

# Understanding and Treating Unwanted Trauma Memories in Posttraumatic Stress Disorder

Anke Ehlers

Department of Psychology, Institute of Psychiatry, King's College London, UK

Distressing and intrusive reexperiencing of the trauma is a hallmark symptom of posttraumatic stress disorder (PTSD; American Psychiatric Association, 1994). However, unwanted memories of trauma are not a sign of pathology per se. In the initial weeks after a traumatic experience, intrusive memories are common. For most trauma survivors, intrusions become less frequent and distressing over time. A central question for understanding and treating patients with PTSD is therefore what *maintains* distressing intrusive reexperiencing in these people. Three factors appear to be important: (1) memory processes responsible for the easy triggering of intrusive memories, (2) the individuals' interpretations of their trauma memories, and (3) their cognitive and behavioral responses to trauma memories.

## Characteristics of Reexperiencing in PTSD

Clues about the memory processes underlying reexperiencing symptoms in PTSD can be drawn from their phenomenological characteristics. Note that unlike the convention in DSM-IV (American Psychiatric Association, 1994), which classifies ruminative thoughts about the trauma such as "Why did it happen to me" or "If only I had . . ." as a part of reexperiencing, the author distinguishes between intrusive memories and rumination about the trauma (Ehlers & Clark, 2000; Ehlers & Steil, 1995). Evidence is accumulating that these cognitions are phenomenologically and functionally distinct (e.g., Evans, Ehlers, Mezey, & Clark, 2007b; Speckens, Ehlers, Hackmann, Ruths, & Clark, 2007).

Systematic comparisons of *intrusive trauma memories* in people with and without PTSD pointed to many important similarities. The intrusions most commonly take the form of relatively brief, vivid sensory impressions such as images, sounds, body sensations, tastes, or smells (e.g., Ehlers et al., 2002; Michael, Ehlers, & Halligan, 2005a). Yet, there are also a number of differences between the intrusions in people with and without PTSD. These have been shown to predict chronic PTSD, over and above what can be predicted from the frequency of early intrusions, and shown to change

with successful therapy (Hackmann, Ehlers, Speckens, & Clark, 2004; Michael, Ehlers, Halligan, & Clark, 2005b; Speckens, Ehlers, Hackmann, & Clark, 2006).

(1) *Nowness*: Trauma survivors with PTSD describe to a greater extent that their intrusive memories appear to happen in the *here and now* than those without PTSD (Michael et al., 2005b). Most dramatically, in a posttraumatic flashback people lose all contact with current reality and respond as if the trauma was happening at that moment (see, e.g., Ehlers, Hackmann, & Michael, 2004). To a lesser degree, this sense of *nowness* is also characteristic of other intrusive trauma memories in PTSD (Michael et al., 2005b). Furthermore, people with PTSD may also show *affect without recollection* (Ehlers & Clark, 2000), that is, emotions and behavior from the trauma *without* having a conscious memory of the trauma (e.g., collapsing in a fetal position when seeing someone who resembles the assailant). Thus, some of the reexperiencing symptoms lack the *autonoetic awareness* which is a defining feature of episodic memories (Tulving, 2002).

(2) *Lack of context*: Intrusive memories in PTSD lack contextual information and appear *disjointed* from other relevant autobiographical information (Ehlers et al., 2004; Michael et al., 2005b). People with PTSD keep reexperiencing moments of the trauma and the corresponding emotions (e.g., when they believed they would never see their children again), even if they know the predicted outcome did not occur. Thus, during intrusive trauma memories, people with PTSD have difficulties retrieving other information that corrected their original impressions and predictions during these moments or their meanings.

(3) *Ease of triggering by matching cues*: In PTSD, a wide range of situations can trigger intrusive memories, including those that do not have an obvious meaningful connection with the trauma and those that the individual does not recognize as triggers. This has the effect that intrusions may appear to come "out of the blue." Closer analysis of these situations shows that triggers often have *sensory* similarities with stimuli present shortly before or during the trauma (e.g., similar color, shape, smell, or body sensation; Ehlers et al., 2002).

(4) *Distress*: Trauma survivors with PTSD describe their intrusive memories as more distressing than those without PTSD (e.g., Michael et al., 2005b).

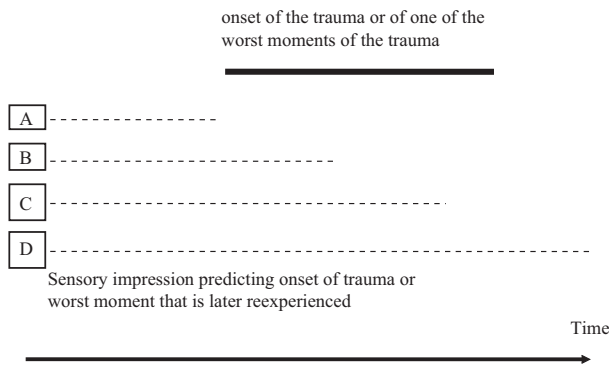


Figure 1. Warning signal hypothesis of intrusive memories (Ehlers et al., 2002). Possible temporal relationships between content of intrusion and worst moments of the trauma.

## What Is Reexperienced?

Many things happen during a traumatic event. What determines what is later reexperienced? Patients with PTSD reported in systematic interviews that they reexperienced brief moments from the trauma such as “hearing footsteps behind me” or “seeing the perpetrator stand before me with a knife” (Ehlers et al., 2002). Further analysis of these intrusions indicated that they represented sensory impressions that signaled the onset of the trauma or the onset of its worst moments. Ehlers et al. (2002) therefore suggested that the intrusions had functional significance in that they represented stimuli that predicted the worst moments of trauma and had thus acquired the status of warning signals, consistent with modern associative learning models that highlight the information value of conditioned stimuli (CS) in predicting the unconditioned stimuli (UCS) (Rescorla, 1988). Thus, in Pavlovian conditioning terms, it appears that people with PTSD reexperience the CS rather than the UCS after trauma. Evidence for this hypothesis comes from studies of PTSD patients and violent offenders who had intrusive memories of their crime (Evans, Ehlers, Mezey, & Clark, 2007a; Hackmann et al., 2004).

Ehlers et al.’s (2002) emphasis that the sensory impressions that are later reexperienced *preceded* the trauma or its worst moments has been interpreted by some authors (e.g., Berntsen & Rubin, 2008) as meaning that they needed to be *finished* before trauma onset (Possibility A in Figure 1). However, consistent with what is known about CS in Pavlovian conditioning (Rescorla, 1988), the hypothesis concerns sensory impressions that *started* just before the worst moment and thus had *predictive* information value. They may well have still been present during the worst moment (this includes possibilities B to D in Figure 1). Furthermore, it is important to note that the worst moments of the trauma are defined *subjectively* in Ehlers et al. (2002), from the perspective of the individual with PTSD, not from the perspective of what other people may find most

distressing. Furthermore, it is important to note that in prolonged trauma, there are usually several moments when the meaning of the event changed for the worse, and each of them may be represented in reexperiencing.

## Hypothesized Memory Mechanisms Underlying Reexperiencing

Ehlers and Clark (2000) suggested that reexperiencing and the ease with which it is triggered in PTSD can be explained by a combination of three memory processes, namely strong perceptual priming, strong associative learning, and poor memory elaboration (binding with other information in autobiographical memory). Experimental evidence for the role of each of these processes in reexperiencing is emerging (e.g., priming: Ehlers, Michael, Chen, Payne, & Shan, 2006; Michael & Ehlers, 2007; Michael et al., 2005a; associative learning: Sündermann, Ehlers, Böllinghaus, Gamer, & Glucksman, 2010; Wessa & Flor, 2007; poor binding with other autobiographical information: Kleim, Wallott, & Ehlers, 2008).

The description of phenomenological characteristics of reexperiencing and intentional trauma recall in PTSD by Ehlers and Clark (2000) has been interpreted by some theorists (Berntsen, 2009) as an argument for *special mechanisms* that are unique to trauma memories. This is incorrect. The Ehlers and Clark (2000) model proposes that the phenomenology of reexperiencing can be explained by the above three basic memory processes. One important difference between the Ehlers and Clark (2000) model and other approaches that aim to explain involuntary memories of trauma by general memory mechanisms (Berntsen, 2009; Rubin, Boals, & Berntsen, 2008) is the range of memory phenomena under consideration. Whereas Ehlers and Clark’s (2000) model was developed to explain the full range of intrusive reexperiencing in PTSD, including those that lack auto-noetic awareness, Berntsen (2009) and Rubin et al. (2008) only include the involuntary retrieval of memory content that is recognized by the individual as a trauma memory. Berntsen (2009) explicitly excludes involuntary auditory and visual imagery that is not deemed autobiographical and “phenomena in which the involuntary mental contents overrule reality more or less completely” (p. 15). Thus, many of the phenomena that the Ehlers and Clark (2000) theory aims to explain (such as flashbacks where patients lose all contact with current reality, other intrusions that are not recognized by the individual as a memory, reexperiencing strong emotions, physiological reactions, or behavior from the trauma without recollection of the trauma), are excluded from consideration. However, these phenomena are important for understanding PTSD and for developing effective treatments. The wider range of reexperiencing symptoms under consideration explains why the Ehlers and Clark (2000) model emphasizes memory processes that facilitate cue-driven reexperiencing, namely priming and associative learning.

## Are There Deficits in the Intentional Recall of Trauma Memories?

Several theorists suggest that compromised cognitive processing during the trauma leads to *deficits in intentional recall* of the trauma. Different hypotheses about the nature of this deficit have been suggested in the literature, for example, a deficit in memory representations that facilitate intentional recall (Brewin, Dalgleish, & Joseph, 1996) or highly fragmented memories (e.g., Foa & Rothbaum, 1998; van der Kolk & Fisler, 1995). Building on the work on transfer-appropriate processing (for a review see Roediger, 1990), Ehlers and Clark (2000) suggested that data-driven processing during trauma (i.e., the predominant processing the sensory impressions) will facilitate strong perceptual priming for accompanying stimuli and (in combination with a lack of self-referent processing) will lead to relatively weaker intentional recall of the worst moments of the trauma.

Other theorists (Berntsen, 2009; Rubin et al., 2008) predict the opposite and hypothesize that trauma memories are highly accessible so that intentional and unintentional retrieval is enhanced. Empirical tests of these hypotheses in clinical populations are sparse (for reviews see Ehlers et al., 2004; McNally, 2003). There is very little evidence for complete psychogenic amnesia (Evans et al., 2009; McNally, 2003, but also see Markowitsch et al., 1998). Unless there are organic causes for poor memory (e.g., head injury or drugs), trauma survivors usually remember most of what happened. There is evidence, however, for more subtle problems with intentional recall. People with PTSD may be confused about the order of events, have small gaps in memory, or may fail to remember details that are important for the meaning of especially distressing parts of the event (e.g., a rape survivor who blamed herself for not fighting the perpetrator did not remember that he had threatened her with a knife beforehand). Trauma survivors with PTSD give more disorganized narratives of traumatic events than those without PTSD (e.g., Halligan, Michael, Clark, & Ehlers, 2003; Harvey & Bryant, 1999).

In the author's view, the controversy about deficient versus enhanced intentional recall of trauma in PTSD can be resolved by considering the trauma as a series of events rather than one event (Ehlers et al., 2004). Earlier work defines the traumatic event from an external point of view and refers to the memory for this externally defined event as "the trauma memory." The author believes that this is misleading. From the trauma survivors' perspective, the traumatic experience may have several distinct parts that are not necessarily remembered as one integrated event. For example, Ehlers and Clark (2000) described a patient with PTSD who had intrusive memories that contradicted each other and stemmed from different parts of the (prolonged) traumatic event. Furthermore, it is important to bear in mind that only some moments from the traumatic event are later reexperienced. Thus, the proposed problems in intentional retrieval may mainly apply to the memory for these moments. In line with this argument, Evans et al. (2007a) found that narratives of the moments that were reexperienced were more disorganized than other segments of the trauma

narrative that were not; furthermore in 23% of the cases these moments were not included in the narrative at all.

Further clarity is needed about the exact nature of the problems in voluntary recall of parts of the trauma memory in PTSD and the pathways by which they contribute to the persistence of PTSD. Ehlers et al. (2004) suggested that the *disjointedness* of the memories of the worst moments during the trauma from other relevant autobiographical information is particularly relevant in PTSD. Kleim et al. (2008) found experimental support for this hypothesis. Disjointedness has the effect that when the individual remembers the worst moments, they have difficulty accessing other information that puts the meaning of these moments into perspective. This maintains a sense of current threat (Ehlers & Clark, 2000). Furthermore, poor memory elaboration is thought to contribute to reexperiencing as it leads to poor inhibition of cue-driven retrieval. Note that this would only be expected to lead to distressing reexperiencing symptoms if there is also strong priming for potential triggers and strong associations between the triggers and emotional responses as (Ehlers & Clark, 2000; Ehlers et al., 2004).

## Nontrauma Autobiographical Memories in PTSD

People with and without PTSD also differ in how they remember other events in their lives. Like people with depression, those with PTSD have difficulty remembering specific autobiographical events (see Moore & Zoellner, 2007, for a review). This effect is not due to differences in verbal intelligence (Schönfeld & Ehlers, 2006). Low autobiographical memory specificity at 2 weeks after trauma predicts chronic PTSD (Kleim & Ehlers, 2008).

## Relationship Between Memory and Appraisals in PTSD

An important predictor of chronic PTSD is how people *interpret* their memories of the trauma. Ehlers and Steil (1995) suggested that people with PTSD show negative idiosyncratic interpretations of intrusive trauma memories such as "I am going crazy," which lead to a sense of ongoing threat and distress, and motivate dysfunctional control strategies such as rumination, memory suppression, and excessive safety-seeking behaviors that maintain PTSD. Prospective longitudinal studies of trauma survivors supported this suggestion (e.g., Dunmore, Clark, & Ehlers, 2001; Ehlers, Mayou, & Bryant, 1998; Ehring, Ehlers, & Glucksman, 2008; Halligan, Michael, Clark, & Ehlers, 2003; Michael, Halligan, Clark, & Ehlers, 2007; Murray, Ehlers, & Mayou, 2002; Steil & Ehlers, 2000).

Similarly, Ehlers and Clark (2000) suggested that negative interpretations of problems in intentional recall such as memory gaps or difficulties in remembering the exact order of events (e.g., "I must have a brain damage" and "Something

even worse and unbearable must have happened”) contribute to the maintenance of PTSD. Studies by Dunmore et al. (2001) and Halligan et al. (2003) supported this suggestion.

Furthermore, what is remembered can contribute to problematic appraisals of the trauma. Problems in remembering the order of events can contribute to self-blame for the event (Ehlers & Clark, 2000). Low autobiographical memory specificity contributes to appraisals of being permanently changed (Schönfeld, Ehlers, Böllinghaus, & Rief, 2007).

## Clinical Implications

The above analysis of memory processes in PTSD and their link with problematic appraisals and behaviors that maintain PTSD has led to the development of specific theory-guided treatment procedures for this condition (Ehlers & Clark, 2000; Ehlers, Clark, Hackmann, McManus, & Fennell, 2005).

The *Updating Trauma Memories* procedure addresses the *disjointedness* of memories of the worst moments of the trauma from information that gives them a less threatening meaning. This procedure includes (1) identifying the moments during the trauma that create the greatest distress and sense of “nowness” (“hotspots”) through imaginal reliving or writing a narrative, and identification of the patient’s intrusive memories, (2) identifying the personal meanings of these moments, and (3) identifying “updating” information that puts the impressions the patient had at the time or the problematic meanings into perspective. This information can be either relevant details from the course, circumstances, and outcome of the trauma or the result of cognitive restructuring of the highly idiosyncratic meanings of the trauma, and (4) actively linking the updating information to the hotspots in memory, for example, by bringing the hotspot vividly to mind and simultaneously using verbal reminders, images, incompatible actions, or incompatible sensations to remind the patient of the new meanings.

*Stimulus discrimination training* addresses the *easy triggering* of intrusive memories by matching sensory cues. Patients learn to identify the subtle sensory triggers of reexperiencing and learn to realize that they are responding to a memory. They learn to pay close attention to the differences between the harmless trigger and its present context (“now”) and the stimulus configuration that occurred in the context of trauma (“then”).

*Reclaiming your life* homework assignments address appraisals of permanent change and problems in retrieving specific memories of the patient’s life before the trauma. These assignments involve doing things that the patient has given up since the trauma, for example, resuming social contacts, sports, or other leisure activities. These activities provide retrieval cues for specific memories of themselves before the trauma.

Negative interpretations of intrusive memories and problems in intentional recall are addressed through information, cognitive restructuring, and behavioral experiments. The patient is encouraged to experiment with dropping dysfunc-

tional behaviors such as rumination, hypervigilance, and excessive precautions.

The treatment program (*Cognitive Therapy for PTSD*) has been shown to be highly effective and acceptable to patients with PTSD after a range of traumas in randomized controlled trials and effectiveness studies (Duffy, Gillespie, & Clark, 2007; Ehlers et al., 2003, 2005; Gillespie, Duffy, Hackmann, & Clark, 2002; Smith et al., 2007).

## Acknowledgments

The work described here was funded by the Wellcome Trust (069777).

## References

- American Psychiatric Association. (Ed.). (1994). *Diagnostic and statistical manual of mental disorders* (4th ed.). Washington, DC: American Psychiatric Association.
- Berntsen, D. (2009). *Involuntary autobiographical memories*. Cambridge, UK: Cambridge University Press.
- Berntsen, D., & Rubin, D.C. (2008). The reappearance hypothesis revisited: Recurrent involuntary memories after traumatic events and in everyday life. *Memory & Cognition*, *36*, 449–460.
- Brewin, C.R., Dalgleish, T., & Joseph, S. (1996). A dual representation theory of posttraumatic stress disorder. *Psychological Review*, *103*, 670–686.
- Duffy, M., Gillespie, K., & Clark, D. M. (2007). Post-traumatic stress disorder in the context of terrorism and other civil conflict in Northern Ireland: Randomised controlled trial. *British Medical Journal*, *334*, 1147–1150.
- Dunmore, E., Clark, D. M., & Ehlers, A. (2001). A prospective study of the role of cognitive factors in persistent posttraumatic stress disorder after physical or sexual assault. *Behaviour Research and Therapy*, *39*, 1063–1084.
- Ehlers, A., & Clark, D. M. (2000). A cognitive model of posttraumatic stress disorder. *Behaviour Research and Therapy*, *38*, 319–345.
- Ehlers, A., Clark, D. M., Hackmann, A., McManus, F., & Fennell, M. (2005). Cognitive therapy for PTSD: Development and evaluation. *Behaviour Research and Therapy*, *43*, 413–431.
- Ehlers, A., Clark, D. M., Hackmann, A., McManus, F., Fennell, M., Herbert, C., et al. (2003). A randomized controlled trial of cognitive therapy, self-help booklet, and repeated assessment as early interventions for PTSD. *Archives of General Psychiatry*, *60*, 1024–1032.
- Ehlers, A., Hackmann, A., & Michael, T. (2004). Intrusive reexperiencing in posttraumatic stress disorder: Phenomenology, theory, and therapy. *Memory*, *12*, 403–415.
- Ehlers, A., Hackmann, A., Steil, R., Clohessy, S., Wenninger, K., & Winter, H. (2002). The nature of intrusive memories after trauma: The warning signal hypothesis. *Behaviour Research and Therapy*, *40*, 1021–1028.
- Ehlers, A., Mayou, R. A., & Bryant, B. (1998). Psychological predictors of chronic PTSD after motor vehicle accidents. *Journal of Abnormal Psychology*, *107*, 508–519.
- Ehlers, A., Michael, T., Chen, Y. P., Payne, E., & Shan, S. (2006). Enhanced perceptual priming for neutral stimuli in a traumatic context: A pathway to intrusive memories? *Memory*, *14*, 345–358.

- Ehlers, A., & Steil, R. (1995). Maintenance of intrusive memories in posttraumatic stress disorder: A cognitive approach. *Behavioural and Cognitive Psychotherapy*, *23*, 217–249.
- Ehring, T., Ehlers, A., & Glucksman, E. (2008). Do cognitive models help in predicting the severity of posttraumatic stress disorder, phobia and depression after motor vehicle accidents? A prospective longitudinal study. *Journal of Consulting and Clinical Psychology*, *76*, 219–230.
- Evans, C., Ehlers, A., Mezey, G., & Clark, D. M. (2007a). Intrusive memories in perpetrators of violent crime: Emotions and cognitions. *Journal of Consulting and Clinical Psychology*, *75*, 134–144.
- Evans, C., Ehlers, A., Mezey, G., & Clark, D. M. (2007b). Intrusive memories and ruminations related to violent crime among young offenders: Phenomenological characteristics. *Journal of Traumatic Stress*, *20*, 183–196.
- Evans, C., Mezey, G., & Ehlers, A. (2009). Amnesia for violent crime. *The Journal of Forensic Psychiatry and Psychology*, *20*, 85–106.
- Foa, E. B., & Rothbaum, B. O. (1998). *Treating the trauma of rape. Cognitive-behavior therapy for PTSD*. New York: Guilford.
- Gillespie, K., Duffy, M., Hackmann, A., & Clark, D. M. (2002). Community based cognitive therapy in the treatment of posttraumatic stress disorder following the Omagh bomb. *Behaviour Research and Therapy*, *40*, 345–357.
- Hackmann, A., Ehlers, A., Speckens, A., & Clark, D. M. (2004). Characteristics and content of intrusive memories in PTSD and their changes with treatment. *Journal of Traumatic Stress*, *17*, 231–240.
- Halligan, S. L., Michael, T., Clark, D.M., & Ehlers, A. (2003). Posttraumatic stress disorder following assault: The role of cognitive processing, trauma memory, and appraisals. *Journal of Consulting and Clinical Psychology*, *71*, 419–431.
- Harvey, A. G., & Bryant, R. A. (1999). A qualitative investigation of the organization of traumatic memories. *British Journal of Clinical Psychology*, *38*, 401–405.
- Kleim, B., & Ehlers, A. (2008). Reduced autobiographical memory specificity predicts depression and posttraumatic stress disorder after recent trauma. *Journal of Consulting and Clinical Psychology*, *76*, 231–242.
- Kleim, B., Wallott, F., & Ehlers, A. (2008). Are trauma memories disjointed from other autobiographical memories in PTSD? An experimental investigation. *Behavioural and Cognitive Psychotherapy*, *36*, 221–234.
- Markowitsch, H. J., Kessler, J., Van der Ven, C., Weber-Luxemburger, G., Albers, M., & Heiss, W. D. (1998). Psychic trauma causing grossly reduced brain metabolism and cognitive deterioration. *Neuropsychologia*, *36*, 77–82.
- McNally, R. J. (2003). *Remembering trauma*. Cambridge, MA: The Belknap Press/Harvard University Press.
- Michael, T., & Ehlers, A. (2007). Enhanced perceptual priming for neutral stimuli occurring in a traumatic context: Two experimental investigations. *Behaviour Research and Therapy*, *45*, 341–358.
- Michael, T., Ehlers, A., & Halligan, S. L. (2005a). Perceptual priming for trauma-related material in posttraumatic stress disorder. *Emotion*, *5*, 103–112.
- Michael, T., Ehlers, A., Halligan, S., & Clark, D.M. (2005b). Unwanted memories of assault: What intrusion characteristics predict PTSD? *Behaviour Research and Therapy*, *43*, 613–628.
- Michael, T., Halligan, S., Clark, D. M., & Ehlers, A. (2007). Rumination in posttraumatic stress disorder. *Depression and Anxiety*, *24*, 307–317.
- Moore, S. A., & Zoellner, L. A. (2007). Overgeneral autobiographical memory and traumatic events: An evaluative review. *Psychological Bulletin*, *133*, 419–437.
- Murray, J., Ehlers, A., & Mayou, R. A. (2002). Dissociation and posttraumatic stress disorder: Two prospective studies of road traffic accident victims. *British Journal of Psychiatry*, *180*, 363–368.
- Rescorla, R. A. (1988). Pavlovian conditioning. It's not what you think it is. *American Psychologist*, *43*, 151–160.
- Roediger, H. L. (1990). Implicit memory: Retention without remembering. *American Psychologist*, *45*, 1043–1056.
- Rubin, D. C., Boals, A., & Berntsen, D. (2008). Memory on posttraumatic stress disorder: Properties of voluntary and involuntary, traumatic and nontraumatic autobiographical memories in people with and without posttraumatic stress disorder symptoms. *Journal of Experimental Psychology: General*, *137*, 591–614.
- Schönfeld, S., & Ehlers, A. (2006). Overgeneral memory extends to pictorial retrieval cues and correlates with cognitive features in posttraumatic stress disorder. *Emotion*, *6*, 611–622.
- Schönfeld, S., Ehlers, A., Böllinghaus, I., & Rief, W. (2007). Overgeneral memory and suppression of trauma memories in posttraumatic stress disorder. *Memory*, *15*, 339–352.
- Smith, P., Yule, W., Perrin, S., Tranah, T., Dalgleish, T., & Clark, D. M. (2007). Cognitive-behavioral therapy for PTSD in children and adolescents: A preliminary randomized controlled trial. *Journal of the American Academy of Child and Adolescent Psychiatry*, *46*, 1051–1061.
- Speckens, A. E. M., Ehlers, A., Hackmann, A., & Clark, D. M. (2006). Changes in intrusive memories associated with imaginal reliving in posttraumatic stress disorder. *Journal of Anxiety Disorders*, *20*, 328–341.
- Speckens, A., Ehlers, A., Hackmann, A., Ruths, F., & Clark, D. M. (2007). Intrusions and rumination in patients with posttraumatic stress disorder: A phenomenological study. *Memory*, *15*, 249–257.
- Steil, R., & Ehlers, A. (2000). Dysfunctional meaning of posttraumatic intrusions in chronic PTSD. *Behaviour Research and Therapy*, *38*, 537–558.
- Sündermann, O., Ehlers, A., Böllinghaus, I., Gamer, M., & Glucksman, E. (2010). Early heart rate responses to standardized trauma-related pictures predict posttraumatic stress disorder – a prospective longitudinal study. *Psychosomatic Medicine*, *72*, 302–310.
- Tulving, E. (2002). Episodic memory. *Annual Review of Psychology*, *53*, 1–25.
- van der Kolk, B. A., & Fisler, R. (1995). Dissociation and the fragmentary nature of traumatic memories: Overview and exploratory study. *Journal of Traumatic Stress*, *8*, 505–525.
- Wessa, M., & Flor, H. (2007). Failure of extinction of fear responses in posttraumatic stress disorder: Evidence from second-order conditioning. *American Journal of Psychiatry*, *164*, 1684–1692.

---

Anke Ehlers

---

Department of Psychology (PO77)  
King's College London  
Institute of Psychiatry  
De Crespigny Park  
London SE5 8AF  
UK  
Tel. +44 20 7848 5033  
Fax +44 20 7848 0591  
E-mail anke.ehlers@kcl.ac.uk

---