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A multi-method laboratory investigation of emotional reactivity and emotion regulation abilities in borderline personality disorder

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ABSTRACT

Background and objectives: Borderline personality disorder (BPD) is conceptualized as a disorder of heightened emotional reactivity and difficulties with emotion regulation. However, findings regarding emotional reactivity in BPD are mixed and there are limited studies examining emotion regulation capabilities in this population.
Methods: Twenty-five individuals with BPD and 30 healthy controls (HCs) engaged in a baseline assessment followed by the presentation of neutral and BPD-relevant negative images. Participants were instructed to react as they naturally would to the image, or to use a mindfulness-based or distraction-based strategy to feel less negative. Self-reported and physiological (i.e., heart rate, electrodermal activity, and respiratory sinus arrhythmia) measures were collected.
Results: Compared with the HCs, the BPD group exhibited elevated heart rate and reduced respiratory sinus arrhythmia at baseline. However, there were no differences in emotional reactivity in self-report or physiological indices between the two groups. In addition, the BPD group did not exhibit deficits in the ability to implement either emotion regulation strategy, with the exception that the BPD group reported less positive emotions while distracting compared with the HCs.
Limitations: This study is limited by a small sample size and the inclusion of a medicated BPD sample.
Conclusions: Emotion dysregulation in BPD might be better accounted for by abnormal baseline emotional functioning rather than heightened emotional reactivity or deficits in emotion regulation. Treatments for BPD might be enhanced by directly targeting resting state emotional functioning rather than emotional reactions or regulatory attempts.

1. Introduction

Borderline personality disorder (BPD) is a disorder of affective instability, conflict in interpersonal relationships, and self-destructive behavior (Linehan, 1993). Prevalence estimates of BPD are as high as 6% (Grant et al., 2008) and approximately 23% of outpatients meet diagnostic criteria for the disorder (Korzekwa, Dell, Links, Thabane, & Webb, 2008). Prominent theories of BPD posit that emotion dysregulation is either the core feature of the disorder (Linehan, 1993) or a key facet of the disorder (Fonagy & Bateman, 2008; Selby & Joiner, 2009). Emotion dysregulation is broadly comprised of the coupling of abnormalities in emotional responding and difficulties regulating emotional responses (Linehan, 1993).

1.1. Emotional reactivity and regulation in BPD

Basic emotion theorists propose that emotional reactivity and emotion regulation are two components of emotion dysregulation that have the potential to influence each other and contribute to "emotional output" (Gross & Thompson, 2007). *Emotional reactivity* refers to multi-systemic (i.e., experiential, behavioral, and physiological) changes in response to an emotionally-evocative stimulus; *emotion regulation* refers to the process by which an individual attempts to modify the emotion-generative process, often with the goal of decreasing one's emotional intensity (Gross & Jazaeiri, 2014). A majority of emotion-based research in BPD has

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examined emotional reactivity using a range of methodologies including laboratory paradigms with negative images (Herpertz, Kunert, Schwenger, & Sass, 1999; 2000), scripts (Kuo & Linehan, 2009; Schmahl et al., 2004), and film clips (Austin, Riniolo, & Porges, 2007; Kuo & Linehan, 2009; Lobbestael & Arntz, 2010). Findings from this literature are mixed, and recent evidence suggests that emotional reactivity in BPD may not be pervasive, but rather, specific to emotion and/or content of the stimulus. Indeed, Kuo, Neacsiu, Fitzpatrick, and MacDonald (2013) reported that individuals with BPD experience greater reactivity when sadness or anger is induced using personally relevant stressors compared to generalized stressors. Similarly, Limberg, Barnow, Freyberger, and Hamm (2011) found that heightened reactivity in BPD is more pronounced in response to BPD-relevant stimuli compared to generalized negative stimuli.

In contrast to the emotional reactivity literature, there is a smaller research base examining emotion regulation in BPD. A number of processes factor into effective emotion regulation, including emotion-regulation strategy choice and/or emotion-regulation strategy implementation (Jazaieri, Urry, & Gross, 2013). A handful of studies have begun to evaluate the latter by examining instructed/volitional emotion regulation in BPD. In a study examining cognitive reappraisal (i.e., generating new appraisals of a situation to change its emotional impact; Gross & John, 2003) in BPD, Marissen, Meuleman, and Franken (2010) found that persons with BPD did not have altered event-related potentials (ERP) while reappraising negative images compared to HCs. In contrast, functional magnetic resonance imaging (fMRI) studies show that individuals with BPD exhibit reduced activation of the anterior cingulate cortex during reappraisal of negative auditory scripts (Lang et al., 2012) as well as reduced deactivation of the amygdala (Koenigsberg et al., 2009) and increased activation of the insula (Schulze et al., 2011) during reappraisal of negative images compared with HCs. Ruocco, Medaglia, Ayaz, and Chute (2010) examined the effects of cognitive distancing, a form of reappraisal, among individuals with BPD and HCs, and found that the BPD group did not differ from HCs in self-reported sadness or mean levels of oxygenated hemoglobin in the prefrontal cortex. Thus, there is some evidence that individuals with BPD are able to effectively reduce their emotional reactivity using cognitive reappraisal (as indexed by ERP and self-report) upon instruction. However, this research is limited to the examination of one strategy type, i.e., cognitive reappraisal; indeed, it remains unclear whether these findings generalize to other prominent emotion regulation strategies and/or whether individuals with BPD are more or less skilled at implementing different types of strategies.

1.2. Mindful awareness and distraction

Two emotion regulation strategies that have received limited attention in the BPD literature are mindful awareness and distraction. Mindful awareness involves willingly and non-judgmentally noticing and experiencing emotions, as opposed to evaluating, rejecting, or suppressing them (Segal, Williams, & Teasdale, 2012). Conversely, distraction involves shifting attention away from an emotionally evocative stimulus in order to reduce its impact (Sheppes, Scheibe, Suri, & Gross, 2011). Research in HCs indicates that acceptance-based strategies such as mindful awareness are more effective than other emotion regulation strategies (i.e., suppression, distraction) at increasing pain tolerance in HCs (Kohl, Rief, & Glombiewski, 2012). Mindful awareness also reduces self-reported discomfort (Luciano et al., 2010) and physiological indices of emotion (Hofmann, Heering, Sawyer, & Asnaani, 2009; Low, Stanton, & Bower, 2008) relative to other emotion regulation strategies. Similarly, distraction in HCs leads to reductions in self-reported negative emotions (Denson, Moulds, & Grisham, 2012; Webb, Miles, & Sheeran, 2012), reduced amygdala activation (McRae et al., 2010), quicker reductions in late positive potentials (Thiruchselvam, Blechert, Sheppes, Rydstrom, & Gross, 2011), and increased prefrontal and parietal activity (McRae et al., 2010) when participants are exposed to negative stimuli such as images or personalized stressors.

Currently, no studies have examined whether individuals with BPD are able to implement mindful awareness upon instruction and only one study has examined the instructed use of distraction; Jacob et al. (2011) instructed individuals with BPD to engage in a distraction task, a positive memory imagery task, a soothing imagery task, and a neutral task (control) while viewing neutral and negative film clips. The authors found that all the strategies were associated with greater reduction in self-reported negative emotions and greater increase in positive emotions than the neutral control task after the negative film. Though informative, this study did not include a control group and thus, it is unclear whether individuals with BPD are less "skilled" at implementing distraction than HCs. Moreover, it remains unclear whether persons with BPD are better at applying some strategies over others.

1.3. The present study

We addressed the limitations in the extant literature by employing a multi-method laboratory design to examine emotional reactivity and volitional emotion regulation in BPD. Baseline differences were first compared between individuals with BPD and HCs. Next, participants engaged in an event-related laboratory task where they viewed neutral and BPD-relevant images while instructed to either 1) react naturally (i.e., reactivity condition) or 2) engage either mindful awareness or distraction (i.e., regulation condition). Self-reported ratings and physiological measures were collected throughout. We hypothesized that the BPD group would exhibit (a) abnormal baseline emotional functioning compared to HCs, (b) heightened change in emotional intensity from the presentation of neutral to BPD-relevant stimuli (i.e., reactivity) compared to HCs, and (c) heightened emotional intensity when implementing mindful awareness and distraction compared to the HC group while controlling for emotional reactivity (i.e., regulation). We further explored the relative efficacy of these two strategies and the potential modulating influence of group status.

2. Materials and methods

2.1. Participants

Twenty-five individuals with BPD (9 male) and 30 HCs (10 male) between the ages of 18 and 60 were included in the study. Individuals with BPD were recruited from the BPD Clinic at the Centre for Addiction and Mental Health (CAMH), located in Toronto, ON. The majority (92%) of the BPD participants were recruited from an ongoing Dialectical Behavior Therapy (DBT) skills training study. Of those, two individuals participated in the study after receiving 2 and 5 weeks of DBT skills training, respectively; the remaining participants did not yet receive treatment at the time of the study. HCs were recruited from the community through internet postings. BPD exclusion criteria included diagnosis of psychotic disorder, bipolar disorder, or dementia, or evidence of an organic brain syndrome or mental retardation. HC exclusion criteria included meeting diagnostic criteria for any current DSM-IV Axis-I diagnosis or endorsing four or more of the DSM-IV criteria for BPD. HCs who endorsed item "(5) recurrent suicidal behavior, gestures, or threats, or self-mutilating behavior" (American Psychiatric Association, 2000, p. 710) from the BPD criteria were also excluded. Finally,