



Imagery vividness ratings during exposure treatment for posttraumatic stress disorder as a predictor of treatment outcome

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ABSTRACT

Within exposure-based trauma treatments for posttraumatic stress disorder (PTSD), imagery vividness during imaginal exposure of the traumatic memory is an understudied but potentially important predictor of treatment outcome. Further, to our knowledge, this relationship has only been studied in women to date, and never among individuals with PTSD and substance use disorders which could impact ability to produce vivid mental imagery and its impact. The current study investigated whether imagery vividness ratings during in-session exposure predicted post-treatment PTSD symptom severity in a sample of men and women with comorbid PTSD and substance use disorders, and also examined whether gender moderated this relationship. A sample of 71 participants who received an exposure-based trauma treatment were included in the analyses. PTSD symptom severity was assessed using both the Clinician Administered PTSD Scale (CAPS) and the Impact of Event Scale-Revised (IES-R). Results varied according to method of assessing PTSD symptom severity. Higher imagery vividness was associated with better treatment outcome when assessed by the CAPS, with vividness in later sessions relating more strongly to outcome than vividness in earlier sessions. With the IES-R, higher imagery vividness ratings predicted more favorable treatment outcome for men, but less favorable treatment outcomes for women. Findings are discussed in the context of using imagery vividness to maximize treatment outcomes and future research directions involving scientific replication.

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1. Introduction

Posttraumatic stress disorder (PTSD) is a debilitating psychological disorder that can develop following exposure to traumatic events, and is a prevalent public health concern (i.e., lifetime prevalence of 6.8%; NCS-R; Kessler, Berglund, Demler, Jin, & Merikangas, 2005) that is associated with a variety of problems. These include psychological comorbidity (e.g., depression, panic attacks, substance use), occupational impairment, and elevated health care costs (Hofmann, Litz, & Weathers, 2002; Kessler, 2000; Walker et al., 2003). Several effective treatments for PTSD currently exist (see Foa, Keane, Friedman, & Cohen, 2008 for a review), including Prolonged Exposure (Foa, Hembree, & Rothbaum, 2007). Prolonged Exposure consists of several components typical of

cognitive-behavioral treatments, including *in vivo* and imaginal exposure. In imaginal exposure, patients repeatedly recount their most distressing traumatic memory, while *in vivo* exposure involves gradual and systematic exposure to individualized trauma triggers (e.g., situations, objects).

Prolonged Exposure is a highly effective treatment for PTSD (Powers, Halpern, Ferenschak, Gillihan, & Foa, 2010). This intervention is largely based on Emotional Processing Theory (EPT; Foa & Kozak, 1986; Foa & Riggs, 1993), which proposes that fear structures—specifically, with pathological/erroneous associations between the physiological, behavioral, and cognitive elements of fear—are the initiating and maintaining factors underlying anxiety disorders. With respect to PTSD specifically, EPT posits that exposure to trauma-related stimuli reduces fear because activation of the fear structure during exposure allows for the correction of inaccurate stimulus–stimulus and stimulus–response associations (Foa & Rothbaum, 1998). The fear structure is theorized to be activated when the patient uses imagery to recount the target or

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index trauma (i.e., during imaginal exposure in and out of session; Foa et al., 1999; Rothbaum, Meadows, Resick, & Foy, 2000), and, according to Foa and Kozak (1986), habituation of fear is one possible mechanism of change. Examination of additional mechanisms underlying the effectiveness of Prolonged Exposure is warranted, however, and would allow for further development of theoretical models of trauma recovery. Further, it is unclear how individual differences may interact with Prolonged Exposure treatment components to predict responsiveness to treatment. Both areas of study are of high importance with respect to maximizing therapeutic outcomes for the most individuals possible.

1.1. Imagery vividness

One potential mechanism of exposure-based treatments that remains less studied is emotional engagement, assessed through imagery vividness, with the index trauma memory during imaginal exposure. In order to increase engagement with the trauma memory, and the fear response conditioned to the memory, patients are instructed to recount the trauma. Patients are encouraged to include the thoughts and feelings experienced during the trauma and to describe them in present (rather than past) tense as vividly as possible. Vividness ratings can be collected throughout the exposure session in conjunction with ratings of distress (i.e., subjective units of distress [SUDS]; Wolpe, 1958) in order to assist the clinician in assessing how intensely the patient is reliving the event. Hackmann, Ehlers, Speckens, and Clark (2004) found that, among individuals with PTSD, both vividness of intrusive memories and distress decreased with treatment (as well as other elements of the memories such as frequency of intrusions). This highlights a potential association between imagery vividness and the emotional salience of the memory, with an important research question becoming whether vividness can be used to directly assist with treatment for PTSD.

Based on the proposition that more vivid trauma memory imagery elicits greater trauma-related fear, Rauch, Foa, Furr, and Filip (2004) examined whether higher imagery vividness in early sessions predicted better outcomes in women who had experienced sexual or non-sexual assault. They found that (a) vividness ratings collected during imaginal exposure positively correlated with SUDS in early imaginal exposure sessions, (b) this correlation weakened in later sessions, (c) vividness decreased significantly with continued imaginal exposure over the course of Prolonged Exposure sessions, and, perhaps most importantly, (d) vividness was not related to PTSD outcome. The authors attributed this unexpected null finding to a restricted range of vividness ratings (actual ratings were not reported in the published manuscript), potentially reflecting enhanced overall imagery ability with respect to trauma memories (Bryant & Harvey, 2006). They also proposed that patients may only need to reach a threshold of vividness for fear to be elicited, and that higher levels of vividness may not impact, or may even interfere with, outcome (i.e., over engagement).

The results of this study call into question the predictive utility of imagery vividness ratings. In fact, while assessing vividness ratings during imaginal exposure was part of the original Prolonged Exposure manual (Foa & Rothbaum, 1998), vividness ratings were not included in the most recent version of the treatment (Foa et al., 2007). Given the theorized importance of emotional engagement with the trauma memory as a mechanism of fear elicitation, and the manual's prescribed goal to have patients neither under- nor over-engage with the memory, further examination of the role of imagery vividness in Prolonged Exposure outcomes is warranted.

An additional characteristic that may be important when investigating the impact of imagery vividness on PTSD treatment outcome is gender. Studies have consistently demonstrated a higher

prevalence of PTSD in women than in men (see Olff, Langeland, Draijer, & Gersons, 2007 for a review) and mechanisms for this difference require further investigation. It is also possible that the mechanisms impacting treatment outcome might differ between genders. For example, there is some evidence for gender-based differences in fear extinction (e.g., Milad et al., 2010; Stark et al., 2006), the primary hypothesized mechanism of change in exposure. Research findings on gender differences in vividness ability among non-clinical samples, however, are mixed. Campos (2014) found no gender differences with regard to general vividness in a sample of college students, for example, while Richardson (1995) demonstrated that women had higher scores than men on self-reported vividness when utilizing the Vividness of Visual Imagery Questionnaire (Marks, 1973). Meanwhile, Karatzias, Power, Brown, and McGoldrick (2009) found no difference between men and women on vividness in a sample of individuals with PTSD. Given that previous research has not been extended to investigating potential gender differences in the relationship between vividness ratings and PTSD treatment outcome, such inquiry is warranted.

Investigating the role of imagery vividness in imaginal exposure may also be particularly relevant to individuals with comorbid PTSD and substance use disorders. PTSD is highly prevalent in samples of individuals with substance use disorders (i.e., 36–50%), and individuals in treatment for substance use disorders with comorbid PTSD have poorer prognoses than individuals without the diagnosis (Brady, Back, & Coffey, 2004). Cognitive impairments among individuals with substance use disorders may also impact the ability to generate vivid images. Individuals with substance use disorders are at risk for numerous cognitive deficits resulting from excessive substance use, including poorer memory functioning (Glass et al., 2009; Jovanovski, Erb, & Zakzanis, 2005; London et al., 2005; Scott et al., 2007; Solowij & Battisti, 2008) and poorer visual spatial memory than non-substance users (Ersche, Clark, London, Robbins, & Sahakian, 2006). Thus, vividness ability may also be compromised in this population, and the impact of vividness on PTSD treatment outcome might be different among individuals with comorbid PTSD and substance use disorders than in those with PTSD only.

To our knowledge, the study by Rauch et al. (2004) is the only report to date examining the impact of imagery vividness on treatment outcome following participation in an exposure-based trauma therapy for PTSD. Given the unexpected null findings of this study, it is important to address methodological limitations that may have impacted study outcomes. First, their investigation was limited to women, such that the effect of gender could not be examined. Second, Rauch et al. (2004) used only one assessment of PTSD, whereas replicating and extending findings using multiple modes of assessment could improve the reliability of findings regarding the potential usefulness of assessing vividness during PTSD. Finally, the study by Rauch and colleagues was restricted to participants who had experienced sexual or non-sexual assault as opposed to a wider spectrum of traumatic event exposure.

The present study aimed to replicate and extend Rauch et al.'s (2004) study in a sample of individuals of men and women with comorbid PTSD and substance use disorders. Hypotheses for this study were as follows: (1) Consistent with the study by Rauch et al. (2004), there will be a stronger, positive relationship between imagery vividness ratings and SUDS during earlier imaginal exposure sessions than during later sessions; and (2) Higher overall vividness and SUDS ratings will be negatively associated with PTSD symptom severity post-treatment.

We also aimed to answer the following exploratory questions: Does the relationship between imagery vividness and PTSD severity at outcome vary across sessions? And second, are vividness and post-treatment PTSD outcomes differentially related in women versus in men?

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