610362647

Störkel, L. M., Hepp, J., Kieslich, P. J., Schmahl, C., & Niedtfeld, I. (2018). *Ecological momentary assessment of antecedents and consequences on non-suicidal self-injury*. Paper presented at the International Congress on Borderline Personality Disorder and Allied Disorders, Sitges, Spain.

Tackman, A. M., & Srivastava, S. (2016). Social responses to expressive suppression: The role of personality judgments. *Journal of Personality and Social Psychology, 110*(4), 574-591. doi:10.1037/pspp0000053

Thielmann, I., Hilbig, B. E., & Niedtfeld, I. (2014). Willing to give but not to forgive: Borderline personality features and cooperative behavior. *Journal of Personality Disorders, 28*(6), 778-795. doi:10.1521/pedi_2014_28_135

Todorov, A., & Olson, I. R. (2008). Robust learning of affective trait associations with faces when the hippocampus is damaged, but not when the amygdala and temporal pole are damaged. *Social Cognitive and Affective Neuroscience, 3*(3), 195-203. doi:doi.org/10.1093/scan/nsn013

Todorov, A., Said, C. P., Engell, A. D., & Oosterhof, N. N. (2008). Understanding evaluation of faces on social dimensions. *Trends in Cognitive Sciences, 12*(12), 455-460. doi:10.1016/j.tics.2008.10.001

Tomko, R. L., Lane, S. P., Pronove, L. M., Treloar, H. R., Brown, W. C., Solhan, M. B., . . . Trull, T. J. (2015). Undifferentiated negative affect and impulsivity in borderline personality and depressive disorders: A momentary perspective. *Journal of Abnormal Psychology, 124*(3), 740-753. doi:10.1037/abn0000064

Tomko, R. L., Solhan, M. B., Carpenter, R. W., Brown, W. C., Jahng, S., Wood, P. K., & Trull, T. J. (2014). Measuring impulsivity in daily life: The momentary impulsivity scale. *Psychological Assessment, 26*(2), 339-349. doi:10.1037/a0035083

Tomko, R. L., Trull, T. J., Wood, P. K., & Sher, K. J. (2014). Characteristics of borderline personality disorder in a community sample: Comorbidity, treatment utilization, and general functioning. *Journal of Personality Disorders, 28*(5), 734-750. doi:10.1521/pedi_2012_26_093

Torgersen, S., Kringlen, E., & Cramer, V. (2001). The prevalence of personality disorders in a community sample. *Archives of General Psychiatry, 58*(6), 590-596. doi:10.1001/archpsyc.58.6.590

Trull, T. J., & Ebner-Priemer, U. (2013). Ambulatory assessment. *Annual Review of Clinical Psychology, 9*(2), 151-176. doi:10.1146/annurev-clinpsy-050212-185510

Trull, T. J., Solhan, M. B., Tragesser, S. L., Jahng, S., Wood, P. K., Piasecki, T. M., & Watson, D. (2008). Affective instability: Measuring a core feature of borderline personality disorder with ecological momentary assessment. *Journal of Abnormal Psychology, 117*(3), 647-661. doi:10.1037/a0012532

Trull, T. J., Tomko, R. L., Brown, W. C., & Scheiderer, E. M. (2010). Borderline personality disorder in 3-D: Dimensions, symptoms, and measurement challenges. *Social and Personality Psychology Compass, 4*(11), 1057-1069. doi:10.1111/j.1751-9004.2010.00312.x

Turner, B. J., Cobb, R. J., Gratz, K. L., & Chapman, A. L. (2016). The role of interpersonal conflict and perceived social support in nonsuicidal self-injury in daily life. *Journal of Abnormal Psychology, 125*(4), 588-598. doi:10.1037/abn0000141

Van Asselt, A., Dirksen, C. D., Arntz, A., & Severens, J. L. (2007). The cost of borderline personality disorder: Societal cost of illness in BPD-patients. *European Psychiatry, 22*(6), 354-361. doi:10.1016/j.eurpsy.2007.04.001

Van Beest, I., Van Kleef, G. A., & Van Dijk, E. (2008). Get angry, get out: The interpersonal effects of anger communication in multiparty negotiation. *Journal of Experimental Social Psychology, 44*(4), 993-1002. doi:10.1016/j.jesp.2008.02.008

Van Kleef, G. A. (2009). How emotions regulate social life the emotions as social information (EASI) model. *Current Directions in Psychological Science, 18*(3), 184-188. doi:10.1111/j.1467-8721.2009.01633.x

Van Kleef, G. A., De Dreu, C. K., & Manstead, A. S. (2004). The interpersonal effects of anger and happiness in negotiations. *Journal of Personality and Social Psychology, 86*(1), 57-76. doi:10.1037/0022-3514.86.1.57

Victor, S. E., Scott, L. N., Stepp, S. D., & Goldstein, T. R. (in press). I want you to want me: Interpersonal stress and affective experiences as within-person predictors of nonsuicidal

self-injury and suicide urges in daily life. *Suicide and Life-Threatening Behavior*. doi:10.1111/sltb.12513

Vingerhoets, A. J., Cornelius, R. R., Van Heck, G. L., & Becht, M. C. (2000). Adult crying: A model and review of the literature. *Review of General Psychology, 4*(4), 354-377. doi:10.1037//1089-2680.4.4.354

Wagner, T., Roepke, S., Marschall, P., Stiglmayr, C., Renneberg, B., Gieb, D., . . . Fleßa, S. (2013). Krankheitskosten der Borderline Persönlichkeitsstörung aus gesellschaftlicher Perspektive. *Zeitschrift für Klinische Psychologie und Psychotherapie, 42*(4), 242-255. doi:10.1026/1616-3443/a000227

Watson, D., & Clark, L. A. (1999). *The PANAS-X: Manual for the positive and negative affect schedule-expanded form*. Iowa City, IA: University of Iowa.

Welch, S. S., & Linehan, M. M. (2002). High-risk situations associated with parasuicide and drug use in borderline personality disorder. *Journal of Personality Disorders, 16*(6), 561-569. doi:10.1521/pedi.16.6.561.22141

Whalen, D. J., Scott, L. N., Jakubowski, K. P., McMakin, D. L., Hipwell, A. E., Silk, J. S., & Stepp, S. D. (2014). Affective behavior during mother–daughter conflict and borderline personality disorder severity across adolescence. *Personality Disorders: Theory, Research, and Treatment, 5*(1), 88-96. doi:10.1037/per0000059

Williams, K. D., & Jarvis, B. (2006). Cyberball: A program for use in research on interpersonal ostracism and acceptance. *Behavior Research Methods, 38*(1), 174-180. doi:10.3758/BF03192765

Wilson, S., Stroud, C. B., & Durbin, C. E. (2017). Interpersonal dysfunction in personality disorders: A meta-analytic review. *Psychological Bulletin, 143*(7), 677-734. doi:10.1037/bul0000101

Wittchen, H., Zaudig, M., & Fydrich, T. (1997). *Strukturiertes klinisches Interview für DSM-IV*. Göttingen, Germany: Hogrefe.

Wojciszke, B., Bazinska, R., & Jaworski, M. (1998). On the dominance of moral categories in impression formation. *Personality and Social Psychology Bulletin, 24*(12), 1251-1263. doi:10.1177/01461672982412001

Yen, S., Pagano, M. E., Shea, M. T., Grilo, C. M., Gunderson, J. G., Skodol, A. E., . . . Zanarini, M. C. (2005). Recent life events preceding suicide attempts in a personality disorder sample: findings from the collaborative longitudinal personality disorders study. *Journal of Consulting and Clinical Psychology, 73*(1), 99-105. doi:10.1037/0022-006X.73.1.99

Zacchilli, T. L., Hendrick, C., & Hendrick, S. S. (2009). The romantic partner conflict scale: A new scale to measure relationship conflict. *Journal of Social and Personal Relationships, 26*(8), 1073-1096. doi:10.1177/0265407509347936

Zanarini, M. C., Frankenburg, F. R., Reich, D. B., & Fitzmaurice, G. (2010a). The 10-year course of psychosocial functioning among patients with borderline personality disorder and axis II comparison subjects. *Acta Psychiatrica Scandinavica, 122*(2), 103-109. doi:10.1111/j.1600-0447.2010.01543.x

Zanarini, M. C., Frankenburg, F. R., Reich, D. B., & Fitzmaurice, G. (2010b). Time to attainment of recovery from borderline personality disorder and stability of recovery: A 10-year prospective follow-up study. *American Journal of Psychiatry, 167*(6), 663-667. doi:10.1176/appi.ajp.2009.09081130

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

List of Tables

List of Supplementary Tables