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COGNITIVE REAPPRAISAL OF NEGATIVE EMOTIONAL IMAGES IN BORDERLINE PERSONALITY DISORDER: CONTENT ANALYSIS, PERCEIVED EFFECTIVENESS, AND DIAGNOSTIC SPECIFICITY

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Individuals with borderline personality disorder (BPD) report using cognitive reappraisal less often than healthy individuals despite the long-term benefits of the emotion regulation strategy on emotional stability. Individuals with BPD, mixed anxiety and/or depressive disorders (MAD), and healthy controls (HC) completed an experimental task to investigate the tactics contained in cognitive reappraisal statements vocalized for high and low emotional intensity photographs. Self-reported effectiveness after using cognitive reappraisal to decrease negative emotions was also evaluated. Although BPD and MAD used a similar number of cognitive reappraisal tactics, they perceived themselves as less effective at reducing their negative emotions compared to HC. During cognitive reappraisal, BPD and MAD uttered fewer words versus HC, while BPD uttered fewer words versus MAD. Results suggest that individuals with BPD and MAD are less fluent and perceive themselves as less effective than HC when using cognitive reappraisal to lower negative emotions regardless of stimulus intensity.

Keywords: emotion regulation, borderline personality disorder, anxiety disorders, major depressive disorder, cognitive reinterpretation

Emotion dysregulation is a central symptom dimension underlying borderline personality disorder (BPD) that is theorized to result from an oversensitive and highly reactive emotional response system and difficulties effectively regulating emotions (Neacsiu, Bohus, & Linehan, 2014). Studies of emotion dysregulation in BPD have frequently focused on emotional reactivity to stimuli in a laboratory setting or using event-contingent approaches (Carpenter & Trull,

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2013; Kuo & Linehan, 2009). Comparatively less attention has been paid to the specific strategies that individuals with BPD use to regulate their emotions, despite research suggesting that the emotion regulation (ER) strategies people tend to use can maintain symptoms of emotion dysregulation over the long-term (Sheppes, Suri, & Gross, 2015). Given that individuals with BPD are more likely to use ER strategies that place them at an increased risk for harm (e.g., non-suicidal self-injury; substance use; Selby, Anestis, Bender, & Joiner, 2009), understanding their capacity to appropriately select and effectively implement ER strategies may illuminate factors that contribute to symptoms of emotion dysregulation in BPD.

Cognitive reappraisal is a particularly effective ER strategy used to modify a person's evaluation of a situation in order to alter the accompanying emotional experience (e.g., interpreting that individuals involved in a car crash got out alive and unscathed, without actual verification). Many favorable outcomes have been linked to the use of cognitive reappraisal (Gross, 2014), including higher positive levels of emotion experience and well-being (Gross & John, 2003); lower sympathetic nervous system reactivity in response to negative mood induction (Gross, 1998); and emotionally closer interpersonal relationships (English, John, & Gross, 2013). There is also important variation in how cognitive reappraisal is employed: some people use reappraisal tactics that allude to a more positive outcome (e.g., suggesting that all witnesses of a car crash will drive safer as a result); tactics that challenge the reality of the circumstances (e.g., suggesting that the car crash was part of a movie shoot); and tactics that normalize or accept the negative event (e.g., acknowledging the fact that it is more dangerous to drive than to fly on an airplane; McRae, Ciesielski, & Gross, 2012). Studies have also begun to examine the influence that emotional intensity has on the strategies that people tend to use to regulate their emotions. A particularly striking finding is that individuals strongly prefer cognitive reappraisal when presented with low-intensity negative stimuli but shift to distracting themselves when confronted with high-intensity negative stimuli (Sheppes et al., 2014). Because cognitive reappraisal involves attending to the actual components of emotional stimuli, some people might employ more temporally antecedent ER strategies (e.g., avoidance or distraction) when intensity is high or low—even when it is usually considered less beneficial to use these strategies in the long term.

People with BPD report using cognitive reappraisal less often compared to healthy individuals (e.g., Beblo et al., 2010; Svaldi, Griepenstroh, Tuschen-Caffier, & Ehring, 2012). However, results are more variable when people with BPD are compared to those with other psychiatric disorders (e.g., Fletcher, Parker, Bayes, Paterson, & McClure, 2014; Rosenthal, Cukrowicz, Cheavens, & Lynch, 2006; Svaldi et al., 2012). Research also suggests a lower use of cognitive reappraisal among depressed and anxious individuals (D'Avanzato, Joorman, Siemer, & Gotlib, 2013; Joormann & Gotlib, 2010; Lei et al., 2014), leading to suggestions that emotion dysregulation underlies many disorders (Neacsiu et al., 2014). Concurrently, research suggests that individuals with BPD may perceive negative stimuli (e.g., facial expressions, pictures, and videos) as more intensely negative than people without a psychiatric disorder

(Daros, Uliaszek, & Ruocco, 2014; Elices et al., 2012; Jacob et al., 2009). This perceived emotional intensity bias may have consequences for the ER strategies and reappraisal tactics people with BPD use when confronted with emotion-provoking situations. Whereas people with BPD may at least attempt to use cognitive reappraisal, it is not yet known whether they differ from healthy individuals and those with anxiety and depressive disorders in the number of tactics they employ or produce less effective reinterpretations, potentially due to a higher perceived negative emotional intensity. Further, research has yet to examine the actual content of reappraisal statements produced by individuals with BPD.

Aside from intensity, subjective beliefs about the success in using an ER strategy to modulate emotions can improve actual emotional outcomes. Compared to a control condition, participants who were led to expect that ER might be more successful reported higher positive and lower negative emotions after viewing a negative video (Bigman, Mauss, Gross, & Tamir, 2016). Similarly, people with higher self-efficacy in ER report lower symptoms of depression, lower negative emotions, higher prosocial behavior, and higher coping abilities (Bandura, Caprara, Barbaranelli, Gerbino, & Pastorelli, 2003; Caprara et al., 2008; Tamir, John, Srivastava, & Gross, 2007). Individuals with BPD have judged themselves as being less successful after engaging in ER strategies as part of two neuroimaging paradigms (Ruocco, Medaglia, Ayaz, & Chute, 2010; Schulze et al., 2011) even though there were no actual group differences in negative emotion ratings. Research has not thoroughly examined whether individuals with BPD differ in their beliefs about implementing cognitive reappraisal from healthy individuals or those with other psychiatric disorders.

In the present study, we aimed to clarify whether individuals with BPD use cognitive reappraisal in a different manner than healthy controls (HC) or individuals with depressive and/or anxiety disorders (MAD). Participants were shown high- and low-intensity negative images and asked to either describe the contents of the images or decrease their negative emotions by verbalizing their cognitive reappraisal tactics aloud. Participants indicated their perceived emotional intensity of each image and their effectiveness in regulating emotions in response to each image. Raters independently assessed the real-time contents of the cognitive reappraisal statements and classified them according to more specific reappraisal tactic categories (McRae et al., 2012). We hypothesized that individuals with BPD, compared to HC and those with MAD, would use fewer cognitive reappraisal tactics and report lower self-efficacy in reducing negative emotions. Reflecting a tendency to perceive negative stimuli more intensely (Neacsiu et al., 2014), we also hypothesized that individuals with BPD would perceive low-intensity stimuli as more intensely negative than would HC and those with MAD. Secondary to these main predictions, we explored whether individuals with BPD would use fewer words during reappraisal trials, given research suggesting lower verbal reasoning ability in BPD (Thomsen, Ruocco, Carcone, Mathiesen, & Simonsen, 2017). We also explored group differences in specific cognitive reappraisal tactics and associations of BPD, depression, and anxiety symptoms with outcomes from the cognitive reappraisal task.

METHOD

PARTICIPANTS

Participants were recruited from the community through online postings and a research registry maintained by the laboratory of the article's final author. Recruitment was restricted to females to minimize sex differences in the ability to engage in cognitive reappraisal (McRae, Ochsner, Mauss, Gabrieli, & Gross, 2008). Though 101 females were recruited, 7 were excluded for not meeting inclusion criteria for any group and 2 were excluded for not completing the task. The final sample comprised 32 HC, 30 MAD, and 30 BPD. On average, participants were 28.25 years old (SD = 9.23) and age did not differ across groups, $F < 1$. Groups differed on ethnicity ($\chi^2(2) = 7.89$, $p < .001$, $d = .78$), with more Caucasians in the MAD group ($n = 21$) than in the HC ($n = 11$) and BPD groups ($n = 15$). Groups differed on education level, $F(2, 89) = 6.86$, $p = .002$, $d = 2.89$, with BPD ($M = 13.90$, $SD = 1.69$) reporting significantly fewer years than HC ($M = 15.48$, $SD = 1.50$; $p = .001$). There were no differences in education between MAD and other participant groups ($M = 14.80$, $SD = 1.85$; ps < .25).

All participants completed the BPD module of the Structured Interview for DSM-IV Personality (SIDP; Pfohl, Blum, & Zimmerman, 1997), which defines BPD based on the presence of symptoms within the past five years. The Structural Clinical Interview for DSM-IV Axis I Disorders–Patient Edition (SCID-I/P; First, Spitzer, Gibbon, & Williams, 2002) was used to assess the presence of psychotic, mood, anxiety, and alcohol and non-alcohol substance use disorders. Individuals in the HC group did not have a history of any of these psychiatric diagnoses, and the presence of any psychotic disorder or current substance use disorder was an exclusion for all groups. The MAD group was required to have at least one current *DSM-IV* mood or anxiety disorder, and they were not permitted to have a diagnosis of BPD ($M_{symptoms} = 1.70$, $SD = 1.29$); however, 26.7% met three or four diagnostic criteria for BPD. The clinical groups were also required to report that they had sought treatment for their condition and/or received a formal diagnosis. Diagnoses were consensually agreed upon during "best-estimate" style meetings (Klein, Ouimette, Kelly, Ferro, & Riso, 1994), where each participant was also assigned a Modified Global Assessment of Functioning score (GAF; Hall, 1995).

Current *DSM-IV* mood and anxiety diagnoses for the BPD and MAD groups were as follows: major depressive disorder (MDD; BPD: $n = 16$; MAD: $n = 12$), dysthymia (BPD: $n = 1$), bipolar II disorder (BPD: $n = 1$), panic disorder (BPD: $n = 7$; MAD: $n = 8$), agoraphobia (MAD: $n = 2$), social anxiety disorder (BPD: $n = 11$; MAD: $n = 16$), specific phobia (BPD: $n = 1$), obsessive compulsive disorder (BPD: $n = 1$), post-traumatic stress disorder (BPD: $n = 6$; MAD: $n = 3$), and generalized anxiety disorder (BPD: $n = 7$; MAD: $n = 11$). The BPD group ($n = 21$) reported significantly higher rates of psychiatric hospitalizations than the MAD group ($n = 7$; $\chi^2(1) = 11.30$, $p < .001$, $d = .96$) but reported similar rates of exposure to psychotherapy ($n = 28$ and $n = 26$, respectively; $\chi^2(1) = .74$, $p = .39$; $d = .22$). Two individuals in the HC group also reported previous psychotherapy. Current psychotropic medication use was as follows: antidepressants (BPD: $n = 12$; MAD: $n = 14$), atypical antipsychotics (BPD:

n = 9; MAD: *n* = 1), mood stabilizers (BPD: *n* = 6; MAD: *n* = 1), anxiolytics (BPD: *n* = 11; MAD: *n* = 5), and other types (BPD: *n* = 7; MAD: *n* = 3). The BPD group solely endorsed significantly higher rates of current atypical antipsychotics use than the MAD group (Fisher's exact test, $p = .01$).

COGNITIVE REAPPRAISAL TASK

This task was adapted from a previous study in which participants were instructed to passively view or engage in cognitive reappraisal in response to negative or neutral images (McRae et al., 2012). In the present study, participants viewed 26 high-intensity and 26 low-intensity negative images from the International Affective Picture System (IAPS; Lang, Bradley, & Cuthbert, 2008) that significantly differed based on normative magnitude ratings of negative valence and arousal (ts > 5.52, ps < .001, ds > 1.53). Prior to viewing the pictures (12–13 seconds), a cue for instructing the participant to either "describe" or "change" (3–4 seconds) was presented. For the describe instruction, participants were told to "look at the picture, keep your eyes on it the whole time, and allow yourself to respond naturally to it. During this time, you should also describe what is happening in the picture in a few words out loud." For the change instruction, which was indicated to elicit a cognitive reappraisal statement, participants were asked to change their thoughts about the picture by telling themselves something "out loud that helps you to feel less negative about the picture." The presentation order was pseudo-randomized such that participants always received sets of four pictures corresponding to each stimulus type (low-intensity describe, low-intensity change, high-intensity describe, high-intensity change) in randomized order before moving forward to the next set.

High- and low-intensity images were counterbalanced for instruction in two versions of the task using equivalent stimulus lists that were not significantly different on intensity and arousal (ts < .79, ps > .43, ds < .31) and matched for content as much as possible (e.g., two pictures depicting soldiers).[1] After each picture, participants provided ratings using the number pad on a keyboard to three questions that were not timed. The first two questions asked, "How negative do you feel right now?" on a scale from 1 (*not at all negative*) to 7 (*very negative*) and "How intensely negative would you subjectively rate the image itself?" on a scale from 1 (*not at all intense*) to 7 (*very intense*). The third question asked, "How difficult was it to come up with a description?" on a scale from 1 (*not at all difficult*) to 7 (*very difficult*) when participants were asked to describe the image. Participants were asked, "How effective were you at changing the way you feel?" on a scale from 1 (*not at all effective*) to 7 (*very effective*) when the instruction was to change the accompanying emotion. Each stimulus trial was separated by a jittered inter-trial interval (700–100 ms) with a fixation cross-presented at the center of the screen.

1. The following IAPS images were used in the experiment. High-intensity List A: 3005.1, 3015, 3051, 3230, 3266, 3530, 6350, 9040, 9181, 9252, 9301, 9420, 9910; High-intensity List B: 3064, 3100, 3170, 3181, 3261, 6313, 9253, 9265, 9300, 9400, 9410, 9570, 9921; Low-intensity List A: 1275, 2205, 2312, 2455, 2700, 2753, 6010, 6200, 6834, 7360, 9120, 9471, 9530; Low-intensity List B: 2278, 2590, 2691, 6190, 6836, 6840, 9041, 9102, 9160, 9421, 9440, 9470, 9561.

PROCEDURE

After written informed consent, each participant completed a 10-minute standardized training session detailing what they were expected to do during describe and change trials. They were told to make responses out loud so that their responses could be audio-recorded (Olympus WS-822 GMT). Participants were also instructed to stay focused on each individual picture and to provide statements that involved elements of the picture. Three sample trials (one describe, two change) were completed prior to the task, with practice ratings to the questions they would see after each stimulus. During practice of the change trials, participants were prompted for an initial response, and research assistants verbally provided additional tactic examples using a script. Participants who did not feel confident after practicing—indicated by a rating of three or less during a check-in before the procedure began (scale of 1 = *not at all confident* to 7 = *very confident*)—restarted the training exercise until they felt confident. The procedure took 20–30 minutes and was designed and implemented using E-Prime 2.0 (Psychology Software Tools, Sharpsburg, PA).

Participants completed the Borderline Evaluation of Severity over Time (BEST; Pfohl et al., 2009), a 12-item self-report measure that assesses the severity of symptoms of BPD over the past two weeks (Cronbach's $\alpha = .90$). They also completed the Depression, Anxiety, and Stress Scale (DASS; Lovibond & Lovibond, 1995), a 42-item scale that was modified to inquire about the past two weeks to match the BEST. Internal consistency for subscales assessing depression and anxiety were excellent (Cronbach's $\alpha \geq .89$). After the task, participants were asked how *difficult* it was to follow the change instruction, how *successful* they were at decreasing negative emotions using the change instruction, and how *important* it was to follow the change instruction. These items were rated on a scale from 1 (*not at all*) to 9 (*very*) with specific anchors that corresponded to each question.

DATA REDUCTION AND STATISTICAL PLAN

Participants' verbal responses to each picture were transcribed by three research assistants and assessed for word count in Microsoft Excel 2013. Two different raters, unaware of diagnostic status, independently read the transcribed files to provide objective ratings for each description and reappraisal statement that participants provided. A coding system was used to rate nine different reappraisal tactics on the basis of that strategy's definition (McRae et al., 2012).[2] Statements were considered for each of the nine tactic categories using the following scale: 0 = *no use of this tactic*, 1 = *could be*

2. Brief definitions of the tactics are as follows (see McRae et al., 2012 for more details). *Explicitly positive*: reappraisal that suggests an above neutral consequence; *change current circumstances*: changes the current circumstances of the scene depicted; *reality challenge*: challenges the authenticity of the depiction; *change future consequences*: asserts that the situation will change in the future; *agency*: a person with skills will change the situation; *distancing*: invoking physical or psychological distance from the depiction; *technical-analytic-problem-solving*: focusing on a plan to change the outcome of the depiction; *acceptance*: normalizes the event, invoking justification at times; and *non-specific reappraisal*: used when raters could not determine the specific strategy, but a reinterpretation was rated as being made.

interpreted as using this tactic, 2 = *fairly clearly uses this tactic*; 3 = *definitely uses this tactic*. Ratings were averaged to indicate the strength of using a tactic, and we then applied a cut-off score of 1.5 to indicate that a tactic was used. Raters also rated whether each transcribed response conformed to instructions (dichotomous "yes" or "no" rating) and how confident they were in their ratings overall on a scale from 1 (*not at all confident*) to 9 (*very confident*). The lead authors (ARD and ACR) were consulted if either rater's confidence was below or equal to four for each of the reappraisal statements. Raters categorized each cognitive reappraisal statement reported by each participant (average number of tactics used per participant = 3.55, *SD* = .58). Overall agreement on the categorization of reappraisal statements between raters was excellent ($\kappa = .91$) with a range from .67 (change current circumstances) to .99 (acceptance) across tactics.

We analyzed the data using a two-level multilevel modeling approach with a random slope for participant, an unstructured covariance matrix, and three sets of orthogonal contrasts (BPD/HC; MAD/HC; BPD/MAD; West, Aiken, & Krull, 1996). Data were organized such that participants' ratings for each trial (Level 1) were nested within participants (Level 2). Dependent variables included perceived emotional intensity, negative intensity of the image, and either difficulty describing or perceived effectiveness in regulating emotions based on the condition. Because difficulty and effectiveness were opposing dimensions, we reverse-coded the difficulty ratings for consistency with the other dependent variables and renamed the combined variable "self-efficacy." We added effect coding for the fixed effects of Group, Instruction (i.e., change or describe), and Intensity (i.e., high or low), and two-way and three-way interactions between these predictors. Dependent variables pertaining to the number of words and cognitive reappraisal tactics were also added. Instruction was dropped as a variable from the tactic analysis, which focused only on change trials. Simple effects were estimated to subsequently explore meaningful statistically significant two- and three-way interactions. Multilevel modeling was also used to probe the dimensional relationships between symptoms of BPD, depression, and anxiety, and the dependent variables in the current study. Demographic variables, clinical characteristics, and relationships between variables of interest were analyzed with categorical tests, ANOVA with Tukey post-hoc comparisons, and Pearson's correlations as appropriate. All statistics were performed in IBM SPSS (Version 24.0, Armonk, NY).

RESULTS

PARTICIPANT CHARACTERISTICS

Groups differed significantly on self-reported depression, anxiety, BPD (based on BEST) symptoms, and GAF scores, Fs > 23.94, ps < .001, ds > 1.38. BPD reported the highest self-reported depression ($M = 24.31$, $SD = 11.40$) and differed significantly from both MAD ($M = 14.17$, $SD = 9.55$) and HC ($M = 3.00$, $SD = 5.98$; all ps < .001). BPD reported the highest self-reported BPD symptoms ($M = 21.70$, $SD = 8.16$) and differed significantly from both MAD ($M = 8.30$, $SD = 6.52$) and HC ($M = 2.28$, $SD = 3.35$, all ps < .001). BPD

reported levels of anxiety (M = 13.66, SD = 8.16) similar to those reported by MAD (M = 10.55, SD = 7.57; p = .17), but both clinical groups differed from HC (M = 2.31, SD = 3.35; ps < .001). BPD had lower GAF scores (M = 51.13, SD = 4.77) than MAD (M = 60.37, SD = 5.91) and HC (M = 82.84, SD = 3.40; all ps < .001).

MANIPULATION CHECKS

Groups differed in ratings of difficulty in following the change instruction and their success at decreasing their negative emotions using the change instruction, Fs > 3.19, ps < .05, ds > .52. Post-hoc Tukey comparisons, however, did not reach statistical significance (all ps > .06). Marginal findings were as follows: BPD and MAD reported somewhat higher difficulty employing cognitive reappraisal than HC (ps < .07; ds > .48), and BPD reported somewhat lower success at decreasing negative emotion using cognitive reappraisal than HC (p = .06; d = .49). Groups did not differ with respect to how important it was to follow the change instruction, $F(2, 89)$ = .54, p = .58, d = .06. Ratings of adhering to describe (M = 99.60%; SD = 1.31) and change instructions (M = 92.00%; SD = 8.37) were not different between groups, Fs < 1.59, ps > .21, ds < .33.

DO GROUPS DIFFER IN COGNITIVE REAPPRAISAL TACTICS OR PERCEIVED EFFECTIVENESS?

On average, participants with BPD (M = 15.65, SD = 3.25) used a similar number of cognitive reappraisal tactics as those of MAD (M = 15.60, SD = 2.81) and HC (M = 16.66, SD = 3.21). Controlling for Intensity, there were no main effects of Group for the total number of cognitive reappraisal tactics per trial across contrasts, ps > .12, R_β^2 < .003. There was a main effect for Intensity on the MAD/HC contrast, which indicated that MAD used more cognitive reappraisal tactics than HC during high- versus low-intensity stimuli, b = .03, SE = .01, p = .047, R_β^2 = .002. The effect of Intensity was not significant on the BPD/HC and BPD/MAD contrasts, ps > .09, R_β^2 < .001, and there were no Group × Intensity interactions, ps > .19, R_β^2< .001.

For perceived effectiveness, significant Group × Instruction interactions were found across all contrasts, bs < –.12, SE < .07, ps < .04, R_β^2 > .001, but not Group × Intensity interactions, ps > .66, R_β^2 < .004. When examining simple effects of Group during change trials, both BPD (b = –.60, SE = .20, p = .004, R_β^2 = .08) and MAD (b = –.85, SE = .27, p = .002, R_β^2= .09) reported significantly lower self-efficacy than HC (Figure 1, left and middle panels). BPD and MAD did not differ on ratings of perceived self-efficacy on change trials, b = –.10, SE = .21, p = .62, R_β^2 = .002 (Figure 1, right panel). No significant simple effects of Group were found during describe trials across all analyses (ps > .51, R_β^2 < .004). Main effects were found for Intensity, bs < –.36, SE < .07, ps < .001, R_β^2 > .002, and Instruction, bs < –.07, SE < .03, ps < .001, R_β^2 > .02, across all contrasts. This indicates that all individuals reported lower self-efficacy for high-intensity and change stimuli than for low-intensity and describe stimuli. Controlling for Group, significant Intensity × Instruction effects were found for MAD/HC and BPD/MAD contrasts, bs < –.07,

SE < .03, *p*s < .007, R_β^2 = .002; whereas this effect was marginal for the BPD/HC contrast, *b* = –.12, *SE* = .07, *p*s = .073, R_β^2 = .0007.

DO GROUPS DIFFER IN EFFECTS OF STIMULUS INTENSITY OR TASK INSTRUCTION?

With respect to subjective emotional intensity, there were no main effects of Group in the contrasts, *p*s > .22, R_β^2 < .02. There were also no two- or three-way interactions with Group, *p*s > .57, R_β^2 < .0001. A similar pattern of non-significant findings was found for ratings of image intensity, with no significant main effects of Group and no interaction effects with Group across all contrasts, *p*s > .14, R_β^2 < .02. Independent of group, participants reported significantly higher negative emotions for high- versus low-intensity stimuli (main effects for Intensity, *b*s > .72, *SE* < .73, *p*s < .001, R_β^2 > .03). Participants also reported significantly lower levels of negative emotions following change versus describe stimuli (main effects for Instruction, *b*s < –.10, *SE* < .06, *p*s < .05, R_β^2 > .001). Participants also rated high-intensity stimuli as significantly more intense than low-intensity stimuli (main effects for Intensity, *b*s > 1.06, *SE* < .06, *p*s < .001, R_β^2 > .06). Ratings of negative intensity for high- and low-intensity images were balanced across the two Instruction conditions regardless of group (non-significant main effect of Instruction, *p*s > .30, R_β^2 < .0002). Intensity × Instruction effects were non-significant across all contrasts for both dependent variables, *p*s > .22, R_β^2 > .0002.

ANCILLARY ANALYSES

Words Uttered. The average words uttered per trial appeared lower in the BPD group (*M* = 17.14, *SD* = 9.69) than in the MAD group (*M* = 20.37, *SD* = 11.16) and HC (*M* = 21.84, *SD* = 10.25). Using multilevel modeling, we found significant Group × Instruction interactions in each model, *b*s < –.55, *SE* < .33, *p*s < 0.001, R_β^2 > .002, but no Group × Intensity interactions, *p*s > .66, R_β^2 < .004. When change trials were examined separately, both BPD (*b* = –5.50,

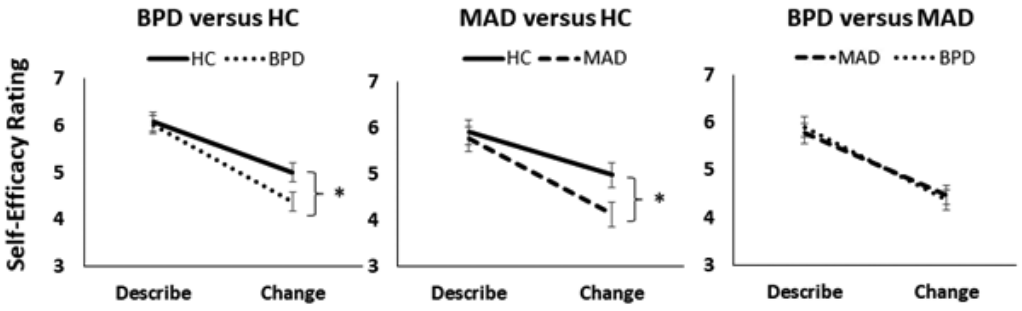

FIGURE 1. Self-efficacy ratings across group comparison and instruction to describe or use cognitive reappraisal ("change" trials). *Indicates significant difference between groups using multilevel modeling and fixed effects contrasts, *p* < .05.

SE = 1.81, *p* = .003, R_β^2 = .09) and MAD (*b* = -6.40, *SE* = 2.38, *p* = .008, R_β^2 = .07) uttered fewer words than HC. BPD also uttered fewer words than MAD during change trials, *b* = –3.70, *SE* = 1.84, *p* = .047, R_β^2 = .04. When describe trials were examined separately, BPD uttered fewer words than HC, *b* = –3.88, *SE* = 1.81, *p* = .03, R_β^2 = .05. There were no other differences for words uttered on describe trials (BPD/MAD, *b* = –2.75, *SE* = 1.83, *p* = .14, R_β^2 = .02; MAD/HC, *b* = –4.46, *SE* = 2.38, *p* = .064, R_β^2 = .04), although the comparison between MAD and HC was marginally significant. Main effects were found for Instruction (*b*s > .96, *SE* < .33, *p*s < .004, R_β^2 < .002) for all contrasts but not for Intensity (*p*s > .18, R_β^2 < .0004). This indicates that participants uttered fewer words for describe stimuli versus change stimuli but not high- versus low-intensity stimuli. Controlling for Group, significant Intensity × Instruction effects were found for MAD/HC and BPD/MAD contrasts, *b*s < –.55, *SE* < .14, *p*s < .001, R_β^2 > .004, while this effect was only marginal for the BPD/HC contrast, *b* = –.59, *SE* = .33, *p* = .08, R_β^2 = .0007. Importantly, years of education were not significantly associated with the average number of words uttered among participants' responses to each of the four stimulus types, *r*s < .20, *p*s > .052.

Specific Tactics. For the three most frequently endorsed reappraisal tactics and controlling for Intensity, the only significant effect for Group was lower "change current circumstances" tactic ratings for MAD than for HC, *b* = –.14, *SE* = .06, *p* = .01, R_β^2 = .07. BPD was rated as using "change current circumstances" marginally less often than HC, *b* = –.08, *SE* = .04, *p* = .054, R_β^2 = .04. All other differences in tactics between Groups were not significant, *p*s > .47, R_β^2 < .006. Main effects for Intensity indicated that all participants used "change current circumstances" less frequently during high- versus low-intensity stimuli, *b*s < –.08, *SE* < .03, *p*s < .004, R_β^2 > .03. Main effects of Intensity also indicated more frequent use of "reality challenge" and "change future circumstances" tactics for high- versus low-intensity images (*b*s > .03, *SE* < .01, *p*s < .001, R_β^2 > .001) but only when comparing MAD/HC and BPD/MAD. When comparing BPD/HC, there were no main effects for Intensity in the frequency in using these two tactics, *p*s > .15, R_β^2 < .001. All Group × Intensity effects were also non-significant across all analyses, *p*s > .27, R_β^2 < .0007.

Dimensional Relationships. Symptoms of BPD, depression, and anxiety were all positively associated with each other (*r*s > .57, *p*s < .001). As seen in Table 1, both subjective negative intensity ratings and image intensity ratings were associated with higher BPD symptoms, but not depression or anxiety symptoms, when entered into the model simultaneously as covariates.[3] Symptoms of BPD

3. Given the similar rates of MDD in the MAD and BPD groups, we added an effect-coded covariate (–1 = *absent*; 1 = *present*) to test the association between a current MDD diagnosis and our dependent variables. Current MDD was not related to subjective negative emotion intensity, negative ratings of the stimulus, self-efficacy ratings (for change trials), difficulty ratings (for describe trials), or total number of cognitive reappraisal tactics (*p*s > .28, R_β^2 < .01). There was a marginal effect whereby individuals with a current MDD diagnosis were found to utter fewer words on cognitive reappraisal trials on average, *b* = –1.59, *SE* = .91, *p* = .08, R_β^2 = .03.

TABLE 1. Relationships Between Psychopathology Dimensions and Subjective Emotional Intensity, Ratings of Stimulus Intensity, and Average Words Uttered per Trial

Test	Covariate	*b*	*SE b*	*t*	*p*	95% CI
Subjective emotional intensity						
1	Intercept	3.25	.11	29.78	< .001	3.03, 3.47
	BPD symptoms	.03	.01	2.69	.009	.007, .05
2	Intercept	3.30	.22	15.09	< .001	2.87, 3.74
	BPD symptoms	.04	.02	2.18	.03	.003, .07
	Depression	–.02	.02	–1.26	.21	–.05, .01
	Anxiety	.03	.02	1.32	.19	–.01, .06
Ratings of stimulus intensity						
1	Intercept	3.75	.10	37.65	< .001	3.55, 3.94
	BPD symptoms	.03	.01	3.06	.003	.01, .05
2	Intercept	3.76	.10	37.60	< .001	3.56, 3.96
	BPD symptoms	.03	.01	2.25	.03	.003, .06
	Depression	–.01	.01	–.99	.33	–.04, .01
	Anxiety	.02	.02	1.23	.22	–.01, .06
Number of words uttered per trial						
1	Intercept	19.83	.72	27.72	< .001	18.41, 21.25
	BPD symptoms	–.21	.07	–3.01	.003	–.35, –.07
2	Intercept	19.92	.72	27.60	< .001	18.49, 21.36
	BPD symptoms	–.10	.11	–.93	.36	–.31, .11
	Depression	–.10	.10	–.97	.34	–.30, .10
	Anxiety	–.03	.13	–.26	.79	–.28, .22

BPD = borderline personality disorder.

were not significantly associated with self-efficacy ratings for change trials or difficulty ratings for describe trials or when simultaneously entered with depression and anxiety symptoms (ps > .07, R_{β}^2 < .04). Although higher BPD symptoms were significantly associated with fewer words uttered when collapsed across stimulus type, none of the symptom variables (BPD, depression, anxiety) were significant when entered simultaneously, suggesting non-specific relationships. Finally, symptoms of BPD were not associated with the number of cognitive reappraisal tactics rated as employed or when simultaneously entered with depression and anxiety symptoms (ps > .14, R_{β}^2 < .03).

DISCUSSION

In the present study, we used an experimental task to assess the real-time specific tactics of cognitive reappraisal implemented by individuals with BPD, MAD, and HC when confronted with high- and low-intensity negative stimuli. Contrary to our expectations, participant groups used a comparable number of cognitive reappraisal tactics. While BPD and MAD reported lower self-efficacy

in reducing their negative emotions during cognitive reappraisal trials than HC, BPD did not report even lower self-efficacy than MAD, as anticipated. Analyses based on symptom dimensions revealed significant associations between higher BPD symptoms and higher ratings of perceived emotional intensity and intensity of each image, which remained significant after statistically controlling for symptoms of depression and anxiety. Secondary to our main predictions, we found that BPD uttered fewer words than HC across all trials and that BPD uttered fewer words than MAD during cognitive reappraisal. When considered simultaneously, higher symptoms of BPD, depression, and anxiety were not associated with words uttered and self-efficacy ratings, suggesting that BPD symptoms did not contribute to these effects above and beyond depression and anxiety.

We found no group differences in the number of tactics used during cognitive reappraisal. Given that several studies have found that individuals with BPD employ cognitive reappraisal less often than controls (and occasionally individuals with other psychiatric disorders), we expected that participants with BPD would use fewer tactics, or a more restricted range of tactics, during cognitive reappraisal. Instead, we found only that MAD used the "change current circumstances" tactic less often than HC, while BPD used the same tactic somewhat less often than HC. These results suggest that self-report scales and experimental-based indices of cognitive reappraisal use may not always be concordant in their relationships between or within groups (McRae, 2013). Studies that instruct participants to use specific ER strategies typically find no performance differences between BPD and HC (e.g., Kuo, Fitzpatrick, Metcalfe, & McMain, 2016; Ruocco et al., 2010; Sauer et al., 2016; Schulze et al., 2011). It is possible that the use of our standardized training procedure and instructions before the task may have led to more similar performances across participant groups. Sauer and colleagues (2016) found that BPD, HC, and MDD all chose cognitive reappraisal more often for low-intensity negative images and distraction for high-intensity negative images, with no significant group differences despite using an experimental task. However, individuals with more severe BPD symptoms chose distraction for high-intensity BPD–relevant stimuli more often (Sauer et al., 2016). Given that the present study investigated only one ER strategy, it may be promising to examine the extent to which individuals with BPD and MAD are flexible at implementing a variety of ER strategies and can modify their ER approach when certain strategies are not effective.

Results from the present study indicated that both BPD and MAD feel less effective at reducing their negative emotion when using cognitive reappraisal than HC. However, neither BPD nor depressive symptoms contributed above and beyond anxiety symptoms to the lower self-efficacy ratings. Sauer and colleagues (2016) also demonstrated that BPD report lower perceived effectiveness in regulating emotions than HC for high-intensity stimuli; MDD reported the same pattern, but for both high- and low-intensity stimuli. Although we solely measured self-reported evaluations of ER effectiveness, future studies may incorporate assessments of beliefs or expectancies regarding cognitive reappraisal. Indeed, people who expect to be more successful in regulating their emotions when confronted with a negative emotional situation go on to

be more successful in changing their emotions (Bigman et al., 2016). Belief in one's ability to engage in ER is also associated with better well-being, indexed by lower negative emotions and depressive symptoms, as well as higher positive emotions and prosocial behaviors (Bandura et al., 2003; Caprara et al., 2008; Tamir et al., 2007). These findings highlight the importance of considering people's lay beliefs about which ER strategies may work, in which situations, and why. It remains possible that individuals with BPD and other psychiatric disorders endorse beliefs that cognitive reappraisal might be less effective than other strategies, thereby limiting the use of a generally more beneficial ER strategy.

While previous studies indicate that people with BPD might rate negative emotional stimuli as more intensely negative than healthy individuals, we did not observe such effects in the present study. Nevertheless, higher BPD symptoms were associated with higher ratings of negative emotions and intensity ratings even after controlling for symptoms of depression and anxiety. Previous research indicates that implementing cognitive reappraisal is more cognitively demanding because it involves directly attending to the stimuli, which would be more difficult for high-intensity (versus low-intensity) negative images (Sheppes et al., 2014). All participants were expected to have more difficulty with high-intensity images regardless of instruction because they were more likely to elicit higher levels of arousal and be more challenging to describe or reappraise. Accordingly, mean responses were highest in relation to subjective negative emotions and negative image ratings for the high-intensity describe trials (without the use of cognitive reappraisal) and lowest for low-intensity change trials. Ratings of mean difficulty were lower for low-intensity describe trials while mean self-efficacy was lower for high-intensity change trials. It is also important to consider that individuals with psychiatric disorders may be less aware of their emotions and have difficulty describing them, which may influence their self-reporting on emotional phenomena (Marchesi, Brusamonti, & Maggini, 2000; Suvak et al., 2011). Nevertheless, given the design of the task and the effects reported above, we feel confident that participants were actively engaging in cognitive reappraisal according to the instructions. Lower ratings of negative emotion were provided during change trials, suggesting that individuals were relatively more successful in down-regulating their negative emotions when using cognitive reappraisal. Moreover, independent raters confirmed that participants engaged in different reappraisal tactics for most of the change trials.

Finally, we found that BPD and MAD uttered significantly fewer words than HC during cognitive reappraisal. Moreover, BPD uttered fewer words than MAD during reappraisal and fewer words on describe trials than HC. Although higher levels of BPD, depression, and anxiety all had similar relationships to fewer words uttered, BPD symptoms were not significantly associated with words uttered when controlling for other symptoms. In our ancillary analyses, we also found that current MDD was marginally associated with fewer words uttered. Given evidence of difficulties in verbal reasoning and cognitive flexibility in BPD (Thomsen et al., 2017), we theorized that more limited verbal capacities might impact the use of cognitive reappraisal in BPD, especially because it is a cognitive-linguistic ER strategy. Research suggests,

however, that both individuals with BPD and MDD may experience difficulties using expressive language, producing fewer words and lower lexical complexity when referring to internal states (Carter & Grenyer, 2012; Iverson & Lam, 2013). In BPD, lower expressive language ability is thought to relate to inconsistent verbal and nonverbal communication that individuals with BPD may have received as a child and could contribute to the acquisition of fewer ER strategies during childhood development (Judd & McGlashan, 2008). Results of the present study suggest that symptoms of psychopathology more generally impact the expressive language required to engage in cognitive reappraisal. This process may be more pronounced in BPD, leading to more difficulty producing reappraisal statements and thus a reliance on other ER strategies with lower demands on cognitive-linguistic processes. Our results also indicate that fewer words were uttered on describe than on change trials, suggesting that cognitive reappraisal may indeed be more cognitively demanding (see Sheppes et al., 2014).

Limitations of the study include restricting our recruitment to women and participant groups that were relatively small; therefore, our findings may not generalize to larger non-restricted samples. There was a high level of diagnostic and symptom overlap between our MAD and BPD groups. We allowed those in the MAD group to have up to four diagnostic symptoms of BPD, and both groups had a high level of current MDD diagnoses. Results should be replicated in larger participant samples, with greater restrictions on the specific diagnoses or symptoms permitted in the clinical comparison groups. Research has also indicated that increases in cognitive reappraisal during interventions such as cognitive-behavioral therapy are integral for decreases in symptoms of depression and anxiety (e.g., Aldao, Jazaieri, Goldin, & Gross, 2014). Although there were no differences between the BPD and MAD groups in whether participants had received psychotherapy, we assessed these variables using dichotomous "yes" or "no" ratings rather than frequency or duration. It is therefore possible that our BPD and MAD groups also differed in the length of psychotherapy and/or the theoretical orientation of psychotherapy received, which may lead to differences in the tendency to engage in cognitive reappraisal. We also acknowledge that our power to detect independent contributions of BPD, depression, and anxiety symptoms is low, especially given that the self-report measures used in the present study are highly correlated. Another important consideration is that some research suggests that using BPD–specific or interpersonally focused stimuli may elicit more heightened emotional responses from BPD participants, which may be an informative next step in this line of research (Kuo, Neacsiu, Fitzpatrick, & MacDonald, 2014). Future studies may also wish to explore the quality and content of ER strategy responses using a similar task but without an extensive training period. This type of procedure might be more representative of real-world situations where participants use multiple ER strategies, including cognitive reappraisal.

Despite these limitations, our results suggest that individuals with BPD apply cognitive reappraisal tactics in much the same way as healthy people and those with depressive and anxiety disorders. These findings add to other research showing that individuals with BPD can implement more adaptive cognitive ER strategies such as cognitive reappraisal, mindful awareness, and

distraction, especially when provided with instructions on how to do so. People with BPD displayed significantly less fluency than MAD and HC and reported lower self-efficacy in using cognitive reappraisal than HC. These factors may lead individuals with BPD to implement cognitive reappraisal less often in their daily lives. Considering the difficulties that individuals with BPD have with respect to regulating emotional experiences, future studies should explore the specific ways that individuals with BPD implement other ER strategies (e.g., acceptance, suppression) and their perceived effectiveness. Ultimately, this research may have important clinical translational value by identifying ways that ER strategies lead to differential emotional outcomes in BPD. Using this information, researchers and clinicians may be able to develop interventions to modify and increase how effectively ER strategies are used in individuals with BPD.

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