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Do Borderline Personality Disorder Features Predict Emotion Regulation Use and Outcomes in Daily Life? An Ecological Momentary Assessment Study

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Cleveland State University

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DO BORDERLINE PERSONALITY DISORDER FEATURES PREDICT EMOTION
REGULATION USE AND OUTCOMES IN DAILY LIFE? AN ECOLOGICAL
MOMENTARY ASSESSMENT STUDY.

KAYLA M. SCAMALDO

Bachelor of Arts in Psychology

Cleveland State University

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We hereby approve this thesis for

KAYLA M. SCAMALDO

Candidate for the Master of Arts in Clinical Psychology degree for the

Department of Psychology

And the CLEVELAND STATE UNIVERSITY'S

College of Graduate Studies by

Thesis Chairperson, Ilya Yaroslavsky, Ph.D.

Department & Date

Methodologist, Elizabeth Goncey, Ph.D.

Department & Date

Thesis Committee Member, Christopher France, Psy.D.

Department & Date

Student's Date of Defense: May 7, 2019

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ABSTRACT

Borderline Personality Disorder (BPD) is associated with emotion dysregulation, reflected by frequent use of maladaptive responses and infrequent use of adaptive responses. However, studies on emotion regulation (ER) use and BPD have primarily employed survey methodology and it's unclear whether these responses are deployed in daily life. Further, it is unclear if there are differences in the effectiveness of various ER responses among individuals with elevated BPD symptoms. Therefore, this study examined whether BPD symptoms predict increased use of maladaptive strategies, including rumination, suppression, and substance use, and decreased use of adaptive strategies, distraction and problem solving, in daily life. Finally, we explored the effect that BPD symptoms have on ratings of perceived effectiveness of a given ER strategy. Participants were undergraduate students and community adults (N=145) who completed measures of BPD features, demographic information, and a 7-day Ecological Momentary Assessment (EMA) protocol that measured the frequency of ER strategies and the perceived effectiveness of those strategies during peak times of distress in daily life. Results indicate that elevated BPD symptoms predict increased use of rumination and substance use, decreased use of problem solving, and increased perceived effectiveness of rumination and problem solving.

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CHAPTER I

INTRODUCTION

Borderline Personality Disorder (BPD) is characterized by a pervasive pattern of intense negative affective states, marked impulsivity, identity confusion, and unstable interpersonal relationships and self-image (Lieb, Zanarini, Schmahl, & Linehan, & Bohus, 2004). BPD is the most frequently observed personality disorder in clinical settings (Widiger & Weissman, 1991; APA, 2010) with lifetime prevalence rates estimated between 1% - 3% of the general population (Trull, Jahng, Tomko, Wood, & Sher, 2010), and 6% in the primary care setting (Grant et al., 2008). Prevalence rates are higher within outpatient and inpatient mental health treatment settings, where estimates range from 10% to 15% - 25% respectively (Meuldijk, McCarthy, Bourke, & Grenyer, 2017; Widiger & Weissman, 1991), and are related to the severe dysfunction associated with the behavioral and emotional symptoms of the disorder. Not surprisingly, individuals with BPD are 2 to 5 times more likely to receive inpatient psychiatric treatment compared to individuals without a personality disorder (Sansone, 2018).

Individuals with the disorder frequently evidence impairments in social, occupational, and daily functioning (APA, 2010), given their intense, negative emotions that are difficult to manage. Such dysregulation is associated with dysfunction in

interpersonal relationships, difficulty fulfilling role obligations, and engagement in impulsive behaviors like suicidality and substance abuse to resolve negative affect (Linehan, 1987). Individuals with BPD commit suicide at a rate 50 times higher than that of the general population (APA, 2001) with approximately 10% of those diagnosed with BPD attempting suicide, and 4%-10% successfully completing the act (McGlashan, 1986; Paris, 2008; Stone, Stone, & Hurt, 1987).

The personal suffering experienced by those with BPD and their family members is paralleled by high societal costs that are associated with lost productivity and treating the disorder. For example, Goodman and colleagues (2011) reported that the mean cost of treatment of for BPD ranges from \$14,606 - \$60,087 in out-of-pocket expenses, and \$45,573 - \$108,251 in insurance claims (Goodman et al., 2011). The high costs associated with emergency services and inpatient psychiatric treatment utilization in this population exemplify the need to better understand the mechanisms that underlie this disorder. Fortunately, commonalities across models of BPD may shed light on these mechanistic effects.

1.1 Models of Borderline Personality Disorder

The construct 'borderline' emerged from a psychodynamic framework (Stern, 1938), wherein BPD was framed as the boundary between neurotic and psychotic personality organization (Kernberg, 1975). Termed Borderline Personality Organization (Kernberg, 1966), early psychodynamic writings postulated that BPD arose from early childhood environments in which caregivers were emotionally unavailable, withdrawn, or overprotective. Such environments inhibited youths' capacity to separate effectively from their caregiver during adolescence, which has been found to account for difficulty in

modulating emotion and behavioral patterns observed in BPD (Fonagy & Bateman, 2008). As engaging in successful separation from the caregiver is a key developmental hurdle, failure to navigate this transitional phase was believed to adversely influence personality development. Specifically, researchers postulated such experience engendered an inability to form integrated representations of self and other (splitting), an ability to observe or hear things that others may not perceive (reality testing), and the use of maladaptive defense mechanisms such as projection, denial, and dissociation (Kernberg, 1996; Lenzenweger, Clarkin, Kernberg, Foelsch, 2001; Agostino, Monti, & Starcevic, 2017). The utilization of maladaptive defense mechanisms are associated with deficits in effective functioning and maintenance of interpersonal relationships that challenged an individual's ability to successfully manage his or her emotions (Kernberg, 1966; 1975).

Others have also noted emotional volatility as a key facet of the disorder. For example, the Biosocial model posited that emotional lability associated with BPD begins to develop during the childhood years, where 'transactions' occur between an individual's biological vulnerabilities and environmental influences (Linehan, 1987). For Linehan, one biological vulnerability was reflected in the propensity to experience quickly changing, intense feelings of distress that are slow to return to baseline levels. The transactions between this vulnerability and invalidating environments, wherein the child's internal states, perceptions, and needs are ignored, lead to the child having difficulty understanding, identifying, modulating, or tolerating emotions appropriately (Linehan, 1987). Consequently, due to the lack of emotional knowledge, individuals

develop an array of deficits in response to emotional augmentation, that further lead to emotional instability and the experience of intense emotions that are difficult to manage.

More contemporary models, such as Selby's (2009) Emotional Cascade model of BPD, explained the cycle of distress-upregulation through 'emotional cascades,' wherein emotions, feelings, and behaviors interact with one another (Selby, Anestis, Bender, & Joiner, 2009). Selby's model postulates when individuals with BPD become distressed in response to a triggering event, they will ponder over the event, which maintains and exacerbates their negative affect. Selby and colleagues (2009) posited that individuals with BPD engage in a cycle of contemplating their negative emotions and experiencing subsequent augmentation of negative emotions, resulting in hypervigilance to emotional stimuli and distress (Selby et al., 2009). This repetitive cycle of unpleasant emotions may assist in the clarification of the hallmark feature of BPD, emotion dysregulation (Selby & Joiner, 2009).

1.2 Emotion Dysregulation in Borderline Personality Disorder

Across conceptual models, evidence suggests that, at its core, BPD is a disorder of emotion dysregulation (Glenn & Klonsky, 2009; Gratz, Rosenthal, Tull, Lejuez, & Gunderson, 2006; Linehan, 1987, 1993; Nica & Links, 2009; Selby et al., 2009; Skodol et al., 2002), characterized here by experiencing intense negative emotions that are out of control (Carpenter, 2013; Lieb et al., 2004; Linehan, 1987). Empirical evidence from cross-sectional survey and laboratory studies suggests that individuals with BPD experience more intense, labile, and negative emotions as compared to healthy controls (Feliu-Soler et al., 2013; Levine, Marziali, & Hood, 1997; Kuo & Linehan, 2009), individuals with Major Depressive Disorder (MDD) (Jacob et al., 2009), and those with

Bipolar Disorder (Henry et al., 2001). These findings mirror those that show strong associations between BPD and dispositional levels of distress. For instance, Chu and colleagues (2016) had university students and community members (N=150) rate their dispositional levels of positive and negative affect. Their results show that elevated BPD symptom counts, for both student and community samples, ascertained through psychiatric interview, were positively associated with higher dispositional levels of negative affect (Chu, Victor, & Klonsky, 2016).

While many studies consistently associate elevated negative affectivity among individuals with BPD, findings on affect reactivity among clinical and analogue samples have been mixed. For example, Evans and colleagues (2013) instructed individuals with varying levels of BPD symptomology to rate their negative and positive affect at baseline and after viewing a negative mood induction film. While borderline features were positively associated with elevated baseline negative affect, they were not associated with affect reactivity after negative mood induction (Evans, Howard, Dudas, Denman, & Dunn, 2013). In another study comparing 20 individuals with BPD, 20 with Social Anxiety Disorder (SAD), and 20 controls, Kuo and Linehan (2009) found that those with BPD evidence significantly higher baseline negative affect than healthy controls but did not significantly differ from the other two groups in reactivity to evocative film clips (Kuo & Linehan, 2009). Conversely, indirect evidence from Dixon-Gordon and colleagues (2013) found significant differences between those with BPD and healthy controls following interpersonal exclusion in which individuals with BPD symptoms evidenced increased reactivity to distress. Specifically, Dixon-Gordon and colleagues (2013) executed deception procedures using a computer to control a virtual ball tossing

game, who participants believed were real players. Participants who were progressively excluded indicated increased sensitivity and marked distress following interpersonal rejection (Dixon-Gordon, Gratz, Breetz, & Tull, 2013). Using idiographic stimuli that were interpersonal to induce negative mood states, Kuo and colleagues (2014) found greater reactivity in sadness and anger among those with BPD as compared to individuals with SAD and healthy probands (Kuo, Neacsiu, & Fitzpatrick, 2014). As BPD appears to be an interpersonal disorder and interpersonal distress produces particularly heightened reactivity in negative affect (Sadikaj, Russell, Moskowitz, & Paris, 2010), it is important to consider how interpersonal contexts could influence this relationship in real life situations.

1.3 Emotion Dysregulation in Daily Life

Although the laboratory is an excellent place to start initial inquiry into effective processes in BPD, it cannot accommodate the myriad daily life situations that people encounter; therefore, examining these processes as they unfold in daily life has potential to increase researchers' understanding of this disorder. Emotion dysregulation observed among those with BPD includes intense negative emotions, heightened emotional reactivity, and dynamic changes in mood that may not be captured by typical self-report methodology and laboratory measures (Sadikaj et al., 2010). Data collection methods that account for momentary changes in emotional states, which capture difficulties managing emotions in daily life, are especially useful for clarifying processes that influence emotion dysregulation among those with this disorder (Carpenter & Trull, 2012; Trull & Ebner-Priemer, 2009). For instance, Ebner-Priemer and colleagues (2007) found that patients diagnosed with BPD report more intense negative emotions and fewer positive

emotions when reporting their emotions every 10-20 minutes on a minicomputer for a 24-hour period (Ebner-Priemer et al., 2007). Additionally, Tolphin and colleagues (2004) instructed undergraduate students to utilize a daily diary twice a day for two weeks to report their positive and negative affect, finding that negative affect was higher for those with elevated borderline symptoms (Tolphin, Gunthert, Cohen, & O'Neill, 2004). These findings were mirrored by Chu and colleagues (2016), who also observed heightened NA, as well as greater frequency of its occurrence and duration among those with BPD symptoms (Chu, Victor, & Klonsky, 2016). These findings show that across analogue and clinical samples, elevated BPD features are associated with high levels of negative affect in daily life and capture unique details of NA wherein elevated BPD features are associated with increased frequency and duration of NA periods.

With respect to affective reactivity among individuals with BPD symptoms, studies that utilize experience sampling methods (ESM) have found more consistent results as compared to laboratory studies. For example, Glaser and colleagues (2007) instructed 44 BPD patients, 42 psychotic patients, and 49 probands to wear a wristwatch that would 'beep' pseudo-randomly 10 times per day for 6 consecutive days, to alert the participant to complete self-assessment forms concerning contextual information (e.g. location, activity, persons present), and report positive and negative affectivity. Their results showed that BPD patients reported significantly more affect reactivity in daily life compared to probands and psychotic patients, as reflected by a large increase in negative affect and a large decrease in positive affect (Glaser, Van Os, Mengelers, & Myin-Germeys, 2007). Furthermore, Russell and colleagues (2007) found that individuals with BPD reported heightened negative affect and within-subject deviation from their mean

negative affect level (i.e. intra-individual variability) in daily life than did healthy probands, which may suggest heightened reactivity to changes in participants' environments (Russel, Moskowitz, Zuroff, Sookman, & Paris, 2007). When interpersonal context is considered in daily life, individuals with high BPD features reported greater negative affect and interpersonal stressors than individuals with low BPD features (Tolphin et al., 2004), and patients with BPD reported more disagreements and doubt in social interactions, which led to augmented distress as compared to healthy probands (Stepp, Pilkonis, Yaggi, Morse, & Feske, 2009). Across methodologies, individuals with BPD features evidence dysregulated emotions by exhibiting intense negative affect and heightened affect reactivity.

1.4 Deficits in Emotion Regulation

As noted, emotion dysregulation, or the experience of intense negative emotions that are difficult to manage, are associated with the onset and maintenance of psychopathology, including BPD (Baer, Peters, Eisenlohr, Geiger, & Sauer, 2012). Emotion dysregulation is posited as a consequence of the inability to utilize effective strategies to modulate one's emotions (Gratz & Roemer, 2004). This process of modulating emotions, known as emotion regulation (ER), is an individual's exertion of intentional influence on emotions, via implementing or terminating emotion modulation strategies, as a function of consciously monitored changes in affect (Parkinson & Totterdell, 1999). Attempts to increase one's feelings is called upward regulation, and it can lead to the improvement of positive emotions (e.g., increase happiness) or augmentation of negative emotions (e.g., increase sadness). On the other hand, attempts to regulate emotions by decreasing emotions, known as downward regulation or

downregulation, involves attenuating pleasant (e.g., reduce joy) or negative mood states (e.g., reduce distress) (Parkinson & Totterdell, 1999). For individuals with BPD, the failure to downregulate distress over time develops into out-of-control emotions that cloud judgment and intentions (Shedler & Westen, 2004). The failure of those with BPD to downregulate their distress creates a positive feedback loop that further increases the intensity and duration of negative affect.

1.5 Emotion Regulation Strategies

ER failures may come about from ineffectively implemented adaptive responses that reduce distress in the short and long term, and the frequent use of maladaptive responses in effort to feel better in the short term, but inadvertently maintain distress in the long term. Failure to downregulate emotions effectively by frequently using maladaptive ER strategies, or infrequently using adaptive responses may reflect mechanisms by which BPD features predict dysregulated emotions. These associations are evidenced by self-report and behavioral studies.

1.5.1 Rumination

One maladaptive ER strategy, rumination, has gained traction from the popularity of Selby's (2009) Emotional Cascade model, in which rumination shares a reciprocal relationship with negative affect creating a positive feedback loop. Rumination in this model can be defined as repetitive maladaptive thoughts focused on the internal state regarding the causes and consequences of negative emotional experiences (Nolen-Hoeksema, 1991; Nolen-Hoeksema, Wescio, & Lyubomirsky, 2008). Frequent utilization of rumination while distressed leads to parallel dysfunction observed in BPD, including loss of social support, impaired ability to problem solve, reduced drive for instrumental

behavior, and increased risk for greater severity in depression symptoms and episodes (Nolen-Hoeksema, 1991; Nolen Hoeksema & Morrow, 1993). Individuals with BPD who ruminate engage in dysregulated behaviors such as non-suicidal self-injury (NSSI), binge-eating, aggression, and substance use (Nolen-Hoeksema et al., 2007; Nolen-Hoeksema & Harrell, 2002; Selby & Joiner, 2013; Trull et al., 2000).

Empirical evidence suggests that dysphoric individuals who are instructed to ruminate report more intense negative interpretations of hypothetical situations and are more negative about future events, compared to dysphoric participants who engage in other adaptive ER strategies (Lyubomirsky & Nolen-Hoeksema, 1995). Additionally, individuals with BPD are more likely to report increased dispositional rumination (Peters, Geiger, Smart, & Baer, 2014) compared to healthy probands (Selby et al., 2009). Importantly, behavioral studies suggest that individuals with various levels of BPD features report increased NA after rumination induction. For example, Selby and colleagues (2009) instructed individuals with and without BPD symptomology to ruminate for five minutes and found that individuals with BPD features reported greater reactivity in NA (Selby et al., 2009). There is a dearth of evidence for rumination in daily life for individuals with BPD (Schulze, Burkner, Bohlander, & Zetsche, 2018), and the limited findings available are analogous to those in laboratory studies. For example, evidence from a nonclinical sample shows that individuals who experience greater negative affect are more likely to employ maladaptive ER strategies, such as rumination (Lennarz, Hollenstein, Lichtwarck-Aschoff, Kuntsche, & Granic, 2019). Furthermore, Selby and colleagues (2016) reported indirect evidence for rumination, where individuals who reported increased rumination and NA evidenced increased experience of

nightmares and elevated rumination the following day (Selby, Fehling, Panza, & Kranzler, 2016).

1.5.2 Suppression

Another maladaptive ER strategy that may exacerbate distress is suppression, which can be defined as deliberately inhibiting unpleasant emotional thoughts out of awareness (Baer et al., 2012; Gross & Levenson, 1993). As individuals with BPD report experiencing out of control emotions and avoiding aversive states (Gratz, Rosenthal, Tull, Lejuez, & Gunderson, 2006), it is likely that individuals with BPD utilize thought suppression (Baer, et al., 2012; Rosenthal et al., 2005). Experimental reviews find that BPD severity is associated with greater thought suppression in response to distress (Bijttebier & Vertommen, 1999) and that utilizing thought suppression leads to rebound effects of symptoms of BPD (Chapman, Specht, & Cellucci, 2005). Indeed, results from behavioral studies suggest that negative affectivity increases as a function of engagement in thought suppression for individuals with BPD features in an undergraduate sample (Cheavens et al., 2017). Additionally, Rosenthal and colleagues (2005) collected self-report measures of thought suppression via the White Bear Suppression Inventory (WBSI) for individuals diagnosed with BPD. Their results demonstrate that chronic efforts to suppress unpleasant thoughts exacerbated negative emotions and BPD severity (Rosenthal, Cheavens, Lejuez, & Lynch, 2004). Finally, Cheavens and colleagues (2005) found that individuals with BPD who reported dysregulated emotions and endorsed thought suppression predicted severity in BPD features, suggesting that frequent thought suppression increases distress, which leads to heightened emotional intensity and engagement in dysregulated behaviors (Cheavens et al., 2005).

While the effects of utilizing suppression are consistently reported in behavioral studies, daily life provides a murkier picture. For example, Chapman and colleagues (2009) found instructed use of suppression over a four-day period, eight times a day, demonstrated benefits for individuals with BPD symptoms, where participants reported increased upregulation of positive emotions and decreased urges for dysregulated behaviors (Chapman, Rosenthal, & Leung, 2009). While this evidence is inconsistent with behavioral studies, results that illustrate the short-term benefits of utilizing maladaptive ER strategies underscore the need for longitudinal study of suppressing emotional thoughts for those with BPD features.

1.5.3 Substance Use

Substance use has been documented as a coping strategy across the age span, from adolescence (Wagner, Myers, & McIninch, 1999; Wills, 1986) through adulthood (Fromme & Rivet, 1994). Substance use is one form of disengagement coping that enables a temporary relief from stress and dysphoria (Carver & Scheier, 1989; Connor-Smith & Flachsbart, 2007). Surprisingly, while substance use disorders have commonly been examined as one form of impulsive behaviors among those with BPD features, and as comorbid conditions, relatively little is known about the ER role of substance use among those with elevated BPD features (Aldao, Nolen-Hoeksema, & Schweizer, 2010; Carver & Scheier, 1989; Carver, Johnson, & Joormann, 2008; Nica & Links, 2009; Trull, Sher, Minks-Brown, Durbin, & Burr, 2000). Indirect evidence from college samples suggests that undergraduate students may use drinking as a coping strategy among those with elevated distress levels (Martens et al., 2008). Additionally, Cooper and colleagues

(2000) found similar associations between substance use as a means of coping with distress in a community sample (Cooper, Agocha, & Sheldon, 2000).

Studies that employed ESM substantiate substance use as maladaptive ER response. For example, Fabes and Eisenberg (1997) instructed participants to complete one daily diary every evening for 14 days, reporting positive and negative affectivity, stressful events, and endorsed their use of various coping responses (e.g. planful/restraint coping, suppression of activities, social support, denial, venting, substance use) (Fabes & Eisenberg, 1997). Results provide indirect evidence for substance use as a coping strategy in daily life, where, independent of stressful events, individuals with decreased regulatory control were more likely to utilize substance use as a coping strategy when experiencing heightened levels of NA (Fabes & Eisenberg, 1997).

1.5.4 Problem Solving

Problem solving, an adaptive ER strategy, is defined as conscious efforts to modify distressful situations and their consequences by assessing solutions and planning courses of action (Aldao et al., 2010). Poor problem solving skills are associated with psychopathology (D'Zurilla, Chang, Nottingham, & Faccini, 1998; Aldao et al., 2010; Kant, D'Zurilla, & Maydeu-Olivares, 1997; VanBoven & Espelage, 2006), as an individual's capacity to effectively problem solve is negatively impacted by experiencing intense negative emotions (Lyubomirsky & Nolen-Hoeksema, 1995; Silk, Steinberg, & Morris, 2003). Deficits in problem solving may lead to developing a repertoire of maladaptive ER strategies (Nolen-Hoeksema et al., 2008), which further interfere with effective problem solving (Hong, 2007). Individuals who exhibit deficits in problem solving report greater engagement in urgent behaviors to decrease distress, including

NSSI and suicidal behaviors (Schotte, Cools, & Payvar, 1990; Williams, Barnhofer, Crane, & Beck, 2005; Nock & Mendes, 2008). While dysregulated emotions and behaviors are common among BPD, it is posited that individuals with BPD would exhibit difficulties in problem solving.

While behavioral studies report consistent evidence of social problem solving for individuals who experience intense negative emotions, there is a dearth of literature that examines general problem solving in behavioral and daily life studies among individuals with BPD symptoms, so social problem solving will also be discussed here (Bray, Barrowclough, & Lobban, 2007). The extant empirical literature has demonstrated that deficits on a dispositional measure of social problem solving and poor performance on a problem-solving task were associated with BPD features, independent of other psychiatric symptoms (Bray et al., 2007). Dixon-Gordon and colleagues (2011) instructed female undergraduate students to engage in a state-dependent activity in which the beginning and end of a social situation is described and participants report the steps of the scenario being resolved. The authors found that individuals with high BPD features reported trait-level deficits in problem solving, reduced number of solutions to social problem solving, and increased inappropriate solutions after negative mood induction (Dixon-Gordon, Chapman, Lovasz, & Walters, 2011). In daily life, problem-solving and BPD features are not examined but limited findings suggest that adolescents who endorse utilizing problem solving when distressed did not effectively regulate sadness, anger, or anxiety (Silk, Steinberg, & Morris, 2003). Examining the use of general problem solving in daily life may provide clarity in understanding the effectiveness of utilizing problem solving for individuals with BPD symptoms.

1.5.5 Distraction

While it's posited that focused attention may influence enduring negative mood states (Carver & Scheier, 1990; Nolen-Hoeksema, 1991), distraction—which involves moving attention away from emotional stimuli—may attenuate negative emotions (Sheppes, Scheibe, Suri, & Gross, 2011; Silk et al., 2003). Though maladaptive forms of distraction may exist, such as NSSI (Selby & Joiner, 2009) and interpersonal conflict (Clifton, Pilkonis, & McCarty, 2007), distraction as an ER strategy includes positive behaviors such as engaging in an activity, working on a hobby, or concentrating on work (Nolen-Hoeksema, 1991). For healthy probands, instructed use of distraction reduces distress after engaging with nonspecific and idiographic stimuli (Denson, Moulds, & Grisham, 2012; Webb, Miles, & Sheeran, 2012), while dysphoric individuals experience reduced worry ratings and sad mood after instructed distraction (Nolen-Hoeksema & Morrow, 1993; Vickers & Vogeltanz-Holm, 2003).

Behavioral studies suggest that utilizing distraction effectively decreases distress after negative mood induction and upregulates positive emotions for individuals with BPD (Jacob et al., 2011; Kuo, Fitzpatrick, Metcalfe, & McCain, 2016), even in high states of distress (Sheppes & Gross, 2011). Although individuals with BPD symptoms report increased positive affect, healthy probands report significantly greater positive affect, suggesting that healthy controls are more effective in implementing distraction than individuals with BPD features (Kuo et al., 2015). Additionally, Sauer and colleagues (2016) found that females with BPD report reduced efficacy in distraction compared to healthy probands, although there were no significant differences in frequency of the use of distraction between groups (Sauer et al., 2016). Specifically, participants viewed

negative pictures that were low or high in valence and instructed to think of something neutral, distract, or reduce the negativity of the image, reappraisal (Sauer et al. 2016). While there is sufficient evidence to suggest that distraction is an effective adaptive ER strategy, this relationship has not been examined in daily life (Sauer et al., 2016; Shiffman et al., 2008), there is not sufficient evidence to suggest that individuals with BPD symptoms are less skilled in implementing distraction in daily life. Moreover, it remains unclear whether individuals with BPD features are better at applying some adaptive strategies over others.

1.5.6 Summary of Emotion Regulation Strategies in Borderline Personality Disorder

Individuals with BPD symptoms evidence emotion dysregulation characterized here as low use of adaptive ER strategies and high use of maladaptive ER strategies. Maladaptive ER strategies, like suppression, substance use, and rumination, are positively associated with BPD symptoms. Emotion dysregulation is considered a key element of BPD, and enduring emotion dysregulation is associated with greater likelihood to employ maladaptive ER strategies, such as rumination (Lennarz et al., 2019). Rumination shares a robust positive relationship with BPD symptoms in self-report methodologies that suggest this strategy exacerbates NA and may lead to dysregulated behaviors (Selby et al., 2009). One maladaptive strategy that is typically studied as an impulsive dysregulated behavior, substance use, also shares a relationship with BPD symptoms wherein individuals engage in substance use in order to cope with distress (Dulit, Fyer, Haas, Sullivan, & Frances, 1990; Chapman, Specht, & Cellucci, 2005). Further, attempts to inhibit the intense negative emotions in BPD, suppression, is postulated as a frequently

used ER strategy to quickly escape from distress. (Baer, et al., 2012; Rosenthal et al., 2005).

On the other hand, problem solving, an adaptive ER strategy, requires conscious focus and efforts to modify a distressful situation and ability to brainstorm various actions to resolve the situation (Aldao et al., 2010). Intense negative emotions, a feature of BPD, may interfere with an individuals' ability to effectively problem solve (Lyubomirsky & Nolen-Hoeksema, 1995; Silk et al., 2003). Rather than focusing on a situation, distraction involves attempts to move attention away from emotional stimuli to downregulate negative emotions (Sheppes et al., 2011; Silk et al., 2003). Given the strong relationship between BPD symptoms and the tendency to dwell on a situation (Selby et al., 2009), one may postulate that individuals with BPD symptoms utilize distraction less.

Overall, given the evidence that suggests low adaptive ER use and high maladaptive ER use among individuals with BPD symptoms, it is presumed that individuals with elevated BPD symptoms will demonstrate decreased utilization of problem solving and distraction and increased utilization of rumination, substance use, and suppression in daily life. Also given the negative outcomes associated with maladaptive ER use and ineffective adaptive ER use, it is important to understand what individuals with elevated BPD symptoms utilize in daily life to resolve distress, rather than relying on self-report methodologies.

CHAPTER II

CURRENT STUDY AIMS

While utilization of maladaptive ER strategies are associated with distress (Chapman et al., 2009; Chapman et al., 2017; Silk et al., 2003), and individuals with BPD features experience emotion dysregulation, it is unclear whether individuals with BPD experience difficulties in ER due to their use of maladaptive responses, insufficient use of adaptive responses, or whether the use of adaptive responses has differential effects for those with elevated versus low BPD symptoms. It is important to understand the effectiveness of ER strategies, which is dependent upon who uses the strategy, where it's used, and how the strategy is implemented. Therefore, this study aims to examine the utilization of adaptive and maladaptive ER strategies for individuals with BPD and the effectiveness of using various ER strategies in daily life.

2.1 Hypotheses

Hypothesis 1. BPD features will predict the frequent use of maladaptive ER strategies (i.e., rumination, suppression, and substance use) in daily life (see Figure 1).

Hypothesis 2. BPD features will predict infrequent use of adaptive ER strategies (i.e., problem solving and distraction) in daily life (see Figure 2).

Hypothesis 3. I want to examine the relationship between BPD features, utilization of ER strategies and their association with self-report effectiveness in resolving distress.

Considering the mixed evidence regarding ER strategy choice for individuals with BPD and the dearth of evidence examining effectiveness of strategy utilization during peak times of distress for individuals with BPD, this in an exploratory aim of the study.

CHAPTER III

METHODS

3.1 Participants

Participants were 145 university students and community-dwelling adults, recruited from the Undergraduate Psychology Research Pool at Cleveland State University, ResearchMatch.com, and Craigslist.com. The sample was 73% female with an age range of 18-58 ($M=24.55$, $SD=9.38$). Undergraduate participants received course credit and community-dwelling adults were paid for their time. Eligible participants were those who correctly completed nine items that measured response inconsistency and had access to a smart cellular phone with a text-messaging and data plan.

3.2 Procedure

3.2.1 Laboratory procedures. As part of larger study protocol examining ER and affective processing in laboratory and daily life settings, participants completed survey measures of demographic information and BPD symptoms. After completing the laboratory protocol, participants were introduced to the EMA survey and a research

assistant designed their week-long EMA schedule with them to optimize timing of prompts (see below).

3.2.2 Ecological momentary assessment. The EMA protocol follows best practices (Shiffman, Stone, & Hufford, 2008), where fixed prompts were sent to participants in SurveySignal (Hofmann & Patel, 2015) no less than 1.5 hours apart, five times per day between 9:00 a.m.- 9:00 p.m. for one week following the laboratory visit to sample times of peak distress and ER strategies across the morning, afternoon, and evening. Participants were sent the link to the survey by text message, which redirected the participant to complete the survey in their designated web browser. A reminder prompt was sent to participant within 15 minutes if they failed to open the initial text with the survey link, providing participants 30 minutes total to complete the survey before the link deactivated. Participants reported contextual information during their peak level of distress regarding activities they engaged in, interpersonal contexts, ER strategy choice, and the effectiveness of utilizing that strategy. Participants from the community were incentivized by monetary compensation and students were given course credit to complete 80% of the prompts over the measurement period. Research assistants updated participants over the week of their progress.

3.3 Laboratory Measures

3.3.1 Demographics. Demographic information included participants' age, sex, race, and education levels.

3.3.2 Borderline features. Borderline personality features were assessed with the Personality Assessment Inventory Borderline Scale (PAI-BOR; Morey, 1991). The PAI-BOR is a well-validated 24 item measure that assesses affective instability, identity

problems, negative relationships, and self-harm. Individuals respond via a 4-point Likert scale, from 0 (False) to 3 (Very True) to items such as, “My moods get quite intense” and “Sometimes I feel terribly empty inside”. Those who score above 38 meet threshold for possible clinical-levels of BPD symptoms (De Moor, Distel, Trull, & Boomsma, 2009; Trull, Widiger, Lynam, & Costa, 2003). The PAI-BOR has evidenced strong psychometric properties including high internal consistency ($\alpha = .92$, Trull et al., 1997), predictive validity (De Moor et al., 2009), and is widely used with student, community, and clinical samples (Chapman et al., 2009; De Moor et al., 2009; Morey, 1991; Trull 1995, 2001; Trull, Useda, Conforti, & Doan, 1997; Trull et al., 2003).

3.4 Ecological Momentary Assessment Measures

3.4.1 Periods of distress. Times of ER use in daily life were indexed by moderate and greater levels of NA during the hour prior to a given EMA prompt. Respondents were prompted to identify when they felt the most “negative” in the hour prior to the prompt and to rate the degree to which they felt sad, upset, angry, frustrated, or stressed at those times using a 5-point Likert scale (1= “very slightly/not at all”, 2= “a little”, 3= “moderately”, 4= “quite a bit”, 5= “extremely”). Instances during which a moderate level of any negative affect, indicated by a rating of 3 or above, were analyzed with respect to ER use and the effectiveness of ER responses. Observations that contained NA ratings of 2 or below were not included, to guarantee effectiveness ratings were not impacted by individuals not being distressed and therefore not benefitting from ER strategy use (Floor effects).

3.4.2 ER in daily life. Discrete ER responses were measured via three items that examine the temporal order of ER. Each item was provided as one response option

measured dichotomously (utilized vs. not-utilized), and presented to respondents with a list of ER responses that include: rumination (“Feel unable to stop thinking about how you were feeling.”), suppression (“Try not to think about how you were feeling.”), substance use (“Smoke cigarettes & Drink alcohol.”), problem solving (“Do something to fix the reason for how you were feeling.”), and distraction (“Do something to keep your mind off how you were feeling.”). Participants had the opportunity to report an open-ended ER response that was not listed in the 15 response choices; these responses were analyzed and coded into corresponding ER categories. ER responses during peak times of distress in daily life were coded across the three ER items whether an ER strategy occurred (i.e., rumination, suppression, substance use, problem solving, distraction), endorsing 0 (not utilized) or 1 (utilized).

3.4.3 ER effectiveness daily life. Following report of ER strategy deployed, participants rated the effectiveness of the specified ER strategy. Effectiveness was measured by one item, (“How much did that make you feel better?”) via a 5-point Likert scale (1= “very slightly/not at all”, 2= “a little”, 3= “moderately”, 4= “quite a bit”, 5= “extremely”).

3.5 Analyses.

Analyses were completed using SPSS version 22 (SPSS IBM, 2013) and Hierarchical Linear Modeling software v. 7.03 (Raudenbush, Bryk, Cheong, & Congdon, n.d.). SPSS was used to examine variable distributions and associations among study variables to characterize the sample, including testing assumptions that underlie the proposed statistical models, investigating bivariate relationships of interest among participant characteristics, and calculating average ER utilization and effectiveness

ascertained through EMA. Across analyses that tested hypotheses 1 and 2, assumptions of linearity and non-multicollinearity were met. In analyses of hypothesis 3 that tested ER effectiveness, the highest two categories of the effectiveness measure (i.e., “extremely” and “quite a bit”) were collapsed to accommodate sparse data that resulted in the failure to achieve model stability. Effectiveness ratings for all other ER strategies remained unchanged. Robust standard errors were employed to attenuate the effects of heteroscedasticity that was evident in all models testing study hypotheses.

Because ER responses and effectiveness are nested within participants, I employed multilevel logistic regression models that accounted for dependence associated with a given respondent across their EMA observations. The effects of sex were co-varied in all models as women have been shown to have elevated BPD symptoms, and to more often engage in adaptive and maladaptive ER responses relative to males (Charbonneau, Mezulis, & 2009; Johnson et al., 2003; Kovacs et al., 2009; Nolen-Hoeksema & Aldao, 2011; Thayer, Rossy, Ruiz-Padial, & Johnsen, 2003; Yaroslavsky, Bylsma, Rottenberg, & Kovacs, 2013).

For hypotheses 1-2, I employed multilevel logistic regression models in which I regressed a given ER responses (level 1 outcome) on sex (level 2 covariate) and BPD symptoms (level 2 predictor), while modeling a random intercept that reflected individual differences between participants with respect to their average use of a given ER response. To test hypothesis 3, I employed multilevel ordinal logistic regression models that regressed the effectiveness of a given ER strategy (level 1 outcome) on age, sex (level 2 covariates) and BPD symptoms (level 2 predictor).

3.6 Power Analysis.

No study to this authors' knowledge has examined the effects of BPD features on specific ER strategy utilization or effectiveness in daily life, but meta-analytic findings note large-to-moderate associations between BPD and self-report measures of ER responses examined in this study. Therefore, I conducted power analyses with respect to small, medium, and large effects based on Cohen's (1992) standards using Optimal Design (Raudenbush et al., n.d.) software. Based on prior studies with community and clinical samples, I anticipated at minimum a 70% response rate to EMA prompts, and Intraclass Correlation Coefficient (ICC) ranging from .26 - .52. A target sample of $N = 120$ would enable me to detect moderate-to-large effect sizes across the range of ICCs at Power = .80, and at Power = .60 for small effect sizes in the presence of low ICCs (i.e., ICC = .23 OR lower).

CHAPTER IV

RESULTS

4.1 Descriptive Analyses

Overall, participants endorsed problem solving the most during the entire measurement period at 592 times (22.2%), followed by suppression at 498 times (18.7%), distraction at 426 times (15.97%), rumination at 296 times (11.1%), and substance use 34 times (1.3%) to resolve peak levels of distress (see Table 1). Next, ICCs were examined to quantify the stability of the various ER responses, with high ICC values reflecting high stability. Problem solving (ICC=.67) and suppression (ICC=.55) evidenced the highest stability followed by distraction (ICC=.52) and rumination (ICC=.49), suggesting that those who rely on these given responses during distress were also likely to engage in that strategy in subsequent periods of distress. Lastly, substance use evidenced the lowest stability, suggesting that it was used infrequently, and individuals were not as likely to engage in substance use (ICC=.21) compared to competing strategies. Pearson correlations were conducted to examine bivariate correlations between level 2 variables and contrary to assumptions, age and sex were unrelated to BPD symptoms but were examined as potential covariates in all analyses to account for their possible predictive

power ($r_s = -.14 - .14$, $p_s = .10 - .36$). Overall completion of EMA prompts was 79% and 43% of those responses exhibited moderate levels of NA.

4.2 Hypothesis Testing

Do BPD symptoms predict increased probability of deploying a maladaptive ER

response at times of distress? To answer this question, maladaptive ER strategy use (level 1 outcome; rumination, suppression, and substance use) was regressed on BPD symptoms (level 2 predictor), age, and sex (level 2 covariates). In partial support of the hypothesis, greater BPD symptoms predicted increased utilization of rumination ($OR=1.02$, $p<.01$) and substance use ($OR=1.02$, $p<.01$) during peak hours of distress in daily life. Contrary to expectations, BPD symptoms were unrelated to use of suppression during peak times of distress in daily life. These effects were independent of age and sex, wherein older participants ($OR=1.03$, $p<.01$) and men ($OR=4.07$, $p<.01$) tended to endorse substance use, and men were less likely to use suppression ($OR=.51$, $p<.01$) during peak times of distress (see Table 2).

Do BPD symptoms predict decreased probability of deploying an adaptive ER response

at times of distress? To answer this question, adaptive ER strategy use (level 1 outcome; problem solving and distraction) was regressed on BPD symptoms (level 2 predictor), age, and sex (level 2 covariates). Analyses revealed partial support for the second hypothesis, where elevated BPD symptoms predict decreased utilization of problem solving ($OR=.96$, $p<.001$), but not the use of distraction during times of peak distress in daily life. These effects are independent of age and sex, wherein men were less likely ($OR=.60$, $p<.01$) to report distraction and older participants showed trended toward increased use of distraction ($OR=1.01$, $p=.10$) during peak times of distress (see Table 3).

Does the perceived effectiveness of ER responses (rumination, suppression, substance use, problem solving, distraction) differ as a function of BPD symptoms? To explore perceived effectiveness of a given ER strategy, the third hypothesis was examined by ordinal logistic regression models that regressed ER effectiveness for each ER strategy when it was deployed (level 1 outcome) on age, sex (level 2 covariates) and BPD symptoms (level 2 predictor). Results suggest elevated BPD symptoms may positively predict greater perceived effectiveness of problem solving and rumination ($OR = 1.02, p = .07$; $OR = 1.04, p = .06$), respectively (see Table 4).

Other than the trend-level effects outlined above, BPD symptoms were unrelated to ratings of perceived effectiveness of all other strategies, including distraction, suppression and substance use during peak times of distress. With respect to covariates, older participants reported greater perceived effectiveness of problem solving to reduce distress relative to their younger peers ($OR=1.03, p<.05$). Furthermore, those of older age found distraction to be more effective relative to their younger peers ($OR=1.04, p<.01$).

CHAPTER V

DISCUSSION

The present study aimed to examine the relationship between elevated BPD symptoms and deployment of maladaptive and adaptive ER strategies in daily life and the perceived effectiveness of those strategies. The literature on ER strategy use in BPD suggests that individuals utilize decreased adaptive ER strategies and increased maladaptive ER strategies. Given the gaps in extant literature regarding ER strategy choice among individuals with BPD features in their daily lives, the effectiveness of these strategies is not well understood. Exploring the perceived effectiveness of adaptive and maladaptive ER strategies among individuals with elevated BPD symptoms in daily life may clarify one mechanism that leads individuals with BPD symptoms to utilize maladaptive ER over adaptive ER.

The first hypothesis examined whether individuals with BPD symptoms endorse increased use of maladaptive ER strategies (rumination, substance use, suppression), and found elevated BPD symptoms predict higher likelihood to use rumination and substance use during peak hours of distress in daily life. Our findings on rumination parallel data collected through self-report which show individuals with BPD demonstrate greater

likelihood to report increased dispositional rumination as compared to control participants (Peters et al., 2014; Selby et al., 2009) and individuals with MDD (Watkins, 2009). This evidence also mirrors the few experience sampling studies that examine ER use in daily life whereby control participants (Lennarz et al., 2019), those with personality pathology (Ruscio, Gentes, Jones, Hallion, Coleman, & Swendsen, 2015), and individuals with BPD symptoms (Selby & Joiner, 2013; Selby et al., 2016) endorse increased rumination when distressed in daily life. Our findings indicate greater ruminative tendencies in daily life among those with BPD symptoms and show that it is a stable ER response in our sample, suggesting that individuals with BPD features are more likely to employ habitual ruminative responses relative to their low symptom peers. This finding bridges results from self-report to daily life, which suggest individuals with BPD symptoms report increased dispositional rumination (Peters et al., 2017; Selby et al., 2009; Trull & Carpenter, 2013) and a greater tendency to deploy rumination in various contexts (Sauer et al., 2016) as compared to their low symptom peers. It may be particularly relevant to intervene on increased use and tendency to use rumination for individuals with elevated BPD symptoms as chronic rumination may exacerbate dysregulated behaviors (Selby et al., 2013).

Our results are also consistent with cross-sectional and laboratory findings that examine substance use as an ER strategy (Vollrath et al., 1998). Past findings garnered from self-report methodologies indicate that substance use is associated with efforts to inhibit negative emotions for individuals with personality pathology (Smyth, Wiechelt, 2004) and BPD symptoms (Dulit et al., 1990; Chapman et al., 2005). A daily life study by Selby and Joiner (2013) examined substance use as a dysregulated behavior and found

it the most frequently endorsed behavior for individuals with BPD symptoms. The results from this study are important considering the lack of studies that examine substance use as an ER strategy in daily life, so laboratory findings may be generalized to the daily life setting. The increased risk for substance use as a coping strategy may be a key target for treatment since increased endorsement of substance use is associated with substance abuse problems in the future and possible development of substance use disorders (DeJong, Brink, Harteveld, & Wielen, 1993; Dulit et al., 1990; Trull et al., 2000).

No significant relationship was detected between BPD symptoms and use of suppression, and while this effect is incongruent with findings from self-report methodology it can be interpreted in a few ways. Findings on thought suppression are biased because when spontaneous ER responses are measured in the laboratory, as participants are usually given one or two other strategies to consider in addition to thought suppression (Evans et al., 2013). It is unclear whether thought suppression is actually chosen relative to the broader pool of responses for individuals with elevated BPD symptoms. Our study measured suppression by asking participants if they, “tried not to think about how [they] were feeling” during peak times of distress, in addition to 14 other ER strategies. Future research should examine spontaneous ER responses with larger variability in response selection. Further, suppression is typically studied as a maladaptive ER strategy but there is evidence that suggests only increased dispositional suppression is negative but using it in a flexible fashion may be adaptive under specific contexts for short-term benefits. For example, suppression has been found to be especially useful in situations when an individual is around others, in a public space, or during interpersonal conflict with an acquaintance or stranger (English et al., 2018), or

for short periods of time (Liverant, Brown, Barlow, & Roemer, 2008). Perhaps individuals with low BPD symptoms were using suppression flexibly when they reported its use in our study, thereby reflecting an appropriate use in-context, whereas individuals with high BPD symptoms may have been using suppression inflexibly and therefore it was less adaptive. However, all individuals here endorsed use of suppression and therefore it may occlude the complete picture. The chronic use of suppression in a rigid or inflexible way is maladaptive, and future studies should also examine ER flexibility and the various contexts where suppression is implemented in daily life for individuals with elevated BPD symptoms.

Lastly, the available literature suggests that BPD is associated with maladaptive ER strategy use, like suppression, but frequent use of emotional or thought suppression is associated with depression symptoms rather than BPD symptoms (Berking, Neacsiu, Comtois, & Linehan, 2009). BPD is highly comorbid with depression, so perhaps the engagement of some maladaptive ER strategies, like suppression, reflect a subgroup of individuals with BPD symptoms and comorbid MDD. Our sample was constituted of individuals with various histories of depression and therefore we wouldn't be able to detect a significant difference between low or high BPD features since many of the participants met clinical levels of depression.

The second hypothesis testing whether individuals with BPD symptoms endorse decreased use of adaptive ER strategies (problem solving, distraction) was also partially supported, wherein elevated BPD symptoms robustly predict decreased use of problem solving during peak times of distress in daily life. Data collected from self-report shows that psychopathology is negatively associated with dispositional problem solving (Aldao

et al., 2010) and individuals with BPD symptoms in the laboratory exhibit deficits in social problem solving when distressed relative to control participants (Bray et al., 2007; Dixon-Gordon et al., 2011). Furthermore, studies on problem solving report that individuals are more likely to use problem solving if they desire to modulate emotions to downregulate negative emotions and upregulate positive emotions (Coats & Blanchard-Fields, 2008). Given the nature of BPD and the tendency to reject or avoid negative emotions and engage in ER strategies that achieve short-term benefits, findings on problem solving in BPD from self-report may also apply to daily life. These results may suggest problem solving is a key target for ER intervention for individuals with greater BPD symptoms, as attenuated orientation in problem-solving is associated with negative outcomes including development of depression, anxiety, substance use, and eating disorders.

Also, our findings indicate BPD symptoms are unrelated to use of distraction. This finding is contrary to previous cross-sectional findings in this area that suggest BPD symptom severity has a positive relationship with endorsement of distraction when viewing BPD specific stimuli (Sauer, Sheppes, Lackner, Arens, Tarrasch, & Barnow, 2016). While this finding on the surface suggests that individuals with BPD are likely to endorse distraction when viewing stimuli that specifically used to augment distress, participants in that study were only able to choose from reappraisal or distraction, and it may be easier to deploy distraction from intense stimuli rather than implement a neutral or positive perspective and review the distressful event in order to downregulate distress. This is a common flaw in methodology among studies that examine distraction among BPD symptoms and report similar findings (English, Lee, John, & Gross, 2016; Sauer et

al., 2016). Evidence from daily life studies suggest that distraction is a commonly endorsed ER strategy among nonclinical samples (Lennarz et al., 2019; Troy et al., 2018), which may mean that individuals with BPD symptoms may be relying on strategies other than distraction (“Do something to keep your mind off how you were feeling”), given the various options provided. In support of this interpretation, evidence on distraction in BPD focuses on maladaptive forms of distraction, which includes binge eating, substance use, NSSI, or interpersonal conflict (e.g., yelling, screaming), rather than the adaptive form that we measured. Selby and colleagues (2009) postulate that individuals with BPD symptoms may evidence a greater likelihood to engage in maladaptive forms of distraction because they grant immediate benefits. Future studies should differentiate between adaptive and maladaptive forms of distraction and test whether BPD is associated with increased maladaptive distraction in daily life. Overall, these findings attempt to assist in understanding adaptive ER among individuals with BPD symptoms and suggest that individuals with BPD symptoms are less likely to use problem solving to resolve peak distress in daily life.

The third hypothesis explores how individuals with BPD symptoms rated perceived effectiveness of maladaptive (rumination, substance use, suppression) and adaptive (distraction, problem solving) ER strategies and evidenced two trend findings. Results suggest that individuals with elevated BPD symptoms are more likely to endorse use of rumination and evidenced increased perceived benefits after utilization of rumination during peak times of distress. This result is inconsistent with laboratory findings wherein individuals with BPD symptoms report less benefits indexed by worse NA, after being instructed to ruminate (Sauer & Baer, 2012). Among the limited

literature in daily life, there are several studies that examine ER effectiveness among nonclinical samples (Heiy & Cheavens, 2014; Lennarz et al., 2019; Troy et al., 2018) pathological samples (Ruscio et al., 2015), while only one study (Fitzpatrick et al., 2018) examines effectiveness of maladaptive ER use among individuals with BPD symptoms which evidenced no significant association with BPD symptoms. Findings from rumination in daily life found that rumination evidenced decreased effectiveness indicated by upregulation of negative emotions in both a non-clinical adolescent sample (Lennarz et al., 2019; Troy et al., 2018) and in a sample of individuals with MDD and/or generalized anxiety disorder (Ruscio et al., 2015).

Additionally, effectiveness of maladaptive ER among individuals with BPD symptoms was studied by Fitzpatrick and colleagues (2018), who suggest BPD symptoms are unrelated to effectiveness of maladaptive strategies in daily life. This finding could be influenced by their measurement of maladaptive ER strategies, as individuals reported their use of eight various maladaptive responses once a day (or retrospectively if necessary) and were created into an aggregate variable. Perhaps different maladaptive ER strategies are more effective than others, and this unique effect is lost when the strategies are not examined independently.

Furthermore, indirect evidence from Chapman and colleagues' (2009) study parallels our results that support the notion that maladaptive strategies, like rumination, achieve immediate benefits that attenuate negative emotions in the short term (Chapman et al., 2017; Sheppes & Gross, 2012). Although studies have found rumination to be an ineffective strategy, effectiveness was measured by objective comparisons of pre- and post-negative affect rather than by perceived benefits (Chapman et al., 2009 Lennarz et

al., 2019; Silk et al., 2003; Troy et al., 2018), as measured here. Maybe it is an individual's perception of ER strategy effectiveness that increases the frequency of utilization rather than the direct effects on negative and positive affect. Future studies should examine ER effectiveness and objective ratings of positive and negative affect to investigate the potential differences for individuals with BPD features. Additionally, this perception of rumination may be an efficacious target for intervention among individuals with BPD symptoms, as individuals who chronically use rumination are report increased dysregulated behaviors (Ruscio et al., 2015; Selby et al., 2013).

Next, individuals with BPD symptoms are less likely to utilize problem solving and but report higher perceived effectiveness of problem solving in resolving distress. This finding is in line with experimental evidence on problem solving, that suggests individuals with BPD features can effectively implement problem solving and successfully downregulate distress (Gratz et al., 2006). This may suggest that the evidence we see in the laboratory can be generalized to daily life, but one study exists that contradicts this interpretation. Fitzpatrick and colleagues (2018) report that individuals with BPD symptoms reported increased use of adaptive strategies and similar or decreased effectiveness in utilization compared to their low symptom peers. While this is inconsistent with our finding, Fitzpatrick and colleagues (2018) examined adaptive strategies as an aggregate variable, so effectiveness of strategies does not reflect one specific strategy, like problem solving, as explored in this study. In line with our findings on rumination above, specific results on effectiveness of various adaptive ER strategies are lost in Fitzpatrick and colleagues' study (2018) and cannot be directly compared to these results.

Overall, our results are in line with data collected from self-report that suggest individuals with BPD are less likely to indicate use of problem solving (Dehaghi, Kaviani, & Tamaneefar, 2014; Dixon-Gordon et al., 2011; Wupperman, Neumann, & Axelrod, 2008) but can benefit from deployment (Gratz et al., 2006). This finding has clinical significance, as individuals with BPD symptoms report increased effectiveness in problem solving but use it less than their low symptom peers. Exploring the contexts in which individuals with BPD symptoms utilize problem solving and understanding the factors that impede implementation of the strategy may be key targets for intervention. Past findings demonstrate the efficacy of treatment that focus on skills training in problem solving for individuals with BPD symptoms, including less impulsivity, negative affect and improvements in mood and global functioning (Blum et al., 2008; Bray et al., 2007).

Hypothesis 3 evidenced mixed findings, wherein BPD symptoms are unrelated to effectiveness of substance use, suppression, and distraction while elevated BPD symptoms predict increased effectiveness of rumination and problem solving. Together, our results show that BPD symptoms indicated increased likelihood to utilize substances but were unrelated to perceived effectiveness of substance use. Substance use may be an effective ER strategy for all individuals who rely on substances to downregulate distress, rather than an effect that is specific to individuals with BPD symptoms. Additionally, BPD symptoms were also unrelated to deployment and effectiveness of distraction in daily life. Also, this finding may suggest that the effectiveness of suppression and distraction are not different for individuals with high or low BPD features, and that use of

suppression and distraction was effective for everyone ($M = 2.19$, $M = 2.84$), respectively.

Regarding substance use, our finding is mirrored by results from Troy and colleagues (2018) that suggest the most frequently endorsed strategies were not related to effectiveness of downregulating distress (Troy et al., 2018). Although substance use evidenced greater likelihood of employment for individuals with elevated BPD symptoms, its effectiveness is unrelated to BPD symptoms. This interpretation corroborates previous findings in the literature that suggest an individual's choice to frequently engage in ER strategies in daily life are independent from the effectiveness of downregulating distress (Heiy & Cheavens, 2014; Lennarz et al., 2019; Troy et al., 2018).

With respect to covariates, our robust findings on gender differences in substance use are in line with past research among ER strategy choice, where men are more likely to use substances to attenuate emotions than women (Nolen-Hoeksema, 2012; Tamres, 2002). Nolen-Hoeksema (2012) examined this effect, demonstrating that men hold more positive perceptions of the rewards from drinking or using drugs and receive less judgment of substance use relative to their female peers. Consequently, males increased likelihood to use alcohol as ER significantly mediated greater alcohol problems as compared to their female counterparts (Nolen-Hoeksema, 2012). Thus, our findings confirm sex effects observed by others. Additionally, men evidenced decreased use of suppression during peak times of distress in daily life. These results could suggest that out of the various options we offered to participants, men relied on other ER strategies to downregulate distress, like substance use, instead of suppression. On the other hand, in contrast to traditional findings on age differences, we found that older age predicts

increased substance related coping (Nolen-Hoeksema, 2012; Segal, Hook, & Coolidge, 2001). While these covariate effects are important, it should be considered that we used a diverse community sample which comprised various psychopathology and demographics, but our sample was mostly young adults ($M=24.55$) and approximately 73% female.

Among effects of covariates on adaptive ER strategies, men were less likely to endorse use of distraction and older age predicts increased use of distraction during peak times of distress. Furthermore, older aged participants report increased effectiveness of distraction and problem solving. Our results are consistent with the literature on ER effectiveness and age that suggest older participants are more effective in their ability to implement problem solving, suggesting that self-report and laboratory findings can be generalized to daily life for older aged participants and effectiveness of adaptive ER strategies (Blanchard-Fields, 1998; 2007). Additionally, past research in line with our findings on sex differences suggest that women are more likely than men to indicate use of distraction (Nolen-Hoeksema, 2012; Tamres et al., 2002). Future studies should examine these covariates effects in depth.

5.1 Limitations

It is plausible that a number of limitations may have influenced the results obtained. Our sample contained only 32 participants with clinical levels of BPD symptomology; more participants with BPD features could increase statistical power, as some of our findings evidenced trend level effects, and it would also be beneficial to achieve approximately equal groups in terms of sex. Also, our methodology and consideration of ER strategies may be a disadvantage. Specifically, ER strategies as they appeared in the survey on participant's smartphones display the first 6 strategies, five of

which are problem solving, rumination, distraction, and suppression, and were highly stable responses within our sample. If these ER strategies were randomized during each prompt, we may have observed greater variability in ER strategy utilization. Furthermore, we only measured one week of participants' daily lives, which does not reflect an individual's entire ER repertoire. Moreover, we only examined the use and effectiveness of five strategies, while past findings suggest individuals use up to fifteen strategies (Heiy & Cheavens, 2014). Lastly when we asked participants to endorse their choice of ER strategy during peak distress, two responses are a bit ambiguous (problem solving, "Do something to fix the reason for how you were feeling"), and distraction, ("Do something to keep your mind off how you were feeling"), leaving the researcher unable to decipher whether individuals engaged in maladaptive behaviors rather than adaptive behaviors while implementing problem solving or distraction to resolve distress (e.g., solving the problem through interpersonal aggression).

5.2 Recommendations for Future Research

Future work should concentrate on the methodology and the findings of this study. The design of our EMA protocol evidenced several limitations, and future studies should randomize the order of ER strategies in the survey, examine additional ER strategies, lengthen the measurement period, and continue to examine ER in daily life by relying on multiple observations each day. Additionally, future studies should probe further and ask, "What did you specifically do to keep your mind off how you were feeling?", or "What did you do specifically to fix the reason for how you were feeling?", to help elucidate how individuals with BPD symptoms engage in various ER responses. It would also be important to examine the influence of duration of implementation of an ER

strategy on perceived effectiveness. Additionally, future studies should examine whether elevated BPD symptoms are associated with greater utilization of multiple strategies during one observation and if effectiveness of strategies improve in the temporal order they are implemented in. Lastly, future research should explore how effectiveness of spontaneous of ER strategies change over the course of the measurement period. This additional information may clarify whether individuals with BPD symptoms are successfully implementing ER strategies in their daily lives.

Moreover, the findings from this study suggest that the perceived effectiveness of ER strategies do not influence the frequency of engagement, which begs the question, what are the precipitant factors that influence ER choice? Future research should investigate the contextual information that influences ER choice among individuals with BPD symptoms, including who participants are with, where they are, and the affective dynamics of the observation such as intensity of NA and PA. Additionally, future directions should examine the age and sex differences among ER choice and effectiveness in daily life. Finally, future studies should examine objective and subjective ratings effectiveness, by comparing perceived benefits to the change in negative and positive affect. This may help bridge the gap between instructed ER use in the laboratory and how these benefits apply to deployment of these same strategies in daily life.

5.3 Strengths and Clinical Implications

While researchers note the need for studies to investigate individual differences among ER strategy choice in daily life, there is a dearth of daily life studies that examine ER strategy choice among individuals with psychopathology, more specifically individuals with BPD symptoms (Nolen-Hoeksema, 2012; Sheppes, 2014). This study is

the first to examine specific ER strategy utilization and the perceived effectiveness of those strategies among individuals with elevated BPD symptoms in daily life. Unique methodology was utilized wherein ER strategy choice was measured at 5 times per day during peak times of distress over a week, ER strategies were not instructed nor forced, and ER strategies were examined individually rather than using aggregate variables of maladaptive and adaptive ER use.

Utility of EMA and this methodology in itself exhibit clinical significance, as we found that individuals rely on rumination and those with BPD symptoms report increased rumination. While not a part of this study, using EMA can extrapolate contextual factors that can help identify unique contexts that influence the adaptive versus maladaptive nature of a given response and can better clarify why things are effective or ineffective for individuals with BPD symptoms. Potentially, if we can identify moments and contexts where individuals ruminate more often, we could implement an ecological momentary intervention (EMI) and instruct individuals step-by-step to engage with an adaptive intervention, which has been found to be efficacious in reducing daily stress and rumination and improve positive affect, health behaviors and psychological symptoms (Beute & de Kort, 2018; Heron & Smyth, 2010; Santangelo, Bohus, & Ebner-Priemer, 2014).

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APPENDIX A. Tables

Table 1. Means, standard deviations, and frequency of ER utilization of level 1 variables.

ER				
Strategies	<i>N</i>	<i>M</i>	<i>SD</i>	%
Problem Solving	592	.22	.42	22.2
Rumination	296	.11	.31	11.1
Distraction	426	.16	.37	15.97
Suppression	498	.19	.39	18.67
Substance use	34	.01	.11	1.3
Other	1,363	.51	.50	51

Table 2. Maladaptive Emotion Regulation Strategies on Borderline Personality Disorder Symptoms.

Variables	DV: Rumination			DV: Suppression			DV: Substance Use		
	<i>B</i>	<i>SE</i>	<i>OR & CI</i>	<i>B</i>	<i>SE</i>	<i>OR & CI</i>	<i>B</i>	<i>SE</i>	<i>OR & CI</i>
Age	.01	.02	1.02 (.99-1.05)	.01	.01	1.01 (.99-1.03)	.03**	.01	1.03 (1.01-1.05)
Sex	-.28	.26	.75 (.45-1.36)	-.68**	.23	.51 (.32-.80)	1.40**	.51	4.07 (1.50-11.14)
BPD	.02**	.01	1.02 (1.00-1.03)	.01	.01	1.01 (1.00-1.02)	.02**	.01	1.02 (1.00-1.03)
Random Effect									
Intercept	-2.56***	.78	.40	-1.69***	.18	.25	-4.23***	.21	.01
Residual ^a	3.29			3.29			3.29		

^a Residual variance for logistic models is a constant. ****p*<.001, ***p*<.01, **p*<.05

Table 3. *Adaptive Emotion Regulation Strategies on Borderline Personality Disorder Symptoms.*

Variables	DV: Problem Solving				DV: Distraction			
	<i>B</i>	<i>SE</i>	<i>OR</i>	<i>CI</i>	<i>B</i>	<i>SE</i>	<i>OR</i>	<i>CI</i>
Age	.01	.01	1.01	(.99-1.03)	.01	.01	1.01	(.99-1.03)
Sex	.28	.25	1.33	(.80-2.19)	-.51**	.20	.59	(.40-.88)
BPD	.04***	.01	.96	(.95-.98)	-.01	.01	.99	(.98-1.00)
Random Effect								
Intercept	-1.59***	.20	.30	(.11-.37)	-1.85***	.16	.25	(.10-.26)
Residual ^a	3.29			3.29	3.29			

^a Residual variance for logistic models is a constant. *** $p < .001$, ** $p < .01$, * $p < .05$

Table 4. *Effectiveness of Adaptive and Maladaptive Emotion Regulation Strategies on Borderline Personality Disorder Symptoms.*

Variables	DV: Effectiveness of Problem Solving				DV: Effectiveness of Rumination			
	<i>B</i>	<i>SE</i>	<i>OR</i>	<i>CI</i>	<i>B</i>	<i>SE</i>	<i>OR</i>	<i>CI</i>
Age	.03*	.02	1.03	(.99-1.05)	.02	.02	1.02	(.97-1.07)
Sex	.12	.38	1.13	(.53-2.42)	-.62	.58	.54	(.17-1.71)
BPD	.02†	.01	1.02	(.99-1.05)	.03†	.02	1.04	(.99-1.07)
Random Effect								
Intercept	-3.44	.43	.03	(.01-.08)	.92	.65	2.51	(.69-9.09)
Residual ^a	3.29				3.29			

^a Residual variance for logistic models is a constant. *** $p < .001$, ** $p < .01$, * $p < .05$

APPENDIX B

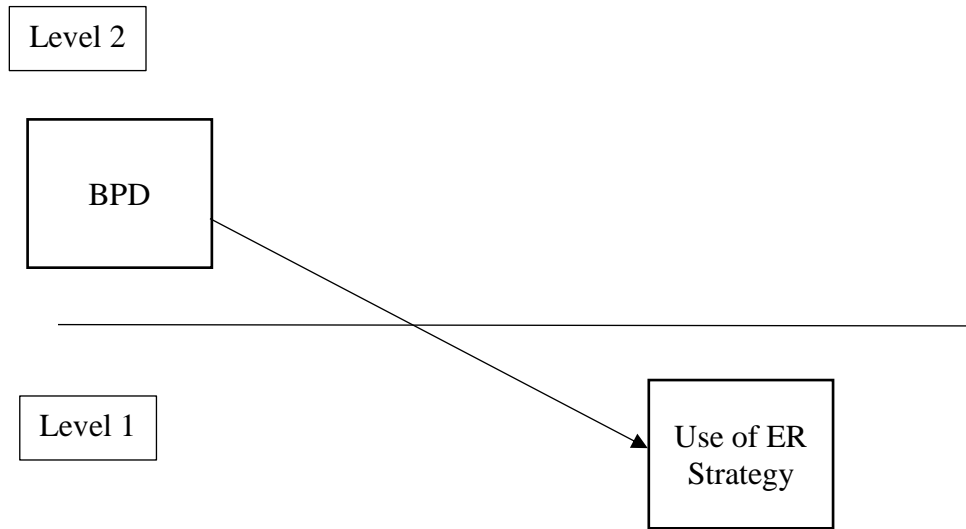


Figure 1. Hypotheses 1-2: BPD= PAI-BOR total score; Use of ER Strategy= Utilization of emotion regulation strategies including problem solving, distraction, rumination, suppression and substance use.

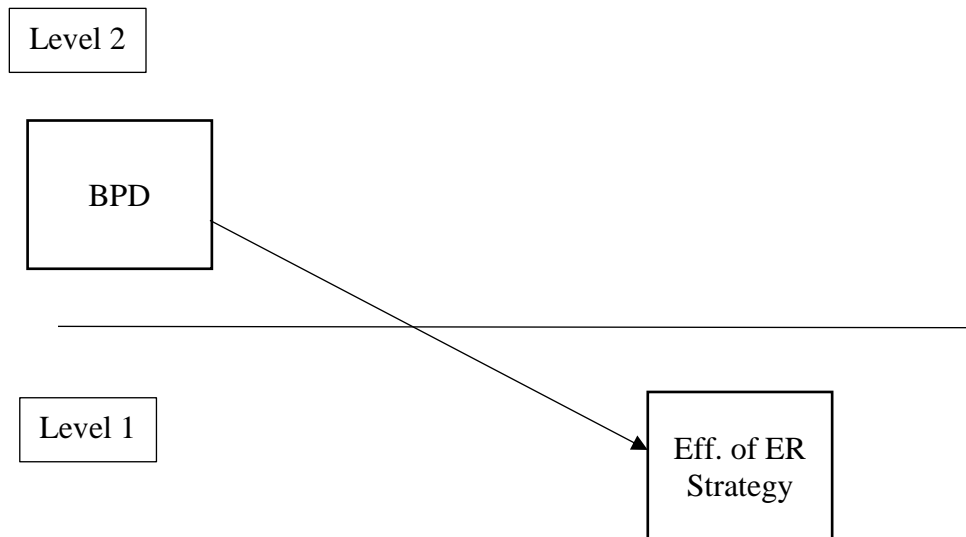


Figure 2. Hypothesis 3: BPD= PAI-BOR total score; Eff. of ER Strategy= Perceived effectiveness of emotion regulation strategy used during peak hours of daily life including problem solving, distraction, rumination, suppression, and substance use.