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Emotion regulation, physiological arousal and PTSD symptoms in trauma-exposed individuals



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ABSTRACT

Objectives: Retrospective studies suggest a link between PTSD and difficulty regulating negative emotions. This study investigated the relationship between PTSD symptoms and the ability to regulate negative emotions in real-time using a computerised task to assess emotion regulation.

Method: Trauma-exposed ambulance workers ($N = 45$) completed self-report measures of trauma exposure, PTSD symptoms and depression. Participants then completed a computer task requiring them to enhance, decrease or maintain their negative emotions in response to unpleasant images. Skin conductance responses (SCR) were recorded and participants also made ratings of emotion intensity. Immediately after the computer task, participants were asked to describe the strategies they had used to regulate their negative emotions during the task and recorded spontaneous intrusions for the unpleasant images they had seen throughout the following week.

Results: PTSD symptoms were associated with difficulty regulating (specifically, enhancing) negative emotions, greater use of response modulation (i.e., suppression) and less use of cognitive change (i.e., reappraisal) strategies to down-regulate their negative emotions during the task. More intrusions developed in participants who had greater reductions in physiological arousal whilst decreasing their negative emotions.

Limitations: PTSD was measured by self-report rather than by a clinician administered interview. The results suggest a relationship between emotion regulation ability and PTSD symptoms rather than emotion regulation and PTSD.

Conclusions: Difficulty regulating negative emotions may be a feature of trauma-exposed individuals with PTSD symptoms, which may be linked to the types of strategies they employ to regulate negative emotions.

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Introduction

Difficulty regulating negative emotions has been linked to the onset and maintenance of anxiety and depression (Campbell-Sills & Barlow, 2007; Gross, 1998a). More recent studies also suggest a relationship between emotion regulation difficulties and post-traumatic stress disorder (PTSD; Bonn-Miller, Vujanovic, Boden, & Gross, 2011; Cloitre, Miranda, Stovall-McClough, & Han, 2005; Eftekhari, Zoellner, & Vigil, 2009; Ehring & Quack, 2010; Kashdan, Uswatte, & Steger, 2006; Moore, Zoellner, & Mollenholt, 2008; Price, Monson, Callahan, & Rodriguez, 2006; Tull, Barrett, McMillan, & Roemer, 2007; Vujanovic, Bonn-Miller, Potter, Marshall, & Zvolensky, 2011). Whilst promising, these studies are limited to

retrospective designs and reliant on self-report questionnaires to assess emotion regulation skills, including strategies typically used, as well as self-reports of emotion intensity. The difficulty with these designs is that they rely on participants accurately reporting and being aware of the intensity of their emotions and how they regulate them. Since discrepancies between self-report and physiological measures of emotion intensity have been found, the assessment of emotion regulation should ideally incorporate both self-report and objective (i.e. physiological) measures. This is especially important because deficits in emotion regulation can manifest as chronically elevated subjective negative affect relative to physiological activity; this is regardless of the level of environmental demands (Connelly & Denney, 2007). It is unclear whether PTSD symptom severity is linked to objective (physiological) difficulties in regulating negative emotions as opposed to perceived difficulty regulating emotion. The current study aimed to address this gap in the literature.

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Gross (1998a) proposed a process model of emotion regulation, linking the timing of emotion regulation strategies to their effectiveness. The strategies used early in the process of generating an emotion are known as antecedent-focused and are thought to be more effective than those employed once an emotion is already underway, known as response-focused strategies (Gross, 1998a; Gross & Thompson, 2007). The model outlines three categories of strategies individuals may use to regulate their emotions, both positive and negative, once in any given situation. Attentional deployment is the first and refers to strategies to direct attention, such as choosing to focus on a particular part of the situation or environment. The second category is cognitive change and includes strategies, such as cognitive reappraisal, which alter the meaning of a situation to change its emotional impact. Response modulation is the third category and includes response-focused strategies, such as the suppression of emotion or expressive suppression (the latter of which refers to the suppression of observable indicators of emotion, such as suppressing facial expressions) or drug use, to influence physiological, experiential or behavioural reactions.

PTSD has been associated with emotion regulation strategies involving response modulation such as emotion suppression and expressive suppression whereas cognitive change (reappraisal) is generally reported to be under-utilised (e.g. Eftekhari et al., 2009; Ehlers & Clark, 2000; Ehling & Quack, 2010; Feeny & Foa, 2005; Marx & Sloan, 2005; Moore et al., 2008). More recently, Boden et al. (2013) prospectively investigated the relationship between emotion regulation strategies at intake for residential group CBT for PTSD and PTSD symptom severity at discharge in a sample of military veterans. Expressive suppression was associated with greater PTSD symptom severity whereas cognitive reappraisal was associated with fewer PTSD symptoms. Additionally, change in the use of expressive suppression during treatment predicted PTSD symptom severity at discharge even after accounting for baseline PTSD symptom severity. The greater the decrease in an individual's use of expressive suppression during treatment, the lower the PTSD symptom severity scores at discharge. These results further highlight the tendency for those with greater PTSD symptoms to use response modulation strategies more often and cognitive change strategies less frequently.

While the aforementioned studies suggest a link between self-reported difficulties in emotion regulation and PTSD in groups of individuals exposed to a range of trauma, including women who have experienced childhood sexual abuse (Cloitre et al., 2005), military veterans (Boden et al., 2013; Kashdan et al., 2006) and other trauma-exposed populations (Bonn-Miller et al., 2011; Eftekhari et al., 2009; Ehling & Quack, 2010; Tull et al., 2007), they all relied on self-report measures of emotion regulation incorporating a retrospective design. Only one study could be found which assessed the ability of trauma-exposed individuals to regulate negative emotions in real-time. Following the aftermath of the 9/11 terrorist attacks, Bonanno, Papa, Lalande, Westphal, and Coifman (2004) presented New York college students with unpleasant images on a computer screen. Participants were instructed to enhance or decrease their negative emotional responses to the images. Those who were better able to enhance and decrease their negative emotions showed less psychological distress by the end of the second year following these attacks. Although PTSD symptomatology was not measured, this study provides preliminary evidence that difficulty regulating negative emotions on-line can be measured using experimental tasks and is linked to the development of psychological distress following trauma. However, as in the other studies, these authors relied only on self-report ratings of the intensity of emotional experience during the experimental task and a physiological measure of emotion regulation was not adopted.

A possible way forward in this important area of research would be to incorporate an objective physiological measure when assessing the ability to regulate negative emotions. One study has used concurrent assessment of physiology in addition to subjective reports of emotional experience in a healthy student population using an experimental task. Jackson, Malmstadt, Larson, and Davidson (2000) presented students with unpleasant and neutral images on a computer screen with instructions to enhance, decrease, or maintain their emotional responses whilst startle eyeblinks were measured. Instructions to decrease negative emotions led to smaller startle eyeblinks and instructions to enhance negative emotion led to larger startle eyeblinks. This was an important study in suggesting that an experimental task could be used to measure emotion regulation objectively through the assessment of its effects on physiological activity.

Since measuring skin conductance responses (SCR) is a less intrusive mode of measuring physiological arousal compared to startle eyeblinks, we chose SCR as a physiological measure of emotion regulation for our trauma-exposed participants. To our knowledge, no study has yet investigated the regulation of negative emotions and the corresponding effect on SCR in trauma-exposed participants without any training in emotion regulation being provided. We measured SCR and self-report ratings of emotion as indicators of emotion regulation ability whilst trauma-exposed participants were instructed to enhance, maintain or decrease their negative emotional responses to unpleasant images presented during a computer task. Participants were not provided with instructions or training regarding how they might regulate their negative emotions. Participants were also asked to record intrusions related to the computer task for the week following participation using diaries since previous research has suggested that reductions in physiological arousal whilst being shown unpleasant images in the form of traumatic films may lead to the development of trauma-related intrusive memories (e.g., Holmes, Brewin, & Hennessy, 2004).

Our aims were fourfold: (1) to validate the experimental task and the use of SCR to measure the regulation of negative emotions in real-time in trauma-exposed individuals who had not been provided with any specific instructions or training, (2) to explore whether emotion regulation was related to PTSD symptom severity, (3) to investigate whether specific strategies (cognitive change and response modulation) were linked to greater PTSD symptom severity, and (4) to assess the relationship between changes in arousal during attempts to regulate negative emotions and the subsequent development of intrusive memories.

In relation to our first aim, it was predicted that self-reported and objective (i.e., SCR values) indices of emotion regulation would be greater towards unpleasant images compared to neutral images, and would be greatest following instructions to enhance, smallest following instructions to decrease, and in between following instructions to maintain initial negative emotional responses towards unpleasant images. We also hypothesised that difficulty regulating negative emotions on the computer task would be associated with greater PTSD symptom severity. Due to the novel nature of the design, we made no assumptions or hypotheses about whether emotion regulation difficulties in those with greater PTSD symptoms would be present in all or in just some conditions (i.e., following instructions to enhance, maintain or decrease negative emotions). Since healthy participants are able to enhance and decrease negative emotions in response to negative pictures with corresponding effects on physiology (i.e., Kim & Hamann, 2012; Ray, Ochsner, McRae, & Gross, 2010), difficulty regulating emotion in response to any of the instructions would be suggestive of emotion regulation difficulty. It was therefore hypothesised that PTSD symptom severity would be related to difficulty enhancing, decreasing or maintaining initial negative emotions in response to

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