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Unwanted memories of assault: what intrusion characteristics are associated with PTSD?

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Abstract

Intrusive memories are common in the immediate aftermath of traumatic events, but neither their *presence* or *frequency* are good predictors of the persistence of posttraumatic stress disorder (PTSD). Two studies of assault survivors, a cross-sectional study ($N = 81$) and a 6-month prospective longitudinal study ($N = 73$), explored whether *characteristics* of the intrusive memories improve the prediction. Intrusion characteristics were assessed with an Intrusion Interview and an Intrusion Provocation Task. The distress caused by the intrusions, their "here and now" quality, and their lack of a context predicted PTSD severity. The presence of intrusive memories only explained 9% of the variance of PTSD severity at 6 months after assault. Among survivors with intrusions, intrusion frequency only explained 8% of the variance of PTSD symptom severity at 6 months. Nowness, distress and lack of context explained an additional 43% of the variance. These intrusion characteristics also predicted PTSD severity at 6 months over and above what could be predicted from PTSD diagnostic status at initial assessment. Further predictors of PTSD severity were rumination about the intrusive memories, and the ease and persistence with which intrusive memories could be triggered by photographs depicting assaults. The results have implications for the early identification of trauma survivors at risk of chronic PTSD.

Keywords: Posttraumatic stress disorder; Trauma memories; Intrusions; Predictors of PTSD; Rumination; Screening

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1. Introduction

Although unwanted distressing memories of traumatic events are a core symptom of posttraumatic stress disorder (PTSD), relatively little is known about their phenomenology (for reviews see DeSilva & Marks, 1999; Falsetti, Monnier, Davis, & Resnick, 2002; Reynolds & Brewin, 1998, 1999). Intrusive memories are very common in the initial aftermath of trauma, but their presence or frequency is not a good predictor of subsequent PTSD (McFarlane, 1988; Shalev, 1992). This raises the interesting question of whether people who develop persistent PTSD can be distinguished from those that only have transient intrusive memories in terms of the characteristics of their intrusions, and/or in terms of their response to these memories.

1.1. Characteristics of intrusions

Preliminary interview and questionnaire studies have systematically asked people with PTSD to describe their intrusive *memories,* and have found that these mainly consisted of relatively brief *sensory* fragments of the traumatic experience (e.g., Ehlers et al., 2002). These could take the form of visual images, sounds, smells, tastes or bodily sensations such as pain. It has been suggested, and supported by preliminary data, that visual intrusions are particularly common (Ehlers et al., 2002; Ehlers & Steil, 1995; Mellman & Davis, 1985; van der Kolk & Fisler, 1995). Interestingly, the participants in the above studies rarely described their intrusive (spontaneously triggered, unwanted) *memories* as thoughts. For example, Ehlers et al. (2002) found that 97% of childhood sexual abuse survivors described that their intrusive memories included visual sensations, but only 26% said that they included thoughts. It remains unclear whether the modality in which intrusive memories are experienced differentiates trauma survivors with and without PTSD.

Theories of PTSD have highlighted some characteristics of intrusive memories that may be predictive of persistent PTSD. Intrusive memories appear to be triggered by a wide range of stimuli, including internal and external cues (Brewin, 2001; Brewin, Christodoulides, & Hutchinson, 1996; Ehlers & Clark, 2000; Ehlers & Steil, 1995; Foa, Steketee, & Rothbaum, 1989; Southwick et al., 1993; van der Kolk & Fisler, 1995). Patients are often not aware of these triggers so that the intrusive memories appear to come out of the blue. Ehlers and colleagues (Ehlers & Clark, 2000; Ehlers et al., 2002) highlighted the role of triggers that match the sensory characteristics of stimuli that were present at the time of the trauma, even in the absence of a meaningful relationship. *Ease of triggering* of intrusive memories may be one of the characteristics linked to their persistence.

A number of authors (e.g., Bremner, Krystal, Southwick, & Charney, 1995; Brewin et al., 1996; Ehlers & Clark, 2000; Ehlers, Hackmann, & Michael, 2004; Foa & Rothbaum, 1998), further observed that intrusive memories in PTSD are often accompanied by a sense of "*nowness*", i.e. the feeling that the sensations are experienced in the present rather than as a memory from the past, and that the emotions (including physical reactions and motor responses) accompanying the intrusions are the same as those experienced at the time ("original" emotions). This sense of "nowness" does not appear to be restricted to flashback experiences, but may also apply to briefer intrusive memories that do not involve loss of awareness of present surroundings (Hackmann, Ehlers, Clark, & Speckens, 2004). The *vividness* of the intrusive memories has also been highlighted in this context (e.g., Brewin et al., 1996).

Several explanations have been put forward for the ease of triggering of intrusive memories in PTSD and the sense of "nowness" that accompanies them, including particularly large fear networks in memory (Foa et al., 1989); different levels of representations of the trauma in memory (Brewin, 2001; Brewin et al., 1996); and a disjointed, poorly elaborated autobiographical memory for the trauma that leads to poor inhibition of cue-driven retrieval of aspects of the memory in the form of intrusions (Ehlers & Clark, 2000; Ehlers et al., 2004). The latter theory highlights the poor integration of elements of the traumatic experience with each other, and with their context of previous and subsequent information. The authors hypothesize that difficulty in accessing context information may prevent the trauma memory from being "updated", e.g., failure to access the information "I did not die during the assault" during an intrusion of seeing the assailant with a knife before being attacked will induce a sense of current threat ("I will die"). Thus, the *poor access to context information* when experiencing intrusive memories may be a predictor of persistent PTSD according to the Ehlers and Clark (2000) model.

Intrusive memories can be extremely *distressing*, and, accordingly, the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV, American Psychiatric Association, 1994) includes distress in the definition of intrusive recollections in criterion B1 of PTSD. Ehlers and Steil (1995) hypothesized that the *distress* caused by intrusive memories is actually more predictive of persistent PTSD than their frequency.

1.2. Responses to intrusive memories

Ehlers and Steil (1995) hypothesis reflects their view that the distress associated with the intrusive memories is not simply a function of the unpleasantness of the event recalled. The authors proposed that the distress depends on the individual's interpretation of the intrusive memories. Indeed, several studies of trauma survivors found that negative interpretations of intrusive memories such as "I am going crazy" correlate with the distress caused by the intrusion, and the persistence of PTSD (Clohessy & Ehlers, 1999; Dunmore, Clark, & Ehlers, 1999, 2001; Ehlers, Clark et al., 1998; Ehlers, Mayou, & Bryant, 1998; Halligan, Michael, Clark, & Ehlers, 2003; Steil & Ehlers, 2000). Ehlers and Steil (1995) suggested further that the distress associated with the intrusive memories will motivate the individual to engage in a range of behaviours or cognitive strategies that are intended to control the intrusions, but maintain the problem. There is empirical evidence from a range of cross-sectional and prospective studies that effortful suppression of intrusive memories, and rumination about the event are linked to persistent PTSD (Clohessy & Ehlers, 1999; Ehlers et al., 1998; Murray, Ehlers, & Mayou, 2002; Steil & Ehlers, 2000).

The goals of the present two studies of assault survivors were:

(1) To systematically compare individuals with and without PTSD, who had experienced a comparable traumatic event, with respect to the modalities and sensory qualities of their intrusive memories (Studies 1 and 2),
(2) To investigate the relationship between PTSD severity and (a) the intrusion characteristics summarized above (frequency, ease of triggering, "nowness", vividness, lack of context, distress) and (b) responses that are thought to maintain intrusions, namely thought suppression, and rumination (Studies 1 and 2).

(3) To test in a prospective longitudinal investigation whether intrusion characteristics and responses to intrusions predict the persistence of PTSD (Study 2).

2. Method

2.1. Participants

Participants had experienced either common assault, actual bodily harm, grievous bodily harm, sexual assault, or rape. Recruitment was conducted in collaboration with Victim Support (VS), a UK-wide charity that receives addresses of all victims of crime from the police and contacts each victim offering help and support. Several local VS offices in South England and Wales agreed to send out information flyers about the study to assault survivors on their database. Unfortunately, time constraints did not allow the VS offices to record the exact number of flyers they sent out. Survivors who were interested in participating contacted the investigators and received more information about the study. People who decided to participate gave written consent and were interviewed at their home or their local VS office. Participants who were seen at the VS office were reimbursed for their travel expenses (which varied from one participant to another, depending on the actual cost incurred). People whose assault occurred before the age of 16; whose assault occurred in the context of ongoing domestic violence; and those with a history of psychosis or with current substance abuse were excluded from the study.

Study 1—Cross-sectional investigation: Participants had experienced an assault between 3 months and 5 years before entering the study. The sample comprised 81 assault victims, 48 male and 33 female, with ages ranging from 20 to 65 years, mean = 37.27 years, SD = 11.86. Thirty-two participants (40%) met PTSD criteria at the time of interview, and 49 (60%) did not fulfil PTSD criteria. A comparison of the PTSD and no PTSD groups (see Table 1) showed that they did not differ in terms of sex, age, ethnic origin, education level, or marital status. The groups also did not differ in the number of weeks since the assault, type of assault experienced, or severity of the assault. Severity of the assaults was a composite score of the number of assailants, duration of assault, use of verbal threat, extent of resultant injuries, and weapon use, as in previous studies with assault survivors (Dunmore et al., 1999, 2001). As expected, the PTSD group reported more severe PTSD and depressive symptoms and higher levels of state and trait anxiety.

Study 2—Prospective longitudinal investigation: Participants had experienced an assault less than three months before initial interview. The sample comprised 73 assault victims, 40 male and 33 female, with ages ranging from 20 to 74 years, mean = 40.36 years, SD = 14.80. There was no overlap between the participants of Studies 1 and 2. Twenty-seven participants (37%) met diagnostic criteria for PTSD at initial assessment, and 46 participants (63%) did not meet PTSD criteria. Participants who were interviewed within the first month after the assault were included in the PTSD group if they met all DSM-IV diagnostic criteria except E, which requires that the duration of disturbance is more than a month. PTSD was reassessed at three and 6 months after the first interview. Table 1 shows that there was no difference between the groups with respect to sex, age or marital status. However, the no PTSD group had higher educational attainment than the PTSD group, U ($N = 68$) = 355.00, $p = .012$. The groups did not differ in type and severity of

Table 1
Participant and assault characteristics

	Study 1			Study 2		
	PTSD	No PTSD	Statistic	PTSD	No PTSD	Statistic
Sex, *N* (%)			χ^2 (1, 81) = .458			χ^2 (1, 73) = .150
Female	15 (47%)	15 (47%)		13 (48%)	20 (43%)	
Male	17 (53%)	17 (53%)		14 (52%)	26 (57%)	
Age, mean (SD)	36.5 (10.7)	37.8 (12.7)	*t* (76) = −.492	39.2 (13.4)	41.0 (15.6)	*t* (71) = −.495
Ethnic origin, N (%)			χ^2 (1, 76) = .002			χ^2 (1, 70) = 1.205
Caucasian	25 (86%)	42 (89%)		23 (88%)	42 (95%)	
Noncaucasian	4 (14%)	5 (11%)		3 (12%)	2 (5%)	
Education, mean rank, *N* (%)	32.28	39.6	*U* (73) = 513	27.15	39.05	*U* (68) = 355.00*
No exams	6 (21%)	5 (11%)		4 (15%)	4 (10%)	
GCSE/O levels	9 (32%)	14 (31%)		10 (39%)	8 (19%)	
A levels	5 (18%)	6 (13%)		9 (35%)	13 (31%)	
Degree or above	8 (29%)	20 (44%)		3 (12%)	17 (40%)	
Marital status, *N* (%)			χ^2 (2, 75) = .564			χ^2 (2, 70) = 5.448
Not married	12 (41%)	30 (65%)		10 (38%)	18 (42%)	
Married	6 (21%)	9 (20%)		5 (19%)	17 (40%)	
Divorced/ widowed	11 (38%)	7 (15%)		11 (42%)	8 (19%)	
Psychological characteristics, mean (SD)						
STAIS	42.09 (9.19)	30.29 (8.70)	*t* (79) = 5.842**	40.41 (7.72)	33.89 (10.97)	*t* (71) = 2.715**
STAIT	56.86 (10.15)	41.00 (11.03)	*t* (73) = 6.201**	55.80 (9.73)	39.53 (11.04)	*t* (71) = 6.110**
BDI	22.11 (10.50)	7.02 (5.96)	*t* (74) = 8.005**	18.13 (7.84)	5.86 (4.95)	*t* (66) = 7.902**
PDS	29.00 (10.49)	8.081 (6.14)	*t* (79) = 11.325**	30.19 (7.42)	10.22 (6.81)	*t* (71) = 11.701**
Type of assault, *N* (%)			χ^2 (1, 81) = .961			χ^2 (2, 73) = 1.275
Physical assault	28 (88%)	47 (96%)		24 (96%)	46 (100%)	
Sexual assault	4 (13%)	2 (4%)		1 (4%)	0 (0%)	
Weeks since assault, mean (SD)	64.38 (58.49)	49.22 (43.26)	*t* (79) = 1.339	8.67 (2.99)	7.13 (2.96)	*t* (71) = 2.156*
Composite severity of assault, mean rank	45.08	38.34	*U* (81) = 653.5	42.09	34.01	*U* (73) = 483.500

Note: * <.05, ** <.01; STAIS: State-Trait Anxiety Inventory, state version; STAIT: State-Trait Anxiety Inventory, trait version: BDI: Beck Depression Inventory; PDS: Posttraumatic Diagnostic Scale.

the assaults. The assaults of the no PTSD group had occurred somewhat more recently than those of the PTSD group. The small difference of about 10 days should not compromise the validity of the results, as one would expect the severity of re-experiencing symptoms to decline over time. Thus, at most, there may be a slight bias in the direction of overestimating the severity of re-

experiencing symptoms in the no PTSD group. As in Study 1, the PTSD group reported more severe PTSD and depressive symptoms and higher levels of state and trait anxiety. Of the 73 participants, 71 also participated in the follow-up 6 months after the interview.

3. Measures

3.1. Symptom measures

Posttraumatic Stress Disorder Symptoms: PTSD symptoms were assessed with the Posttraumatic Diagnostic Scale (PDS, Foa, Cashman, Jaycox, & Perry, 1997). The PDS asks participants to rate how much they were bothered by each of the PTSD symptoms specified in DSM-IV (American Psychiatric Association, 1994), ranging from 0 'never' to 3 '5 times per week or more/nearly always'. Participants answered the questions with respect to the assault with which the study was concerned. The PDS yields a sum score measuring the overall severity of PTSD symptoms. In addition, the presence/absence of PTSD was determined by assessing whether a participant endorsed the minimum number of symptoms (with at least "1") required by DSM-IV. Several studies have supported the reliability and validity of the scale (Foa et al., 1997). The PDS shows good agreement with the Structured Clinical Interview for DSM-IV (Foa et al., 1997). In order to ensure that the PTSD group were experiencing at least moderate symptom severity, a minimum symptom score of 15 was required for a diagnosis, following Foa (1998) recommendation. In addition, symptoms were required to have been present for at least a month and, in line with PDS scoring criteria, to cause at least two specific problems in functioning (e.g. work) or to affect the overall level of functioning in all areas of life.

Depression and Anxiety: The *Beck Depression Inventory (BDI)* (Beck, Ward, Mendelson, Mock, & Erbaugh, 1961) and the *State Trait Anxiety Inventory (STAI)* (Spielberger, Gorsuch, Lushene, Vagg, & Jacobs, 1983) were used as standardized measures of depression and anxiety, respectively.

General information questionnaire/Semi-structured interview: A questionnaire assessed demographic characteristics. A semi-structured interview, similar to the one used by Dunmore et al. (1999, 2001) assessed the nature and severity of the assault.

3.2. Measures of intrusion characteristics

Intrusion Interview: The Intrusion Interview was an adapted version of the Intrusion Interview by Hackmann, Ehlers, Clark, and Speckens (2004). The semi-structured interview covers the occurrence, content, frequency, modalities, and characteristics (vividness, distress, 'here and now' quality, lack of context) of intrusive memories, as well as strategies used by the individual to deal with the intrusions. It took approximately 30 min to complete. The interviewer first asked "People who have been assaulted can remember the event in different ways. Some people experience that memories of parts of the assault just pop into their mind when they do not want them to. Do you sometimes get such unwanted memories of the assault?" If the participant responded positively, they were asked to describe the most common intrusions. The content of the memories was noted. If patients reported more than one intrusive memory, they were asked to first choose and describe

the major intrusive memory, which was troubling them most. The interviewer then asked "Could you tell me a bit more about how you experience this memory? What is it like?—and prompted "Is it more like a thought" (please describe)? . like a feeling (please describe?) … or like a sensory experience?" If patients chose sensory experience, the sensory modalities were then explored. The frequency with which the intrusive memory had occurred in the previous week was noted, and patients rated its vividness, the distress associated with it, and the extent to which it seemed to be happening now instead of being something from the past ("*nowness*") and the extent to which it appeared to be an isolated moment that was disjointed from what happened beforehand and afterwards (*lack of context*) on 0–100 scales (0 = not at all, and 100 = very much). The correlations between the corresponding scales on the Intrusions Interview and an Intrusion Questionnaire were: frequency $r = .94$, distress $r = .74$, vividness $r = .70$, nowness $r = .84$ (Hackmann et al., 2004), and the 1-week retest reliability of the scales ranged between ranged between $r = .61$ and .72 (Speckens, Ehlers, Hackmann, & Clark, submitted). The interviewer then determined the content of any other intrusive memories that the participants reported.

The Intrusion Interview also assessed participants' responses to their intrusive memories by asking "What do you do when this memory pops into your mind". Three items assessed efforts to suppress the intrusion, "I try to push the memory out of my mind", "I try to distract myself by thinking about other things", "I try to distract myself by doing things", $\alpha = .80$ in Study 1 and $\alpha = .87$ in Study 2; and one item assessed rumination, "I start dwelling on it".

The Intrusion Interview did not cover recollections of the assault in the form of dreams, or the occurrence of feelings associated with the assault without actually remembering it ("affect without recollection", Ehlers & Clark, 2000, e.g., a man who got stabbed in his house felt suddenly extremely upset and only realized later that this feeling was probably caused by a song that was also playing during the stabbing).

3.3. Intrusion provocation task

The task was designed to assess how easily intrusive memories were triggered by assault-related material. It comprised two phases. In the first phase, participants were asked to look at four different pictures that depicted assaults. Male participants looked at pictures in which a man was the victim, and female participants looked at pictures in which a woman was the victim. The pictures were bought from various press agencies. The pictures showed people being punched, stabbed or shot. Some pictures showed the assailant as well as the person being assaulted.

We told participants that we were interested in how much distress was caused by material that might remind them of their assaults. Participants were then asked to sit quietly 2 min after viewing the pictures. When 2 min were up, participants were asked whether any memories of their own assault had popped into their minds. Participants further indicated for what percentage of the time they had intrusive memories of their assaults, how vivid and distressing the memories were, to what extent the memories were experienced as if happening in the present, how much physiological arousal the memories had caused, and how easy the participant found it to think about something else (each on a scale from 0 to 100).

3.4. Procedure

All participants gave written consent prior to participation. The UK Multicentre Research Ethics Committee had approved the study. Participants of Studies 1 and 2 completed the BDI and the STAI trait anxiety scale in the week prior to the interview session. The session lasted approximately 2 h, and participants completed the Intrusion Interview, Intrusion Provocation Task, PDS, and the General Information Questionnaire/Semi-Structured Interview. In addition to the measures described in the present paper, participants completed a number of other questionnaires and interview questions, and gave a narrative account of the assault; the results of which have been presented in Halligan, Michael, Clark, and Ehlers (2003). The interviews were conducted by T.M. or S.L.H. In Study 2, participants completed the PDS again 6 months after the original interview.

3.5. Data analysis

The presence of intrusions in the PTSD and no PTSD groups and their modalities were compared using Fisher's Exact Test. We used the Mann–Whitney U-test for group comparisons of the number of different intrusions and different modalities. The Pearson correlations assessed the relationship of the intrusion characteristics and the participants' responses to the intrusions with PTSD severity as measured by PDS scores. The correlational analyses were conducted with the whole samples of assault survivors in Studies 1 and 2, respectively, as PDS scores were normally distributed. To address the question of whether the intrusion characteristics assessed with the Intrusion Interview predict PTSD symptom severity over and above what can be predicted on the basis on intrusion frequency, we performed hierarchical multiple regression analyses. Additional hierarchical multiple regression analyses tested whether the intrusion characteristics assessed with the Intrusion Interview predict PTSD severity (PDS) at 6 months over and above what can be predicted from PTSD diagnostic status or the severity of reexperiencing symptoms (PDS) at initial assessment.

4. Results

4.1. Intrusion interview

4.1.1. Presence and number of intrusive memories

In Study 1, 75% (24 of 32) of the participants with PTSD, and 49% (24 of 49) of the participants without PTSD group reported intrusive memories. In Study 2, 89% (24 of 27) of the PTSD group and 54% (25 of 46) of the no PTSD group reported intrusive memories. In both studies, intrusive memories were more common in the PTSD group, Study 1, Fisher's Exact Test $p = .023$; Study 2, $p = .004$. The following descriptions refer to those participants who described intrusive memories.

The PTSD group described between 1 and 4 different intrusive memories in Study 1, and between 1 and 5 different intrusive memories in Study 2. The no PTSD group reported between 1 and 3 intrusive memories in both studies. Most participants experienced only one (Study 1: 46%

of the PTSD group, 75% of the no PTSD group; Study 2: 38% of the PTSD group, 52% of the no PTSD group) or two (Study 1: 25% and 21% of the PTSD and no PTSD groups; Study 2: 48% and 36%) different intrusive memories. In Study 1, participants with PTSD named a greater number of different intrusive memories, Mann-Whitney *U*-test ($N = 24$), $Z = 2.355$, $p = .019$; but there was no group difference in Study 2.

The following analyses are based on the intrusion that each participant named as their major intrusive memory.

4.1.2. Modalities of intrusive memories

Table 2 shows the modalities participants reported for their major intrusive memories. The majority of participants reported that they experienced the intrusion as a 'sensory experience only'. Nearly all participants in the PTSD group (Study 1: 100%, Study 2: 91%), and the majority of the no PTSD group (Study 1: 83%, Study 2: 64%), described that their intrusion contained sensory experiences. There was a trend for the PTSD group to be more likely to report sensory experiences during their intrusions; Study 1: Fisher's Exact Test $p = .11$, Study 2: $p = .039$.

Table 3 shows the sensory qualities of the intrusive memories. As there were no differences between the PTSD and no PTSD groups, Table 3 presents the results for all participants combined. Visual sensations were the most common, and smells and tastes the least common.

Table 2
Modalities of the participants' major intrusive memory

	Study 1, % (*N*)		Study 2, % (*N*)	
Intrusion is experienced as…	PTSD	No PTSD	PTSD	No PTSD
Thought only	0% (0)	0% (0)	0% (0)	12.0% (3)
Feeling only	0% (0)	8.3% (2)	4.3% (1)	12.0% (3)
Sensory experiences only	50.0% (12)	45.8% (11)	43.5% (10)	32.0% (8)
Thought and feeling	0% (0)	8.3% (2)	4.2% (1)	12.0% (3)
Thought and sensory experiences	8.3% (2)	8.3% (2)	17.4% (4)	4.0% (1)
Feeling and sensory experiences	25.0% (6)	29.2% (7)	26.1% (6)	24.0% (6)
Thought, feeling and sensory experiences	16.7% (4)	0% (0)	4.2% (1)	4.0% (1)

Table 3
Sensory qualities of intrusive memories: percent participants that endorsed each quality for their main intrusive memory

	Study 1 (%)	Study 2 (%)
Visual: film scene	50.0	42.8
Visual: snapshot	35.4	38.3
Bodily sensations	20.8	10.6
Hearing words or sentences	12.5	10.9
Hearing other sounds	12.5	8.5
Smells or tastes	10.4	4.3

Participants could endorse more than one quality.

Table 4
Correlations of intrusion characteristics and responses to intrusions with PTSD severity

	Study 1	Study 2	
	PTSD severity (PDS)	PTSD severity (PDS)	
	Concurrent $N=48$	Concurrent $N=49$	6 months later $N=47$
Frequency	.48**	.30*	.30*
Vividness	.11	.36*	.31*
Distress	.58**	.45**	.48**
Nowness	.55**	.63**	.58***
Lack of context	.50**	.49**	.51**
Rumination	.34*	.43**	.38**
Suppression of intrusion	.47*	.38**	.10

Note: * $p<.05$, ** $p<.01$.
PDS, Posttraumatic Diagnostic Scale.

Table 5
Regression analyses: prediction of PTSD Severity (PDS) from intrusion characteristics (intrusion interview)

	Intrusion frequency only				Intrusion frequency and intrusion characteristics*				Change in R^{2*} with intrusion characteristics			
	R^2	F	df	p	R^2	F	df	p	R^2 change	F	df	p
Study 1 Concurrent	.27	15.8	1.42	<.001	.64	17.2	4.39	<.001	.37	13.1	3.39	<.001
Study 2 Concurrent	.11	5.2	1.42	.028	.54	11.3	4.39	<.001	.43	12.0	3.39	<.001
Prediction of PTSD severity 6 months later	.08	3.6	1.41	.065	.51	9.8	4.38	<.001	.43	11.0	3.38	<.001

Note: * distress, lack of context and nowness; PDS, Posttraumatic Diagnostic Scale.

4.1.3. Association between intrusion characteristics/responses to intrusions and PTSD severity

The biserial correlation between the presence of intrusive memories (as measured by the Intrusion Interview) and PTSD symptom severity (PDS) was $r = .31$ in Study 1, and $r = .36$ in Study 2. Presence of intrusive memories showed a small, but significant correlation with subsequent PTSD severity at 6 months, $r = .30$. Table 4 shows the correlations between intrusion characteristics (as measured by the Intrusion Interview) and PTSD severity (PDS) for those participants who reported intrusions. The distress caused by the intrusion, its 'here and now' quality, its lack of context, and a ruminative response to it were significantly correlated with concurrent PTSD severity in both studies, and also predicted PTSD severity 6 months later in Study 2. Efforts to suppress intrusions correlated significantly with PTSD symptom severity in the concurrent assessments in both studies, but failed to significantly predict subsequent symptom severity. Vividness ratings only correlated with PDS scores only in Study 2.

Table 5 shows the results of the hierarchical multiple regression analyses that tested whether the intrusion characteristics assessed with the Intrusion Interview predict PTSD severity (PDS) over

and above what can be predicted from intrusion frequency (as measured by the Intrusion Interview). Intrusion frequency was entered in the first step, and distress, lack of context and nowness were entered in the second step. Table 5 shows that in both studies, intrusion frequency only explained a small percentage of the variance of PTSD symptoms, both concurrently and prospectively. When the three intrusion characteristics were entered in the second step, they significantly improved the prediction, and explained an additional 36–43% of the variance. Across all regression analyses, the variable that consistently predicted unique variance of PTSD severity was the perceived nowness of the intrusions.

Participants in Study 2 had lower education levels than those without PTSD. We therefore tested whether the intrusion characteristics (nowness, distress, lack of context) predicted PTSD symptom severity over and above what could be predicted from educational attainment. This was the case for all time points. For the concurrent assessment, educational attainment predicted 21.5% of the variance of PTSD symptom severity, and intrusion characteristics explained an additional 28.6% of the variance, F-change $(3,38) = 7.247$, $p = .001$. For the prediction of PTSD symptom severity 6 months later, educational attainment predicted 20.5% of the variance of PTSD symptom severity, and intrusion characteristics explained an additional 27.2% of the variance, F-change $(3,37) = 6.399$, $p = .001$.

4.1.4. "Added value" of intrusion characteristics in predicting of PTSD severity 6 months later?

One may argue that although the intrusion characteristics (nowness, distress, lack of context) predict more variance of PTSD severity at 6 months than intrusion frequency, they may do so because of shared variance with other reexperiencing symptoms measured by the PDS. A hierarchical multiple regression analysis, however, showed that although PDS reexperiencing symptoms (mean score of items 1–5) at initial assessment predicted 28.2% of the variance of PTSD symptom severity at 6 months, the three intrusion characteristics explained an additional 21.3% of the variance, F-change $(3,39) = 5.481$, $p = .003$.

A further hierarchical multiple regression analysis showed the three intrusion characteristics also explained variance of PTSD severity at 6 months over and above what can be explained by PTSD diagnostic status at initial assessment. PTSD diagnostic status at initial assessment predicted 33.1% of the variance of PTSD symptom severity at 6 months, and the three intrusion characteristics explained an additional 15.8% of the variance, F-change $(3,39) = 4.018$, $p = .014$.

4.1.5. Intrusion provocation task

Looking at photographs depicting assaults triggered intrusive memories more readily in the PTSD group than in the no PTSD group. In Study 1, 68% (21 of 31) of the participants with PTSD and 41% (20 of 49) of the participants without PTSD reported intrusive memories of their own assaults, Fisher's Exact Test $p = .023$. In Study 2, this applied to 73% (19 of 26) of the participants with PTSD and 20% (9 of 46) of the participants without PTSD, Fisher's Exact Test, $p < .001$. Correlations between the characteristics of the intrusive memories triggered by the Intrusion Provocation Task and PTSD severity as measured by the PDS are shown in Table 6. The distress caused by the intrusions, their 'here and now' quality, and the percentage of time that the intrusions were present during the task correlated with both concurrent and subsequent PTSD severity. The vividness of the intrusions, the perceived physical arousal accompanying them, and

Table 6
Results of the intrusion provocation task

	Study 1	Study 2	
	PTSD severity (PDS)	PTSD severity(PDS)	
	Concurrent $N=41$	Concurrent $N=28$	6 months later $N=27$
% Of time intrusions were present	.63**	.55**	.48*
Vividness	.54**	.36	.32
Distress	.77**	.61**	.46*
Nowness	.77**	.53**	.50**
Arousal	.74**	.44*	.22
Ease of disengagement	−.59**	−.38	−.26

Note: *$p<.05$, **$p<.01$; PDS, Posttraumatic Diagnostic Scale.

the ease with which participants could disengage from them showed some significant correlations in the expected direction.

5. Discussion

In line with previous research, the presence of intrusive memories of the traumatic event was not unique to assault survivors with PTSD (McFarlane, 1988; Shalev, 1992; Steil & Ehlers, 2000). A substantial proportion of assault survivors without PTSD experienced intrusive trauma memories, namely 49% in the cross-sectional investigation and 54% of the prospective longitudinal investigation. Their intrusions were phenomenologically similar to those of participants with PTSD in that they were largely described as sensory experiences, with visual intrusions being most common (e.g., Ehlers et al., 2002; Ehlers & Steil, 1995; Mellman & Davis, 1985). There was only a trend for a group difference in that participants with PTSD tended to be more likely to describe their intrusions as sensory.

The early identification of people at risk of chronic PTSD is an important issue in the care of trauma survivors (e.g., Brewin et al., 2002; Ehlers & Clark, 2003; McNally, Bryant, & Ehlers, 2003). Symptom screening instruments rely on the presence and frequency of symptoms. The present data showed that these aspects of intrusive memories have little predictive value. Presence of intrusive memories only explained 9% of the variance of PTSD severity at 6-month follow-up in the prospective study. Similarly, the frequency of intrusive memories was not a good predictor of subsequent PTSD severity, and explained only 8% of the variance of PTSD severity at 6 months among those participants who had intrusions.

It was therefore of theoretical and practical interest to find that certain characteristics of the intrusive memories improved the accuracy of the prediction by further 37–43% of the variance: the perceived nowness and lack of context of the intrusive memories, and the distress associated with them. These intrusion characteristics also significantly improved the prediction of PTSD

symptom severity at 6 months over and above what could be predicted from PTSD diagnostic status and the severity of PDS reexperiencing symptoms at initial assessment.

The perceived "here and now" quality of the intrusion emerged as the predictor that consistently contributed unique variance in the regression models. Several authors have emphasized a "here and now" quality of intrusive memories, which does not appear to be restricted to flashbacks (Bremner et al., 1995; Brewin et al., 1996; Ehlers & Clark, 2000; Foa & Rothbaum, 1998). The present findings underscore its value in predicting the persistence of PTSD symptoms. Interestingly, in line with the present investigations, a recent study by Speckens, Ehlers, Hackmann, and Clark (submitted) found that the perceived "here and now" quality of intrusive memories also predicted poor response to imaginal exposure to the trauma memory. The predictive value of the "here and now" quality of intrusive memories is of theoretical interest for models of PTSD as it appears to distinguish intrusive trauma memories from other autobiographical memories, which are usually accompanied by autonoetic awareness, i.e., the awareness that one is experiencing a memory from one's past (Tulving, 1998, 2002).

Furthermore, the present studies were the first to demonstrate that a perceived lack of context of the intrusive memories also predicted PTSD severity. This is consistent with Ehlers and Clark (2000) and Ehlers, Hackmann and Michael's (2004) proposal that the poor integration of elements of the traumatic experience with each other (such linking the moment of being stabbed with the final outcome of the assault, e.g., "I am alive") and with other autobiographical information (e.g., all the times one has been in a similar situation without being stabbed) characterizes trauma memories. Research on autobiographical memories suggests that such integration of autobiographical information would usually *inhibit* the retrieval of involuntary spontaneous memories (Conway & Pleydell-Pearce, 2000).

In line with Ehlers and Steil (1995), the distress caused by the intrusive memories was a consistent predictor of PTSD severity, replicating earlier findings of Ehlers et al. (1998), Clohessy and Ehlers (1999) and Steil and Ehlers (2000).

The predictive role of the "here and now" quality of the intrusions and the intrusion-related distress was further confirmed for intrusions triggered by the Intrusion Provocation Task. This task further showed that the ease with which intrusions are triggered by reminders correlates with concurrent and subsequent PTSD severity, the probability that intrusions were triggered and the percentage of time that participants had intrusive memories after looking at pictures of assaults. Lack of context of intrusive memories was not assessed in this task.

In line with earlier results (Clohessy & Ehlers, 1999; Ehlers et al., 1998; Murray et al., 2002; Steil & Ehlers, 2000), we also found that a ruminative response to intrusions is linked to PTSD. Thoughts about how the assault could have been avoided, about the unfairness of the attack, or pondering how life would be better if the trauma had never occurred, are examples of typical ruminative thoughts in assault survivors with PTSD. They are thought to maintain PTSD in several ways (Ehlers & Clark, 2000; Joseph, Williams, & Yule, 1997). First, rumination may be similar to cognitive avoidance in that it prevents the elaboration and integration of the trauma memory. Second, it may help maintain negative appraisals such as "My life is permanently changed" or "The world is unfair". Finally, rumination may provide internal retrieval cues for unwanted trauma memories.

We found only partial evidence for the hypothesis that suppression of intrusive memories is maladaptive in that it correlated with concurrent, but not with subsequent PTSD severity. Earlier

studies had consistently reported a relationship (Ehlers et al., 1998; Steil & Ehlers, 2000). Discrepant findings might be due to difference in sample sizes, as the earlier studies were conducted with much larger samples. Furthermore, it may be necessary to refine the questions asked to assess dysfunctional forms of memory suppression and distraction, as distraction may be adaptive under some circumstances.

The studies had several limitations. First, intrusion characteristics and responses to intrusions were assessed by simple rating scales. Nevertheless, they explained a substantial degree of the variance of PTSD severity, and simple rating scales may be of greater practical use when screening for people at risk of persistent PTSD than longer scales or a full diagnostic assessment for PTSD. Second, the study was part of a larger investigation, and participants had already completed an interview about their assaults, and had given an assault narrative before doing the Intrusion Interview and Intrusion Provocation Task. It is unlikely, however, that these tasks confounded the effects reported in the present paper, as there was a clear break between tasks, and as the PTSD and no PTSD groups did not differ in assault severity. Finally, participants in the prospective studies were only assessed a few weeks after their assault, and it remains to be tested whether the predictive value of intrusion characteristics replicates if people are assessed very soon after trauma.

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