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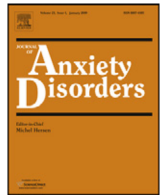

The interactive effects of emotional clarity and cognitive reappraisal in Posttraumatic Stress Disorder☆

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ABSTRACT

The goal of this investigation was to examine how emotional clarity and a specific emotion regulation strategy, cognitive reappraisal, interact to predict Posttraumatic Stress Disorder (PTSD) symptom severity and positive affect among treatment seeking military Veterans ($N = 75$, 93% male) diagnosed with PTSD. PTSD is a highly relevant context because PTSD features include heightened stress reactivity, diminished ability to differentiate and understand emotions, and reliance on maladaptive forms of emotion regulation. We found that the combination of high levels of emotional clarity and frequent use of cognitive reappraisal were associated with (a) lesser total PTSD severity after accounting for shared variance with positive affect and the extent to which emotions are attended to (attention to emotions), and (b) greater positive affect after accounting for shared variance with total PTSD severity and attention to emotions. This is the first study to demonstrate interactive effects of emotional clarity and cognitive reappraisal.

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1. Introduction

Posttraumatic Stress Disorder (PTSD) is a debilitating psychiatric condition prevalent in populations with high rates of trauma exposure, such as military veterans (Bremner, Southwick, Darnell, & Charney, 1996; Milliken, Aucterlonie, & Hoge, 2007). Current research on PTSD has demonstrated the underlying role of emotional disturbances, including a broad pattern of low emotional awareness and poor emotion regulation (Bonn-Miller, Vujanovic, Boden, & Gross, 2011; Frewen, Dozios, Neufeld, & Lanius, 2008; Kashdan, Breen, & Julian, 2010; Lanius et al., 2010; Tull, Barrett, McMillan, & Roemer, 2007). In the present study, our goal was to examine the interactive effects of one facet of emotional awareness (i.e., emotional clarity) and one type of emotion regulation (i.e., cognitive reappraisal) on PTSD symptom severity and positive affect among military Veterans with PTSD.

1.1. The role of cognitive reappraisal

Mounting evidence suggests that emotion regulation plays a crucial role in a wide range of psychological outcomes (Gross, 2007). One emotion regulation strategy that has received particular attention is cognitive reappraisal, which refers to altering how potentially emotion-eliciting situations are construed in order to change their emotional impact. Cognitive reappraisal is typically considered an adaptive strategy in that unpleasant emotions can be down-regulated following stressful events with minimal physiological and cognitive strain (Gross & John, 2003). Indeed, habitual use of cognitive reappraisal tends to be associated with greater mental health (Gross & John, 2003) and lower levels of psychopathology (Eftekhari, Zoellner, & Shree, 2009; Werner & Gross, 2010).

What is not yet clear is why some people are able to successfully engage in cognitive reappraisal while others are not. One explanation derives from the idea that successful self regulation is dependent on information about the intended target of regulation. Specifically, successful emotion regulation should require information about what is being felt from moment-to-moment (Feldman Barrett & Gross, 2001). Therefore, individual differences in emotional clarity (i.e., the extent to which one can identify, differentiate, and understand one's emotions; Gohm & Clore, 2000, 2002) might moderate the success of cognitive reappraisal.

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1.2. The role of emotional clarity

Individual differences in emotional clarity underlies several higher order constructs such as emotional awareness, alexithymia, and emotional intelligence (Coffey, Berenbaum, & Kerns, 2003; Gohm & Clore, 2000, 2002). Individuals low (versus high) in emotional clarity are likely to be more limited in their ability to choose an adaptive emotion regulation strategy, such as cognitive reappraisal, and they may misinterpret and amplify physiological sensations that accompany emotional arousal (Pond et al., in press; Taylor, Bagby, & Parker, 1997). Consistent with this line of reasoning, a growing body of research has found that low emotional clarity (as indexed by individual difference measures, such as the Toronto Alexithymia Scale [TAS; Bagby, Parker, & Taylor, 1994]) strongly predicts a range of psychopathology, independent of other aspects of alexithymia and emotional awareness, such as the extent to which people attend to their emotions (e.g., Berenbaum et al., 2006; Berenbaum, Bredemeier, Thompson, & Boden, in press; Boden, Dizen, Baker, & Berenbaum, 2003). By contrast, individuals high in emotional clarity are likely to have increased ability to choose an adaptive emotion regulation strategy, such as cognitive reappraisal, and to be more successful in their efforts to manage emotions (Barrett, Gross, Christensen, & Benvenuto, 2001; Kang & Shaver, 2004; Kashdan, Ferssizidis, Collins, & Muraven, 2010) and to have greater mental health (e.g., Palmer, Donaldson & Stough, 2002). In summary, theory and research suggests that emotional clarity is a key factor influencing mental health and illness by direct and indirect, via emotion regulation, routes (also see Berenbaum, Raghavan, Le, Vernon, & Gomez, 2003).

1.3. Cognitive reappraisal, emotional clarity, and PTSD

One promising context within which to examine the interactive effects of emotional clarity and cognitive reappraisal is among individuals with PTSD. First, a large body of research has documented associations between PTSD and alexithymia, which is characterized in part by a combination of low attention to emotions and low emotional clarity (Frewen et al., 2008). Furthermore, research has found that low levels of emotional clarity strongly predict PTSD symptom severity above and beyond other aspects of alexithymia, emotional awareness, and emotion dysregulation (Tull et al., 2007). Third, features of PTSD include abnormal, heightened stress reactivity (Yehuda & McFarlane, 1995), and the corresponding use of avoidance-oriented coping strategies (Hepp, Moergeli, Buchi, Wittmann, & Schnyder, 2005; Jacobsen et al., 2002). In fact, PTSD has been characterized in part as a disorder of emotional avoidance (Feeny & Foa, 2005; Marx & Sloan, 2005), which further suggests that individuals with PTSD under-utilize active emotion-regulation strategies, such as cognitive reappraisal. Two studies investigating the use of cognitive reappraisal in the context of PTSD support this hypothesis, finding that less frequent use of cognitive reappraisal was associated with higher levels of PTSD symptom severity (Eftekhari et al., 2009; Ehring & Quack, 2010).

Moving beyond symptoms of PTSD, recent work has sought to understand the processes that contribute to well-being and positive adjustment following the experience of trauma (e.g., Kashdan, Breen, et al., 2010; Kashdan, Ferssizidis, et al., 2010; Tedeschi & Calhoun, 2004). It might reasonably be assumed that a combination of strong emotional clarity and frequent use of cognitive reappraisal would not only predict fewer and less severe PTSD symptoms, but, based on a growing body of evidence finding that psychopathology is relatively independent from positive experience (e.g., Carver, Sutton, & Scheier, 2000; Keyes, 2005), would also predict well-being among individuals with PTSD. This hypothesis follows from theories of psychological flexibility, which posit that the ability to match a given emotion regulation strategy with situational demands and goals is of more importance to psychological health than the particular strategy used (Kashdan & Rottenberg, 2010). Emotional clarity provides information that allows for the optimal selection and use of emotion regulation strategies to modulate emotions in a manner consistent with current goals (e.g., Feldman Barrett & Gross, 2001). Therefore, the benefits of cognitive reappraisal on well-being would in part dependent upon when and under what circumstances it is used to regulate emotions, which is largely influenced by emotional clarity. Findings addressing this hypothesis are especially important in terms of the treatment of PTSD, as: (1) evidence-based interventions that attempt to increase adaptive emotion regulation (e.g., cognitive processing therapy; Resick & Schnicke, 1992) have been shown to lead to reductions in PTSD symptoms (Monson et al., 2006); and yet, (2) a significant number of Veterans do not optimally respond to these treatments and retain diagnoses of PTSD following treatment (Monson et al., 2006).

1.4. The present study

The goal of the present investigation was to examine the interaction of emotional clarity and cognitive reappraisal in predicting PTSD symptom severity and positive affect among military Veterans seeking treatment at a Department of Veterans Affairs (VA) Medical Center. It was hypothesized that veterans with PTSD who frequently used cognitive reappraisal would report less symptom severity and more positive affect, especially if they also had high levels of emotional clarity. Furthermore, it was hypothesized that these interactive effects would be significant even after accounting for shared variance with the extent to which participants attended to their emotions (i.e., attention to emotions). Attention to emotions is a second facet that underlies alexithymia and emotional awareness (Coffey et al., 2003; Gohm & Clore, 2000, 2002). Thus, we attempted to demonstrate that significant effects were specific to the interaction of emotional clarity and cognitive reappraisal, and not to emotional awareness or alexithymia more broadly.

2. Method

2.1. Participants

A total of 75 military Veteran patients (93% male; M_{age} = 45.2 years, SD = 14.4; range = 21–66) participated in this study. All participants had a primary diagnosis of PTSD. Diagnoses were provided by VA staff clinicians prior to treatment entry and confirmed upon entry into PTSD treatment at the residential rehabilitation programs (see next paragraph). The majority of the sample identified their racial/ethnic composition as Caucasian (59.5%), followed by Hispanic/Latino/a (23.0%), African American (12.2%), Pacific Islander (2.7%), Native American/Alaskan Native (1.4%), and "Other" (1.4%). Almost all participants (88.1%) were exposed to some form of combat. The majority reported combat experiences in Iraq/Afghanistan (45.4%), followed by Vietnam (36.0%) and the Persian Gulf (12.0%).

Participants were admitted for PTSD treatment at the residential rehabilitation programs of the VA Palo Alto Health Care System between 2008 and 2010. This program admits veterans and active-duty military personnel with military-related PTSD and related problems. The program has a national catchment area, receiving referrals from VHA hospitals/clinics, Vet Centers, and private practitioners around the country. Veterans are referred to the residential program when a more intensive, residential treatment environment is indicated. Often, this means that PTSD symptoms have been treatment-refractory in outpatient but referrals are also made

directly from an acute psychiatric inpatient or residential substance abuse settings or occasionally when time for treatment is limited by life circumstances (e.g., individual has to return to work). Exclusion criteria for enrollment in the program included: (a) imminent risk of harm to self or others, (b) active withdrawal or inability to remain alcohol and illegal substance-free during treatment, (c) medical or psychiatric conditions rendering the individual unsuitable for residential level of care or unable to actively participate in treatment and (d) legal issues requiring absence from treatment or court-ordered specifically to the program.

Data from the first consenting admission were used in cases where individuals were admitted to the program more than one time. Procedures were approved by the Institutional Review Board for Human Subjects in Medical Research of Stanford University. All questionnaires included in this study were administered within one week of beginning treatment.

2.2. Measures: predictors

2.2.1. Emotional clarity

Emotional clarity was measured using the identification (ID) subscale from the TAS (Bagby, Parker et al., 1994; Bagby, Taylor, & Parker, 1994). The ID subscale from the TAS is frequently used as a measure of individual differences in emotional clarity (e.g., Pamieri, Boden, & Berenbaum, 2009). The ID subscale consists of seven items (e.g., "When I am upset, I don't know if I am sad, frightened, or angry") and participants respond to items using a 5-point Likert scale (1 = "strongly disagree"; 5 = "strongly agree"). Scale scores are computed as a mean of all scale items and scored so that higher scores represented higher levels of emotional clarity. Individual subscales from the TAS have been shown to have excellent psychometric properties (Bagby, Parker et al., 1994).

2.2.2. Cognitive reappraisal

Cognitive reappraisal was measured using the reappraisal subscale from the Emotion Regulation Questionnaire (ERQ; Gross & John, 2003). The cognitive reappraisal subscale consists of six items (e.g., "When I want to feel less negative emotion, I change the way I'm thinking about the situation"). Participants indicate the extent to which they use cognitive reappraisal by responding to items using a 7-point Likert scale (1 = "strongly disagree"; 7 = "strongly agree"). Scale scores are computed as a mean of all scale items and scored so that higher scores represent more frequent use of cognitive reappraisal. Individual subscales from the ERQ have been shown to have excellent psychometric properties (Gross & John, 2003).

2.3. Measures: outcomes

2.3.1. PTSD symptom severity

PTSD symptom severity was measured using the PTSD Checklist – Military Version (PCL-M; Weathers, Litz, Herman, Huska, & Keane, 1993). The PCL-M includes 17 items that correspond to the 17 DSM-*IV* (APA, 2000) symptoms of PTSD. Respondents indicated the degree to which they have been bothered by each of the 17 symptoms, within the past month, using a 5-point Likert scale (1 = "not at all bothered"; 5 = "extremely bothered"). The PCL-M is most frequently scored as a continuous measure with the total score (sum of 17 items) reflective of global PTSD symptom severity. The PCL-M has excellent psychometric properties (Blanchard, Jones-Alexander, Buckley, & Forneris, 1996; Ruggiero, Del Ben, Scotti, & Rabalais, 2003). Indicating the severity of PTSD in the included sample, the mean PCL-M score was quite high, even in comparison to other trauma-exposed populations (e.g., Blanchard et al., 1996; Ruggiero et al., 2003), and far exceeded the cut-off score (50) that indicates clinically significant PTSD (see Table 1).

2.3.2. Positive affect

Positive affect was measured using the positive affect subscale from the Positive and Negative Affect Scale (PANAS; Watson, Clark & Tellegen, 1988). The positive affect subscale consists of ten items assessing general positive affectivity (e.g., "Excited"). Participants indicated the extent to which they experienced each affective state during the previous week using a 5-point Likert scale (1 = not at all; 5 = extreme). Scale scores are computed as a mean of all scale items and scored so that higher scores represent higher levels of positive affect. The PANAS has demonstrated excellent psychometric properties (Watson et al., 1988).

2.4. Measures: control variable

2.4.1. Attention to emotions

Attention to emotions was measured using the externally oriented thinking (EOT) subscale from the TAS (Bagby, Parker et al., 1994; Bagby, Taylor et al., 1994). The EOT subscale from the TAS is frequently used as a measure of individual differences in emotional clarity (e.g., Pamieri et al., 2009). The EOT subscale consists of eight items (e.g., "Being in touch with emotions is essential") and participants respond to items using a 5-point Likert scale (1 = "strongly disagree"; 5 = "strongly agree"). Scale scores are computed as a mean of all scale items and scored so that higher scores represented higher levels of attention to emotions. Individual subscales from the TAS have been shown to have excellent psychometric properties (Bagby, Parker et al., 1994).

3. Results

In a preliminary set of analyses, we investigated zero-order correlations between predictor and outcome variables. As shown in Table 1, emotional clarity and cognitive reappraisal were negatively associated with total PTSD symptom severity, whereas cognitive reappraisal but not emotional clarity was associated with positive affect.

Two hierarchical multiple regression analyses were conducted to test our primary hypotheses (see Table 2). In Step 1, covariates were entered as predictors. Attention to emotions was a covariate in all analyses. Positive affect was an additional covariate in analyses predicting PTSD symptom severity and total PTSD symptom severity was an additional covariate in analyses predicting positive affect, so as to provide a test of specificity of measurement. In Step 2, emotional clarity and cognitive reappraisal were simultaneously entered as predictors. The interaction of emotional clarity and cognitive reappraisal was entered in Step 3. All predictors were centered, and the interaction term was formed by taking the cross-product of centered emotional clarity and cognitive reappraisal scores.

Regarding the prediction of positive affect, neither attention to emotions nor PTSD symptom severity was significant at Step 1, and cognitive reappraisal but not emotional clarity, was significant at Step 2. As expected, the two-way interaction between emotional clarity and cognitive reappraisal significantly improved the prediction of positive affect in Step 3 ($\Delta r^2 = .05$, $p < .05$; Model after step 3: $F(5, 74) = 3.4$, $p < .01$).

In terms of the prediction of PTSD symptom severity, attention to emotions but not positive affect was significant at Step 1, and both emotional clarity but not cognitive reappraisal was significant at Step 2. As expected, the two-way interaction between emotional clarity and cognitive reappraisal significantly improved the

Table 1
Descriptive statistics, and zero-order correlations.

	1	2	3	4	*M* (SD)	Range
1. Emotional clarity					2.5 (.7)	1.0–5.0
2. Cognitive reappraisal	.15				3.5 (1.2)	1.0–7.0
3. Positive affect	.17	.37**			2.7 (.8)	1.2–4.6
4. PTSD total	−.41**	−.31**	−.17		65.3 (12.2)	37.0–85.0
5. Attention to emotions	.29*	.42**	.23*	−.30**	2.5 (.7)	1.0–5.0

* $p < .05$.
** $p < .01$.

Table 2
Results of hierarchical multiple regression analyses.

Step	Variables	A Predicting positive affect betas		B Predicting PTSD total betas	
1	Attention to emotions	.20		−.27*	
	Positive affect/PTSD total	−.11		−.11	
	Multiple r^2		.06		.10*
2	Emotional clarity	.09		−.35**	
	Cog. reappraisal	.32*		−.20	
	Multiple r^2		.15*		.24**
	Δr^2		.09*		.14**
3	Cog. reappraisal *clarity	.23*		−.30**	
	Multiple r^2		.20**		.32**
	Δr^2		.05*		.08**

* $p < .05$.
** $p < .01$.

prediction of PTSD symptom severity in Step 3 ($\Delta r^2 = .08$, $p < .01$; Model after Step 3: $F(5, 74) = 6.6$, $p < .01$)[1],[2].

To interpret significant interactions we conducted simple slope analyses (Aiken & West, 1991) and plotted simple slopes in Fig. 1 (Cohen & Cohen, 1983). Slope analyses revealed that the relation between frequency of use of cognitive reappraisal and positive affect tended to be significant among participants with high emotional clarity ($\beta = .54$, $p < .01$). Similarly, the relation between frequency of use of cognitive reappraisal and PTSD severity tended to be significant among participants with high emotional clarity ($\beta = -.48$, $p < .01$). As shown in Fig. 1, participants with high versus low emotional clarity and high use of cognitive reappraisal tended to have lower levels of PTSD total and higher levels of positive affect. Participants with low emotional clarity did not vary in their PTSD severity or positive affect depending upon their use of cognitive reappraisal ($\beta < .12$, p's $> .43$).

4. Discussion

The current study is the first to investigate the interactive effects of emotional clarity and the use of cognitive reappraisal in predicting psychopathology and trait emotionality in any population. We found that, among military Veterans seeking treatment for PTSD, the interaction between emotional clarity and cognitive reappraisal significantly predicted: (a) positive affect after accounting for shared variance with attention to emotions and total PTSD symptom severity; and (b) total PTSD symptom severity after accounting for shared variance with attention to emotions and positive affect. Furthermore, the effect sizes of these interactions tended to be large (accounting for 5–8% of unique variance), as changes in r^2 due to moderation/interaction effects are typically quite small and accounting for as little as 1 percent additional variance is often considered important (McClelland & Judd, 1993).

These results conform to conceptual models of emotional clarity (Feldman Barrett & Gross, 2001) and extend the literature on PTSD, as well as post-traumatic growth (Tedeschi & Calhoun, 2004) and psychological flexibility (Kashdan & Rottenberg, 2010). These results demonstrate that the benefits of cognitive reappraisal on symptomatology and well-being among individuals with PTSD are at least partly dependent upon having an increased understanding of one's emotions. We hypothesize that increased emotional clarity provides an understanding of the optimal circumstances in which to use cognitive reappraisal to manage emotions more generally, and emotion elicited by trauma-cues and related symptoms, specifically. Furthermore, these interactions were significant when removing shared variance with either PTSD symptom severity or positive affect, which is consistent with research demonstrating that psychopathology is relatively independent from positive experience (Carver et al., 2000; Keyes, 2005). Thus, the interaction between emotional clarity and cognitive reappraisal is an important predictor of positive affect, and potentially post-traumatic growth, independent of the symptomatology of trauma survivors.

The current study has notable clinical implications. Specifically, interventions that attempt to increase adaptive emotion regulation (e.g., cognitive processing therapy; Resick & Schnicke, 1992) have already been shown to lead to reductions in PTSD symptoms (Monson et al., 2006). However, the present findings suggest that the benefits of such interventions might be increased by also targeting emotional clarity for improvement, or by tailoring interventions to improve cognitive reappraisal and similar emotion regulation strategies among those who already have high levels of emotional clarity. In regard to the latter, our results which demonstrate that individuals who use cognitive reappraisal have lower levels of PTSD symptoms only if they have high emotional clarity. Treatments that focus on increasing both emotional awareness and adaptive emotion regulation (e.g., mindfulness-based interventions; Vujanovic, Niles, Pietrefesa, Schmertz, & Potter, 2011) may be useful in this regard. Treatments that increase adaptive emotion regulation and emotional clarity may also be modified to prevent PTSD and promote resilience in populations at high risk for future trauma (e.g.,

[1] When analyzing individual PTSD symptom clusters, the interaction of emotional clarity and cognitive reappraisal significantly improved the prediction of Re-experiencing symptoms ($\Delta r^2 = .11$, $p < .01$) and avoidance/numbing symptoms ($\Delta r^2 = .06$, $p < .05$), but not Hyperrarousal symptoms ($\Delta r^2 = .02$, $p = .14$).

[2] The three-way interaction of emotional clarity, cognitive reappraisal, and attention to emotions did not significantly improve the prediction of either PTSD symptom severity ($\Delta r^2 = .00$, $p = .71$) or positive affect ($\Delta r^2 = .00$, $p = 60$).

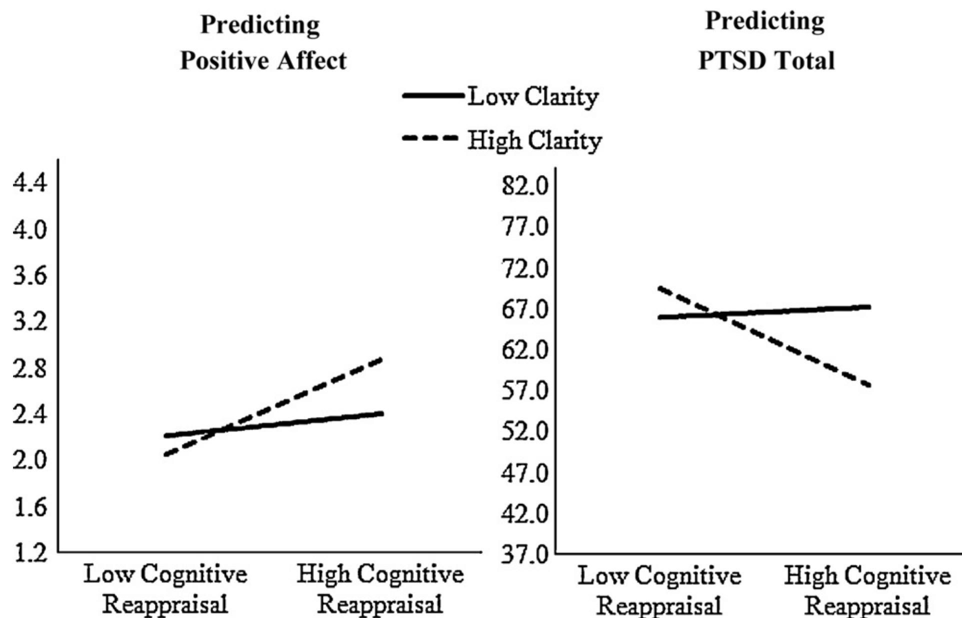

Fig. 1. The interaction between cognitive reappraisal use and emotional clarity significantly predicts positive affect (Panel A) and PTSD total symptom severity (Panel B). In each case, increased use of reappraisal is only beneficial for individuals high in emotional clarity.

active duty military, police officers). The resources required to implement such treatments as part of routine training would likely not be exceedingly high in comparison to the potential significant costs of negative outcomes following trauma exposure. Furthermore, such prevention strategies may increase mental health in these populations more broadly (Werner & Gross, 2010).

Though the present study had notable strengths, there were several limitations. First, though all of our constructs were assessed using well-established self-report measures, we did not measure the use of emotional clarity or cognitive reappraisal in real-time (e.g., in response to trauma-related cues). Doing so would allow for an assessment of the success at which cognitive reappraisal is implemented and moment-by-moment fluctuations in emotional clarity in response to trauma-related cues. Such information would potentially provide for a more detailed and rich understanding of the interplay between emotion reactivity, emotional clarity, and emotion regulation among individuals with PTSD. Future work would benefit from implementing laboratory or ecological momentary assessment, both of which can be used to assess emotion regulation and emotional clarity in real-time (for prior examples, see Kashdan, Ferssizidis, et al., 2010; Lischetzke, Cuccodoro, Gauger, Todeschini, & Eid, 2005). Second, all variables were assessed at treatment intake only, therefore not allowing for an assessment of how treatment changes in emotional clarity and cognitive reappraisal might influence treatment-related changes in PTSD symptom severity and positive affect. Future work might extend these findings by using longitudinal assessments of emotional clarity and choice and use of emotion regulation strategy at multiple points over time. Third, only a military-trauma population was included in the current sample. It might benefit future research to include other trauma-populations (e.g., motor vehicle accident), so as to provide a more complete picture of relations between trauma exposure, more generally, and emotional clarity and emotion regulation. Finally, the current study was comprised of an almost entirely male Veteran sample, and thus future research would benefit from extending the present findings to a more gender-diverse sample.

Our findings demonstrate that emotional clarity and use of cognitive reappraisal should be investigated concurrently to more fully understand adaptive emotion responding among individuals with PTSD. Additional research investigating interactive effects of emotional clarity and use of emotion regulation in psychopathology other than PTSD may be of incremental value, as problems with emotional clarity and emotion regulation are associated with a wide-range of psychopathology (e.g., Berenbaum et al., 2006, in press; Boden et al., 2003; Werner & Gross, 2010).

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