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Individual differences in experiencing intrusive memories: The role of the ability to resist proactive interference

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ABSTRACT

This study explored whether a relatively poor ability to resist or inhibit interference from irrelevant information in working memory is associated with experiencing undesirable intrusive memories. Non-selected participants ($N = 91$) completed a self-report measure of intrusive memories, and carried out experimental tasks intended to measure two different types of inhibition: resistance to proactive interference and response inhibition (i.e., the ability to prevent automatically triggered responses). The results showed a significant relationship between inhibition at the cognitive level (i.e., resistance to proactive interference) and the frequency of intrusive memories (especially in the group of female participants) whereas no such relationship with measures of response inhibition emerged. These findings are consistent with the idea that deficient inhibitory control reflects a vulnerability factor for experiencing intrusive memories. Implications for research investigating risk factors for the development of posttraumatic stress disorder (PTSD) are discussed.

1. Introduction

There is evidence that most people will be exposed to at least one extremely threatening situation during the course of their lives (Ozer, Best, Lipsey, & Weiss, 2003). In a study among 900 US college students, the prevalence rate of having experienced a potentially traumatic event was found to be around 67% (Bernat, Ronfeldt, Calhoun, & Arias, 1998). There is, however, a great variety in how people

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deal with these highly aversive experiences. In the immediate aftermath of a traumatic event, most people report elevated levels of psychopathology, but only a minority of them will eventually develop chronic PTSD (McNally, Bryant, & Ehlers, 2003). The core symptoms of PTSD consist of persistent avoidance of stimuli associated with the trauma, increased arousal levels (e.g., hyper vigilance, exaggerated startle response) and intrusive re-experiencing, including recurring images, flashbacks, nightmares and distress when confronted with reminders of the traumatic event (American Psychiatric Association, 2000). Considering this, one of the intriguing puzzles surrounding research on PTSD is identifying the underlying cognitive mechanisms that could set people at risk for the maintenance of trauma-related symptoms.

Knowledge of the underlying mechanisms could help explaining why and how well-known pre-trauma risk factors (see Brewin, Andrews, & Valentine, 2000; Ozer et al., 2003 for reviews) are involved in pathological responses such as intrusive memories. Cognitive theories of PTSD clearly describe the development of intrusive symptoms due to problems with encoding [e.g., *perceptual processing* (Ehlers & Clark, 2000)], storage [*Situational Accessible Memories* (SAM, Brewin, Dalgleish, & Joseph, 1996)] and retrieval [*Cue-driven retrieval* due to strong associative learning (Ehlers & Clark, 2000)] of the traumatic event. However, the question of how individual differences in posttraumatic psychopathology may be explained by pre-trauma information-processing properties that act as vulnerability factors remains largely unanswered. For example, there is convincing evidence that relatively low pre-morbid intelligence is an important predictor of chronic PTSD symptoms (e.g., Kaplan et al., 2002; Macklin et al., 1998; McNally, 2003), but little is known about the underlying cognitive mechanisms relating intelligence to pathological responses to trauma.

Interestingly, recent developments in the experimental memory literature suggest that specific cognitive deficits existing *prior* to the occurrence of a traumatic event may hamper natural recovery of intrusive re-experiencing that is part of the common posttraumatic response. For example, there is some evidence suggesting that individual differences in working memory capacity (WMC) might play a role in the maintenance of intrusive memories. It has been proposed that WMC reflects a domain-general capability to control attention, which is particularly important in situations involving proactive interference or conflict between competing response tendencies (Engle, 2002). In two studies, Brewin et al. (Brewin & Beaton, 2002; Brewin & Smart, 2005) showed a positive relationship between WMC and the ability to block neutral or personally relevant thoughts from entering working memory. It has been suggested that individual differences on indices of WMC (e.g., Operation Span; Turner & Engle, 1989) reflect the capability to actively inhibit interference from events stored in long-term memory (Kane & Engle, 2000; Lustig, Hasher, & May, 2001; Rosen & Engle, 1998). In this light, the question arises whether deficient inhibitory control may function as a specific vulnerability factor for the persistence of intrusive memories in the aftermath of a traumatic event.

Preliminary evidence for this idea comes from a study of Klein and Boals (2001). In this study employing healthy undergraduate students, the frequency of experiencing intrusive and avoidance symptoms related to a potentially traumatic event was relatively high in people with relatively low WMC (Klein & Boals, 2001). In addition, an earlier study found that people who described themselves as highly distractible (which might be taken as an analogue to performance on WMC tasks) also reported a relatively high frequency of intrusive memories (Verwoerd & Wessel, 2007). The preceding studies have provided indirect evidence for the idea that relatively weak inhibitory control over the contents of working memory might be responsible for individual differences in the experience of unwanted intrusive memories. To further explore this issue, the present retrospective study focused on the relationship between deficient inhibitory control and the frequency of experiencing intrusive memories in an unselected student sample.

It has been suggested that inhibition serves different functions (Hasher, Zacks, & May, 1999) and may even consist of two or more independent mechanisms (Friedman & Miyake, 2004). For example, one type of inhibition involves controlling automatically triggered prepotent responses in order to carry out an effortful primary and compatible response. A lack of such response inhibition seems to be involved in dysfunctional impulsive behavior (Nigg, 2000). Alternatively, inhibition may act on a more cognitive level and involve the ability to resist interference from information that was previously relevant to the task at hand, but has since become irrelevant because of a change in context (Friedman & Miyake, 2004; Hasher et al., 1999). Intrusive memories may be seen as a profound example of