J. Behav. Ther. & Exp. Psychiat. 50 (2016) 127–134

Contents lists available at ScienceDirect

Journal of Behavior Therapy and Experimental Psychiatry

journal homepage: www.elsevier.com/locate/jbtep

Encoding disorganized memories for an analogue trauma does not increase memory distortion or analogue symptoms of PTSD

Daisy A. Segovia [a], Deryn Strange [a, *], Melanie K.T. Takarangi [b]

[a] John Jay College of Criminal Justice, Cuny, USA
[b] Flinders University, Australia

ARTICLE INFO

Article history:
Received 29 January 2015
Received in revised form
26 June 2015
Accepted 4 July 2015
Available online 8 July 2015

Keywords:
Traumatic memory distortion
Disorganized memories
Data-driven versus conceptual encoding
Analogue trauma

ABSTRACT

Background and Objectives: Empirical studies with objective measures and control conditions have failed to demonstrate disorganization; yet people tend to *self-report* disorganization in their trauma narratives, which may have other effects. Thus, we investigated whether a disorganized trauma memory produces more analogue PTSD symptoms and memory distortion, compared to an organized memory.
Methods: Participants watched a traumatic film with missing scenes. Some saw the scenes in their correct temporal sequence; others saw a random sequence; thus for some participants we implanted a disorganized memory. We also told some participants to focus on the meaning of the event (conceptual), some on the sensory details (data-driven), and some received no instruction (control). Participants recorded their intrusions for a week. Then, they reported analogue symptoms and we tested their memory for the film and their confidence in what they remembered.
Results: Analogue symptoms and number of reported intrusions did not differ across conditions, nor did the degree of memory distortion or confidence in those memories. However, participants who self-reported feeling more memory disorganization reported more avoidance symptoms and more memory distortion.
Limitations: We did not measure memory for real trauma, nor did we assess for a history of PTSD. Our results may also be restricted to temporal disorganization.
Conclusions: Although objective assessments of disorganization do not appear important, people's *feelings* regarding the disorganization of their memories not only affect their assessment of the severity of their PTSD symptoms, but also the kinds of memory errors they make.

1. Introduction

The belief that incomplete processing of a trauma results in memories that are more disorganized, fragmented, or likely to be missing significant detail compared to non-traumatic memories has its roots in psychoanalytic theory (see Horowitz, 1976) and continues to pervade the dominant theories of Post-Traumatic Stress Disorder (PTSD; Brewin, Dalgleish, & Joseph, 1996; Brewin, Gregory, Lipton, & Burgess, 2010; Ehlers & Clark, 2000). Moreover, problems with memory appear in the DSM5 as the D1 symptom: "inability to remember an important aspect of the traumatic event" (American Psychiatric Association, 2013, p. 271). However, studies that have employed objective measures of narrative disorganization, or have included appropriate comparison memories (e.g., most important memory, most positive memory) and groups (e.g., a diagnosis of PTSD vs. No PTSD), have failed to demonstrate that such disorganization or fragmentation actually exists in people's trauma narratives. Yet, people tend to *self-report* a sense of disorganization in their trauma narratives (see: O'Kearney & Perrott, 2006; Rubin, 2011). Thus, even if actual disorganization does not matter, we wondered whether a sense of disorganization might make people work harder to extract the meaning out of a traumatic event and establish coherence in their memory. If so, then this memory work might exert other potentially adverse effects on traumatic memory, such as remembering more trauma than was experienced.

1.1. Memory distortion in trauma

Converging evidence demonstrates that personal experiences of trauma are vulnerable to memory distortion. Importantly, people

* Corresponding author. John Jay College of Criminal Justice, Department of Psychology, 524 West 59th Street, New York, NY 10019, USA.
E-mail address: dstrange@jjay.cuny.edu (D. Strange).

http://dx.doi.org/10.1016/j.jbtep.2015.07.003
0005-7916/

tend to remember experiencing more trauma than they actually experienced and this pattern of memory distortion is associated with greater PTSD symptom severity over time (e.g., Engelhard, van den Hout, & McNally, 2008; Giosan, Malta, Jayasinghe, Spielman, & Difede, 2009).

To determine whether the same pattern would appear in the laboratory, we asked participants to watch a short film depicting a fatal car accident (Strange & Takarangi, 2012). We removed select scenes from the film—both traumatic (e.g., child screaming for her parents; as determined by pilot testing $M = 4.64$, $SD = .66$; 1 = not at all traumatic; 7 = extremely traumatic) and non-traumatic (e.g., arrival of rescue helicopter; $M = 2.33$, $SD = .77$) and gave participants a surprise recognition memory test comprised of Old (seen before), Missing (scenes we had removed), and New (never seen) scenes. Participants claimed to have seen 26% of the missing scenes and were more likely to falsely remember seeing missing traumatic compared to non-traumatic scenes. Moreover, over-remembering trauma was related to more frequent analogue PTSD symptoms. We proposed that this over-remembering occurs, in part, because of failures in people's source monitoring.

The Source Monitoring Framework (SMF; Johnson, Hashtroudi, & Lindsay, 1993b, 2008) suggests memory errors typically occur because we do not label memories based on their association with a particular event. Instead, we rely on simple heuristics—how familiar the details feel—to determine whether a remembered detail was a part of the event. Unfortunately, post-event processing—such as imagining additional details or learning new information from another source—affect the familiarity of those new details, and memory errors occur. Therefore, the number of missing clips our participants falsely recall should be affected by the ease with which they can monitor the source of their memories.

1.2. Encoding processes in trauma

According to Ehlers and Clark's (2000) cognitive model of PTSD, people's processing strategies at encoding are also critical to the development of PTSD. Drawing on basic cognitive research (Roediger, 1990) and theories of autobiographical memory (Conway & Pleydell-Pearce, 2000), they suggested that conceptual processing during a traumatic event—focusing on what the event means—determines the clarity of the resulting memory, how well it is integrated with our autobiography, and how easy it is to intentionally retrieve information from that memory. This conclusion certainly fits with typical findings in cognitive psychology whereby conceptually processed material is unfailingly better remembered than material laden with sensory impressions—i.e., data-driven material (e.g., Jacoby, 1983; Morris, Bransford, & Franks, 1977; Roediger, Weldon, & Challis, 1989; Roediger, 1990). Importantly though, Ehlers and Clark further suggested that people who are particularly confused or overwhelmed by data-driven processing are more likely to exhibit the problems with intentional and unintentional memory that are symptomatic of PTSD (see also, Ehlers, Hackmann, & Michael, 2004). However, there is little consistent empirical evidence to support this proposal.

First, recent research by Berntsen and Rubin (2014) contradicts the assumption that people with PTSD exhibit difficulty intentionally recalling some aspect of the event. They found that people rated the frequency of voluntary and involuntary recall of their most important event—whether extremely positive or negative—as similar, and that negative voluntary and involuntary memories were recalled slightly more often than more mundane memories (see also, Berntsen & Rubin, 2008; Ferree & Cahill, 2009; Hall & Berntsen, 2008; Rubin, Boals, & Berntsen, 2008; Rubin, Dennis, & Beckham, 2011). Most importantly, they found that it is having trouble forgetting, rather than remembering, that is more important to PTSD.

Second, researchers have typically taken three different approaches to testing the effects of encoding processes on subsequent symptoms of PTSD: either providing an instruction to encode the event in a particular manner (e.g., Halligan, Clark, & Ehlers, 2002), providing additional contextual information about the event (e.g., Pearson, 2012), or requiring participants to complete a concurrent task during encoding (e.g., a visualspatial finger-tapping task; Holmes, Brewin, & Hennessy, 2004), which is a more indirect test of the effects of encoding processes. Some of these studies have found support for the proposal that conceptual processing reduces the likelihood of PTSD symptoms (e.g., Bourne, Fasquilho, Roth, & Holmes, 2010; Halligan Michael, Clark, & Ehlers, 2003; Harvey & Bryant, 1999), others suggest it might increase the likelihood of PTSD symptoms by creating more integrated and varied associations in autobiographical memory (e.g., Krans, Langner, Reinecke, & Pearson, 2013; Krans, Näring, & Becker, 2009; Pearson, 2012; Pearson, Ross, & Webster, 2012). However, the studies to date have some limitations.

For example, Halligan et al. (2002) asked participants to process film depicting a compilation of traffic accidents, either in a data-driven manner—focusing on sights, sounds, and sensations—or in a conceptual manner—focusing on what was happening in each scene and why. Participants in the data-driven condition recalled fewer events on a free-recall memory test, but, data-driven processing did not produce more PTSD symptoms than conceptual processing. Unfortunately, the study lacked a control group that received no processing instruction. Hence, we do not know whether data-driven participants remembered less than what would be expected with no instruction or whether conceptual participants remembered more. Moreover, Halligan et al. operationalized disorganization by obtaining independent ratings of coherence in participants' free recall narratives of the film. However, compilation footage—which is typically disorganized with no clear story—is not a good proxy; the 'event' has no clear meaning for participants to extract and create a coherent story.

Taken together, what this literature is missing is an experimental analogue of an objectively disorganized memory. Thus, we showed participants a traumatic film depicting a fatal car accident, with a clear beginning, middle and end to the story. We manipulated the film's temporal organization to control how participants encoded the event. Half our participants saw the scenes unfold in their correct temporal sequence. The remainder saw a temporally disorganized version in which the scenes played out in a random sequence (thus, implanting a disorganized memory of the trauma film). To assess the importance of people's subsequent event processing, we asked some participants to focus on the meaning of the event (conceptual instruction), some to focus on the sights and sounds (data-driven instruction), and some received no instruction (control). Thus, we manipulated conceptual versus data-driven processing in two ways: a) how participants experienced the event and b) their subsequent processing of the event, allowing us to determine the effects of a disorganized memory both with and without an additional processing instruction.

Despite the mixed data, we made several predictions. First, we expected participants exposed to both the disorganized trauma film and the conceptual processing instruction to be more motivated to extract meaning out of the event than participants who received either the data-driven processing instruction or no instruction. Their "memory work," should lead to a) more frequent analogue symptoms of PTSD and b) a greater degree of memory