

Intrusive Memories in Perpetrators of Violent Crime: Emotions and Cognitions

Ceri Evans
St. George's Hospital Medical School

Anke Ehlers
King's College

Gillian Mezey
St. George's Hospital Medical School

David M. Clark
King's College

The authors investigated factors that may determine whether perpetrators of violent crime develop intrusive memories of their offense. Of 105 young offenders who were convicted of killing or seriously harming others, 46% reported distressing intrusive memories, and 6% had posttraumatic stress disorder. Intrusions were associated with lower antisocial beliefs before the assault, greater helplessness, fear, dissociation, data-driven processing and lack of self-referent processing during the assault, more disorganized assault narratives, and greater negative view of the self, negative interpretations of intrusive memories, perceived permanent change, and self-blame. In a logistic regression analysis, the cognitive and emotional variables explained substantial variance over and above demographic factors. The results suggest that cognitive factors that predict reexperiencing symptoms in victims of crime generalize to perpetrators.

Keywords: perpetrators, violent crime, intrusive memories, posttraumatic stress disorder, dissociation

Recent studies have suggested that a minority of perpetrators of violent crime may develop posttraumatic stress disorder (PTSD; Kruppa, Hickey, & Hubbard, 1995; Spitzer et al., 2001), but little is known about the conditions that may turn an intentional violent act into a trauma for the perpetrator. Clinical examples include exposure to the gruesome consequences of violence (e.g., victim's body covered in blood), unintended seriousness of the consequences of the violence (e.g., victim died, although the perpetrator did not intend to kill him or her), or greater violence than intended under social pressure (e.g., as part of gang violence; Evans, Ehlers, Mezey, & Clark, in press).

The present article was designed to systematically investigate factors that may lead to perpetrators' intrusive memories of violent crime. As reexperiencing symptoms are the hallmark symptom of PTSD (Horowitz, 1976), studying the factors that lead to intrusive memories is a crucial step in understanding how PTSD may develop in perpetrators. Previous theoretical and empirical work identified the following factors in the etiology of intrusive memories after trauma: (a) cognitive schemas (beliefs, appraisals) before and after the assault, (b) perceived threat to life, (c) over-

whelming negative emotions, and (d) disrupted cognitive processing, leading to problems with the autobiographical memory for the trauma (Brewin, Dalgleish, & Joseph, 1996; Ehlers & Clark, 2000; Horowitz, 1976; van der Kolk & Fessler, 1995). In the present study, we investigated whether these factors apply to perpetrators of violent crime.

Cognitive Schemas Before the Trauma

The development of intrusive memories in survivors of trauma has been attributed to a shattering of their pretrauma beliefs about safety, personal vulnerability, and the predictability of the future (Foa & Riggs, 1993; Janoff-Bulman, 1992; Resick & Schnicke, 1993). One would thus expect that perpetrators with antisocial personality disorder—who hold beliefs such as “I am entitled to break rules to look after myself” or “Force or cunning is the best way to get things done” (Beck, Freeman, & Associates, 1990)—to be at low risk of developing intrusions of their crimes.

Perceived Threat and Negative Emotions During Trauma

The exceptionally threatening character of traumatic events has been highlighted in the diagnostic criteria for PTSD (American Psychiatric Association, 1980; World Health Organization, 1992). Perceived threat to life during trauma showed consistent correlations with PTSD severity in a recent meta-analysis (Ozer, Best, Lipsey, & Weiss, 2003), with an average weighted correlation of .26. For perpetrators of violence, the perceived threat to their social status may be an important additional source of threat (Beck, 1999). It was therefore included as a possible predictor in the present study.

Ceri Evans and Gillian Mezey, Department of Psychological Medicine, St. George's Hospital Medical School, London, England; Anke Ehlers and David M. Clark, Department of Psychology, Institute of Psychiatry, King's College, London, England.

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Correspondence concerning this article should be addressed to Ceri Evans, who is now at the Medlicott Academic Unit of Forensic Psychiatry, Forensic Psychiatry Services, Hillmorton Hospital, Private Bag 4733, Christchurch, New Zealand. E-mail: ceri.evans@cdbh.govt.nz

Emotional reactions during trauma are also highlighted in the diagnostic criteria for PTSD, in particular fear, helplessness, or horror (American Psychiatric Association, 1994). In Ozer et al.'s (2003) meta-analysis, the intensity of such negative emotions showed an average weighted correlation of .26 with PTSD severity. Other negative emotions that have been shown to predict PTSD include anger and shame (Andrews, Brewin, Rose, & Kirk, 2000).

Cognitive Processing and Disorganized Trauma Memories

Theories of PTSD suggest that information processing is compromised during trauma and that compromised information processing explains PTSD symptom severity over and above what is explained by high arousal and negative emotions (e.g., Brewin et al., 1996; Ehlers & Clark, 2000). The most widely investigated indicator of such compromised processing is dissociation, which was the best predictor of PTSD in Ozer et al.'s (2003) meta-analysis, with an average weighted correlation of .35.

Dissociation is a complex concept, and it is unclear how it relates to other forms of cognitive processing that have been shown to influence memory (Roediger, 1990; Wheeler, 1997, 2000). Ehlers and Clark (2000) suggested that two further cognitive processing dimensions, data-driven processing (i.e., the predominant processing of sensory as opposed to conceptual information) and lack of self-referent processing (i.e., failure to encode new information as related to the self and other autobiographical information), predict whether people develop reexperiencing symptoms after trauma. These processes are thought to overlap in part with aspects of dissociation. Preliminary empirical support for a role of data-driven processing and lack of self-referent processing in intrusive trauma memories was found in studies of trauma survivors and volunteers exposed to distressing films (Murray, Ehlers, & Mayou, 2002; Rosario, Williams, & Ehlers, 2006).

Compromised cognitive processing is thought to lead to deficits in the autobiographical memory for the traumatic event. There are different hypotheses about the nature of this deficit, including a deficit in memory representations that facilitate intentional recall (Brewin et al., 1996), highly fragmented memories (e.g., Foa & Riggs, 1993; Herman, 1992), and poorly elaborated memories that are inadequately incorporated into their context of other autobiographical memories (e.g., Ehlers & Clark, 2000). Poor elaboration is thought to lead to poor inhibition of unintentional triggering of aspects of the trauma memory by matching cues. Ehlers, Hackmann, and Michael (2004) further suggested that the poor elaboration should be most pronounced for those parts of the trauma that are later reexperienced.

The mechanisms involved with the formation of trauma memories and deficits in recall specified in the different PTSD models are difficult to measure (Ehlers et al., 2004; McNally, 2003). One way is to code narratives of the traumatic event for indicators of the hypothesized mechanism. Common to the fragmentation and poor elaboration models is the hypothesis that intentional recall of trauma memories should be disorganized. Several studies have shown preliminary support for more disorganized trauma narratives in patients with PTSD versus those without PTSD (Foa, Molnar, & Cashman, 1995; Halligan, Michael, Clark, & Ehlers, 2003; Murray et al., 2002) and in volunteers exposed to a highly

unpleasant film who developed intrusive memories than those without subsequent intrusions (Halligan, Clark, & Ehlers, 2002).

Appraisals of the Trauma and Its Aftermath

PTSD has been found to be associated with excessively negative appraisals of traumatic events (Ehlers & Clark, 2000; Foa & Riggs, 1993; Resick & Schnicke, 1993). For example, trauma survivors who blame themselves for the event or those who appraise a traumatic event as a sign of a negative (e.g., incompetent, unworthy, inadequate) self have more persistent PTSD symptoms than those who do not (Andrews et al., 2000; Dunmore, Clark, & Ehlers, 1997, 1999, 2001; Ehlers, Maercker, & Boos, 2000; Foa, Tolin, Ehlers, Clark, & Orsillo, 1999).

Although it is common for people to experience temporary unwanted memories following trauma, only a subgroup suffer from persisting intrusive memories (e.g., Baum & Hall, 1993). Ehlers and Steil (1995) suggested that negative interpretations of intrusions and other PTSD symptoms contribute to the maintenance of intrusive memories because they motivate the survivor to engage in behaviors that prevent processing of the trauma and may even increase intrusion frequency (e.g., rumination, thought suppression, use of alcohol and drugs). Several studies have supported the role of negative interpretations of intrusions in maintaining intrusions and PTSD (e.g., Dunmore et al., 1999, 2001; Ehlers, Mayou, & Bryant, 1998). Other trauma sequelae may also be interpreted in a negative way, contributing to the maintenance of PTSD (Ehlers & Clark, 2000). A common example is that trauma survivors interpret the trauma and its consequences as meaning that they have permanently changed for the worse as a person. Perceived permanent change has been shown to predict chronic PTSD (Dunmore et al., 1999, 2001; Ehlers et al., 2000).

Study Aims and Hypotheses

We investigated the relationship between emotional and cognitive factors and intrusive memories in perpetrators of violent crime. On the basis of prior research and theories of PTSD, we expected that intrusive memories would be associated with (a) low prior antisocial beliefs; (b) threat perception during the assault; (c) negative emotions during the assault; (d) dissociative, data-driven, and lack of self-referential cognitive processing during the assault, (e) disorganization of the assault narrative; and (f) negative appraisals of the assault and/or its aftermath. We also expected these variables to be associated with PTSD symptom severity. In addition, we explored Ehlers et al.'s (2004) hypothesis that problems in intentional recall in PTSD are greatest for the moments of the trauma that are reexperienced.

Method

Participants

Participants were 105 male prisoners, all of whom had been convicted of grievous bodily harm (GBH), attempted murder, manslaughter, or murder. All participants were imprisoned at two young offenders institutions (YOIs) within the United Kingdom during the 20-month study period. The exclusion criteria were (a) unable to speak English fluently, (b) severe learning disability, (c) active psychosis, (d) actively suicidal, (e) denied being present at

the scene of the offense, and (f) unacceptably high security risk (e.g., a history of hostage taking). Of the 149 prisoners who met the legally defined entry criteria during the study period, 113 were suitable for inclusion in the study. All suitable prisoners were invited to take part. Of these, 6 (5%) declined to participate without stating a reason, and 2 (2%) refused because they experienced distressing flashbacks during the consenting process, giving an overall compliance rate of 105 out of 113 participants approached (93%). All participants completed the study measures.

Measures

Demographic characteristics were assessed using a semistructured interview, adapted for perpetrators from Dunmore et al. (1999, 2001). It included questions relating to demographic information, history of treatment for a psychiatric disorder, and history of a previous violent offense. Previous traumatic experiences were assessed with the trauma checklist from the first part of the Posttraumatic Diagnostic Scale (Foa, Cashman, Jaycox, & Perry, 1997).

Characteristics of the offense were assessed using The Index Offence Interview, a semistructured interview adapted for perpetrators from Dunmore et al. (1999, 2001). It included questions related to (a) legal aspects (e.g., conviction, plea, initial charge, sentence), (b) descriptive aspects (e.g., victim[s], location, timing, duration, use of weapons), (c) medical aspects (e.g., victim and perpetrator injuries), and (d) situational aspects (e.g., drug or alcohol intoxication, background stress, perceived provocation, planning and preparation, motivation for the assault, including intent to kill the victim).

Measures of Intrusions and PTSD Symptoms

Intrusion interview. The presence or absence of intrusive memories for the index offense was assessed using the Intrusion Interview (Michael, Ehlers, Halligan, & Clark, 2005), a semistructured 30-min interview that covers occurrence, content, frequency, modalities, and qualities of intrusive memories. *Intrusive memories* were defined as memories that (a) were part of what actually happened at the time and (b) were recurrent, distressing, and involuntarily triggered. The interviewer first asked a generic screening question designed to elicit reports of unwanted memories of the assault of an intrusive nature:

People who have committed a violent offence [sic] can remember the event in different ways. Some people have memories of **parts of the assault** that just **pop into their mind when they do not want them to**. These are usually from particular moments from before, during or after the incident that somehow “got stuck” in memory and keep coming back. These memories consist of **part of what actually happened at the time**, rather than your thoughts about what has happened since, such as being in prison because of the assault. Do you sometimes get such unwanted recollections of the assault?

If endorsed, then participants were asked to describe all such intrusive memories in detail. If more than one intrusive memory was identified, then the participant was asked to identify the one that was most upsetting or distressing and to describe this intrusion in greater detail. Examples of the intrusions included images of the wounded victim (e.g., “I get the picture of his face in my head . . .

I can see blood coming out the back of his head . . . I thought he was dead”), or intrusions of the sensations accompanying the weapon causing damage to the victim (e.g., “The knife goes in and I see . . . blood squirt out . . . you know, you get that smell of blood . . . and the squirt . . . its just like the smell of blood. A lot of blood . . . a kind of ‘iron-ey’ kind of smell . . . I hear the squirt of the blood.”).

Interviews were transcribed verbatim. Two raters independently rated the transcripts of the intrusion interviews to determine whether intrusive memories reported by the participant met criteria for an intrusive memory. The interrater reliability was high ($\kappa = 0.90$, $p < .001$, $N = 105$). Discussion between the two raters led to resolution of all five cases involving disagreement. A previous study showed that the 1-week test-retest reliability of the interview scales ranged between $r = .61$ and $r = .72$ (Speckens, Ehlers, Hackmann, Ruths, & Clark, 2006).

The Posttraumatic Stress Scale—Interview version (PSS-I; Foa, Riggs, Dancu, & Rothbaum, 1993). The PSS-I is a 17-item structured interview that assessed current symptoms of PTSD in relation to the index offense as defined by the *Diagnostic and Statistical Manual of Mental Disorders*, 4th edition (*DSM-IV*; American Psychiatric Association, 1994). The interviewer rates each symptom on a scale ranging from 0 (*not at all*) to 3 (*five or more times per week/very much*). The total PSS-I score is the sum of the ratings for the 17 items. The scale has high internal consistency ($\alpha = .85$), moderate to high correlations with other measures of psychopathology, high test-retest reliability ($r = .80$), high interrater reliability ($\kappa = 0.91$), and good diagnostic agreement with the Structured Clinical Interview for *DSM* (Foa et al., 1993) and the Clinician-Administered PTSD Scale (Foa & Tolin, 2000). In order to qualify for a diagnosis of PTSD, participants had to have the minimum number of symptoms specified in the *DSM-IV*, scored with at least 1 (once per week or less/a little).

Measures of Predictor Variables

If not mentioned otherwise, participants rated their agreement with each item of the following questionnaires on a 7-point scale ranging from 1 (*strongly disagree*) to 7 (*strongly agree*).

Antisocial Beliefs Scale. This questionnaire was developed for the purposes of the present study to assess antisocial beliefs prior to the offense, using typical antisocial beliefs listed in Beck et al. (1990; six items, e.g., “force or cunning is the best way to get things done”; $\alpha = .85$). Participants were instructed to answer the scale items with respect to their beliefs before the index offense.

The Perceived Physical Threat Scale (Dunmore et al., 1997). This measure was used to ask participants about the extent to which he believed he would be seriously injured at the time of the assault (two items such as “During the assault I believed that I would be seriously injured”; $\alpha = .77$).

The Perceived Social Image Damage Scale. This measure was developed for the purposes of the present study and assessed the extent to which the participant felt diminished as a result of the victim’s actions immediately before the assault, particularly with respect to undermining the image that he perceived that others held of him. The items were based on Beck’s (1999) categories of social transgressions, which can lead to perceived psychological injury or

damaged personal self-esteem (12 items such as “The victim’s actions caused me to lose face”; $\alpha = .85$).

Emotions During the Assault Scale (Dunmore et al., 1999). Participants rated the extent to which they experienced each of a list of 23 emotions during the assault on a 5-point scale ranging from 0 (*not at all*) to 4 (*very strongly*). A principal-axis factor analysis with oblimin rotation extracted six factors with eigenvalues greater than 1.00. The four scales reflecting negative emotions were interpreted as Helpless (four items: helpless, sad, betrayed, inferior; $\alpha = .73$), Anger (five items: angry, furious, frustrated, hatred, insulted; $\alpha = .83$), Shame (two items: ashamed, embarrassed; $\alpha = .85$), and Fear (two items: terrified, afraid; $\alpha = .90$).

The Negative View of the Self Scale. This measure assessed the extent to which the participant held a general negative view of himself, and items were derived from the Negative Thoughts About the Self subscale of the Posttraumatic Cognitions Inventory (Foa et al., 1999; five items such as “I am worthless”; $\alpha = .91$).

The Self-Blame Scale. This measure assessed the degree to which participants continued to reproach themselves for their violent actions (four items such as “I am constantly troubled by my conscience for the crime I committed”; $\alpha = .90$). The items were derived from the 18-item Guilt Attribution subscale of the Revised Gudjonsson Blame Attribution Inventory (Gudjonsson & Singh, 1989), a scale developed to assess remorse in offenders that has good reliability and transcultural validity (Gudjonsson & Petursson, 1991).

Interpretation of Posttraumatic Symptoms Inventory and Permanent Change scales (Dunmore et al., 1999, 2001). These scales assessed the extent to which participants interpreted symptoms arising from the assault in a negative way (11 items such as “My reactions since the event show I must be losing my mind”; $\alpha = .90$) and the extent to which participants perceived that the assault had irreversibly affected them as a person in a negative way (nine items such as “I have permanently changed for the worse”; $\alpha = .89$). Both measures have been shown to have good reliability and predictive validity in assault survivors (Dunmore et al., 1999, 2001).

The Peritraumatic Dissociative Experiences Questionnaire-rater version (Marmar, Weiss, & Meltzer, 1997). This 10-item structured interview assesses the degree of dissociation experienced during and immediately after a traumatic event. Each dissociative experience (e.g., derealization, out-of-body experiences) reported by the participant was rated by the interviewer on a 3-point scale ranging from 1 (*no*) to 3 (*threshold*). The scale has been shown to have good internal consistency and satisfactory convergent and discriminative validity (Marmar et al., 1997). Internal consistency in the present sample was $\alpha = .84$.

The Lack of Self-Referent Processing and Data-Driven Processing scales (Halligan et al., 2003). These eight-item scales assess (a) the extent to which participants failed to process the assault as happening to themselves and to incorporate the experience with other autobiographical information relating to the self (lack of self-referent processing; e.g., “I felt as if it was happening to someone else”; “I felt cut off from my past”) and (b) the extent to which participants primarily engaged in the processing of sensory as opposed to meaning information during the assault (data-driven processing, e.g., “It was just like a stream of unconnected impressions following each other”). Both scales have been shown to have good internal consistency and to predict memory disorganization

and the development of PTSD symptoms in trauma survivors (e.g., Halligan et al., 2003). Internal consistencies in the present sample were $\alpha = .83$ and $\alpha = .84$, respectively.

Assault narrative task. Participants were asked to give a detailed narrative of the assault by recalling it as vividly, clearly, and in as much detail as possible, while describing events in the order in which they occurred without interruption. All narratives were tape-recorded and transcribed verbatim. Scoring for disorganization followed Foa et al. (1995), in the adaptation by Halligan et al. (2003). Narratives were divided into “chunks” or clauses containing “only one thought, action, or speech utterance.” Three indices of memory disorganization were assessed: (a) repetitions: clauses consisting of repetitions; (b) disorganized thoughts: clear expressions of uncertainty with regard to memory, confusion, or nonconsecutive chunks (e.g., “I know something didn’t . . . at least . . . they were broken”); and (c) organized thoughts: clauses indicating understanding of what was happening, as a reverse indicator of disorganization. Each score was z transformed in order to control for the variable narrative length, and the composite memory disorganization score was calculated as $z(1) + z(2) - z(3)$ (Halligan et al., 2003). In addition, the rater gave a global disorganization rating, ranging from 1 (*not at all disorganized*); temporally sequential with high amounts of detail) to 10 (*extremely disorganized*), after reading each narrative. Interrater reliability (two raters, 20 narratives) showed high agreement for the composite memory disorganization score ($r = .92, p < .001$) and for the global memory disorganization rating ($r = .96, p < .001$).

To compare sections of the narrative that corresponded to the main intrusion with other parts of the narrative, global disorganization ratings were done separately for (a) a five-chunk section of the narrative corresponding to the time of the stated intrusion, (b) a randomly selected five-segment section beginning at least 10 chunks after the intrusion in the assault narrative, and (c) a randomly selected five-chunk narrative segment global memory disorganization finishing at least 10 chunks prior to the intrusion. Examination of the assault narratives showed that 11 participants (22.9%) in the intrusion group did not describe their intrusive memory within the narrative. To ensure conservative testing of the hypothesis, these cases were excluded even if the intrusion was from the time period covered in the narrative.

Procedure

The Prison Health Research Ethics Committee (PHREC) approved the study, and the investigators obtained prior written approval of the governors and the lead clinician of the two participating YOIs. The heads of security and operations at the YOIs approved the use of recording equipment. Participant responses were kept confidential, including from the institutional authorities. Participants were not reimbursed.

After the participant had given written informed consent, the semistructured interviews assessing demographic and offense characteristics were administered. Participants then gave a narrative account of the event and filled in the questionnaires. The Intrusion Interview and the PSS-I followed. The session took between 1.5 and 2 hr. All interviews were conducted individually by Ceri Evans. Participants also completed short interviews on rumination and amnesia, which will be presented elsewhere. Where relevant, participants were provided with enlarged rating

scales for each questionnaire or interview to consider while the researcher read questions or statements out loud to minimize any potential confounding effect of reading ability.

Statistical Analyses

Data were analyzed with the SPSS for Windows, Version 11.5. Chi-square tests (categorical data, or Fisher's exact test if the chi-square was invalid) or *t* tests (continuous data, or, when indicated by Levene's equality of variance test, *t* tests based on unequal variances) were used to compare demographic and assault characteristics of participants with and without intrusions. The cognitive and emotional factors under investigation were analyzed using a hierarchical approach. First, participants with and without intrusions were compared on groups of variables by using multivariate analyses of variance (MANOVAs). If the multivariate test was significant, then univariate comparisons followed. Logistic regression analysis was used to examine whether the cognitive and emotional factors explain the presence of intrusions over and above what can be predicted from demographic factors. Stepwise discriminant function analysis was used to cross-validate the best predictors from the logistic regression with another method. In addition, correlations of the predictors with PTSD symptom severity, as measured by the PSS-I, are reported. The following variables were log transformed to normalize distributions: PSS-I scores, helplessness, self-referent processing, permanent change, interpretation of symptoms, and global narrative disorganization rating. No outliers had to be removed (alpha level was set at $p < .05$), and all tests are two-tailed.

Results

Prevalence of Intrusions

Forty-eight participants (45.7%) reported current intrusive memories of their violent offense. Two additional participants reported having had intrusions in the first few months after the assault that had ceased by the time of the interview (these were included in the no-intrusion group). Six participants (5.7%) met diagnostic criteria for PTSD. Table 1 shows that the intrusion and no-intrusion groups were comparable for nearly all demographic and assault characteristics, including a history of previous trauma. Participants with intrusions were more likely than those without intrusions to report a history of psychiatric disorders (48% vs. 23%) and a history of previous violent offenses (58% vs. 33%). As to be expected, they also scored higher on the PSS-I.

Comparison of Participants With and Without Intrusive Memories

Table 2 compares the intrusion and no-intrusion groups on the cognitive and emotional variables under investigation. The table also shows the correlation of the variables with PTSD symptom severity, as measured by the PSS-I.

Participants with intrusions reported lower antisocial beliefs for the time before the assault. For the measures of perceived threat (perceived physical threat, social image damage), the multivariate analysis of variance (MANOVA) failed to show a significant group difference. The MANOVA of negative emotions showed a significant group difference ($p = .049$). The intrusion group

reported greater intensity of negative emotions during the trauma than the no-intrusion group. The univariate comparisons showed that this was because of greater helplessness and fear in the intrusion group. The intrusion groups did not differ in the extent to which they felt angry or ashamed during the assault, although greater shame correlated with PTSD symptom severity.

The MANOVAs for cognitive processing and memory disorganization also showed significant group differences ($ps = .001$). Participants with intrusions reported greater dissociation, lack of self-referent processing, and data-driven processing during the assault than those without intrusions, and showed greater disorganization of the assault narrative as indexed by both the composite score and the global rating.

The MANOVA of appraisals of the assault and its aftermath also showed a highly significant group difference ($p < .001$). The intrusion group scored higher on negative view of self, negative interpretation of symptoms, permanent change, and self-blame than the no-intrusion group.

Further Analyses of the Cognitive Processing and Memory Measures

In the intrusion group, the mean global memory disorganization rating scores for the five-chunk section of the narrative corresponding to the time of the stated intrusion ($M = 3.44$, $SD = 1.14$) was significantly greater than a randomly selected five-segment section beginning at least 10 chunks after the intrusion ($M = 0.24$, $SD = 0.58$), $t(40) = 17.54$, $p < .001$. However, there was no significant difference between the five-chunk narrative segment global memory disorganization ratings at the time of the intrusion and a randomly elected segment finishing at least 10 chunks prior to the intrusion, $t(43) = 0.620$, $p = .54$.

Dissociation, data-driven processing and lack of self-referent processing were moderately correlated (rs between .50 and .56, all $ps < .001$). The two measures of memory disorganization correlated with $r = .28$ ($p = .004$).

Regression Analyses

We used a hierarchical logistic regression analysis to test whether the emotional and cognitive factors explained the presence of intrusions over and above what can be explained by demographic factors. Groups of variables were entered in blocks of theoretically linked concepts (Ehlers & Clark, 2000) in approximate temporal order (i.e., antisocial beliefs were entered in Block 2, followed by emotions during the assault in Block 3, cognitive processing and trauma memory measures in Block 4, and appraisals of the event and its aftermath in Block 5). Only variables that had shown significant group differences were entered in the equation. To reduce the risk of multicollinearity, for cognitive processing and memory disorganization only, one measure was entered, and perceived permanent change was dropped from the appraisal block. We expected that each block would add significantly to the explanation of intrusive memories.

Table 3 shows the means and intercorrelations between the predictors. Table 4 shows that, as expected, all blocks of variables significantly increased the amount of variance explained. Demographic variables (past psychiatric history and previous criminal offense) explained 18% of the variance of the presence of intrusive

Table 1
Demographic and Assault Characteristics

Variable	No-intrusion group				Intrusion group				<i>t</i>	χ^2	<i>p</i>
	<i>M</i>	<i>SD</i>	<i>N</i>	%	<i>M</i>	<i>SD</i>	<i>N</i>	%			
Demographic characteristics											
Age in years ^a	19.7	0.91			19.9	0.91			0.41		.68
Ethnicity ^b										2.25	.13
Caucasian			39	68.4			39	81.2			
Non-Caucasian			18	31.6			9	18.8			
PTSD symptoms (PSS-I; log) ^c	2.28	2.23			10.35	5.76			11.48		<.001
Education (age left in years) ^c	15.1	1.8			14.8	1.4			0.34		.70
Past treatment for psych. disorder ^b										7.29	.007
No			44	77			25	52			
Yes			13	23			23	48			
Past trauma ^b										1.25	.26
None			16	28			9	19			
At least 1			41	72			39	81			
Prior imprisonment ^b										1.10	.29
No			40	70.2			29	60.4			
Yes			17	29.8			19	39.6			
Prior violent offense ^b										6.59	.01
No			38	66.7			20	41.7			
Yes			19	33.3			28	58.3			
Assault characteristics											
Time since assault (in months) ^c	21.2	12.1			24.4	9.8			1.49		.14
Victim ^b										0.02	.89
Stranger			39	59.6			28	58.3			
Victim known			23	40.4			20	41.7			
Victim died ^b										0.44	.51
No			38	66.7			29	60.4			
Yes			19	33.3			19	39.6			
Duration of assault ^b										0.61	.43
> 5 min.			35	61.4			33	68.7			
< 5 min.			22	38.6			15	31.3			
Location of assault ^b										2.70	.10
Public place			47	82.5			33	68.8			
Victim's/offender's place			10	17.5			15	31.3			
Provocation ^b										0.05	.52
No			7	12.3			8	16.7			
Yes			50	87.7			40	83.3			
Alcohol intake (units) 6 hr before assault ^d										0.24	.89
< 4			25	43.9			19	39.6			
4–9			7	12.2			7	14.6			
10 or more			25	43.9			22	45.8			
Illegal drug use 6 hr before assault ^b										1.04	.31
No			33	57.9			23	47.9			
Yes			24	42.1			25	52.1			
Planning of assault ^{e,e}	11.79	23.25			9.85	18.71			0.46		.64
Intent to seriously injure ^{e,f}	3.88	2.22			3.56	2.36			0.70		.48
Intent to kill ^{e,f}	2.18	1.96			1.79	1.71			1.06		.29

Note. PTSD = posttraumatic stress disorder; PSS-I = Posttraumatic Stress Scale–Interview version; log = variable was log transformed for statistical analysis; psych. = psychiatric.

^a *df* = 102. ^b *df* = 1. ^c *df* = 103. ^d *df* = 2. ^e Rated on a 100-point percentage scale ranging from *no forethought, planning, or preparation* to *detailed forethought, planning, and preparation*. ^f Measured on a 7-point scale ranging from 1 (*totally disagree*) to 7 (*totally agree*).

memories of the offense. In Block 2, antisocial beliefs prior to the offense significantly added to the prediction and explained a further 5.4% of the variance (24% explained in total). In Block 3, emotions at the time of the offense (helplessness and fear) ex-

plained an additional 10% (34% in total). In Block 4, the measures of cognitive processing and memory disorganization predicted an additional 10% of the variance over and above that explained by the previous measures (44% in total). In Block 5, appraisals of the

Table 2
Cognitive Variables and Emotions Differences Between Perpetrators With and Without Intrusions and Correlations With Posttraumatic Stress Symptom Severity

Variable	No-intrusion group		Intrusion group		Statistic	p	Eta	Correlation with PSS-I (log)
	M	SD	M	SD				
Antisocial beliefs before assault	3.29	1.45	2.75	1.29	F(1, 103) = 3.95	.050	.19	-.14
Perceived threat					F(2, 96) = 1.79^a	.173		
Perceived physical threat	2.72	1.77	2.31	1.60			.12	.04
Perceived threat to social image	3.85	1.32	4.17	1.14			.13	.21*
Intensity of negative emotions					F(4, 100) = 2.48	.049		
Helpless (log)	0.77	0.90	1.31	1.16	F(1,103) = 7.07	.009	.25	.37***
Fear	0.79	1.08	1.41	1.42	F(1,103) = 6.37	.013	.24	.38***
Anger	2.25	1.13	2.25	1.15	F(1,103) = 0.00	.999	.00	.01
Shame	0.82	1.14	1.10	1.31	F(1,103) = 1.46	.230	.12	.32**
Cognitive processing					F(3, 101) = 5.84	.001		
Dissociation (rater)	15.0	4.17	18.5	4.50	F(1,103) = 17.07	<.001	.38	.46***
Data-driven processing	1.80	0.99	2.24	0.99	F(1,103) = 5.09	.026	.22	.35**
Lack of self-referent processing (log)	1.20	1.03	1.74	1.05	F(1,103) = 8.20	.005	.27	.42***
Memory disorganization^b					F(2, 100) = 8.57	.001		
Global rating (log)	3.84	1.53	4.74	1.76	F(1,101) = 9.06	.001	.29	.36***
Composite disorganization	-0.47	1.45	0.56	1.57	F(1,101) = 11.80	.001	.32	.20*
Appraisals of the event and its sequelae					F(4, 100) = 12.34	<.001		
Negative view of self	1.57	0.80	2.47	1.59	F(1,103) = 14.02	<.001	.35	.39***
Self-blame	2.98	1.82	5.11	1.40	F(1,103) = 44.14	<.001	.55	.60***
Negative interpretation of PTSD symptoms (log)	1.93	1.08	2.52	1.33	F(1,103) = 6.82	.010	.25	.37***
Permanent change (log)	2.06	1.18	2.55	1.45	F(1,103) = 3.94	.050	.19	.39***

Note. Bold labels refer to multivariate analysis of variance; all other analyses are univariate. PSS-I = Posttraumatic Stress Scale-Interview version; PTSD = posttraumatic stress disorder.

^a Related univariate analyses were not carried out because the multivariate analysis was not statistically significant. ^b N = 103.

* p < .05. ** p < .01. *** p < .001.

assault and its aftermath measures contributed a further 16% of the predicted variance (60% in total), and 85% of the participants were correctly identified. In the final model, a history of psychiatric disorders and self-blame explained unique variance at p < .05, and there were trends for dissociation and the composite memory disorganization score at p < .10.

Discriminant function analysis was used to replicate the result with a different regression method, using variables that discriminated most strongly between the groups. In this analysis, the variables self-blame, history of psychiatric disorders, dissociation,

and composite memory disorganization score were selected. These variables had a canonical correlation with intrusive memories of r = .66 (Wilks's λ = .564), χ²(4, 103) = 56.77, p < .001. The standardized discriminant function coefficients for the selected variables were .78, .46, .33, and .32, respectively.

Discussion

In line with preliminary reports (Kruppa et al., 1995; Spitzer et al., 2001), a substantial proportion (46%) of violent offenders

Table 3
Means, Standard Deviations, and Intercorrelations of Predictors of Intrusive Memories (N = 105)

Variable	M	SD	1	2	3	4	5	6	7	8	9	10
1. Previous violent offense			—	.16	.04	-.12	-.10	.11	.19	.16	.10	.18
2. Past treatment for psychiatric disorder				—	.00	-.19	.01	.08	.12	.05	.01	-.09
3. Antisocial beliefs	3.04	1.40			—	-.20*	-.17	-.03	-.12	.16	-.29**	.31**
4. Helplessness (log)	0.25	0.21				—	.43***	.28**	.09	.18	.38***	.21*
5. Fear	1.07	1.28					—	.37***	.13	.25**	.31**	.24*
6. Dissociation	16.60	4.65						—	.23*	.14	.29**	.29**
7. Composite memory disorganization score	0.00	1.59							—	.11	.19	.09
8. Negative view of self	1.98	1.30								—	.42***	.57***
9. Self-blame	3.95	1.95									—	.32**
10. Interpretation of symptoms (log)	0.48	0.15										—

Note. log = variable was log transformed for statistical analysis.

* p < .05. ** p < .01. *** p < .001.

Table 4
 Logistic Regression Analysis Predicting the Presence and Absence of Intrusive Memories

Variable	<i>B</i>	<i>SE B</i>	Exp(<i>B</i>)	NR ²	-2LL	χ ² (2, <i>N</i> = 103)	<i>p</i>	% correctly classified
Block 1				.181	127.00			65
History factor						15.00	.001	
Previous violent offense	1.06*	0.43	0.35					
Past treatment for psychiatric disorder	1.18**	0.45	0.31					
Block 2 ^a				.235	122.13	4.88	.027	65
Add antisocial beliefs before assault								
Previous violent offense	1.14*	0.44	0.32					
Past treatment for psychiatric disorder	1.22**	0.46	0.29					
Antisocial beliefs	-0.35*	0.16	0.71					
Block 2				.343	111.45	10.68	.005	70
Add emotions during assault								
Previous violent offense	1.41**	0.49	0.24					
Past treatment for psychiatric disorder	1.51**	0.51	0.22					
Antisocial beliefs	-0.23	0.17	0.80					
Helplessness (log)	3.00*	1.31	20.20					
Fear	0.27	0.20	1.30					
Block 3				.440	100.85			77
Add cognitive processing during assault and memory disorganization						10.60	.005	
Previous violent offense	1.19*	0.52	0.31					
Past treatment for psychiatric disorder	1.34*	0.53	0.26					
Antisocial beliefs	-0.30	0.19	0.75					
Helplessness (log)	2.46†	1.30	11.70					
Fear	0.11	0.22	1.10					
Dissociation	0.13*	0.06	1.10					
Composite memory disorganization score	0.39*	0.18	1.50					
Block 4 ^b				.60	81.27			85
Add appraisals of the assault and its aftermath						19.58	<.001	
Previous violent offense	0.87	0.59	0.42					
Past treatment for psychiatric disorder	1.63*	0.64	0.20					
Antisocial beliefs	-0.14	0.25	0.87					
Helplessness (log)	1.41	1.53	4.10					
Fear	-0.10	0.27	0.91					
Dissociation	0.12†	0.07	1.10					
Composite memory disorganization score	0.45†	0.23	1.60					
Negative view of self	0.23	0.30	1.30					
Self-blame	0.62**	0.20	1.90					
Interpretation of symptoms (log)	0.55	2.40	1.70					

Note. NR² = Nagelkerke *R* squared; -2LL = -2 log likelihood; log = variable was log transformed for statistical analysis.

^a *df* = 2; *N* = 103. ^b *df* = 3; *N* = 103.

* *p* < .05. ** *p* < .01. † *p* < .10.

reported intrusive memories of the crimes they committed, and a minority (6%) met diagnostic criteria for PTSD. Given that participants had intentionally harmed other people, it is not surprising that the PTSD rate in this sample was much lower than the rates observed in victims of assault (Andrews et al., 2000; Halligan et al., 2003). Nevertheless, the results indicated that for some perpetrators, their violent crime turns into a traumatic experience. Their distressing intrusive memories resembled those observed in assault survivors (Ehlers et al., 2004).

If the conditions that lead perpetrators to involuntarily reexperience parts of the crimes they committed are better understood, then this will provide an important stepping stone in explaining how PTSD develops in this population. The present study was designed to address this question. Drawing on theoretical models of PTSD and previous research with assault survivors, we chose a

range of potential emotional and cognitive predictors of intrusive memories. With the exception of perceived threat, the results supported the hypothesis that the theoretical models and findings on intrusive memories in assault victims generalize to perpetrators. In line with previous research (e.g., Foa et al., 1999; Halligan et al., 2003; Ozer et al., 2003) and theoretical models of PTSD (Brewin et al., 1996; Ehlers & Clark, 2000; Foa & Riggs, 1993; Janoff-Bulman, 1992; Resick & Schnicke, 1993), low antisocial beliefs, negative emotions and problematic information processing during the assault, disorganized trauma memories, and negative appraisals of the trauma and its aftermath, were related to intrusive memories and the severity of PTSD symptoms. The logistic regression analysis further showed that the cognitive and emotional factors under investigation improved the prediction of intrusive memories considerably over and above what can be explained by demographic

factors. A history of psychiatric disorders and previous violent offenses explained 18% of the variance. Emotional and cognitive predictors predicted a further 42% of the variance.

Cognitive Schemas Before the Trauma

The data supported the hypothesis that antisocial beliefs would be protective against the development of intrusive memories. This finding is in line with “discrepancy theories” of trauma reactions, in which it is argued that intrusive memories arise from an incompatibility between deeply held beliefs and actual behavior (see Brewin & Holmes, 2003, for a review). Individuals with antisocial beliefs may be less likely to perceive a discrepancy with their values when they behave violently and, hence, less likely to develop intrusive memories. It would be interesting to include a measure of psychopathy in future studies to explore these findings further.

Perceived Threat and Negative Emotions During Trauma

There may be a number of reasons why perceived threat during the assault was not significantly related to intrusive memories. First, whereas perceived threat to life is predictive in victims of assault, it may be less relevant for perpetrators who inflict harm. Second, we may not have assessed other important aspects of threat that are important for perpetrators. One interesting dimension for future studies may be perceived moral breach during the assault. A qualitative analysis (Evans et al., in press) included the suggestion that in some cases, a sense of having acted unacceptably or in a way that the community would not condone seemed to be linked to the development of intrusive memories. In support of this argument, self-blame after the assault showed a strong association with intrusions in the present study.

Our finding that participants with intrusive memories reported to have felt greater helplessness and fear during the assault than those without intrusions corresponds well to Criterion A2 of the *DSM-IV* diagnostic criteria for PTSD (American Psychiatric Association, 1994). It is interesting that the emphasis on helplessness and fear replicated in the present sample of perpetrators, as one may have assumed that other emotions may be more relevant in this population. The helplessness factor may, however, have somewhat different connotations in perpetrators than in victims of violence in that this scale may have reflected feelings of degradation rather than helplessness in defending oneself. The findings that anger and shame were not significantly related to intrusions is in line with Brewin et al.’s (1996) hypothesis that emotions such as shame are secondary emotions that only develop after the trauma.

Cognitive Processing and Memory Disorganization

As in previous research (Ozer et al., 2003), dissociation during the trauma was associated with intrusive memories and PTSD symptoms. In line with Ehlers and Clark’s (2000) model, data-driven processing and lack of self-referent processing were also related to reexperiencing symptoms and correlated moderately with dissociation. As in Halligan et al.’s (2003) study, memory disorganization was related to intrusive memories and PTSD symptoms. The two measures of memory disorganization only

showed a small correlation with each other. This is consistent with reviews suggesting that different measures assess different components of problematic trauma memory retrieval (Ehlers et al., 2004; McNally, 2003). For example, gaps in memory increase the global disorganization rating but not the composite memory disorganization score. Furthermore, not all parts of the trauma memory may show deficits, especially if the trauma is a prolonged event. In the present study, we found some preliminary support for Ehlers et al.’s (2004) suggestion that the deficits in intentional recall should be most marked for those parts of the trauma that are reexperienced. The section of the assault narrative corresponding to the intrusive memory was rated as more disorganized than a subsequent section of assault memory transcript. However, no significant difference was found when comparing the intrusion segment with a narrative segment before the intrusion. This negative finding may have been influenced by the fact that we excluded 23% of the intrusion group who did not mention the part corresponding to the intrusion in their narratives. This procedure may have been overly conservative, as one may argue that omissions in the narrative may indicate difficulties with intentional retrieval or even a gap in memory.

Appraisals of the Trauma and Its Aftermath

In support of theories that emphasize the role of negative appraisals of the trauma and its aftermath in PTSD (Ehlers & Clark, 2000; Foa & Riggs, 1993; Resick & Schnicke, 1993), we found that such appraisals related to intrusive memories and PTSD symptom severity in perpetrators of violent crime. The appraisal factors explained an additional 16% of the variance over and above the other variables included in the logistic regression analysis. The findings parallel those obtained in victims of assault and torture (Dunmore et al., 1999, 2001; Ehlers et al., 2000; Foa et al., 1999; Halligan et al., 2003).

Limitations

The present study had several limitations. First, the study was cross-sectional, and the results remain correlational. It is therefore not possible to establish causal relationships between the cognitive and emotional factors under investigation and intrusive memories. Second, participants were interviewed after being convicted for the crime, which meant that cognitive processing and emotions were assessed many months after the event. It is therefore possible that recall was imprecise and may have been affected by subsequent events such as interrogations and court proceedings. It is unlikely, though, that these events would have created a systematic bias in favor of the hypotheses under investigation. Most likely, they may have contributed to the error variance. Moreover, time since the assault was not related to intrusions. It is possible, however, that experiencing intrusive memories may have led the participants to reevaluate the perceived threat during the assault. Third, the findings rely on self-report, and we cannot rule out that participants did not always give valid answers. However, there was no incentive to distort the answers because participants had already been convicted, the results of the interviews were confidential and did not have any influence on their sentence and conditions in prison, and there was no financial incentive. Furthermore, the main dependent variable—presence of intrusive memories—was not based on sim-

ple participant endorsement but on detailed descriptions, which were rated by experts on the phenomenology of intrusive memories in patients with PTSD. Similarly, interviewer ratings were used to measure dissociation. Fourth, our assessment of memory disorganization rests upon the assumption that disorganization in a narrative reflects disorganization in an underlying memory representation. However, disorganization in the narrative may result from other processes, such as problems with expressing the contents of memory or censoring. Fifth, we used 16 cognitive processes and emotions as predictor variables in a study with 105 participants. Even though we used a hierarchical approach to data analysis, the possibility of chance findings cannot be ruled out. However, all positive findings, with the exception of the role of antisocial beliefs, replicate findings of other studies with assault victims, which supports the validity of these findings. Sixth, some of the items of the Permanent Change scale may have been affected by the experience of being in prison and may have somewhat different meanings for perpetrators and victims. Seventh, the present findings were obtained with a group of young, predominantly male perpetrators of violent crime. Masculine confrontations, which are essentially “honor” contests in public settings and involve alcohol, were overrepresented in the present sample, whereas sexual or domestic homicides were less frequent than might be expected in studies involving older prisoners (Daly & Wilson, 1988; Polk, 1994). It is unclear whether such differences would affect the generalizability of these findings to other offender populations. Finally, the study focused on intrusive memories rather than on PTSD, and it remains to be tested whether the factors highlighted in the present article also predict PTSD in this population. The correlations of the predictor variables with the PSS-I suggest that this is likely to be the case. Future studies will need to investigate what factors determine whether perpetrators who have intrusive memories of their crimes develop the full syndrome of PTSD.

Conclusion

In summary, the results support the hypothesis that similar mechanisms explain intrusive memories in victims and perpetrators of violence. They may also have clinical implications for the treatment of violent offenders, as there are effective cognitive-behavioral treatment programs for distressing, intrusive traumatic memories and PTSD (e.g., Ehlers, Clark, Hackmann, McManus, & Fennell, 2005; Foa & Rothbaum, 1998; Resick & Schnicke, 1993). However, the issue of whether distressing intrusive memories of the offense in perpetrators should be treated is not straightforward. From a clinical perspective, it can be argued that individuals deserve treatment for their mental distress, regardless of their perceived responsibility for their distress. Furthermore, it could be argued that, without treatment, the offender’s risk of future violent behavior may be increased because of general symptoms, such as increased irritability, or by specific triggering of intrusive memories and flashbacks. A counterargument would be that intrusive memories, and the distress associated with these memories, provide regular, uncomfortable reminders of the crime and help to reduce the risk of violent reoffending. Whether treatment of intrusive memories in violent offenders has an impact on subsequent offenses will need to be tested empirically.

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