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Dysfunctional meaning of posttraumatic intrusions in chronic PTSD

Regina Steil^{a,*}, Anke Ehlers^b

^a*Institute of Psychology, Friedrich-Schiller University of Jena, Germany*

^b*Department of Psychiatry, Warneford Hospital, University of Oxford, UK*

Abstract

The paper suggests that the negative idiosyncratic meaning of posttraumatic intrusions (e.g., ‘I am going crazy’) and cognitive strategies intended to control the intrusions play a major role in maintaining posttraumatic stress disorder. Two studies of 159 and 138 motor vehicle accidents survivors showed that the dysfunctional meaning of intrusions explained a proportion of the variance of the intrusion-related distress, strategies used to end the intrusions, and PTSD severity that was not explained by intrusion frequency, accident severity, or by general catastrophic thoughts when anxious. Rumination, thought suppression, and distraction when having intrusions showed substantial correlations with PTSD severity, as did avoidance of reminders of the accident. The results have implications for the treatment of chronic PTSD. © 2000 Elsevier Science Ltd. All rights reserved.

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1. Introduction

Intrusive recollections of aspects of a traumatic event and its sequelae are at the core of posttraumatic stress disorder (PTSD). Reexperiencing can take the form of images, or other sensory impressions such as noises, smells, tactile sensations, thoughts, flashbacks, or dreams.

* Corresponding author. Institut für Psychologie der Universität Jena, Steiger 3, Haus 1, D-07743 Jena, Germany. Tel.: +49-3641-945183; fax: +49-3641-945182.

E-mail address: s6stre@rz.uni-jena.de (R. Steil).

These symptoms distinguish PTSD from the other anxiety disorders. The present paper is concerned with involuntary memories or thoughts which are related to the trauma or its consequences. Trauma-related phenomena occurring during sleep are not considered because it is possible that different mechanisms are involved in their development and/or maintenance.

Reexperiencing symptoms that occur immediately after a trauma are generally considered a sign of normal adaptation (Eberly, Harkness & Engdahl, 1991; Rachman, 1990). In line with this assumption, prospective studies have found that the experience of intrusive recollections immediately after the trauma is often *not* a good predictor of persistent PTSD (McFarlane, 1988; Perry, Difede, Musngi, Frances & Jacobsberg, 1992; Shalev, 1992). On the other hand, intrusive reexperiencing that persists for several months has been shown to predict long-term PTSD symptoms (Baum, Cohen & Hall, 1993; McFarlane, 1992; Perry et al., 1992). This difference indicates that it is important to distinguish between factors that determine initial reexperiencing symptoms, and those involved in their maintenance.

Although theoretical models of PTSD etiology and maintenance vary widely, there is general agreement that avoidance of reminders of the trauma is a central factor in maintaining PTSD symptoms. It prevents adequate emotional processing of traumatic experiences as well as habituation to traumatic memories. It interferes with integration and restructuring of dysfunctional cognitions concerning the trauma (Chemtob, Roitblat, Hamada, Carlson & Twentyman, 1988; Foa, Steketee & Rothbaum, 1989; Foa & Riggs, 1993; Horowitz, 1976; Jones & Barlow, 1990; Keane, Zimering & Caddell, 1985; Pennebaker, 1989; Van der Kolk & van der Hart, 1991). Avoidance has been found to be involved in the long-term maintenance of intrusive phenomena in PTSD and in other anxiety disorders (Lawrence, Fauerbach & Munster, 1996; Salkovskis & Kirk, 1989).

PTSD patients engage in a wide range of avoidance behaviors. Cognitive avoidance strategies seem to be especially common, but have not yet been investigated in sufficient detail. Clinical observation shows that PTSD patients commonly report to use thought suppression, a cognitive activity designed to avoid or end particular thoughts, images, or memories. Research has demonstrated that, paradoxically, thought suppression increases the probability of intrusive phenomena in other anxiety disorders, for example obsessional compulsive disorder and generalized anxiety disorder (Lavy & van den Hout, 1994; Salkovskis & Campbell, 1994). Heightened attention to and monitoring of intrusive memories may similarly increase the probability of their occurrence.

Many patients with PTSD report ruminating extensively, for example about why the trauma happened to them. Rumination appears to be another cognitive avoidance strategy in that it focuses on experiences surrounding the traumatic event rather than the event itself. Borkovec and Inz (1990) proposed that rumination, as a predominantly verbal activity, is used to avoid physical and emotional reactions towards unpleasant and anxiety-provoking images. Wells (1994) postulated that rumination blocks emotional processing of distressing experiences and concurrently connects these experiences to many other stimuli, thereby enhancing their accessibility in memory networks. Ehlers and Steil (1995) suggested that rumination may be one of the major strategies of cognitive avoidance in chronic PTSD.

What determines who engages in cognitive and behavioral avoidance is as yet unclear. An important observation in this context is that, while posttraumatic intrusions are common in the immediate aftermath of trauma, not all survivors find these intrusions distressing (Shalev,

Schreiber & Galai, 1993). This finding echoes results showing that it is distress caused by obsessional intrusions, not their occurrence per se, which distinguishes clinical from nonclinical populations (Rachman & de Silva, 1978). Traumatized individuals who experience intrusive recollections of the trauma as distressing are more likely to attempt to avoid or suppress them than those who do not find them distressing. The hypothesis that intrusion-related distress is an important determinant of long-term outcome is supported by findings that initial distress caused by intrusive memories of motor vehicle accidents (MVA) predicted PTSD severity 12 months later (Mayou, Bryant & Duthie, 1993).

What determines the degree of distress caused by posttraumatic intrusions? Trauma severity has been shown to be associated with PTSD severity. Aspects of the traumatic event such as injury severity, witnessed death or injury and threat to life have been found to influence the development of PTSD symptoms (Creamer, Burgess & Pattison, 1992; Yehuda, Southwick & Giller, 1992). It is quite likely that these factors are associated with the distress caused by persistent posttraumatic intrusions. However, it is doubtful that they are significant determinants of intrusion-related distress in the longer term.

In the maintenance of other anxiety disorders, cognitive factors such as the interpretation of particular symptoms have been found to play a central role (Clark, 1986; Ehlers, Margraf & Roth, 1988; Salkovskis & Kirk, 1989). In panic disorder, for example, misinterpretation of bodily sensations (e.g., 'I am going to lose control' or 'This means that something terrible will happen') is believed to determine engagement in safety behaviors and avoidance, and so maintain the disorder. Similarly, several authors have suggested that patients with PTSD interpret PTSD-symptoms in a dysfunctional way (e.g., 'If after all of this time I react to memories of the event in such a strong way there must be something wrong with me!', e.g., Foa et al., 1989; Foa & Riggs, 1993; Jones & Barlow, 1990; Peterson, Prout & Schwarz, 1991). In particular, misinterpretation of symptoms of arousal has been a focus in the PTSD literature.

Ehlers and Steil (1995) have proposed that the negative idiosyncratic meaning of intrusive symptoms is important in the maintenance of PTSD. Dysfunctional meanings concern both the occurrence of intrusions (e.g., 'The fact that I have these uncontrollable memories means that I am going crazy') and their content (i.e., the traumatic events and its sequelae). Examples of the latter are 'My life is ruined', 'It was my fault', and 'It will happen again'.

The authors suggest two pathways by which dysfunctional meanings maintain posttraumatic intrusions and other PTSD symptoms. They are assumed (1) to determine the degree of distress, and thus arousal, caused by intrusions, and (2) to determine the extent of cognitive and behavioral avoidance.

Fig. 1 illustrates the proposed associations between the negative idiosyncratic meaning assigned to trauma and posttraumatic symptomatology. The 'distress' pathway leads to short-term maintenance of arousal and reexperiencing symptoms. Distress caused by the negative meaning of the intrusions is likely to be accompanied by physical symptoms such as heightened arousal, difficulties sleeping, and poor concentration (1). Physical arousal in turn can act as an internal trigger for the occurrence of intrusions (2). Furthermore, intense distress and arousal may confirm the negative meaning (3) the intrusions have for the individual (e.g., 'I am incompetent').

The 'avoidance' pathway leads to the maintenance of posttraumatic intrusions in the short

and long term. The dysfunctional meaning of the intrusions motivates the individual to engage in behavioral and cognitive avoidance strategies intended to bring the intrusions to an end (4). The increase in upset and arousal which is connected to the occurrence of intrusions may contribute to the motivation to avoid these experiences (5). As described above, cognitive strategies like thought suppression and rumination actually lead to increased intrusion frequencies (6). The individual may perceive the paradoxical effects of cognitive avoidance strategies as alarming. These strategies might therefore contribute to the level of distress caused by posttraumatic intrusions ('Although I try very hard to get rid of these memories, they keep coming back to me!'). Furthermore, these strategies might directly be related to symptoms of heightened arousal like difficulties sleeping or concentrating (7). Avoidance of reminders of the trauma prevents reduction in distress/arousal (habituation). It prevents change in meaning of the intrusions and the trauma (8) and thus maintains the intrusions in the long term.

Two studies on survivors of motor vehicle accidents were conducted to empirically test

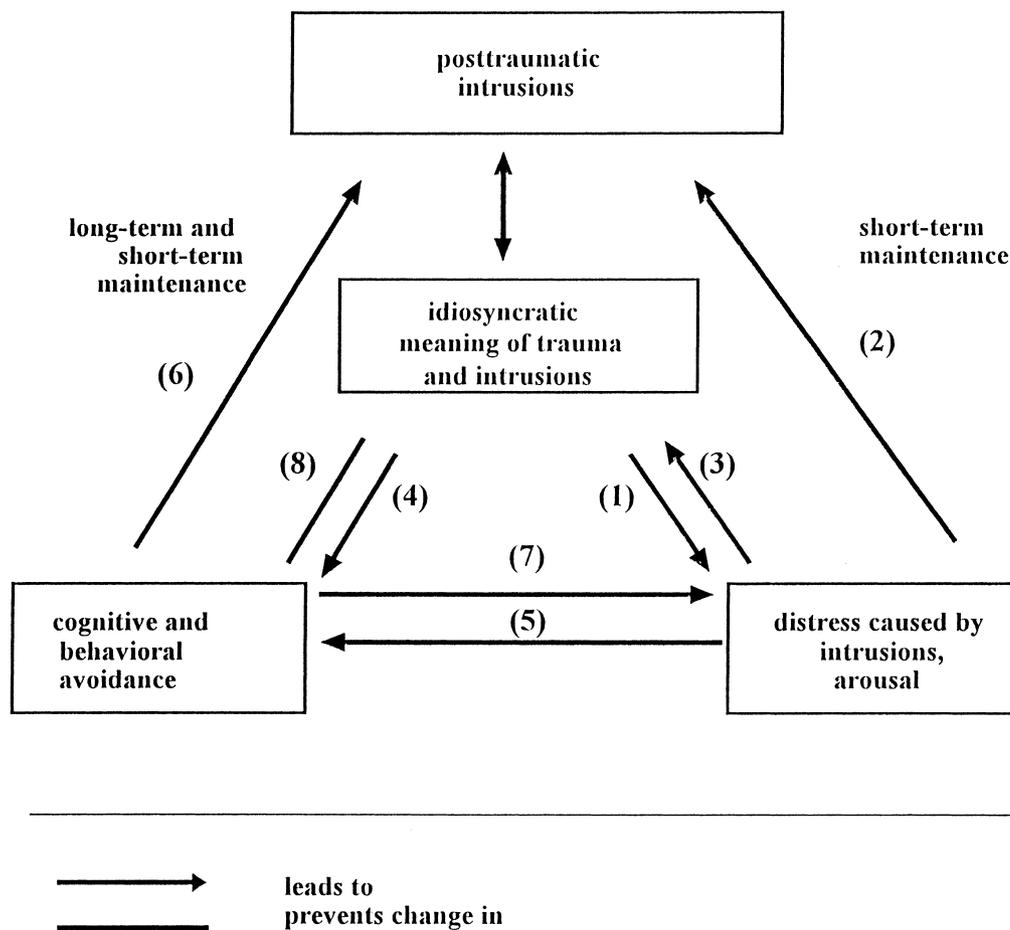


Fig. 1. The role of dysfunctional meaning of intrusions in the maintenance of posttraumatic symptoms. (Numbers are explained in the text.)

hypotheses derived from the model. Specifically, it was hypothesized that the dysfunctional meaning of posttraumatic intrusions shows substantial correlations with:

1. Distress caused by posttraumatic intrusions;
2. Behavioral and cognitive avoidance (avoidance of reminders, rumination, thought suppression, distraction);
3. PTSD symptom severity,

which are not mediated by objective or subjective accident severity, intrusion frequency, or general dysfunctional cognitions when anxious.

It was further hypothesized that:

4. Intrusion-related distress, and behavioral and cognitive avoidance would show substantial correlations with PTSD severity.

2. Method

2.1. Participants

2.1.1. Study 1

Participants were 159 individuals who had experienced a MVA and had responded to radio interviews and newspaper reports in which the project was described. They contacted the first author and received further explanations on the telephone. If they agreed to participate in the study, they were sent the questionnaire package described below. 84% of recipients returned the questionnaire package.

2.1.2. Study 2

Participants were 138 individuals who had experienced a MVA and had responded to a newspaper report asking accident survivors to share their experiences with a journalist. All respondents were sent a letter informing them about the project as well as the questionnaire package. The return rate was 66%. Table 1 gives an overview of the demographic and accident characteristics for both samples.

All participants were Caucasian. In Study 1 the majority of participants were women, whereas in Study 2 the majority were men. Participants of Study 2 had experienced more severe accidents and had sustained more severe injuries.

2.2. Questionnaires

Participants completed a questionnaire package which assessed sociodemographic information, information about the accident, the participants' posttraumatic symptoms, avoidance, and cognitions concerning posttraumatic intrusions. There were a few differences between the questionnaires used for Study 1 and Study 2, as detailed below. Most importantly, Study 2 assessed a wider range of dysfunctional meanings of posttraumatic intrusions than Study 1. It also included the Agoraphobic Cognitions Questionnaire (Chambless, Caputo,

Table 1
Demographic and accident characteristics for Studies 1 and 2

Characteristics	Participants with PTSD		Participants without PTSD		All participants	
	Study 1	Study 2	Study 1	Study 2	Study 1	Study 2
<i>N</i>	77 (48%)	75 (54%)	82 (52%)	63 (46%)	159	138
% men	41	71	40	73	41	72
Age (in years)						
<i>M</i>	43.8	43.9	42.7	38.7	43.2	41.5
SD	13.4	13.7	14.4	11.6	13.9	13
Level of education ^a , (% participants)						
8 years	24	35	19	30	22	33
10 years	38	43	31	30	34	37
13 years	17	7	28	18	23	11
University degree	21	12	22	22	21	17
Living situation ^b						
Married	48	52	52	46	50	49
Long-term partner	14	8	15	19	14	13
Living alone	12	13	19	21	16	17
Divorced or separated	14	21	5	8	9	15
Widowed	11	2	5	2	8	2
Living with parents	1	4	4	5	3	4
Time since accident in years ^c						
<i>M</i>	5.8	7.9	6.4	8.7	6.1	8.3
SD	6.8	8.3	8.3	8.9	7.6	8.5
% involved in accident as ^d , (% participants)						
Car driver	58	57	58	51	58	54
Car passenger	22	15	28	16	25	15
Pedestrian	1	4	4	6	3	5
Motor bike driver	8	16	4	24	6	20
Bicyclist	11	8	6	2	8	5

Table 1 (continued)

Characteristics	Participants with PTSD		Participants without PTSD		All participants	
	Study 1	Study 2	Study 1	Study 2	Study 1	Study 2
Injury severity (AIS-points) ^{e,f}						
<i>M</i>	2.2	3.2	1.4	3.2	1.8	3.2
SD	1.3	1.4	1.3	1.3	1.3	1.4
Distribution ^g , (%)						
0	14	5	30	6	23	6
1	14	7	22	6	18	7
2	29	11	32	6	30	9
3	31	36	10	38	20	37
4	8	15	2	24	5	19
5	4	21	4	14	4	18
% amnesic for parts of the accident because of head injury	48	72	26	60	37	67
Number of previous accidents ^h						
<i>M</i>	0.9	0.9	0.9	1.1	0.9	1.0
SD	1.6	2.5	1.5	1.6	1.6	2.1
% responsible for the accident according to police ⁱ	25	23	35	19	30	21

^a Information missing for 3 participants in Study 2.

^b Information missing for 1 participant in Study 1.

^c Information missing for 1 participant in Study 2.

^d Information missing for 1 participant in Study 2.

^e According to the Abbreviated Injury Scale (AIS, States et al., 1980).

^f Information missing for 7 participants in Study 2.

^g The higher the AIS-score is, the more severe the injuries.

^h Information missing for 1 participant in Study 1.

ⁱ Information missing for 3 participants in Study 1 and 6 participants in Study 2.

Bright & Gallagher, 1984) as a measure of general dysfunctional cognitions regarding anxiety symptoms to test the specificity of interpretations of posttraumatic intrusions.

2.2.1. Accident severity

Subjects answered a number of questions about objective characteristics of the accident. These included details about the injuries sustained, the length of hospitalization, the number of people injured or killed, and whether the participants had witnessed death or injury. Injury severity was coded by the first author using the Abbreviated Injury Scale (AIS 80, States et al., 1980). This coding system allows the seriousness of each specific injury to be rated. It ranges from 0 ('not injured at all') to 5 ('life-threatening injury'). Following the recommendations of the American Association for Automotive Medicine, the score for the most severe injury was used as the overall score (maximum AIS).

Perceived threat to life was chosen to represent the subjective severity of the accident because it has consistently been shown to predict PTSD (March, 1993). In Study 1, several measures of this concept were taken. Participants rated the perceived threat to life during the accident, and the perceived probability of death or severe injury at two time points: during the accident and from their present point of view. In Study 2, only the perceived probability of death or severe injury from their present point of view was assessed because this variable had shown the highest correlations with PSS scores in Study 1.

2.2.2. Intrusion frequency and distress

Participants indicated how many times they usually experienced intrusive recollections per month, and rated the distress usually caused by them on a scale from 0 ('not distressing at all') to 100 ('extremely distressing'). In Study 1, participants also provided information about the sensory qualities of their intrusions.

2.2.3. Posttraumatic stress disorder symptoms

Participants completed a modified form of the Posttraumatic Stress Symptom Scale (PSS, Foa, Riggs, Dancu & Rothbaum, 1993) in a German translation by the authors (back translation was used). The PSS asks participants to rate how much they were bothered by each of the PTSD symptoms specified in DSM-III-R ranging from 0 ('never') to 3 ('5 times per week or more/ very severe/ nearly always'). Because it was important for the purposes of the present study to distinguish between posttraumatic symptom frequency and the distress caused by the symptom, participants were first asked to rate whether the symptom had occurred. This question was used to assess the DSM-III-R diagnosis of PTSD. If participants had experienced the symptom, they were asked to provide two ratings. They first indicated how often the symptom had occurred, on a scale from 0 ('never') to 3 ('5 times per week or more'). The sum of these ratings represents the PSS-frequency scale. Cronbach's alpha for this scale was 0.89 ($N = 297$). Participants then rated the degree of distress that each of the symptoms caused on a scale from 0 ('not at all') to 3 ('very much'). The sum of these ratings represents the PSS-distress scale. Cronbach's alpha for this scale was 0.91 ($N = 297$).

2.2.4. Dysfunctional meaning of posttraumatic intrusions

In Study 1, participants rated how often the thought 'I am going crazy' occurred when they

had posttraumatic intrusions, on a scale from 0 ('never') to 100 ('always'). This question reflected the most common negative interpretation of intrusions found in pilot interviews. In Study 2, the Intrusions Cognitions Questionnaire (ICQ) developed by the authors for the purposes of the present study assessed a wider range of meanings, using the same 0–100 rating scale. It comprises 15 items addressing thoughts about personal vulnerability/ permanent change for the worse (e.g., 'I am inferior to other people', 'My life is ruined'), justice (e.g., 'Others have harmed me'), personal responsibility for the accident (e.g., 'It is my fault') and future danger (e.g., 'It will happen again'). Cronbach's alpha was 0.86 ($N = 120$). An overall ICQ score was calculated as the mean of the 15 items. A translation of the questionnaire is given in Appendix A.

Avoidance of reminders of the accident was assessed with the Postaccident Avoidance Questionnaire (PAQ) which was developed by the authors on the basis of pilot interviews. The PAQ contains 21 items measuring avoidance of thoughts about the accident, and of situations that directly (e.g., going by car) or indirectly (e.g., watching casualty programs on TV) remind the participant of the trauma, on a scale from 0 ('never avoid') to 100 ('always avoid'). Cronbach's alpha was 0.88 ($N = 227$). The PAQ score is the mean of the 21 items.

2.2.5. Cognitive strategies used to control intrusions

Participants rated how often they used rumination ('I ruminate about them'), thought suppression ('I try put the recollections out of my mind'), or distraction ('I try to distract myself', Study 2 only) when they had posttraumatic intrusions, each on a scale from 0 ('never') to 100 ('always').

2.2.6. Catastrophic cognitions regarding anxiety symptoms

The Agoraphobic Cognitions Questionnaire (ACQ, Chambless et al., 1984; German version by Ehlers, Margraf & Chambless, 1993) assesses typical catastrophic cognitions that occur when individuals are anxious. About half of the items relate to physical disaster (e.g., 'I am going to have a heart attack') whereas the other half relate to social or behavioral consequences (e.g., 'I am going to scream'). The questionnaire distinguishes between patients with anxiety disorders and normal controls. The ACQ was only given in Study 2. Cronbach's alpha for this sample was 0.85 ($N = 129$) which is comparable with other studies of the German version of this questionnaire (alphas: 0.74–0.87; retest reliability: $r_s = 0.75$ –0.80; Ehlers & Margraf, 1993).

2.2.7. General beliefs about distressing cognitions

Whether or not people use avoidance strategies to deal with distressing intrusions will be influenced by their general beliefs about how best to deal with distressing experiences. It is to be expected, however, that the impact of these more general attitudes on avoidance of intrusions will be weaker than the impact of negative idiosyncratic meanings assigned to the intrusions. In order to test this suggestion, participants were asked to rate the extent to which they agreed with the statement: 'One gets over distressing events more easily if one tries to forget and distract oneself from them', on a scale from 0 ('do not believe at all') to 100 ('totally convinced'). In Study 1, they also rated the extent to which they generally used cognitive avoidance/thought suppression to deal with distressing thoughts ('I generally tend to

suppress and avoid unpleasant thoughts'), on a scale from 0 ('not at all true for me') to 100 ('applies to me completely').

2.3. Statistical analysis

The predicted relationships were tested using Pearson correlations. Stepwise multiple regression analyses tested what combination of variables explained PTSD symptomatology. If not mentioned otherwise, the significance level was 5% (two-tailed). In Study 2, intrusion frequency, ACQ scores, and injury severity were log-transformed to normalize their distributions. In Study 1, this only applied to intrusion frequency.

3. Results

3.1. Prevalence of PTSD symptoms

About half of the participants met criteria for a DSM-III-R diagnosis of PTSD (Study 1: 48%, Study 2: 54%). As shown in Table 2, the avoidance symptom cluster was largely responsible for whether or not an individual was classified as having PTSD. The vast majority of non-PTSD participants met criterion B of DSM-III-R (reliving cluster) and about half of them met criterion D (arousal cluster). The most common symptoms were (mean frequencies in

Table 2

Percentage of individuals meeting DSM-III-R criteria for PTSD and distress caused by symptom clusters^a

Symptom cluster	Participants with PTSD		Participants without PTSD		All participants	
	Study 1	Study 2	Study 1	Study 2	Study 1	Study 2
Reliving						
% meeting criterion	100	100	82	67	91	85
<i>M</i> distress	1.6	1.6	0.7	0.6	1.1	1.1
<i>SD</i> distress	0.8	0.9	0.6	0.7	0.9	0.9
Avoidance/numbing						
% meeting criterion	100	100	5	5	51	62
% with at least one symptom	100	100	63	95	81	98
<i>M</i> distress	1.3	1.5	0.2	0.9	0.7	1.2
<i>SD</i> distress	0.8	0.4	0.3	0.3	0.7	0.5
Arousal						
% meeting criterion	100	100	50	54	85	88
% with at least one symptom	100	100	90	91	95	96
<i>M</i> distress	1.6	1.6	0.6	0.7	1.1	1.2
<i>SD</i> distress	0.8	0.7	0.6	0.7	0.8	0.8

^a Minimum score for distress = 0; maximum score for distress = 3.

Studies 1 and 2 respectively): hypervigilance (1.9, 1.4), sense of foreshortened future (1.1, 1.9), intrusive recollections (1.4, 1.3), sleep disturbance (1.1, 1.6), problems concentrating (1.1, 1.6), exaggerated startle (1.4, 1.1), distress when confronted with reminders (1.2, 1.1), alienation from others (0.7, 1.3), and loss of interest in significant activities (0.7, 1.2). The most distressing symptoms were (mean distress ratings for Studies 1 and 2, respectively): sense of foreshortened future (1.1, 2.0), intrusive recollections (1.3, 1.4), distress when confronted with reminders (1.3, 1.4), sleep disturbance (1.1, 1.6), problems concentrating (1.1, 1.6), and exaggerated startle (1.3, 1.0).

Participants of Study 1 experienced a mean of 19 intrusive recollections per month ($SD = 27$), and those of Study 2 a mean of 35 per month ($SD = 74$). Study 1 showed that the most common forms of intrusive experiences were seeing static visual images of the accident (69% of the participants), seeing a film-like scene of the accident (65%) and hearing noises from the accident (54%). Participants rated seeing images of the accident as the most distressing intrusive experience.

3.2. Correlations of accident severity with PTSD and intrusions

3.2.1. Study 1

Injury severity correlated with PSS-distress, $r = 0.25$, $P = 0.001$, but not with PSS-frequency, intrusion frequency or distress. The number of dead people seen correlated with intrusion frequency, $r = 0.19$, $P = 0.021$, and (as a trend) with intrusion distress, $r = 0.16$, $P = 0.055$, but not with the PSS scales. No other measures of objective accident severity showed any significant correlations with PTSD symptoms or intrusions. Of the subjective measures of accident severity, perceived threat to one's life correlated with intrusion-related distress, $r = 0.20$, $P = 0.014$, and (as a trend) with PSS-frequency, $r = 0.15$, $P = 0.064$. Perceived probability of death or severe injury as rated from the present point of view correlated with intrusion distress, $r = 0.21$, $P = 0.009$, and with PSS-frequency, $r = 0.18$, $P = 0.021$, and PSS-distress, $r = 0.19$, $P = 0.018$. The correlations with intrusion distress, PSS-frequency, and PSS-distress remained significant when injury severity was partialled out, $r = 0.17$, $P = 0.032$, $r = 0.18$, $P = 0.027$, $r = 0.18$, $P = 0.031$. Perceived probability of death or severe injury at the time of the accident, however, did not show any correlations with PTSD and intrusion measures. The association between intrusion-related distress and probability of death or severe injury as currently perceived was significantly stronger than that between distress and perceived probability at time of the accident, $r = 0.21$ compared to $r = 0.04$, $t(144) = 1.96$, $P < 0.05$.

3.2.2. Study 2

The pattern of correlations did not replicate in this study. Injury severity and perceived probability of death or severe injury as rated from the present point of view did not correlate with PSS scores or intrusion distress, and showed small negative correlations with intrusion frequency, $r = -0.24$, $P = 0.008$, $r = -0.18$, $P = 0.038$. There was very little range in perceived probability of death; nearly all the participants gave a maximum probability rating, with a mean score of 86 ($SD = 21$). The number of injured people seen correlated with intrusion-related distress, $r = 0.21$, $P = 0.016$. No other measures of objective accident severity showed any significant correlations with PTSD symptoms or intrusions.

Table 3
Correlations of dysfunctional meaning of posttraumatic intrusions with intrusion severity (All correlations significant at $P < 0.001$)

Measures of dysfunctional meaning	Zero order correlations		Partial correlations		
	Intrusion frequency	Intrusion distress	Intrusion distress by intrusion frequency ^a	Intrusion distress by ACQ ^b	Intrusion distress by accident severity ^c
Study 1					
'I am going crazy.'	0.29	0.45	0.35	– ^d	0.45
Study 2					
ICQ-score	0.29	0.51	0.42	0.42	0.52

^a Partial correlation controlling for intrusion frequency.

^b Partial correlation controlling for general catastrophic thoughts when anxious (Agoraphobic Cognitions Questionnaire).

^c Partial correlation controlling for accident severity (injury severity, number of dead people seen, perceived probability of death/severe injury as rated from the present point of view).

^d Not assessed.

Table 4
Correlations of dysfunctional meaning of posttraumatic intrusions with strategies intended to control intrusions (All correlations significant at $P < 0.001$)

Strategies	Zero order correlations	Partial correlations				
		Intrusion frequency ^a	ACQ ^b	Accident severity ^c	Meta-cognition ^d	General thought suppression ^e
Study 1						
Avoidance of reminders	0.45	0.42	– ^f	0.49	0.49	0.45
Rumination	0.35	0.27	–	0.34	0.34	0.34
Thought suppression	0.34	0.34	–	0.35	0.36	0.33
Study 2						
Avoidance of reminders	0.48	0.41	0.28	0.51	0.48	–
Rumination	0.54	0.50	0.39	0.55	0.56	–
Thought suppression	0.50	0.46	0.42	0.49	0.50	–
Distraction	0.50	0.46	0.42	0.42	0.48	–

^a Partial correlation controlling for intrusion frequency.

^b Partial correlation controlling for general catastrophic thoughts when anxious (Agoraphobic Cognitions Questionnaire).

^c Partial correlation controlling for accident severity (injury severity, number of dead people seen, perceived probability of death/severe injury as rated from the present point of view).

^d Partial correlation controlling for meta-cognition 'One gets over distressing experiences if one tries to forget and distract oneself from them.'

^e Partial correlation controlling for general tendency to suppress unpleasant thoughts.

^f Not assessed.

3.3. Hypothesis 1: dysfunctional meaning of posttraumatic intrusions and intrusion-related distress

Table 3 shows the correlations between dysfunctional meanings of posttraumatic intrusions and intrusion frequency and distress. As expected, correlations with intrusion-related distress were highly significant. In Study 1, the single item 'I am going crazy' explained 20% of the variance of intrusion-related distress; in Study 2, the 15-item ICQ explained 26% of the variance of intrusion-related distress. Partial correlations controlling for intrusion frequency or accident severity (both studies), and general anxiety-related cognitions (Study 2) remained highly significant. The intercorrelation between intrusion frequency and distress was $r = 0.51$, $P < 0.001$ in both studies.

3.4. Hypothesis 2: dysfunctional meaning of posttraumatic intrusions and avoidance strategies

As shown in Table 4, the dysfunctional meaning of posttraumatic intrusions showed highly significant correlations with avoidance of reminders (PAQ), rumination, thought suppression, and distraction. In Study 2, the ICQ explained substantial proportions of the variance of avoidance (PAQ, 23%), thought suppression (25%), rumination (29%), and distraction (25%). In Study 1 (using the single item 'I am going crazy'), the correlations were somewhat lower but nevertheless highly significant. Partial correlations controlling for intrusion frequency or accident severity (both studies) and general anxiety-related cognitions (Study 2 only) also remained highly significant.

The belief that it is best to forget distressing events and distract oneself from them showed small correlations with thought suppression, Study 1, $r = 0.18$, $P = 0.024$, Study 2, $r = 0.36$, $P < 0.001$, and with distraction (only assessed in Study 2), $r = 0.28$, $P = 0.001$. Associations with rumination and the PAQ were small and nonsignificant. Even when this belief was partialled out, the associations between the dysfunctional meaning of intrusions and the avoidance measures remained highly significant (see Table 4). The same applied to the partial correlations controlling for the general tendency to use thought suppression in Study 1. There were no significant correlations between the general tendency to use thought suppression and the PAQ, rumination, thought suppression, and distraction in Study 1.

3.5. Hypothesis 3: dysfunctional meaning of intrusions and PTSD severity

In both studies, the negative idiosyncratic meaning of posttraumatic intrusions showed highly significant correlations with PSS severity (Table 5). It explained 21% and 20% of PTSD symptom frequency and distress in Study 1, and 37% and 40% respectively in Study 2. All correlations remained highly significant when intrusion frequency, accident severity, or general anxiety-related cognitions were partialled out.

3.6. Hypothesis 4: intrusion distress, cognitive and behavioral avoidance and PTSD

Table 6 shows that intrusion distress, avoidance of reminders, rumination, thought suppression, and distraction were all significantly correlated with frequency of and distress caused by PTSD symptoms. The correlations with intrusion-related distress remained

Table 5

Correlations of dysfunctional meaning of posttraumatic intrusions with PTSD severity (All correlations significant at $P < 0.001$)

Measures of PTSD severity	Zero order correlations	Partial correlations		
		Intrusion frequency ^a	ACQ ^b	Accident severity ^c
Study 1				
Frequency of PTSD symptoms	0.46	0.42	– ^d	0.47
Distress caused by PTSD symptoms	0.45	0.42	–	0.46
Study 2				
Frequency of PTSD symptoms	0.61	0.57	0.48	0.60
Distress caused by PTSD symptoms	0.63	0.59	0.50	0.62

^a Partial correlation controlling for intrusion frequency.

^b Partial correlation controlling for general catastrophic thoughts when anxious (Agoraphobic Cognitions Questionnaire).

^c Partial correlation controlling for accident severity (injury severity, number of dead people seen, perceived probability of death/severe injury as rated from the present point of view).

^d Not assessed.

significant if PTSD symptom frequency and distress caused by PTSD symptoms were calculated excluding those items that measured intrusive recollections and flashbacks. The correlations with avoidance of reminders remained significant if those PTSD symptoms that measured situational and cognitive avoidance were excluded. Intrusion-related distress showed higher correlations with PTSD severity than intrusion frequency. In Study 2, the association between intrusion-related distress and PSS-distress and the association between intrusion-related distress and PSS-frequency was significantly stronger than that between intrusion frequency and PSS-distress and PSS-frequency, $t(125) = 3.03$, $P < 0.01$, $t(125) = 2.38$, $P <$

Table 6

Correlations of intrusion distress, intrusion frequency, and avoidance with PTSD severity (All correlations significant at $P < 0.001$)

Variables	Study 1		Study 2	
	PSS frequency	PSS distress	PSS frequency	PSS distress
Intrusion distress	0.63 (0.60 ^a)	0.67 (0.64 ^a)	0.59 (0.61 ^a)	0.58 (0.59 ^a)
Intrusion frequency	0.55 (0.51 ^a)	0.46 (0.46 ^a)	0.42 (0.43 ^a)	0.36 (0.38 ^a)
Avoidance of reminders	0.59 (0.56 ^b)	0.62 (0.59 ^b)	0.56 (0.54 ^b)	0.55 (0.58 ^b)
Rumination	0.53	0.49	0.45	0.46
Thought suppression	0.36	0.45	0.47	0.44
Distraction	– ^c	–	0.45	0.42

^a Correlation with PSS-scores excluding DSM-IIIIR-symptoms B1 and B3 (intrusive recollections and flashbacks).

^b Correlation with PSS-scores excluding DSM-IIIIR-symptoms C1 and C2 (situational and cognitive avoidance).

^c Not assessed.

Table 7
Results of multiple regression analyses

	Study 1	Study 2
Step 1: Enter		
Adjusted R^2	0.32	0.25
Variables (β weights)	Intrusion frequency (0.55) Injury severity (0.14) Probability death/injury now (0.03) Dead people seen (−0.08)	Intrusion frequency (0.52) Injury severity (−0.01) Probability death/injury now (0.14) Dead people seen (0.15)
Step 2: Stepwise		
Adjusted R^2	0.58	0.53
Variables removed	Probability death/injury now Dead people seen	Injury severity Probability death/injury now Dead people seen
Variables entered (β) in order	Intrusion frequency (0.31) Injury severity (0.11) Avoidance (0.29) Rumination (0.30) Dysfunctional meaning (0.15)	Intrusion frequency (0.25) Dysfunctional meaning (0.37) Avoidance (0.33)
Variables not entered	Thought suppression	Thought suppression Rumination Distraction

0.02. In Study 1, the same applied for PSS-distress, $t(143) = 3.48$, $P < 0.001$. This also applied if PSS scores were calculated excluding those items that measure intrusive recollections and flashbacks.

3.7. Multiple regression

Multiple regression analyses tested the relative contribution of the different variables in predicting PTSD symptom frequency. This dependent variable was chosen because it represents the standard way of assessing PTSD symptom severity with the PSS-SR (Foa et al., 1993). In a first step, intrusion frequency and those measures of accident severity that correlated with PSS-frequency or PSS-distress were forced into the equation: injury severity, perceived probability of death or severe injury from the present point of view, and number of dead people seen. Table 7 shows that these variables together explained 32% of the variance in Study 1, and 25% of the variance in Study 2. Intrusion frequency was the only significant predictor in both studies.

In the second step, the variables proposed in this paper were included in a stepwise analysis, i.e. dysfunctional meaning of intrusions, avoidance of reminders, rumination, thought suppression (both studies), and distraction (Study 2 only). This increased the accuracy of the prediction substantially, and 58% (Study 1) and 53% (Study 2) of the PSS variance could be explained. Table 7 shows the variables that were removed (at $P > 0.10$), and entered (at $P <$

0.05). In both studies, the dysfunctional meaning of intrusions and avoidance of reminders entered the regression function. In Study 1, rumination entered as well.

4. Discussion

As expected, long-term PTSD severity following motor vehicle accidents showed small and mostly nonsignificant correlations with objective and subjective measures of accident severity. Injury severity was significantly related to PTSD severity only in Study 1. This can be explained by the greater range of injury severity reported in Study 1. 23% of participants in Study 2 were not injured at all, compared to only 6% of the participants in Study 1. It is unlikely that inaccurate assessment (self-report) is responsible for the low impact of the accident severity variables because the pattern of results corresponds to that of other studies of PTSD after MVA. Studies that excluded participants without injuries have tended to find no correlations between PTSD and injury severity (Epstein, 1993; Feinstein & Dolan, 1991; Green, McFarlane, Hunter & Griggs, 1993; Mayou et al., 1993; Landsman et al., 1990; see also Green, 1994). Conversely, those that included participants with no or minor injuries have tended to find positive but comparably weak associations, for example, $r = 0.30$ in the study conducted by Blanchard et al. (1995). Recent results show that the extent of persistent medical problems and persistent pain resulting from MVA is more strongly associated with posttraumatic symptomatology than initial injury severity. Mayou et al. (1993) and Ehlers, Mayou and Bryant (1998) found that persistent medical problems were among the most important predictors of chronic PTSD in MVA survivors. One of the possible mechanisms of this relationship is that chronic medical problems, like chronic pain, may serve as constant reminders of the accident and thus trigger posttraumatic intrusions (Ehlers et al., 1998; Green et al., 1993; Landsman et al., 1990).

Of the measures of threat to life, the perceived probability of death or severe injury from the present point of view showed the strongest relationship to PTSD severity and intrusion distress in Study 1. This measure correlated more strongly with intrusion distress than the perceived probability of death or severe injury experienced during the accident. This points to a possible role of UCS reevaluation or hindsight in determining the distress caused by intrusions. Accidents are often traumas of very short duration, and it may be that people only become fully aware of the danger after it is over. The lack of correlations with the life threat measure in Study 2 could be attributed to a ceiling effect.

As expected, posttraumatic intrusions were common both among participants with PTSD and among those without it. Intrusion frequency showed only moderate associations with the distress caused by intrusions and comparably weak associations with PTSD severity. This pattern of results supports the assumption that intrusive recollections are not per se a sign of psychopathology, and it is particularly those intrusions that are experienced as distressing that are related to persistent PTSD symptoms (see also Mayou et al., 1993).

The present studies showed that whether or not posttraumatic intrusions are experienced as distressing depends on their idiosyncratic meaning for the person. Both studies consistently showed substantial correlations between the dysfunctional meanings assigned to intrusions and the distress caused by them. These correlations remained significant when intrusion frequency,

accident severity, and general anxiety-related catastrophic cognitions were partialled out. If the occurrence or content of intrusions are interpreted as indicating (mental) insanity, incompetence, permanent negative change or future danger, the person experiences distress. If, on the contrary, intrusions are seen as a normal part of recovery and processing of the trauma, distress is less likely.

Consistent with our hypothesis, the dysfunctional meaning of posttraumatic intrusions predicted coping strategies that have been found to maintain intrusive cognitive phenomena, namely avoidance of reminders (PAQ), thought suppression, rumination, and distraction. They explained a substantial proportion of the variance in these variables even when the influence of intrusion frequency, accident severity, general anxiety-related catastrophic cognitions, and general beliefs about how best to deal with distressing cognitions were controlled for. Correlations were somewhat higher in Study 2 in which a wider range of intrusion-related negative cognitions were assessed.

As expected, avoidance strategies intended to end distressing intrusions were related to PTSD severity. Avoidance of reminders was still related to PTSD severity when those PSS items that measured avoidance were removed. All of these avoidance strategies are likely to prevent full emotional processing of traumatic experiences and/or change in maladaptive cognitions. Some may directly increase the probability of experiencing intrusions (e.g., thought suppression). The multiple regression analysis showed that in Study 1, rumination predicted a proportion of the variance of PTSD severity that was independent of that explained by avoidance of reminders. The mechanisms by which rumination prevents recovery remain unclear. Rumination usually focuses on events that preceded or followed the actual trauma (e.g., 'Could I have done something to prevent the trauma?') and may thus prevent adequate exposure and/or prevent the individual from accepting the trauma as a fact. It is unlikely that the present study assessed the full range of these maladaptive strategies in dealing with intrusions (see Ehlers & Steil, 1995). Intentional activation of competing emotions like anger or sexual arousal, dissociation, or safety behaviors may also be used with the intention of stopping or preventing intrusive experience and distress.

We had hypothesized that, because the dysfunctional meaning of posttraumatic intrusions predicts (1) maintaining behaviors and cognitive strategies and (2) emotional distress and arousal connected to the occurrence of intrusions, negative interpretations of intrusions should also correlate with PTSD severity. The data were consistent with this hypothesis. Dysfunctional meaning of intrusions explained substantial proportions of PTSD symptom variance even when intrusion frequency, accident severity, and general anxiety-related cognitions were controlled for. In the multiple regression analysis of both studies, dysfunctional meaning of intrusions emerged as a significant predictor of PTSD severity that explained additional variance beyond intrusion frequency and avoidance measures. In both studies, the combination of intrusion frequency, dysfunctional meaning, and avoidance measures explained substantially more variance of PTSD severity than the combination of intrusion frequency and measures of accident severity.

Thus, the overall pattern of results is consistent with the assumption that the negative idiosyncratic meaning of posttraumatic intrusions plays a key role in maintaining PTSD. Although correlational design precludes any causal interpretations, both studies consistently

showed a specific association between intrusion-related cognitions and PTSD symptoms that could not be explained by intrusion frequency or general anxiety-related cognitions.

The pattern of results implies that therapeutic strategies aiming at identifying, restructuring, and changing the negative idiosyncratic meaning of posttraumatic intrusions should be helpful in alleviating posttraumatic symptomatology. Current effective treatments of PTSD already include some components that are likely to normalize symptoms of PTSD, for example education about symptoms and exposure (Foa, Hearst-Ikeda & Perry, 1995; Foa, Rothbaum, Riggs & Murdock, 1991; Resick & Schnicke, 1992). It is, however, possible that further gains could be achieved by focusing on the meaning of intrusions directly. Assessing idiosyncratic meaning assigned to intrusions may be an efficient way to identify interpretations of the trauma and its sequelae that are linked to persistent PTSD. It may also be beneficial to assess the specific cognitive avoidance strategies used by the patient and to target them in treatment.

Several limitations have to be considered when interpreting the studies. First, MVA may be different from other types of trauma and replication of the present results is necessary before they are generalized to other populations. It is promising that Clohessy and Ehlers (1999) (submitted) have recently shown a similar pattern of results in ambulance service workers. Second, both studies used self-selected samples with an overrepresentation of participants with PTSD. In epidemiological studies, life-time prevalence of PTSD after MVA is around 11% (Breslau, Davis, Andreski & Peterson, 1991). In their review on PTSD following motor vehicle accidents Kuch, Cox, and Evans (1996) estimate that about 10% of all MVA survivors develop PTSD in the first year after the accident. Studies using DSM-III-R criteria report a prevalence at one year after the accident of around 15% (Blanchard et al., 1996; Ehlers et al., 1998). However, given that the present samples differed on a number of relevant variables such as injury severity and sex distribution, it is encouraging that results in both samples were identical. Third, PTSD symptoms were only assessed using self-report. Although the self-report version of PSS agrees well with assessor rating (Foa et al., 1993), it is not inconceivable that certain response biases may have influenced the ratings on this measure and the other questionnaires in a similar fashion. Fourth, the retrospective design may have introduced recollection biases and may therefore have underestimated the effects of accident severity. Prospective studies are needed to demonstrate that dysfunctional meanings of intrusions predict chronic PTSD and are not simply a consequence of suffering from persistent symptoms. Ehlers et al. (1999) (submitted) have found preliminary evidence for the predictive role of such interpretations.

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Appendix A

Intrusions Cognitions Questionnaire (ICQ)

This questionnaire is concerned with what goes through your mind when you have memories of the accident. Below you will find a list of thoughts. Please indicate how often each of the thoughts occurs when you have recollections of the accident. There are no right or wrong answers. We are interested in your personal experience.

	Never											Always
1. It is my fault.	0	10	20	30	40	50	60	70	80	90	100	
2. I might go crazy.	0	10	20	30	40	50	60	70	80	90	100	
3. I am inferior to other people.	0	10	20	30	40	50	60	70	80	90	100	
4. I will never get over this.	0	10	20	30	40	50	60	70	80	90	100	
5. It will happen again.	0	10	20	30	40	50	60	70	80	90	100	
6. I will not live long.	0	10	20	30	40	50	60	70	80	90	100	
7. I must have a brain injury.	0	10	20	30	40	50	60	70	80	90	100	
8. This is unjust.	0	10	20	30	40	50	60	70	80	90	100	
9. My life is ruined.	0	10	20	30	40	50	60	70	80	90	100	
10. Something is seriously wrong with me.	0	10	20	30	40	50	60	70	80	90	100	
11. I cannot trust anybody.	0	10	20	30	40	50	60	70	80	90	100	
12. Other people have harmed me.	0	10	20	30	40	50	60	70	80	90	100	
13. I want to have revenge.	0	10	20	30	40	50	60	70	80	90	100	
14. I want to make it undone.	0	10	20	30	40	50	60	70	80	90	100	
15. I am not myself any more.	0	10	20	30	40	50	60	70	80	90	100	

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