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Visual false memories in post-traumatic stress disorder (PTSD)

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ABSTRACT

There is an ongoing debate whether or not patients with post-traumatic stress disorder (PTSD) are more prone to produce false memories. The present study investigated this question using a visual variant of the Deese–Roediger–McDermott (DRM) paradigm, additionally addressing underlying mechanisms of false memory production (e.g., depression, dissociation, emotional valence, arousal). The visual paradigm was administered to 48 traumatized individuals with ($n = 20$) and without PTSD ($n = 28$) and 28 non-traumatized controls. Groups did not differ with regard to memory performance and memory confidence. False memories were correlated with depression. We recommend that future studies employ trauma-related material to further explore memory aberrations in PTSD.

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1. Theoretical background

Victims of traumatic events are often haunted by stressful memories of the experience in form of nightmares or flashbacks. Such intrusive symptoms are part of the diagnosis post-traumatic stress disorder (PTSD; American Psychiatric Association, 1994), but it remains unclear how accurate and valid these involuntary as well as deliberately retrieved traumatic memories are. Several reports about fabricated and invalid (recovered) traumatic memories, in particular those related to childhood sexual

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abuse, have led to an enormous debate and much controversy in the past years (Loftus & Davis, 2006; McNally, 2003). Research has shown that memories in general are susceptible to distortions and false memories can be induced rather easily (Loftus & Davis, 2006).

One experimental paradigm to provoke false memories is the Deese–Roediger–McDermott (DRM; Deese, 1959; Roediger & McDermott, 1995) paradigm. Typically word lists are presented to participants: Each word list is highly associated with one word that is not part of this learning list, the so-called “critical lure”. For example, when *door, glass, pane, shade, ledge, sill, house, open, curtain, frame, view, breeze, sash, screen,* and *shutter* are presented to the participants, the critical lure *window* is often falsely recalled or recognized in later trials. In healthy participants this mechanism has been demonstrated with a prevalence rate of up to 80% for false recall or recognition (Stadler, Roediger, & McDermott, 1999).

The DRM paradigm has already been administered to PTSD patients to investigate whether this population is more susceptible to memory distortions (Bremner, Shobe, & Kihlstrom, 2000; Brennen, Dybdahl, & Kapidzic, 2007; Zoellner, Foa, Brigidi, & Przeworski, 2000). It has been assumed that PTSD patients are more prone to produce false memories arguing that PTSD is linked to dissociation (as a personality trait see, e.g., Bremner, Southwick, Brett, Fontana, Rosenheck, & Charney, 1992; Dancu, Riggs, Hearst-Ikeda, Shoyer, & Foa, 1996; for dissociative experiences at the time of trauma, see Ozer, Best, Lipsey, & Weiss, 2003) and dissociative symptoms have been associated with false memories (e.g., Clancy, Schacter, McNally, & Pitman, 2000; Hyman & Billings, 1998; Winograd, Peluso, & Glover, 1998). Results are yet inconclusive. On the one hand, Bremner et al. (2000) showed that sexually abused women with PTSD were more prone to falsely recall critical lures than abused women without PTSD and women without a history of sexual abuse. On the other hand, Zoellner et al. (2000) found that trauma rather than PTSD was associated with false memories as in their study assault victims with and without PTSD falsely recalled more critical lures than non-traumatized individuals. While the two traumatized groups did not differ statistically with regard to false memories, the false recall of critical lures was correlated with PTSD severity in the PTSD group ($n = 14$). While the two aforementioned studies implemented neutral material to create false memories, Brennen et al. (2007) additionally administered trauma-related word lists to war-exposed participants with and without PTSD. Their findings showed that groups were equally prone to critical lures of non-trauma lists, whereas the PTSD group incorrectly recalled more critical lures of the trauma-related lists.

One explanation for these mixed findings could well be the influence of one or several moderating variables obscuring the relationship between PTSD and false memories. For example, in a recent study by Corson and Verrier (2007) it was found that false memories were significantly more frequent under conditions of high arousal, independent of valence.

In addition to false memories, meta-memory was also investigated in the aforementioned studies. By implementing the *remember-know* paradigm (Tulving, 1985), it was proposed that PTSD patients should display more *remember* responses (i.e. vivid recall of episode) for false memories (Brennen et al., 2007; Zoellner et al., 2000). While the results of Brennen et al. (2007) provided some evidence in this direction (i.e. more *remember* responses of trauma-related false memories), results were statistically insignificant. Another way to investigate meta-memory is to assess memory confidence. This was done in the study by Bremner et al. (2000) by asking participants whether an item of the recognition list was “probably” or “definitely” new versus old. Unfortunately, results on these indices were not reported. While the investigation of memory confidence is highly relevant for the clinical and forensic field, where trauma victims are asked to disclose their trauma-related memories, clear insights on the accuracy-confidence relationship are thus lacking.

Also important for the evaluation of testimonies of trauma victims is that until now only verbal material (presented orally or visually) has been used in studies employing the DRM paradigm in PTSD research (for comparisons of participants with and without histories of trauma on other paradigms, such as the directed forgetting, see, e.g., DePrince & Freyd, 2004; McNally, Ristuccia, & Perlman, 2005). To the best of our knowledge, visual picture cues were never used in PTSD, despite high ecologic validity (cf. Miller & Gazzaniga, 1998; Moritz, Woodward, & Rodriguez-Raecke, 2006), as virtually all traumatic incidents involve the visual sense. Moreover, differences in memory impairment in visual versus verbal material have been reported in PTSD (for meta-analysis see Brewin, Kleiner, Vasterling, & Field, 2007), emphasizing the need to investigate visual false memories in PTSD.

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