EMOTION REGULATION ABILITIES AND STRATEGIES IN BORDERLINE PERSONALITY DISORDER

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ABSTRACT

Borderline personality disorder (BPD), a complex disorder linked to adverse behavioral outcomes and impaired functioning, is associated with difficulties in emotion regulation (ER)—including both ER abilities and use of ER strategies. BPD commonly co-occurs with other disorders that are themselves linked to emotion dysregulation. Thus, it is important to consider the potential role of these comorbidities when examining ER difficulties in BPD. The present study investigated relationships between ER abilities, ER strategies, and BPD, while considering key comorbidities, among a sample of participants: (a) diagnosed with BPD, (b) without BPD but matched to BPD group members on key classes of psychopathology (i.e., mood, anxiety, substance use, trauma-related, and other personality disorders; matched psychiatric control [MPC] group), or (c) free of assessed psychopathology (healthy control [HC] group). Results revealed few significant differences between the BPD and MPC groups, who both demonstrated greater impairments than the HC group across most ER abilities and strategies. Notable exceptions were greater impulse control difficulty (ability) and anger rumination (strategy) in the BPD relative to both other groups. Additionally, lower composite maladaptive ER strategies and higher composite adaptive strategies distinguished the HC from BPD group, with neither composite ER abilities nor strategies differentiating the MPC from BPD group, though this result is limited by statistical overlap between variables. By elucidating the potential role of psychiatric comorbidity in two key components of ER in BPD, this study contributes to a growing literature that may help inform therapeutic interventions targeting the severe emotional and behavioral dysregulation commonly seen in this complex disorder.

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CHAPTER 1

MANUSCRIPT

Introduction

Borderline personality disorder (BPD) is a complex, severe form of psychopathology associated with adverse behavioral outcomes including aggression, non-suicidal self-injury (NSSI), and suicidality (Mancke et al., 2018; Turner et al., 2015). BPD is also linked to difficulties in overall functioning, marked by reduced quality of life and global psychosocial impairments (Gunderson et al., 2011; IsHak et al., 2013). Individuals diagnosed with BPD also exhibit extensive psychiatric comorbidities (Tomko et al., 2014; Zanarini et al., 2004), which may overlap with the emotion dysregulation often seen in BPD (Hofmann et al., 2012; Kober, 2014).

A rich literature suggests that BPD is related to deficits in emotion regulation (ER; e.g., Linehan, 1993; Selby & Joiner, 2009). There is no single, agreed upon definition of ER (Berking & Wupperman, 2012; Bloch et al., 2010), though theories identify abilities and strategies as two important components (Gratz et al., 2018; Tull & Aldao, 2015). *ER abilities* are one's dispositional ways of understanding, reacting to, or relating to emotions (Gratz et al., 2018; Tull & Aldao, 2015) and reflect one's overall ER potential (Naragon-Gainey et al., 2017). Commonly assessed ER abilities are awareness, clarity, and acceptance of emotions, as well as access to ER strategies, engagement in goal-directed behavior, and control of impulses when upset (Gratz & Roemer, 2004). *ER strategies* are the specific approaches used to influence one's experienced and/or expressed emotions in a given moment (Gratz et al., 2018; Gross, 1998; Tull & Aldao, 2015), and they are often

categorized as adaptive or maladaptive (Aldao et al., 2010). Examples of commonly researched adaptive ER strategies include cognitive reappraisal and mindfulness, and examples of commonly examined maladaptive strategies include expressive suppression, experiential avoidance, rumination (e.g., brooding, anger rumination, sadness rumination), and worry (see meta-analyses by Barańczuk, 2019; Chiesa et al., 2013; Naragon-Gainey et al., 2017; and Webb et al., 2012). The delineation between ER abilities and strategies is not meant to be exhaustive, as scholars identify other ER components, including emotional sensitivity (i.e., threshold of emotional response), intensity (i.e., magnitude of emotional response), and persistence (i.e., latency of return to emotional baseline; Linehan, 1993).

Individuals diagnosed with BPD report poorer overall/composite and specific (e.g., emotional clarity, goal-directed behavior and impulse control when upset) ER abilities than those free of assessed psychopathology (i.e., healthy control [HC] groups; e.g., Das et al., 2014; Krause-Utz et al., 2019; López-Pérez & McCagh, 2020), as well as those with some comparison psychiatric disorders, such as social anxiety disorder (SAD; Kuo & Linehan, 2009), obsessive-compulsive personality disorder (OCPD; Steenkamp et al., 2015), binge eating disorder (Svaldi et al., 2012), and mixed psychiatric diagnoses (Bornovalova et al., 2008; Gratz et al., 2013). For other psychiatric groups, however, the evidence is more limited. For instance, participants with BPD reported poorer impulse control compared to those with anorexia nervosa, but groups did not differ in any other ER abilities (Svaldi et al., 2012). Similarly, differences in only select ER abilities emerged between groups with BPD and major depressive disorder (MDD; Dixon-Gordon et al., 2015; Svaldi et al., 2012). Finally, though two studies found that most ER abilities were impaired among participants with BPD relative to those with bipolar disorder (Das et al., 2014; Fowler et al., 2019), a

third study found only poorer control of impulses and access to ER strategies when upset among those with BPD (Fletcher et al., 2014). Of note, in contrast to the other two studies, Fletcher et al. (2014) controlled for self-reported depressive symptom severity in analyses, highlighting the importance of considering comorbidity when assessing diagnostic group differences in ER.

BPD is associated with extensive psychiatric comorbidity, which may confound the findings on ER in BPD. Some studies have statistically controlled for the presence of comorbid diagnoses or severity of psychiatric symptoms. These analyses were limited not only in that they included only one or two categories of disorders (i.e., mood disorders, Bornovalova et al., 2008; Fletcher et al., 2014; mood and anxiety disorders, Gratz et al., 2013; Steenkamp et al., 2015), but also in that the addition of covariates does not help ensure that study groups are comparable with respect to the presence of important comorbidities. Other previous studies have used a second approach to address this sampling issue, comparing the rates of comorbid disorders in the BPD and psychiatric control groups, often (but not always; see Steenkamp et al., 2015) finding no significant comorbidity differences (Daros et al., 2018; Gratz et al., 2013; Kuo & Linehan, 2009). However, one of these studies (Kuo & Linehan, 2009) was limited in that it compared only the total number of comorbid diagnoses, rather than rates of specific comorbid disorders, between the BPD and non-BPD groups. This is problematic because psychiatric disorders vary in the extent to which they are associated with ER deficits (e.g., Garnefski et al., 2005; Jazaieri et al., 2013). Other studies were limited in that they did not assess other (non-BPD) personality disorders (e.g., Daros et al., 2018; Bornovalova et al., 2008), which commonly co-occur with BPD (Biskin & Paris, 2013; Zanarini et al., 1998).

A third approach to comorbidity has been to compare ER abilities between individuals with a specific disorder of interest with and without BPD. For example, one study found greater deficits in most ER abilities among participants with both bipolar disorder and BPD relative to those with bipolar disorder without BPD (Bayes et al., 2016). While there is merit in matching BPD and non-BPD groups on the presence of a certain disorder, there are likely additional disorders whose presence differs between them. Thus, extant research on ER abilities in BPD has not adequately accounted for comorbidity, which may contribute to the ER differences observed.

Relative to the literature on ER abilities, fewer studies have examined the use of ER strategies in BPD. Compared to HCs, individuals with BPD tend to rely more on maladaptive ER strategies, such as rumination or worry (e.g., Daros et al., 2018; Rosenthal et al., 2006) and expressive, emotional, or thought suppression (e.g., Beblo et al., 2010; Lamers et al., 2019; Chapman et al., 2017), and less on adaptive strategies, such as cognitive reappraisal (e.g., Sauer et al., 2016), acceptance of the situation (Svaldi et al., 2012), and mindfulness (Chapman et al., 2017). Comparisons of ER strategies between individuals with BPD and those with other psychological disorders have been mixed, revealing differences in only some ER strategies between individuals with BPD and those with an eating disorder (Svaldi et al., 2012), bipolar disorder (Bayes et al., 2016; Fletcher et al., 2014), other personality disorders (e.g., Rosenthal et al., 2006; Steenkamp et al., 2015), or mixed/unspecified disorders (e.g., Daros et al., 2018; Selby & Joiner, 2013) and even more inconsistent results when comparing those with BPD to those with depressive disorders (e.g., Conklin et al., 2006; Rosenthal et al., 2006; Southward & Cheavens, 2019).

As with ER abilities, studies of ER strategies in BPD have employed the same varied approaches to diagnostic comorbidity, exhibiting similar limitations. Several compared psychiatric comorbidities between BPD and control groups, often excluding key disorders known to co-occur with BPD and be associated with emotion dysregulation (e.g., personality disorders, substance use disorders [SUDs]; Kober, 2014; Smesny et al., 2018) or applying exclusion criteria (e.g., no bipolar disorder, limited psychotropic medication use) that constrained the clinical severity and ecological validity of the BPD group (e.g., Sauer et al., 2016). Fewer studies statistically controlled for comorbid diagnoses, including only one disorder (MDD; Conklin et al., 2006) or multiple disorders (PTSD, mood and/or anxiety disorders) but only one ER strategy (rumination; Selby & Joiner, 2013; Selby et al., 2013). A third set of studies compared ER strategies between individuals with a particular disorder with and without BPD, revealing greater use of rumination among those with BPD along with MDD (Abela et al., 2003) but fewer consistent results regarding bipolar disorder (Bayes et al., 2016), SUDs (e.g., Kruedelbach et al., 1993), bulimia nervosa (BN), or BN and non-BPD personality disorders (Gongora et al., 2004[1]). These studies are limited in that there are likely additional diagnoses, beyond the matching criteria, that varied between groups.

Taken together, studies on ER abilities and ER strategies in BPD suffer from similar limitations with respect to the methods by which they considered the potentially confounding issue of diagnostic comorbidity. Typically, these studies compared the rates of comorbid disorders between groups (often finding no differences and leaving out key

[1] Differences in ER strategy use between participants with BPD, BPD+BN, or BPD+BN+another personality disorder were no longer statistically significant when controlling for severity of self-reported depressive symptoms.

diagnoses), statistically controlled for (a limited number of) comorbid diagnoses, or compared BPD and non-BPD groups who were matched on the presence of one or two types of disorders (without addressing additional comorbidities). A more rigorous method to address psychiatric comorbidity would be to utilize a matching strategy wherein each participant in the BPD group is matched (i.e., specific case matching) to a participant in the psychiatric comparison group on each key disorder class (e.g., the presence/absence of a mood disorder, anxiety disorder, SUD, trauma-related disorder, and non-BPD personality disorder).

ER ability correlates with maladaptive and inversely correlates with adaptive ER strategy use (e.g., Bardeen & Fergus, 2014; Peters et al., 2015; Schramm et al., 2013), raising the question: To what extent do ER abilities and strategies (considered together) independently relate to BPD? Whereas a few studies found that some ER abilities (e.g., impulse control when upset) and strategies (e.g., expressive suppression) were each independently linked to BPD symptoms (Carvalho Fernando et al., 2014; Peters et al., 2015; Schramm et al., 2013), others found that ER strategies (e.g., experiential avoidance; Iverson et al., 2012) or composite ER ability (Neacsiu & Tkachuck, 2016), but not both, related independently to BPD symptoms. Furthermore, the one study examining BPD diagnosis (vs. symptoms) found that neither composite ER ability nor the ER strategy mindfulness related independently to BPD (Sinclair & Feigenbaum, 2012). Thus, more research is needed to understand the independent relationships between ER abilities and strategies with respect to BPD.

As stated above, BPD is associated with adverse outcomes including increased aggression, NSSI, and suicidality and poorer quality of life and global psychosocial

functioning (e.g., IsHak et al., 2013; Soloff et al., 2000; Turner et al., 2015). This is not surprising, as these are part of the diagnostic criteria for BPD (American Psychiatric Association [APA], 2013). Aggression, NSSI, and suicidality are also tied to overall problems with ER (Mancke et al., 2018), impaired ER abilities (Terzi et al., 2017; Rufino et al., 2017), and increased use of maladaptive and/or decreased use of adaptive ER strategies (Daros et al., 2018; Scherer et al., 2013) among individuals with BPD. However, with the exception of one study finding an independent association between BPD diagnosis and suicide attempts when controlling for composite ER ability (Harris et al., 2018), research has not examined the extent to which associations between adverse behaviors or overall functioning and BPD are moderated by ER abilities and/or strategies.

The present study investigated the interrelationships between ER abilities, ER strategies, adverse outcomes, and BPD. Our sample consisted of three participant groups: individuals diagnosed with BPD, individuals without BPD who were each matched to a member of the BPD group on several comorbid diagnostic categories (i.e., matched psychiatric control [MPC] group), and a healthy control (HC) group with no psychopathology. These two control groups allowed us to disambiguate findings specific to BPD and those associated with psychopathology more generally. All participants underwent clinical interviews and completed self-report measures of ER abilities, adaptive and maladaptive ER strategies, adverse behavioral outcomes (i.e., aggression, NSSI, and suicidality), and markers of overall functioning (i.e., quality of life). A clinician-assessed measure of overall psychosocial functioning also was obtained.

Aims and Hypotheses

Aim 1: To examine the relationships between specific ER abilities and a diagnosis of BPD.

Hypothesis 1a: Individuals diagnosed with BPD will report greater difficulties in all specific ER abilities (i.e., awareness, clarity, and acceptance of emotions; and flexible access to ER strategies, engagement in goal-directed behavior, and control of impulses when upset) than both MPCs and HCs.

Hypothesis 1b: MPCs will report greater difficulties in all specific ER abilities than HCs.

Aim 2: To examine the relationships between specific adaptive and maladaptive ER strategies and a diagnosis of BPD.

Hypothesis 2a: Individuals with BPD will report higher levels of all maladaptive ER strategies (i.e., expressive suppression, rumination [brooding, sadness rumination, and anger rumination], experiential avoidance, and worry) and lower levels of all adaptive ER strategies (i.e., cognitive reappraisal and mindfulness) than both MPCs and HCs.

Hypothesis 2b: MPCs will report higher levels of all maladaptive ER strategies and lower levels of all adaptive ER strategies than HCs.

Aim 3: To examine the extent to which composite ER ability (i.e., the composite of specific ER abilities) and composite adaptive and maladaptive ER strategy use (i.e., the composites of specific adaptive and specific maladaptive ER strategies, respectively) are independently associated with a diagnosis of BPD.

Hypothesis 3a: Composite difficulties in ER ability will be associated with BPD diagnostic status (vs. HC or MPC) independent of composite use of adaptive and maladaptive ER strategies.

Hypothesis 3b: Composite maladaptive ER strategy use will be associated with BPD diagnostic status (vs. HC or MPC) independent of composite adaptive ER strategy use and difficulties in ER ability.

Hypothesis 3c: Composite adaptive ER strategy use will be inversely associated with BPD diagnostic status (vs. HC or MPC) independent of composite maladaptive ER strategy use and difficulties in ER ability.

Exploratory Aim 4: To examine the extent to which composite ER ability and composite adaptive and maladaptive ER strategy use independently moderate the relationship between a diagnosis of BPD and adverse behavioral outcomes (i.e., aggression, NSSI, and suicidality) / markers of overall functioning (i.e., quality of life and global psychosocial impairment).

Methods

Participants

Participants were undergraduate students from a large, urban university in the northeastern United States and individuals from the surrounding community. The present study included 84 participants, across three groups, drawn from a larger sample of individuals who participated in existing studies in this laboratory. The three groups consisted of participants who (a) met diagnostic criteria for BPD (i.e., BPD group; $n = 27$); (b) did not meet diagnostic criteria for BPD but had the same pattern of comorbidity (i.e., MPC group; $n = 27$) as a member of the BPD group for each of the following classes of disorders: mood disorders, SUDs, anxiety disorders, trauma- and stressor-related disorders,

and non-BPD personality disorders; or (c) did not meet lifetime diagnostic criteria for any of the psychological disorders assessed (i.e., HC group; *n* = 30).

Measures

Demographic Information and Psychiatric Diagnoses

Demographic History Interview. This interview consists of questions about a variety of demographic variables, including gender, race, and age.

Structured Interview for DSM-IV Personality Disorders (SID-P; Pfohl et al., 1997). The SID-P is a semi-structured clinical interview that assesses the diagnostic criteria of personality disorders according to the Diagnostic and Statistical Manual of Mental Disorders – Fourth Edition (DSM-IV; APA, 1994); these same diagnostic criteria were retained in DSM-5 (APA, 2013). The interview has shown strong inter-rater reliability (e.g., Kappa = .88 to .89; Pfohl et al., 1997). In the present study, the SID-P was used to assess the presence or absence of BPD and comorbid personality disorders.

Structured Clinical Interview for the DSM-5 (SCID; First et al., 2015). The SCID is a semi-structured clinical interview used to assess the DSM-5[2] diagnostic criteria of non-personality (previously *Axis I*) psychological disorders. The SCID has demonstrated strong inter-rater reliability (e.g., Kappa = .70 to 1.00 within modules; First et al., 2015) and was used in the present study to assess the presence/absence of comorbid non-personality disorders.

ER Abilities

[2] A number of participants in the archival database were interviewed using a previous version of the SCID, which examined DSM-IV Axis I criteria. This interview data was retrospectively assessed using DSM-5 disorder criteria to yield updated diagnoses.

Difficulties in Emotion Regulation Scales (DERS; Gratz & Roemer, 2004). The DERS is a 36-item self-report measure that examines difficulties in six ER abilities: awareness of emotions; clarity of emotions; acceptance of emotional responses; and flexible access to ER strategies, engagement in goal-directed behavior, and control of impulses when upset. Participants rate items on a five-point Likert scale (1 = *almost never*, 5 = *almost always*), with higher scores indicating greater difficulty in the respective ER ability. The DERS yields six subscale scores, representing difficulties in each specific ER ability, and a total score, indicating composite difficulties in ER ability (i.e., sum of scores across the specific abilities). The DERS is a widely-used measure of difficulties in ER abilities (Gratz et al., 2018) and demonstrates sound psychometric properties (Gratz & Roemer, 2004). The DERS total score and individual subscale scores demonstrated strong internal consistency (α = .81 to .96) in the present sample.

Of note, some researchers have utilized the nonacceptance subscale as an ER strategy index (e.g., Aldao et al., 2010; Naragon-Gainey et al., 2017), whereas others—including the creators of the DERS (Gratz et al., 2004; Gratz et al., 2018)—consider it a measure of ER ability (e.g., Bardeen & Fergus, 2014; Fergus & Bardeen, 2014). The present study conceptualized the DERS nonacceptance scale, whose items focus on nonacceptance of one's emotions (i.e., a way of relating to or understanding one's experienced emotions), rather than the act of accepting situations that one cannot control as a way to regulate or influence one's emotions (which would reflect an ER strategy), as a measure of ER ability.

ER Strategies

Emotion Regulation Questionnaire (ERQ; Gross & John, 2003). The ERQ is a 10-item self-report measure consisting of two scales that assess the extent to which participants use *cognitive reappraisal* (e.g., "When I'm faced with a stressful situation, I make myself think about it in a way that helps me stay calm") and *expressive suppression* (e.g., "When I am feeling negative emotions, I make sure not to express them"). Each item is rated on a seven-point Likert scale (1 = *strongly disagree,* 7 = *strongly agree*), with higher scores on each scale indicating more frequent use of the respective strategy. The ERQ has demonstrated sound internal consistency and construct validity (Gross & John, 2003) and frequently has been employed as a measure of ER strategies in prior research (see meta-analyses by Aldao et al., 2010; Daros & Williams, 2019; Naragon-Gainey et al., 2017). In the present study, the cognitive reappraisal and expressive suppression scales were operationally defined as forms of adaptive and maladaptive ER strategies, respectively, and demonstrated adequate to strong internal consistency (cognitive reappraisal: α = .86 expressive suppression: α = .72).

Ruminative Responses Scale-10 (RRS-10; Treynor et al., 2003). The RRS-10 is a 10-item self-report measure that assesses the extent to which individuals engage in rumination when upset. The RRS-10 consists of two subscales, *reflective pondering* (e.g., "Write down what you are thinking and analyze it") and *brooding* (e.g., "Think about a recent situation, wishing it had gone better"), each containing five items that are rated on a four-point Likert scale (1 = *almost never,* 4 = *almost always*). The creators of the RRS-10 assert that while brooding is a maladaptive strategy (as evidenced by positive associations with depression), reflective pondering may be linked to negative affect in the short-term but prove adaptive in the long-term (as suggested by both negative and positive correlations

with depression; Treynor et al., 2003). Given this complex conceptualization of reflective pondering, we included only the brooding rumination subscale (as a maladaptive ER strategy), consistent with some (but not all; see meta-analyses by Aldao et al., 2010; Naragon-Gainey et al., 2017) previous studies on ER strategy use (e.g., Selby et al., 2009; Zaki et al., 2013). The brooding subscale demonstrated strong internal consistency in the present sample (α = .86).

Sadness and Anger Rumination Inventory (SARI; Peled & Moretti, 2010). The SARI is a 22-item self-report measure, comprising two 11-item subscales that assess *anger rumination* (e.g., "I have difficulty getting myself to stop thinking about how angry I am") and *sadness rumination* (e.g., "I keep thinking about past experiences that have made me sad"). Items are rated on a five-point Likert scale (1 = *never*, 5 = *always*), indicating how often participants engage in each type of rumination. Both subscales have shown strong internal consistency and construct validity (Peled & Moretti, 2010). The SARI was created using items from preexisting rumination instruments, including the Rumination on Sadness Scale (Conway et al., 2000) and Anger Rumination Scale (Sukhodolsky et al., 2001), both of which prior work has utilized as measures of ER strategy use (see Naragon-Gainey et al., 2017). In the present study, the two SARI subscales were used to measure the maladaptive ER strategies of sadness rumination and anger rumination and demonstrated strong internal consistency (α = .95 for each scale). By including both the SARI and the RRS-10 in this study, we were able to examine diagnostic-group differences in the use of multiple forms of rumination (i.e., general brooding vs. rumination in response to the specific emotions of anger or sadness).

Penn State Worry Questionnaire (PSWQ; Meyer et al., 1990). The PSWQ is a 16-item self-report measure that examines the tendency to engage in uncontrollable worry (e.g., "When I am under pressure I worry a lot."). Items are rated on a five-point Likert scale (1 = *not at all typical of me*, 5 = *very typical of me*). The PSWQ has demonstrated strong internal consistency (including in the present sample: $\alpha = .92$), retest reliability, and convergent and divergent validity (Molina & Borkovec, 1994). As in previous research, the PSWQ was used to measure the maladaptive ER strategy of worry (see Naragon-Gainey et al., 2017).

Acceptance and Action Questionnaire (AAQ; Hayes et al., 2004). The AAQ is a nine-item self-report measure that examines the use of experiential avoidance (e.g., "If I could magically remove all the painful experiences I've had in my life, I would do so," "When I feel depressed or anxious, I am unable to take care of my responsibilities"). Items are rated on a seven-point Likert scale (1 = *never true*, 7 = *always true*) and yield one total score, with higher scores reflecting greater use of experiential avoidance. The AAQ has demonstrated sound psychometric properties in previous research (Hayes et al., 2004), with adequate internal consistency in the present sample ($\alpha = .74$). As in previous studies, the AAQ was used as a measure of the maladaptive ER strategy of experiential avoidance (see Aldao et al., 2010 and Naragon-Gainey et al., 2017).

Mindful Attention and Awareness Scale (MAAS; Brown & Ryan, 2003). The MAAS is a 15-item self-report instrument that measures the use of mindfulness, asking participants about their lack of attention to or awareness of the present moment (e.g., "I could be experiencing some emotion and not be conscious of it until some time later," "I find it difficult to stay focused on what's happening in the present moment"). Items are rated on

a six-point Likert scale (1 = *almost always*, 6 = *almost never*), with higher scores indicating greater use of mindfulness. The MAAS has shown strong psychometric properties in previous research (Brown & Ryan, 2003; MacKillop & Anderson, 2007), with strong internal consistency in the present sample (α = .89). Consistent with prior research, the MAAS was employed as a measure of the adaptive ER strategy of mindfulness (see Naragon-Gainey et al., 2017).

Adverse Behavioral Outcomes and Markers of Overall Functioning

Form and Function of Self-Injury Scale (FAFSI; Jenkins et al., 2011). The FAFSI is a self-report measure of NSSI engagement, which served as an adverse behavioral outcome in the present study. Participants were asked to indicate whether they have performed any of 13 forms of NSSI (e.g., cutting, burning, hitting/punching oneself; write-in "other" option) in their lifetime. For each item endorsed, participants were asked several follow-up questions, including how many times they have engaged in that form of NSSI in their lifetime. The lifetime frequencies for each form of NSSI endorsed were summed to calculate the total frequency of NSSI acts, which we used as an adverse behavioral outcome in this study. The FAFSI has demonstrated sound psychometric properties (Cheung et al., under revision), including adequate internal consistency in the present sample (α = .78), and has been used in several previous investigations of NSSI (e.g., Ammerman et al., 2019; Kleiman et al., 2015; Sorgi et al., 2020).

Suicide Behaviors Questionnaire-Revised (SBQ-R; Osman et al., 2001). The SBQ-R is a four-item self-report measure of suicidality, which was included as an adverse behavioral outcome in the present study. The four items assess (a) lifetime presence of suicidal ideation, plans, and/or attempts ("Have you ever thought about or attempted to kill

yourself?"); (b) past-year frequency of suicidal ideation ("How often have you thought about killing yourself in the past year?"); (c) lifetime presence of disclosing suicidal intent to someone else ("Have you ever told someone that you were going to commit suicide, or that you might do it?"); and (d) self-reported likelihood of attempting suicide in the future ("How likely is it that you will attempt suicide someday?"). Responses are assigned a Likert scale value (e.g., Item 4: *Never* = 0, *Very Likely* = 6). Scores on the four items are summed to derive a total score, which we used as our measure of suicidality. The SBQ-R has demonstrated internal consistency and validity in identifying suicide risk in both community and psychiatric samples (Osman et al., 2001) and had strong internal consistency in the present sample (α = .87).

Buss-Perry Aggression Questionnaire (BPAQ; Buss & Perry, 1992). The BPAQ is a 29-item self-report instrument that assesses habitual aggressiveness. The measure comprises four subscales: physical aggression, verbal aggression, anger, and hostility. Items are rated on a five-point Likert scale (1 = *Extremely uncharacteristic of you,* 5 = *Extremely characteristic of you*) and are summed to yield a total score and a score for each subscale. The physical aggression and verbal aggression subscales are summed to create a total aggression scale, which was utilized as an adverse behavioral outcome variable in the present study. The BPAQ has demonstrated sound reliability and validity in previous research (Buss & Perry, 1992), and the BPAQ total aggression scale showed strong internal consistency in the present sample (α = .88).

Quality of Life Enjoyment and Satisfaction Questionnaire – Short Form (QLESQ-SF; Endicott et al., 1993). The QLESQ-SF is a 16-item self-report measure that assesses quality of life across several domains (physical functioning, household duties, work,

leisure, social support and relationships, and subjective feelings) over the past week. Items are rated on a five-point Likert scale (0 = *Very poor*, 4 = *Very good*). The first 14 items (excluding two items on medication use and overall life satisfaction) are summed to produce a total score, with higher scores indicating greater quality of life, which was operationalized as a marker of overall functioning in the present study. The QLESQ-SF has demonstrated strong psychometric properties in previous research (Stevanovic, 2011) and had strong internal consistency in the present sample (α = .89).

Global Assessment of Functioning (GAF; APA, 1994). The GAF is a clinician-rated index of overall psychosocial functioning over the past year. Clinicians are asked to consider the individual's "psychological, social, and occupational functioning on a hypothetical continuum of mental health—illness" and assign a score on a 100-point scale (1 = severe impairment or risk to self or others, 100 = superior functioning with no psychological symptoms). GAF scores for participants in the present sample were assigned by the diagnosticians who conducted each clinical interview and confirmed by the research team using a best estimate procedure (Klein et al., 1994). The GAF was employed as a marker of overall functioning in the present study.

Procedure

Participants were drawn from a larger sample of individuals who completed other research studies in the present laboratory. Participants completed the self-report measures using an encrypted online platform, and graduate-level diagnosticians (supervised by the laboratory's principal investigator, a licensed clinical psychologist) administered the clinical interviews. Diagnoses and GAF were confirmed using a best estimate procedure,

wherein the results of each interview are described in a written report that is presented to the full team of researchers for discussion (Klein et al., 1994).

In the present study, participants were selected for the BPD group if they met diagnostic criteria for BPD as determined by the SID-P. Participants were selected for the MPC group if they did not meet diagnostic criteria for BPD but presented with the same pattern of presence/absence of key comorbid disorder classes (as determined by the SCID and SID-P) as a member of the BPD group. Participants were selected for the HC group if they did not meet diagnostic criteria for any psychological disorder assessed by the SCID or SID-P.

Analytic Design

Analyses were conducted using SPSS Version 26 (plus Missing Values package; IBM Corp, 2019). An *a priori* power analysis was conducted to estimate the sample size required for analyses. Descriptive statistics and plots were examined to assess missing data, skew, and outliers. Missing data were approximated from the existing dataset using multiple imputation (Sterne et al., 2009). We compared the three diagnostic groups with respect to age, race, and gender; any of these demographic variables differing significantly between groups was included as a covariate in primary analyses. We also assessed zero-order correlations among the independent/predictor variables and diagnostic-group differences between outcome variables for the exploratory analyses. If any of the independent/predictor variables were multicollinear (i.e., $r > .80$), then a composite (overall) score of those variables would be used in Aims 1 and 2. Given that Aim 3 and Exploratory Aim 4 involved both ER ability difficulties and ER strategies, an *a priori* decision was made to limit the number of predictor variables by utilizing composite scores

(of which multicollinearity also was assessed) in these analyses in order to create more stable indices of ER abilities and strategies.

Three one-way multivariate analyses of (co)variance (MAN[C]OVA), including any demographic covariates, were used to examine Aims 1 and 2. The individual (a) difficulties in ER abilities, (b) adaptive ER strategies, or (c) maladaptive ER strategies scales were entered as dependent variables, and diagnostic-group membership was entered as the independent variable. Significant omnibus tests were followed up with univariate analyses (AN[C]OVA), and significant univariate main effects were probed using Bonferroni-corrected contrasts. A multinomial logistic regression was used to examine Aim 3, with composite scores for ER ability difficulties, adaptive ER strategies, and maladaptive ER strategies as predictor variables and diagnostic group as the criterion variable.

Five hierarchical regressions were used to investigate possible interactions between ER abilities/strategies and diagnostic-group status in predicting adverse behavioral outcomes and overall functioning (Exploratory Aim 4). Separate linear regressions were used for the continuous criterion variables of SBQ suicidality score, BPAQ aggression score, QLESQ quality of life score, and GAF psychosocial functioning, and a negative binomial regression (due to over dispersion) was used for the count variable of NSSI frequency. All predictor variables were z-standardized for use in these models. The following variables were entered in the first step of each regression: (a) any demographic variables that differed significantly between diagnostic groups; (b) composite ER ability difficulties, composite adaptive ER strategies, and composite maladaptive ER strategies; and (c) two dummy-coded diagnostic-status variables (i.e., MPC: yes or no; HC: yes or no;

BPD as the reference group). In the second (final) step of each regression, the interactions between each ER composite (i.e., ability difficulties, adaptive strategies, and maladaptive strategies) and each dummy-coded diagnostic-group category were added. Significant interactions were probed by examining and plotting simple slopes.

Results

Preliminary Analyses

A power analysis was conducted to estimate the sample size needed to detect effects using the present analyses. Extant studies of ER in individuals with BPD relative to other psychological disorders have yielded moderate-large effect sizes for both ER abilities (composite: f = .23 to 1.06[3], mean = .55; individual abilities: f = .02 to .99, mean = .41; Carvalho Fernando et al., 2014; Das et al., 2014; Dixon-Gordon et al., 2015; Fowler et al., 2019; Gratz et al., 2013; Kuo & Linehan, 2009; Sinclair & Figenbaum, 2012) and ER strategies (maladaptive: f = .03-.60, mean = .28; adaptive: f = .23-.42, mean = .33; see meta-analysis by Daros & Williams, 2019). Considering these studies did not fully match BPD and psychiatric control groups on comorbid disorder classes, we estimated a more conservative effect of f = .30. With this effect size, α = .05, our sample of 84 participants (across three groups) provided adequate power for Hypotheses 1a through 2b (power = .80 to .90). This sample size also provided adequate power ($\geq$.80) for the multinomial logistic regression for Hypotheses 3a- 3c (Sánchez-Meca et al., 2003).

Examination of descriptive statistics indicated that one participant (MPC group) did not complete the ERQ, and four participants (BPD group) did not complete the QLESQ,

[3] Of note, Das et al. (2014) reported some of the largest effect sizes for group differences on the DERS, despite having the smallest sample of studies examined.

BPAQ, FAFSI, or SBQ. Missing scores on these measures were approximated from the existing dataset using multiple imputation. Fifty imputations were conducted using fully conditional specification, with all study variables, as well as demographic variables (age, gender, and race), included in the imputation model. Subsequent results indicate pooled estimates across the 50 imputed datasets.

Demographic information is presented in Table 1. Results of a one-way ANOVA showed that the diagnostic groups differed in age, $F(2, 81) = 4.34$, $p = .016$. Post-hoc Tukey HSD tests found that participants in the BPD group were significantly older than those in the HC group ($p = .022$) and (at a non-significant level) older than those in the MPC group ($p = .051$). Chi Square and Fisher's exact tests failed to reveal significant diagnostic-group differences in race or gender distributions, ps > .523. Thus, age (but not gender or race) was included as a covariate in all primary and exploratory analyses.

Table 1

Demographic Variables as a Function of Diagnostic Group

Variable	BPD (n = 27)	MPC (n = 27)	HC (n = 30)
Age: *M*(*SD*)	22.67(6.46)*	20.15(1.81)	19.87(1.38)*
Gender: *n*(%)			
Female	20(74.07)	21(77.78)	22(73.33)
Male	7(25.93)	6(22.22)	8(26.67)
Race: *n*(%)			
White	14(51.85)	12(44.44)	17(56.67)
African American	5(18.52)	4(14.82)	5(16.67)
Asian	4(14.82)	5(18.52)	7(23.33)
Other race	4(14.82)	6(22.22)	1(3.33)

Note. BPD = borderline personality disorder group; MPC = matched psychiatric control group; HC = healthy control group

* Significant pairwise difference, $p < .05$

Pooled descriptive statistics were examined across the 50 imputed datasets. NSSI frequency was the only study variable whose distribution showed notable outliers (values more than four standard deviations from the mean of a given imputation) and skew (pooled skew statistic = 6.47) and thus was Winsorized (resulting in one or two values being replaced, depending on the imputation). Although the Winsorized variable still demonstrated notable skew (pooled skew statistic = 4.61), NSSI frequency scores were not transformed because the negative binomial regression accounted for this distribution of the count data.

Zero-order correlations among the six ER ability difficulties and eight ER strategies are displayed in Table 2. Correlations among ER ability difficulty scales were all significant and ranged from small to large (*r*s = .07 to .79, $p < .001$). Correlations among ER strategies ranged from small and non-significant to large and significant (*r*s = .01 to .76, *p*s = .92 to < .001). Correlations between ER ability difficulty and ER strategy scales ranged from small and non-significant to large and significant (*r*s = .006 to .74, *p*s = .95 to < .001). Since these scales were not multicollinear (i.e., all pairwise correlations were < .80, although a few approached .80), the individual ER ability difficulty and ER strategy scales (rather than composites) were used in the primary analyses for Aims 1 and 2. In addition to the DERS total score, composite scores for adaptive and maladaptive ER strategies (i.e., average of z-standardized scores on individual adaptive and maladaptive strategies, respectively) were computed for use in the analyses for Aim 3 and Exploratory Aim 4. Correlations between these composite scores were moderate to large and significant: DERS total and adaptive strategies, $r = -0.52$, $p < .001$; adaptive and maladaptive strategies, $r = -0.49$, $p < .001$. The correlation between DERS total and

Table 2

Correlations Among Study Variables

Variable	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.
1.	--	.50***	.61***	.79***	.07	.51***	-.26*	-.20	.09	.65***	.53***	.60***	.38***	.46***	.09
2.		--	.60***	.63***	.15	.39***	-.20	-.27*	.01	.48***	.51***	.53***	.33**	.48***	.21
3.			--	.77***	.32**	.61***	-.46***	-.41***	.12	.62***	.62***	.63***	.42***	.65***	.25*
4.				--	.12	.63***	-.41***	-.35**	.09	.71***	.63***	.74***	.50***	.62***	.15
5.					--	.51***	-.27*	-.22*	.43***	.18	.18	.15	.16	.38***	.09
6.						--	-.41***	-.38***	.17	.47***	.40***	.46***	.38***	.55***	.11
7.							--	.37***	-.03	-.26*	-.31*	-.354*	-.17	-.37***	-.04
8.								--	-.16	-.31**	-.24*	-.35**	-.23*	-.51***	-.24*
9.									--	.05	-.30	.01	-.16	.07	.09
10.										--	.58***	.74***	.56***	.65***	.23*
11.											--	.76***	.37***	.35**	.23*
12.												--	.48***	.50***	.16
13.													--	.53***	.18
14.														--	.28*
15.															--

Table 2

(Continued)

Variable	16.	17.	18.	19.
1.	.49***	.29*	-.41***	-.41***
2.	.61***	.29**	-.44***	-.54***
3.	.59***	.41***	-.56***	-.68***
4.	.68***	.42***	-.52***	-.55***
5.	.18	.07	-.29*	-.28*
6.	.42***	.33**	-.48***	-.42***
7.	-.37***	-.20	.33**	.51***
8.	-.30**	-.24*	.34**	.40***
9.	.11	.02	-.12	-.15
10.	.55***	.37***	-.53***	-.57***
11.	.55***	.47***	-.43***	-.61***
12.	.60***	.40***	-.50***	-.63***
13.	.36***	.14	-.33**	-.38***
14.	.46***	.30**	-.62***	-.54***
15.	.22	.19	-.32*	-.22*
16.	--	.33**	-.38**	-.59***
17.		--	-.35**	-.50***
18.			--	.50***
19.				--

Note. 1. DERS nonacceptance, 2. DERS goal-directed behavior, 3.DERS impulse control, 4. DERS access to strategies, 5. DERS emotional awareness, 6. DERS emotional clarity, 7. ERQ cognitive reappraisal, 8. MAAS mindfulness, 9. ERQ expressive suppression, 10. RRS brooding, 11. SARI anger rumination, 12. SARI sadness rumination, 13. PSWQ worry, 14. AAQ experiential avoidance, 15. FAFSI NSSI frequency, 16. SBQ suicidality, 17. BPAQ aggression, 18. QLESQ quality of life, 19. GAF psychosocial functioning; DERS = Difficulties in Emotion Regulation Scale; ERQ = Emotion Regulation Questionnaire; MAAS = Mindful Attention and Awareness Scale; RRS = Ruminative Responses Scale-10; SARI = Sadness and Anger Rumination Inventory; PSWQ = Penn State Worry Questionnaire; AAQ = Acceptance and Action Questionnaire; FAFSI = Form and Function of Self-Injury Scale; NSSI = non-suicidal self-injury (frequency

Winsorized to four *SD*s from mean); SBQ = Suicide Behaviors Questionnaire-Revised; BPAQ = Buss-Perry Aggression Questionnaire; QLESQ = Quality of Life Enjoyment and Satisfaction Questionnaire-Short Form; GAF = Global Assessment of Functioning

* $p < .05$; ** $p < .001$; *** $p < .001$

composite maladaptive ER strategies (r = .83, p < .001) revealed multicollinearity, and thus the results of Aims 3 and 4 should be interpreted with caution.

Bivariate correlations (see Table 2) indicated that most of the behavioral and quality of life outcome variables (with the exception of NSSI frequency: rs = .19 to .32) were moderately to strongly associated with each other, remaining rs = .33 to .59. As shown in Table 3, one-way ANOVAs revealed significant diagnostic-group differences on each of the five behavioral and quality of life outcome variables involved in Exploratory Aim 4: aggression, NSSI frequency, suicidality, quality of life, and psychosocial functioning. Pairwise comparisons using Tukey's HSD indicated poorer outcomes for the BPD group relative to the HC group on each of these variables (ps < .030). The BPD group reported greater suicidality and were rated as having poorer psychosocial functioning relative to the MPC group (ps < .003), but these groups did not differ in aggression levels, NSSI frequency, or self-reported quality of life, ps > .283. The MPC group had poorer outcomes than the HC group on aggression, suicidality, psychosocial functioning, and quality of life (ps < .006), but not NSSI frequency (p = .540).

Primary Analyses

Aim 1. ER Abilities and BPD

A one-way MANCOVA (controlling for age) compared the three diagnostic groups on the six ER abilities (DERS subscales). This model revealed a significant multivariate effect of diagnostic group, Wilks' Λ = .55, p < .001. As shown in Table 4, follow-up one-way ANCOVAs revealed significant main effects of diagnostic group on difficulties with the ER abilities of emotional acceptance, engaging in goal-directed behavior when upset, controlling impulses when upset, access to effective ER strategies when upset, and

Table 3

Diagnostic Group Differences in Behavioral and Functioning Outcomes

Outcome Variables	BPD (n = 27) $M(SD)$	MPC (n = 27) $M(SD)$	HC (n = 30) $M(SD)$	F	p	η_p^2
Adverse Behavioral Outcomes						
NSSI frequency	169.48(72.16)[a]	66.15(252.93)[ab]	0.83(2.20)[b]	3.74	.037	.08
Suicidality	10.30(0.74)[a]	7.00(3.82)[b]	4.13(2.36)[c]	24.60	<.001	.38
Aggression	43.08(2.27)[a]	38.89(10.54)[a]	28.90(7.09)[b]	17.44	<.001	.30
Overall Functioning						
Quality of life	30.72(2.18)[a]	33.26(8.66)[a]	41.57(6.48)[b]	13.73	<.001	.25
Psychosocial functioning	51.07(5.85)[a]	59.93(10.56)[b]	84.10(2.12)[c]	173.98	<.001	.81

Note. BPD = borderline personality disorder group; MPC = matched psychiatric control group; HC = healthy control group; NSSI = non-suicidal self-injury (Winzorized to four *SD*s from the mean), measured by the Form and Function of Self-Injury Scale (FAFSI); suicidality = measured by the Suicide Behaviors Questionnaire-Revised (SBQ); aggression = measured by the Buss-Perry Aggression Questionnaire (BPAQ) total aggression score; quality of life = measured by the Quality of Life Enjoyment and Satisfaction Questionnaire-Short Form (QLESQ) total score; psychosocial functioning = measured by the clinician-rated Global Assessment of Functioning (GAF)

[a,b,c] Different superscripts indicate significant differences between groups (Tukey's HSD)

Table 4

Diagnostic Group Differences in ER Abilities and Strategies

ER Variables	BPD (n = 27) $M(SD)$	MPC (n = 27) $M(SD)$	HC (n = 30) $M(SD)$	F	p	η_p^2
Difficulties in ER abilities (DERS scales)						
Nonacceptance	18.59(7.16)[a]	15.85(6.55)[ab]	12.37(5.62)[b]	7.25	.001	.15
Goal-directed behavior	19.11(3.52)[a]	17.26(4.45)[a]	13.33(4.14)[b]	13.16	<.001	.25
Impulse control	18.30(4.70)[a]	14.63(4.82)[b]	10.53(3.32)[c]	18.94	<.001	.32
Access to strategies	24.59(6.59)[a]	22.04(6.98)[a]	16.73(4.72)[b]	12.01	<.001	.23
Emotional awareness	15.19(4.45)	16.11(4.40)	13.37(4.64)	2.84	.064	.07
Emotional clarity	14.52(4.01)[a]	12.67(4.95)[ab]	10.93(3.53)[b]	4.46	.015	.10
Adaptive ER strategies						
Cognitive reappraisal	4.52(1.18)[a]	4.95(0.20)[ab]	5.54(0.64)[b]	6.21	.003	.13
Mindfulness	3.32(0.61)[a]	3.48(0.81)[a]	4.01(0.93)[b]	5.16	.008	.11
Maladaptive ER strategies						
Expressive suppression	3.62(1.12)	3.78(0.22)	3.46(1.12)	0.62	.549	.02
Brooding	14.22(3.25)[a]	12.93(4.02)[a]	9.00(2.59)[b]	17.33	<.001	.30
Anger rumination	36.56(7.18)[a]	29.82(8.50)[b]	22.73(6.86)[c]	22.27	<.001	.36
Sadness rumination	40.33(8.93)[a]	37.48(9.74)[a]	26.47(6.36)[b]	23.66	<.001	.37
Worry	58.70(13.69)[a]	57.85(13.71)[ab]	49.57(13.16)[b]	4.92	.010	.11
Experiential avoidance	41.59(7.01)[a]	40.59(8.33)[a]	31.83(6.85)[b]	14.52	<.001	.27

Note. ER = emotion regulation; BPD = borderline personality disorder group; MPC = matched psychiatric control group; HC = healthy control group; DERS = Difficulties in Emotion Regulation Scale; cognitive reappraisal and expressive suppression = measured by Emotion Regulation Questionnaire (ERQ) scales; mindfulness = measured by Mindful Attention and Awareness Scale (MAAS) total score; brooding = measured by Ruminative Responses Scale-10 (RRS); anger rumination and sadness rumination = measured by Sadness and Anger Rumination Inventory (SARI); worry = measured by Penn State Worry Questionnaire (PSWQ) total score; experiential avoidance = measured by Acceptance and Action Questionnaire (AAQ) total score

[a,b,c] Different superscripts indicate significant group differences (Bonferroni-corrected)

emotional clarity, but not emotional awareness. These significant main effects were probed with Bonferroni-corrected post-hoc tests, indicating that participants in the BPD group reported greater difficulties with impulse control than those in the MPC and HC groups and greater difficulties with emotional acceptance, goal-directed behavior, access to ER strategies, and emotional clarity than those in the HC group. The MPC group reported greater difficulties with goal-directed behavior, impulse control, and access to ER strategies than the HC group. No other pairwise comparisons were significant, *p*s > .125.

Aim 2. ER Strategies and BPD

Two one-way MANCOVAs compared the diagnostic groups on the two adaptive ER strategies and six maladaptive ER strategies, respectively, controlling for age. The adaptive strategies MANCOVA revealed a significant multivariate effect of group, Pillai's Trace[4] = 0.19, $p = .003$. As shown in Table 4, follow-up one-way ANCOVAs revealed diagnostic group differences on both cognitive reappraisal and mindfulness. Bonferroni-corrected post-hoc tests indicated that the BPD group scored lower than the HC group on both adaptive strategies. The MPC group also scored lower than the HC group on mindfulness. No other pairwise comparisons were significant, *p*s > .081.

The maladaptive strategies MANCOVA revealed a significant multivariate effect of diagnostic group, Wilks' $\Lambda = 0.49$, $p < .001$. As shown in Table 4, one-way ANCOVAs revealed main effects of diagnostic group on anger rumination, sadness rumination, brooding, experiential avoidance, and worry, but not expressive suppression. Bonferroni-corrected post-hoc tests further indicated that the BPD group scored higher than the MPC

[4] Box's test of equality of covariance matrices was significant for the adaptive ER strategies MANCOVA. Thus, Pillai's Trace was used as the index of multivariate effects, rather than Wilks' Λ (which was also significant, $p = .003$).

and HC groups on anger rumination and higher than the HC group on sadness rumination, brooding, experiential avoidance, and worry. The MPC group scored higher than the HC group on anger rumination, sadness rumination, brooding, and experiential avoidance. No other pairwise comparisons were significant, *p*s > .058.

Aim 3: ER Abilities, ER Strategies, and BPD

A multinomial logistic regression was run with diagnostic-group status (with BPD as the reference group) entered as the dependent variable and age, composite difficulties in ER abilities, composite maladaptive ER strategies, and composite adaptive ER strategies as the predictor variables. At the multivariate level, age ($\chi^2[2] = 6.38$, $p = .041$) and composite maladaptive ER strategies ($\chi^2[2] = 12.12$, $p = .002$) significantly predicted diagnostic group, but composite difficulties in ER abilities ($\chi^2[2] = 0.24$, $p = .890$) and composite adaptive ER strategies ($\chi^2[2] = 4.54$, $p = .105$) did not. As seen in Table 5, examination of parameter estimates for each group comparison indicated that none of the predictor variables contributed to unique variance in the distinction between the MPC and BPD groups. Lower composite maladaptive ER strategy use significantly and higher composite adaptive ER strategy use non-significantly ($p = .050$) distinguished the HC from BPD group. As stated above, the results of this model should be interpreted with caution given the multicollinearity between composite difficulties in ER abilities and composite maladaptive ER strategies.

Exploratory Analyses

Exploratory Aim 4: ER Abilities, ER Strategies, BPD, and Adverse Outcomes

Five hierarchical regressions (each with the same predictor variables) were used to examine the relationships (controlling for age) between the composites of difficulties in

Table 5

Multinomial Logistic Regression Predicting Diagnostic Group Status from ER Abilities and Strategies, Controlling for Age

Comparison Group and Predictors	*B*	*SE B*	Wald	OR	95% CI	*p*
MPC						
Age	-0.97	0.53	3.35	0.38	[0.13, 1.07]	.067
Composite difficulties in ER abilities	-0.25	0.56	0.20	0.78	[0.26, 2.33]	.657
Composite adaptive ER strategies	0.25	0.42	0.34	1.28	[0.56, 2.94]	.558
Composite maladaptive ER strategies	-0.50	0.87	0.33	0.61	[0.11, 3.31]	.564
HC						
Age	-1.20	0.73	2.73	0.30	[0.07, 1.25]	.099
Composite difficulties in ER abilities	-0.04	0.72	0.00	0.96	[0.23, 3.94]	.953
Composite adaptive ER strategies	1.22	0.62	3.84	3.37	[1.00, 11.37]	.050
Composite maladaptive ER strategies	-3.39	1.19	8.19	0.03	[0.00, 0.34]	.004

Note. BPD (borderline personality disorder) group = reference (omitted) group; ER = emotion regulation; MPC = matched psychiatric control; HC = healthy control; *B* = unstandardized slope; *SE B* = standard error of *B*; OR = odds ratio; CI = confidence interval (of OR)

ER abilities, maladaptive ER strategies, and adaptive ER strategies; their interactions with diagnostic group status (dummy-coded); and adverse behavioral outcomes / markers of overall functioning. Within each of the full models, there were variance inflation factor (VIF) scores that exceeded 10, suggesting problematic levels of multicollinearity (James et al., 2013): VIF = 2.12 to 12.72. Thus, the results of these regressions were not interpreted. (See Additional Analyses section for full results.)

Discussion

The present study examined the relationships between ER abilities, ER strategies, and BPD, independent of the comorbidity commonly associated with both BPD and emotion dysregulation, by comparing participants with BPD to a comorbidity-matched control group [MPC] and a group of individuals without psychopathology (healthy control [HC] group). Contrary to our predictions, the results revealed few differences between the BPD and MPC groups in ER abilities or ER strategies.

Individuals in the BPD group reported greater difficulties than those in the MPC group in only one of six ER abilities assessed (controlling impulses when upset). Thus, there appears to be less differentiation in ER ability levels between those with BPD and those matched on comorbid disorder categories than we had hypothesized. Instead, the specific ability to control impulses when upset may be uniquely impaired in BPD, even relative to those with other psychopathology. This result contributes to existing, mixed findings on the extent to which the ER ability of controlling impulses when upset is impaired specifically in BPD, rather than psychopathology more generally (e.g., Das et al., 2019; Fletcher et al., 2014; Fowler et al., 2019; Kuo & Linehan, 2009; Svaldi et al., 2012),

and aligns with other research revealing greater negative urgency (i.e., affective impulsivity) in BPD than other diagnostic groups (e.g., ADHD, Linhartová et al., 2020; antisocial PD, Taherifard et al., 2015). Notably, impulsive behavior is one of the diagnostic criteria for BPD (APA, 2013), which partly may help explain our result. However, the DSM does not indicate that these behaviors must take place in the context of emotional distress. Thus, our finding highlights that the specific ability to control impulses *when upset* (e.g., "When I'm upset, I lose control over my behaviors" Gratz & Roemer, 2004), which is not necessarily definitional to the disorder, may be uniquely impaired in individuals with BPD compared to those matched on related psychopathology.

In contrast, the BPD group reported greater difficulty than the HC group in five out of six ER abilities (impulse control, emotional acceptance, goal-directed behavior, access to ER strategies, and emotional clarity), with three of these also more impaired in the MPC than HC group (impulse control, goal-directed behavior, and access to ER strategies). This, combined with the relative lack of significant differences in ER abilities between the BPD and MPC groups, suggests that difficulties in ER abilities may be a correlate of psychopathology more generally, particularly the types of comorbidities that often accompany BPD (e.g., mood and anxiety disorders, SUDs). This is consistent with extant literature showing ER ability difficulties in both those with BPD (e.g., Das et al., 2014; Krause-Utz et al., 2019; López-Pérez & McCagh, 2020) and those with other psychopathology (e.g., Carvalho Fernando et al., 2014; Das et al., 2014; Kuo & Linehan, 2009) compared to individuals not diagnosed with any psychopathology. Finally, none of our groups differed in difficulty with emotional awareness, suggesting this might be an elementary ER ability on which others build and which may be less affected by

psychopathology, at least in our young adult sample. This would align with previous meta-analytic findings linking affective symptoms (depression, anxiety) more closely to difficulties in emotional awareness among younger than older youth (Sendzik et al., 2017).

Regarding ER strategies, the BPD group did not score differently from the MPC group on either adaptive strategy, and scored higher than the MPC group on only one maladaptive strategy (anger rumination). The increased use of anger rumination among those with BPD is consistent with previous studies showing an association between anger rumination and BPD symptoms in excess of (Baer & Sauer, 2011) and after controlling for (Peters et al., 2017) other types of rumination. This suggests that anger rumination may be a central facet of BPD, reflected by the fact that intense anger or difficulty controlling anger is one of the diagnostic criteria for BPD (APA, 2013). If replicated, further research will be needed to better understand why anger (over other types of) rumination may be particularly salient to individuals with BPD, beyond the difficulty controlling anger that is part of the diagnostic criteria and the well-studied role of rumination on negative affect, more broadly, in the behavioral dysregulation seen in BPD (Selby & Joiner, 2009).

The lack of more global ER strategy deficits in our BPD relative to MPC group aligns with previous research revealing inconsistent differences in ER strategy use between individuals with BPD and those with other psychopathology, including mood disorders (e.g., Carvalho Fernando et al., 2014; Svaldi et al., 2012) and non-BPD personality disorders (e.g., Rosenthal et al., 2006; Steenkamp et al., 2015), further suggesting that the similarities seen between these groups may in part be attributable to the overlapping comorbidities that were not fully explored in previous studies.

In relation to the HC group, the BPD group scored lower on both adaptive ER strategies (cognitive reappraisal and mindfulness) and higher on all maladaptive strategies except expressive suppression. Relative to the HC group, the MPC group also scored lower on mindfulness (but not cognitive reappraisal) and higher on all maladaptive strategies except worry and expressive suppression. The finding that both groups with psychopathology differed from the HC group in experiential avoidance but not expressive suppression is notable, given that both are inhibitory ER strategies. This discrepancy may reflect a more central link between experiential avoidance, relative to other types of inhibitory ER, and psychopathology. If true, this would be consistent with research finding that experiential avoidance mediated the relationship between expressive suppression, as well as broader avoidant coping, and anxiety symptoms (Kashdan et al., 2006).

When assessed simultaneously, neither composite difficulties in ER abilities nor composite adaptive nor maladaptive ER strategy use differentiated the MPC from BPD group, although lower composite maladaptive ER strategy use (significantly) and higher composite adaptive ER strategy use (non-significantly) distinguished the HC from BPD group. These results suggest that the relationship between ER ability difficulties and BPD, relative to the absence of psychopathology, may be better accounted for by maladaptive patterns of ER strategy use, but that neither ER ability nor ER strategy use independently differentiates BPD from the presence of other (related) psychopathology. These results are consistent with our findings of very few differences between the BPD and MPC groups on individual ER abilities or strategies and expand on previous research failing to find unique associations between composite difficulties in ER ability and BPD diagnosis, relative to a "non-clinical group" (Sinclair & Feigenbaum, 2012). However, the results of this analysis

should be interpreted with considerable caution, as there was multicollinearity between our composite ER ability and maladaptive ER strategy variables.

Among adverse behavioral outcome and overall functioning variables, the BPD and MPC groups differed only in levels of suicidality and clinician-rated psychosocial functioning. These two group differences are not surprising, given literature supporting that BPD is one of the psychological disorders most strongly associated with suicidality (Qin, 2011; Zeng et al., 2015) and psychosocial impairments (Ansell et al., 2007; Wilberg et al., 2009). Among the non-significant findings, it is particularly notable that the BPD and MPC groups engaged in similar levels of aggressive behavior, despite the BPD group reporting greater anger rumination and difficulty controlling impulses when upset. Thus, BPD, more so than related psychopathology, might predispose individuals to perseverate on anger, even when not acting out aggressively. This may contribute to the some of the intense negative responses, beyond aggression, to interpersonal stressors, that are characteristic of individuals with BPD (APA, 2013). Not surprisingly, the BPD group had poorer scores than the HC group on all outcome variables, supporting well-known relationships between BPD and elevated risk for NSSI, suicidality, aggression, and impaired quality of life/psychosocial functioning (e.g., IsHak et al., 2013; Soloff et al., 2000; Turner et al., 2015). As described above, problems with multicollinearity among ER constructs prevented examination of the extent to which ER abilities and strategies moderated associations between BPD status and adverse behavioral outcomes or overall functioning.

To our knowledge, this was the first study of ER in BPD that matched members of comparison groups on their individual patterns of major categories of disorders (e.g., mood

disorders, SUDs) that commonly co-occur with BPD and are known to be associated with emotion dysregulation. Despite this notable improvement in addressing the role of comorbidity, we were unable to match participants at the level of specific diagnoses (e.g., MDD, alcohol use disorder) or on all comorbid disorder categories associated with emotion dysregulation (e.g., eating disorders). Additionally, the majority of our sample identified as white and/or female, and our sample size was modest. Further research is needed to more thoroughly examine the relationships between ER abilities, ER strategies, and BPD within larger, more demographically-diverse samples that are matched on a wider range of specific comorbid psychological disorders and relevant demographic characteristics. Furthermore, due to its being part of a larger ongoing project, the present study included only two adaptive ER strategies, compared to six maladaptive strategies and six ER abilities. A notable future direction would be to administer measures of additional adaptive ER strategies (e.g., subtypes of cognitive reappraisal, problem-solving).

Finally, a significant limitation of our study was the multicollinearity between composites of maladaptive ER strategies and difficulties in ER abilities. Post-hoc analyses showed that this was not driven by any individual scale, such as the DERS access to strategies scale (which, though an ER ability, is inherently related to ER strategies), DERS nonacceptance scale (which has been used as both an ER ability and strategy [Aldao et al., 2010; Gratz et al., 2018; Naragon-Gainey et al., 2017]), or (different forms of) rumination or worry (which some individuals [e.g., those with chronic depression or anxiety] may use so habitually that they become strong markers of overall ER potential—or ability [Naragon-Gainey et al., 2017; Tull & Aldao, 2105]). Specifcally, removing or recategorizing any of these single ER scales did not notably improve the multicollinearity

among composite ability and maladaptive strategy scores (*r*s = .79 to .86, majority > .80). Thus, ER abilities and ER strategies may be less distinct than has been posited, underscoring the importance that future research work to both integrate and more clearly delineate the two constructs to improve our understanding of ER (Gratz et al., 2018).

In sum, the present study contributes to the growing body of literature on emotion dysregulation and BPD. Our finding that the BPD and MPC groups, with comparable patterns of non-BPD psychopathology, did not differ in most areas of ER ability difficulty or ER strategy use suggests that the emotion dysregulation that characterizes BPD may not be unique to this disorder and could be in significant part explained by its common comorbidities that are themselves known to be linked to ER difficulties. Nonetheless, BPD does seem to be characterized by a notable impairment in controlling impulses during emotional distress and a tendency to ruminate on anger, both of which map on to specific BPD diagnostic criteria. Additional clinical and research efforts should work to identify the downstream effects and interactions of affective impulsivity, anger rumination, and patterns of psychiatric comorbidity among individuals with this complex disorder.

CHAPTER 2

ADDITIONAL ANALYSES

Diagnostic Comorbidity

Table 6 displays the DSM-5 diagnoses present in the BPD and MPC groups, the frequencies of which were compared using Fisher's exact tests. Although members of these groups were matched on major classes of (non-BPD) comorbidities, there were some differences in their specific diagnoses. However, with the exception of a significantly higher prevalence of other specified personality disorder in the MPC group (p = .010), the frequencies of specific DSM diagnoses did not differ significantly between the BPD and MPC groups.

Comparison of Participants With and Without Data Collected Via Follow-Up

Although the majority of data in the present sample was archival, participants who were missing any of the measures of interest, and who provided consent for future contact at the time of recruitment, were emailed and asked to electronically complete the missing measures. Those who completed the measures received a $20 electronic gift card in compensation. Participants from whom we collected this additional data were compared to the remaining members of their diagnostic group on the study variables. Given the unequal sizes between these participant subgroups (with vs. without follow-up data), nonparametric tests were used. Participants from whom we collected additional data did not differ significantly from those from whom we did not collect additional data in scores on individual or composite ER ability/strategy variables, adverse behavioral outcomes, or

Table 6

Lifetime DSM-5 Diagnoses Across Study Groups

Diagnosis	BPD Group (n = 27)	MPC Group (n = 27)	HC Group (n = 30)
Mood Disorder	***n* = 24**	***n* = 24**	***n* = 0**
MDD	15	16	0
PDD	3	6	0
Other specified depressive disorder	0	3	0
Bipolar I Disorder	4	1	0
Bipolar II Disorder	1	0	0
Other Specified Bipolar and Related Disorder	3	0	0
Substance Use Disorder	***n* = 19**	***n* = 19**	***n* = 0**
AUD	13	11	0
Other SUD	15	15	0
Anxiety Disorder	***n* = 13**	***n* = 13**	***n* = 0**
SAD	11	7	0
GAD	9	8	0
Panic Disorder	3	2	0
Agoraphobia	1	4	0
Specific Phobia	2	0	0
Other Specified Anxiety Disorder	0	2	0
Anxiety Disorder due to GMC	0	1	0
Trauma- or Stress-Related Disorder	***n* = 5**	***n* = 5**	***n* = 0**
PTSD	5	5	0
Non-BPD Personality Disorders	***n* = 17**	***n* = 17**	***n* = 0**
Paranoid	4	0	0
Schizoid	0	0	0
Schizotypal	0	0	0
Antisocial	4	1	0
Histrionic	0	0	0
Narcissistic	2	0	0
Avoidant	4	6	0
Dependent	3	0	0
Obsessive-Compulsive	8	3	0
Other Specified	0	7	0

Note. BPD = borderline personality disorder; MPC = matched psychiatric control; HC = healthy control; MDD = major depressive disorder; PDD = persistent depressive disorder; AUD = alcohol use disorder; SUD = substance use disorder; SAD = social anxiety disorder; GAD = generalized anxiety disorder; GMC = general medical condition; PTSD = posttraumatic stress disorder

indices of overall functioning, nor in their gender distributions, *p*s > .073. Within the BPD group, the three participants from whom we collected follow-up data were significantly younger and more likely to identify as Asian than those from whom we did not, *p*s < .017.

Running Analyses for Aims 1 and 2 with Composite, Rather than Individual, ER Scales

Given the high (though not multicollinear) correlations between the individual ER ability and strategy scales (see Table 2), we also investigated Aims 1 and 2 using the respective composite scores as dependent variables. Specifically, three one-way ANCOVAs were used to investigate the relationships between diagnostic-group status (independent variable) and composite difficulties in ER abilities (DERS total score; dependent variable for Aim 1) and composite maladaptive and adaptive ER strategy use (one model each; dependent variables for Aim 2), controlling for age. These models revealed significant main effects of diagnostic group on composite difficulties with ER abilities ($F[2, 80] = 16.52$, $p < .001$), composite adaptive ER strategy use ($F[2, 80] = 8.89$, $p < .001$), and composite maladaptive ER strategy use, $F(2, 80) = 28.03$, $p < .001$. As seen in Table 7, Bonferroni-corrected contrasts indicated that the BPD and MPC groups scored significantly higher than the HC group on composite difficulties with ER abilities and use of maladaptive ER strategies and significantly lower than the HC group on composite adaptive ER strategies. The BPD and MPC groups did not differ from each other on these three variables, *p*s > .243.

Table 7

Composite ER Ability and Strategy Scores as a Function of Diagnostic Group

Predictors	BPD (n = 27) M(SD)	MPC (n = 27) M(SD)	HC (n = 30) M(SD)
Composite difficulties in ER abilities	0.27(0.81)[a]	0.16(0.98)[a]	-0.71(0.71)[b]
Composite adaptive ER strategies	-0.42(0.16) [a]	-0.12(0.14)[a]	0.48(0.13)[b]
Composite maladaptive ER strategies	0.43(0.11)[a]	0.20(0.12)[a]	-0.57(0.07)[b]

Note. BPD = borderline personality disorder group; MPC = matched psychiatric control group; HC = healthy control group; ER = emotion regulation; values reflect z-scored variables

[a,b] Different superscripts indicate significant differences between groups ($p < .05$)

Determining NSSI and Suicidality Variables for Exploratory Aim 4

The distributions of lifetime NSSI frequency and overall suicidality (SBQ-R total score) were examined to determine whether to treat these variables dichotomously or as count/dimensional data. Examination of these distributions revealed that neither NSSI nor suicidality was endorsed at a rate of less than 30% or greater than 70% among the sample (NSSI presence = 58.33%, suicidal ideation presence = 59.50%). Thus, NSSI frequency and SBQ-R total score were used in Exploratory Aim 4.

Exploratory Aim 4

A hierarchical negative binomial regression of NSSI frequency (see Table 8) was conducting by running a separate model for each block of predictors, due to limitations of the statistical software. The first model was significant (likelihood ratio $\chi^2[6] = 53.25$, $p < .001$), with HC group status and composite maladaptive ER strategy use as the only

Table 8

Hierarchical Negative Binomial Regressions Predicting NSSI Frequency from Composite ER Abilities and Strategies, Diagnostic Group Status, and Their Interactions, Controlling for Age

Predictors	*B*	*SE B*	Wald χ^2	*OR*	95% CI	*p*
Step 1						
Age[a]	0.28	0.31	1.72	1.34	[0.81, 2.24]	.365
Composite difficulties in ER abilities[a]	-0.26	0.48	0.73	0.80	[0.35, 1.81]	.591
Composite adaptive ER strategies[a]	-0.15	0.46	0.15	0.87	[0.36, 2.06]	.742
Composite maladaptive ER strategies[a]	1.96	0.58	11.60	7.15	[2.30, 22.23]	.001
MPC group status[b]	-0.66	0.61	1.52	0.53	[0.18, 1.60]	.279
HC group status[b]	-3.12	0.85	15.30	0.05	[0.01, 0.22]	< .001
Step 2						
Age[a]	0.37	0.33	2.14	1.46	[0.84, 2.54]	.264
Composite difficulties in ER abilities[a]	-0.65	0.73	1.76	0.59	[0.18, 1.92]	.376
Composite adaptive ER strategies[a]	0.06	0.87	0.08	1.08	[0.21, 5.67]	.945
Composite maladaptive ER strategies[a]	2.19	1.08	4.35	9.06	[1.14, 73.46]	.042
MPC group status[b]	-0.85	0.77	1.46	0.45	[0.11, 1.82]	.272
HC group status[b]	-3.16	1.02	10.25	0.04	[0.01, 0.30]	.002
Composite difficulties in ER abilities x MPC	-0.18	1.10	0.23	0.91	[0.13, 6.30]	.871
Composite difficulties in ER abilities x HC	1.75	1.13	2.99	6.17	[0.81, 46.95]	.120
Composite adaptive ER strategies x MPC	-0.52	1.20	0.30	0.63	[0.07, 5.72]	.661
Composite adaptive ER strategies x HC	0.07	1.11	0.04	1.10	[0.13, 9.32]	.951
Composite maladaptive ER strategies x MPC	0.13	1.33	0.04	1.17	[0.09, 15.20]	.922
Composite maladaptive ER strategies x HC	-1.22	1.73	0.51	0.30	[0.01, 8.92]	.482

Note. NSSI = non-suicidal self-injury; ER = emotion regulation; MPC = matched psychiatric control; HC = healthy control; x = interaction between predictors; *B* = unstandardized slope; *SE B* = standard error of *B*; *OR* = odds ratio; CI = confidence interval (of *OR*)

[a] Continuous predictor variables are z-standardized; [b] Dichotomous predictor variables are dummy-coded variables with BPD as the reference group

significant predictors (negative and positive, respectively) of NSSI frequency. In the full model, which included interactions between each composite ER variable and each dummy-coded diagnostic-group variable, HC status remained a significant negative predictor, and composite maladaptive ER strategy use remained a significant positive predictor of NSSI frequency. No other predictors or interactions were significant, *p*s > .120.

In the hierarchical regression of suicidality (SBQ-R total score; see Table 9), step 1 was significant ($F[6, 77] = 16.44$, $p < .001$), with MPC and HC group status as significant negative predictors and composite difficulties in ER abilities as a significant positive predictor of suicidality. The addition of the interactions in step 2 did not significantly improve the predictive power of the model, $\Delta R^2 = 0.010$, $\Delta F(6, 71) = 0.289$, $p = .925$. In the final model, MPC and HC group status remained significant negative predictors, and neither composite difficulties in ER abilities nor any other predictors or interactions reached significance.

In the hierarchical linear regression of aggression level (BPAQ aggression score; see Table 10), step 1 was significant ($F[6, 77]) = 7.00$, $p < .001$), with only MPC group status as a significant (negative) predictor. The addition of interactions in step 2 did not significantly improve the predictive power of the model, $\Delta R^2 = 0.03$, $\Delta F(6, 71) = 0.66$, $p = .684$. The full model was significant ($F[12, 71] = 3.73$, $p < .001$), with HC group remaining a significant negative predictor and MPC group as a non-significant negative predictor of aggression, $p = .064$. No other predictors or interactions were significant in the full model.

In the hierarchical linear regression of self-reported quality of life (QLESQ total score; see Table 11), step 1 was significant, $F(6, 77) = 10.51$, $p < .001$. There were no significant predictors of quality of life in step 1, though composite maladaptive ER

Table 9

Hierarchical Linear Regression Predicting Suicidality from Composite ER Abilities and Strategies, Diagnostic Group Status, and Their Interactions, Controlling for Age

Predictors	*B*	*SE B*	*t*	*p*
Step 1				
Age[a]	0.48	0.41	1.15	.249
Composite difficulties in ER abilities[a]	1.44	0.64	2.26	.024
Composite adaptive ER strategies[a]	0.11	0.47	0.24	.810
Composite maladaptive ER strategies[a]	1.22	0.95	1.28	.201
MPC group status[b]	-2.10	0.84	-2.52	.012
HC group status[b]	-2.80	1.04	-2.70	.007
Step 2				
Age[a]	0.57	0.45	1.29	.197
Composite difficulties in ER abilities[a]	1.09	1.28	0.86	.393
Composite adaptive ER strategies[a]	0.20	0.76	0.26	.798
Composite maladaptive ER strategies[a]	1.82	1.74	1.05	.296
MPC group status[b]	-2.05	1.02	-2.02	.043
HC group status[b]	-3.03	1.27	-2.38	.017
Composite difficulties in ER abilities x MPC	0.36	1.86	0.19	.848
Composite difficulties in ER abilities x HC	0.25	1.61	0.16	.875
Composite adaptive ER strategies x MPC	-0.84	1.38	-0.61	.540
Composite adaptive ER strategies x HC	0.44	1.10	0.40	.691
Composite maladaptive ER strategies x MPC	-0.97	2.47	-0.39	.694
Composite maladaptive ER strategies x HC	-0.58	2.47	-0.23	.816

Note. ER = emotion regulation; suicidality = total score on Suicide Behaviors Questionnaire-Revised; MPC = matched psychiatric control; HC = healthy control; x = interaction between predictors; *B* = unstandardized slope; *SE B* = standard error of *B*

[a] Continuous predictor variables are z-standardized; [b] Dichotomous predictor variables are dummy-coded variables with BPD as the reference group

Table 10

Hierarchical Linear Regression Predicting Aggression from Composite ER Abilities and Strategies, Diagnostic Group Status, and Their Interactions, Controlling for Age

Predictors	*B*	*SE B*	*t*	*p*
Step 1				
Age[a]	-1.96	1.75	-1.12	.264
Composite difficulties in ER abilities[a]	2.43	2.06	1.18	.239
Composite adaptive ER strategies[a]	0.03	1.51	0.02	.984
Composite maladaptive ER strategies[a]	-1.45	3.07	-0.47	.638
MPC group status[b]	-4.63	2.74	-1.69	.091
HC group status[b]	-13.76	3.37	-4.09	< .001
Step 2				
Age[a]	-2.31	1.79	-1.29	.199
Composite difficulties in ER abilities[a]	1.52	4.02	0.38	.706
Composite adaptive ER strategies[a]	-0.93	2.44	-0.38	.704
Composite maladaptive ER strategies[a]	-3.29	5.56	-0.59	.554
MPC group status[b]	-6.03	3.26	-1.85	.064
HC group status[b]	-12.69	4.07	-3.12	.002
Composite difficulties in ER abilities x MPC	-1.17	5.73	-0.20	.839
Composite difficulties in ER abilities x HC	4.27	5.11	0.84	.403
Composite adaptive ER strategies x MPC	2.85	4.15	0.69	.493
Composite adaptive ER strategies x HC	-0.27	3.52	-0.08	.938
Composite maladaptive ER strategies x MPC	5.73	7.81	0.73	.463
Composite maladaptive ER strategies x HC	0.58	7.91	0.07	.941

Note. Aggression = total aggression score on Buss-Perry Aggression Questionnaire; ER = emotion regulation; MPC = matched psychiatric control; HC = healthy control; x = interaction between predictors; *B* = unstandardized slope; *SE B* = standard error of *B*

[a] Continuous predictor variables are z-standardized; [b] Dichotomous predictor variables are dummy-coded variables with BPD as the reference group

Table 11

Hierarchical Linear Regression Predicting Quality of Life from Composite ER Abilities and Strategies, Diagnostic Group Status, and Their Interactions, Controlling for Age

Predictors	*B*	*SE B*	*t*	*p*
Step 1				
Age[a]	-0.54	1.64	-0.33	.744
Composite difficulties in ER abilities[a]	-1.96	1.66	-1.18	.238
Composite adaptive ER strategies[a]	0.76	1.19	0.64	.526
Composite maladaptive ER strategies[a]	-4.45	2.43	-1.83	.067
MPC group status[b]	0.06	2.20	0.03	.980
HC group status[b]	2.73	2.69	1.01	.310
Step 2				
Age[a]	-1.25	1.65	-0.76	.451
Composite difficulties in ER abilities[a]	-0.35	3.40	-0.10	.919
Composite adaptive ER strategies[a]	-1.18	1.91	-0.61	.539
Composite maladaptive ER strategies[a]	-10.23	4.45	-2.30	.021
MPC group status[b]	-1.42	2.58	-0.55	.583
HC group status[b]	2.31	3.22	0.72	.473
Composite difficulties in ER abilities x MPC	-2.75	4.70	-0.59	.558
Composite difficulties in ER abilities x HC	-1.46	4.22	-0.35	.729
Composite adaptive ER strategies x MPC	3.36	3.31	1.02	.310
Composite adaptive ER strategies x HC	2.47	2.76	.90	.370
Composite maladaptive ER strategies x MPC	9.28	6.19	1.50	.134
Composite maladaptive ER strategies x HC	7.36	6.26	1.18	.240

Note. ER = emotion regulation; MPC = matched psychiatric control; HC = healthy control; x = interaction between predictors; *B* = unstandardized slope; *SE B* = standard error of *B*

[a] Continuous predictor variables are z-standardized; [b] Dichotomous predictor variables are dummy-coded variables with BPD as the reference group

strategies was a non-significant negative predictor, $p = .067$. The addition of interactions in step 2 did not significantly improve the predictive power of the model, $\Delta R^2 = 0.034$, $\Delta F(6, 71) = 0.78$, $p = .590$. Composite maladaptive ER strategies was the only significant (negative) predictor of quality of life in the full model.

In the hierarchical linear regression of clinician-rated psychosocial functioning (GAF; see Table 12), step 1 was significant ($F[6, 77] = 74.98$, $p < .001$), with MPC group status, HC group status, and composite adaptive ER strategies as significant positive predictors. Adding the interactions in step 2 significantly improved the predictive power of the model, $\Delta R^2 = 0.03$, $\Delta F(6, 71) = 2.76$, $p = .027$. In the full model, MPC and HC group status remained significant positive predictors, composite adaptive ER strategies was no longer significant, and there was a significant interaction between composite adaptive ER strategy use and MPC group status. This interaction was probed by examining simple slopes. As shown in Figure 1, composite adaptive ER strategy use was a significant (positive) predictor of GAF score ($B = 8.76$, $p = .002$) among the MPC group, but not among the BPD or HC groups, ps > .272.

Table 12

Hierarchical Linear Regression Predicting Psychosocial Functioning from Composite ER Abilities and Strategies, Diagnostic Group Status, and Their Interactions, Controlling for Age

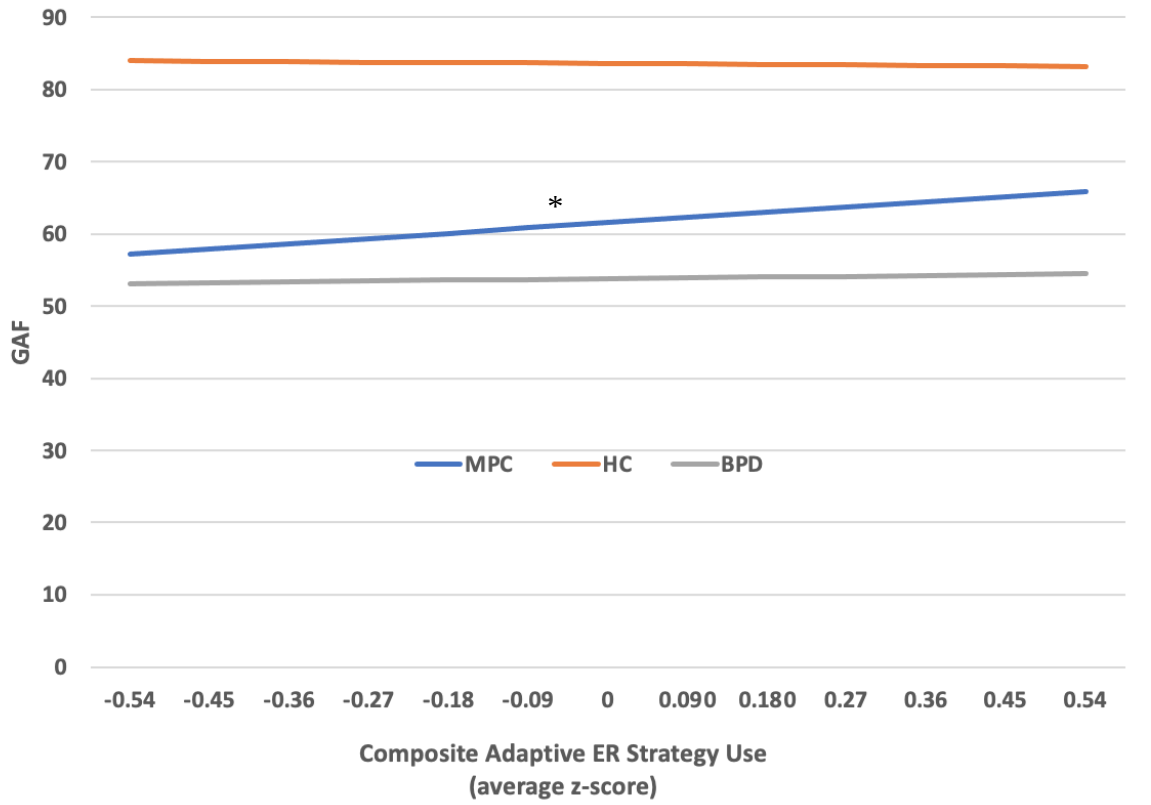
Predictors	*B*	*SE B*	*t*	*p*
Step 1				
Age[a]	-0.57	0.76	-0.75	.456
Composite difficulties in ER abilities[a]	-1.02	1.34	-0.77	.444
Composite adaptive ER strategies[a]	2.28	1.03	2.22	.027
Composite maladaptive ER strategies[a]	-2.87	2.06	-1.39	.164
MPC group status[b]	6.68	1.81	3.70	< .001
HC group status[b]	26.34	2.25	11.71	< .001
Step 2				
Age[a]	-0.93	0.79	-1.17	.242
Composite difficulties in ER abilities[a]	-0.97	2.22	-0.44	.663
Composite adaptive ER strategies[a]	1.21	1.51	0.80	.424
Composite maladaptive ER strategies[a]	-2.78	3.37	-0.83	.409
MPC group status[b]	7.75	2.00	3.87	< .001
HC group status[b]	29.80	2.52	11.81	< .001
Composite difficulties in ER abilities x MPC	1.86	3.42	0.55	.585
Composite difficulties in ER abilities x HC	1.54	2.94	0.53	.600
Composite adaptive ER strategies x MPC	6.87	2.67	2.57	.010
Composite adaptive ER strategies x HC	-1.93	2.19	-0.88	.378
Composite maladaptive ER strategies x MPC	-2.08	4.83	-0.43	.667
Composite maladaptive ER strategies x HC	0.95	4.87	0.20	.845

Note. ER = emotion regulation; MPC = matched psychiatric control; HC = healthy control; x = interaction between predictors; *B* = unstandardized slope; *SE B* = standard error of *B*

[a] Continuous predictor variables are z-standardized; [b] Dichotomous predictor variables are dummy-coded variables with BPD as the reference group

Figure 1

Relationship Between Composite Adaptive ER Strategy Use and Psychosocial Functioning as a Function of Diagnostic Group



Note. ER = emotion regulation; GAF = global assessment of functioning; MPC = matched psychiatric control group; HC = healthy control group; BPD = borderline personality disorder group

* Slope for MPC group is significant at $p < .01$

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