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A memory like an elephant? The consistency of memory for emotional events.

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Consistency of Memory for a Traumatic Event: A Prospective Study among Victims of Violent Assault

The aim of this prospective study was to examine consistency of self-reports of a traumatic event in victims of recent assault. The participants were interviewed within 2 months following the assault, and they completed a follow-up interview 3 months after the first interview. The results show that memory for violent assault is fairly consistent, with central aspects being more consistently remembered than peripheral aspects. No amplification of memory was observed. Demographic and assault characteristics, as well as most of the psychological and psychiatric variables did not predict memory consistency. However, some evidence was found for higher levels of dissociation being associated with absence of information or inconsistent recall over time.

Introduction

Autobiographical memory is a reconstructive process, which is prone to errors (Conway, 1997). Because of the increased emotional arousal experienced during encoding, memories of personally experienced traumatic events are considered to be more fragmented and subject to change over time than non-traumatic memories (Van der Kolk & Fisler, 1995). Memories for traumatic events can become inaccessible, recovered, confabulated, or even completely incorrect over time (Brewin & Holmes, 2003, Porter, Yuille, & Lehman, 1999). Several studies have examined the consistency of trauma reports over time (for a review see McNally, 2003a; Van Giezen, Arensman, Spinhoven, & Wolters, 2005). However, few studies have focused on the consistency of personally experienced traumatic events. The primary focus is often on consistency of so-called “flashbulb events”, such as the September 11 attacks (Peace & Porter, 2004).

The results of studies on consistency of trauma reports appear to be contradictory. Some authors found traumatic memories to be stable over time, while others found a decline or increase in trauma reports over time. For example, Peace and Porter (2004) found that traumatic memories were not fragmented, but vivid, coherent and detailed and more consistent over time than positive emotional memories. Mechanic, Resick, and Griffin (1998) found that memories of rape victims were highly inconsistent. Their memories were subject to failed, confabulated or incomplete recall. Shortly after the event, memory deficits were common, while memory for details improved significantly over the 3 month period following the rape incident.

Most studies that addressed the issue of consistency of memory have used consistency as a proxy measure for accuracy, because consistency can be more easily assessed than accuracy (McNally, 2003a; Talarico & Rubin, 2003). However, consistency and accuracy refer to fundamentally different concepts and therefore cannot be used interchangeably. Accuracy can be defined as “the agreement between the individuals’ recall and either an objective record of the event or social consensus from other participants of the event as to what occurred” (Fivush, 1993, p. 22), while the concept of consistency refers to whether the same information is reported over time, independent of whether the information provided

is accurate. Responses are considered to be inconsistent when they show discrepancies in information over time. A distinction can be made between three different types of inconsistencies: omissions, commissions and distortions. Omissions refer to a decrease in reported information over time, while commissions refer to an increase in information. Distortions can be described as a change in details of the reported information over time (Candel, 2003).

Consistency of memory reports for traumatic events appears to be related to psychopathology and trauma characteristics. During exposure to a traumatic event, victims often exhibit high levels of anxiety and dissociation. In the period following the traumatic event, posttraumatic stress symptoms and depression are common. These emotional complaints during and following the traumatic event may influence the encoding, consolidation and recall of the event (McNally, 2003a; Williams, Watts, Macleod, & Matthews, 1997). Individuals may gradually recall memories of their traumatic experience because of the involuntary intrusive memories, or information that is less accessible through dissociation or suppression may become conscious later on. In Veterans of Operation Desert Storm there were many instances of inconsistent recall for objective traumatic events. Moreover, it was found that as the levels of Posttraumatic Stress Disorder (PTSD) symptoms increased, so did overall inconsistency of memory for combat exposure and amplification of memory for traumatic events (Southwick, Morgan, Nicolaou, & Charney, 1997). Among women who were raped, amnesic participants reported more dissociative experiences during the rape and they more often tended to report a history of previous traumatization (Mechanic et al., 1998).

Trauma characteristics, such as severity of the trauma, duration of exposure and degree of personal involvement, may also influence autobiographical memory. Results from Krinsley, Gallagher, Weathers, Kutler, and Kaloupek (2003) and Neisser et al. (1996) show that a greater degree of involvement in a severe traumatic event appears to be associated with greater consistency of memory over time. With regard to the nature of the information recalled, there are indications for a higher degree of consistency for the central core of information compared to specific details (Christianson, 1989, 1992; Herlihy, Scragg, & Turner, 2002; Schacter, 1996).

Previous studies on consistency of memory for trauma have their limitations. A common problem with consistency studies concerns the fact that consistency of memory often is not defined and measured in a standard way. Also, different coding systems are used to compare memory reports over time. Furthermore, the majority of studies include small samples which often do not appear to be representative and investigate consistency of memory reports many years after trauma exposure.

The present study examines consistency of memory in recent victims of violent assault over a 3 month follow-up period. Trauma related psychological reactions, psychiatric symptoms and mood at the time of occurrence of the event and at the time of reporting the event will be addressed as well. The main objectives of the study are (1) to examine consistency of memories for violent assault over a 3 month period as well as the type of recall errors, (2) to examine the predictive value of psychological and psychiatric factors in relation to (in)consistency of memory for violent assault. Based on the results of previous studies, it was hypothesized that (A) victims of violent assault would show inconsistent memory reports (in particular amplification of memory, i.e. commission errors) over a 3 month period, (B) memory for central information would be more consistent than memory for peripheral information and (C) that demographic and assault characteristics, as well as psychological and psychiatric symptoms (e.g. dissociation, suppression, PTSD) would be predictive of memory inconsistency (in particular commission errors).

Method

Participants

The present study comprises a non-psychiatric sample of assault victims. Subjects were included in the current study if they were a victim of violent assault, either physical or sexual, within the last two months, if they were 18 years or older and had a reasonable comprehension of the Dutch or English language. In order to avoid a confounding effect on the relationship between the variables under study, subjects with acute psychosis were excluded. Participants were also excluded from the study if the assault had occurred in the context of ongoing domestic violence or

incest, or if the circumstances or living environment of the subject posed any potential risk to the interviewer. Subjects were recruited through Victim Support Services (Haaglanden and Haarlem), the emergency department of a general hospital, information about the project on the internet, posters in public places, interviews on local and national television and advertisements in local newspapers. Victim Support Service contacts victims of a crime, after they have reported the incident to the police, and offers them support. The Victim Support Service provided information on the study to victims who were contacted by this service.

Variables and measurement

Consistency was assessed with a newly developed semi-structured interview, the Memory of Assault Interview (MAI). This interview consists of 43 items covering different aspects of the event, like location, circumstances in which the event took place and offender characteristics. The interview has two different sections. The first section comprises 34 questions on situational aspects of the events (e.g. *Where did the event happen?*, *What kind of clothes did the perpetrator wear?*, *What was the weather like that day?*), the second section contains 9 questions on emotional aspects (e.g. *How did you feel during the event?*, *Did you have any control over the situation?*). In addition, two raters (AvG, PhS) independently rated the situational items of the MAI with respect to centrality. Six questions were identified by both raters as referring to central information (i.e. gender of the perpetrator) and six to peripheral information (i.e. weather at the time of the assault).

Consistency of memory for trauma was operationalized as the same information being reported at different points in time. Responses were consistent when they contained exactly the same information at different points in time (consistency+) or when no information was recalled at both assessments (consistency -).

The following psychometrically validated instruments were used to assess psychological and psychiatric symptoms. State anxiety was measured with the State Trait Anxiety Inventory (STAI; Spielberger, 1983; Spielberger, Gorsuch, & Lushene, 1970). For the assessment of PTSD symptom severity we used the

Impact of Event Scale (IES; Horowitz, Wilner & Alvarez, 1979). For the assessment of PTSD diagnosis and other psychiatric diagnosis, the Mini International Neuropsychiatric Interview (MINI; Sheehan et al., 1998) was used. Thought suppression was assessed with the White Bear Suppression Inventory (WBSI; Wegner & Zakanos, 1994). Peritraumatic dissociation was assessed by the Peritraumatic Dissociative Experiences Scale (PDEQ, Marmar, Weiss & Metzler, 1997). General dissociative tendencies were measured with the Dissociative Experiences Scale (DES; Bernstein & Putnam, 1986). Neuroticism was measured with the Eysenck Personality Questionnaire (EPQ; Eysenck & Eysenck, 1975). The 21-item Beck Depression Inventory (BDI II; Beck, Steer, & Brown, 1996) was used to assess depression. Prior traumatization was assessed with a semi-structured interview. The interviewer reads out a number of events regarding emotional, physical and sexual abuse. Participants were asked if these events had ever happened to them prior to the index event. Examples were: *“Were you ever a victim of a violent crime (apart from the recent event)”?*, *“Did you have intercourse against your will?”*, *“Were you physically abused by your partner?”*

The tests were presented in a fixed order. The first assessment consisted of: STAI, MAI, IES, WBSI, PDEQ, DES, MINI, BDI and EPQ. The second assessment contained: STAI, MAI, IES, WBSI, MINI-PTSD, DES, prior trauma interview and EPQ.

Procedure

Information on victims of assault was obtained through the Victim Support Service, through Internet or by phone. Subjects were then contacted by one of the interviewers to provide information on the study and to schedule an appointment. The study was approved by the Medical Ethical Committee of Medical Centre in The Hague. Participants were interviewed by extensively trained interviewers who had at least a BA in psychology. The interviews took place either at the home of the subject, or at the university, or at another place that was most convenient for the victim. Following introduction of the study, subjects gave their written informed consent. The first assessment took an average of 90 minutes and was scheduled

within 2 months following the assault; the second assessment took an average of 120 minutes and took place three months after the first assessment.

Scoring

Consistency of the responses between the answers of the initial and follow-up interview was rated by two independent reviewers (AvG, MM). Cohen's Kappa was used to assess the agreement between the two reviewers on all items ($n= 215$), which was .86, indicating good interrater reliability. All answers on the 43 questions of the MAI were assigned a score of 0 or 1 on the absence or presence of 4 different (in)consistency aspects: Consistency + (identical information at T1 and T2), Consistency - (absence of information at both times), Omissions (less information reported at T2 compared to T1) and Commissions (more information reported at T2 compared to T1). Consistency scores per question were computed using the following formula:

$$\text{Total consistency per item} = \frac{(\text{Consistency+}) + (\text{Consistency -})}{(\text{Consistency+}) + (\text{Consistency -}) + (\text{Omission}) + (\text{Commission})}$$

The mean consistency score was computed by adding up all consistency item scores and dividing it by the number of questions: 43. Outcome scores ranged from 0 to 1. The same formula was used to compute total consistency scores for the situational and emotional items as well as central and peripheral items.

Results

Subject characteristics

Ninety-six victims were contacted by a member of the research team. Of those, 77 completed the first interview within 2 months of the assault ($M=53.6$ days post-crime). Sixty-one victims (79.2%) completed both first and second interview. Of the 61 victims who participated in both interview 1 and 2, 32 (53.3 %) were female. The mean age of participants at the time of the first interview was 39.0 ($SD=14.5$), with a range from 18 to 81. All subjects were victims of violent assault, such as being

shot at, stabbed, threatened, intimidated, sexually assaulted, physically attacked or beaten up. At the time of the assault over 43% percent of the sample were married or cohabiting, 41.7% single and 10% were divorced or widowed. With respect to highest educational achievement, 10% did not graduate from high school, 66.6% were high-school graduates, and 23.4% were college graduates.

Multivariate analyses of variance showed no significant differences on STAI, IES, PDEQ, WBSI, DES, BDI or EPQ scores at T1 between the 61 subjects who completed both interview 1 and interview 2 and the 16 subjects who dropped out after interview 1, although the drop-out group had a significantly higher score on EPQ Neuroticism ($t=2.19$, $df=71$, $p=.03$). There were no significant differences with regard to demographic characteristics between study completers and dropouts.

Prior traumatization

Fifty-nine percent of the subjects were victim of a crime earlier in their life, and over one third (34.4%) of the subjects had experienced the same crime as the reported assault earlier on in their lives. More than half (52.5%) of the participants had witnessed a crime at least once in their lives. Over 25% of the respondents were physically or emotionally abused by their partner at one or more occasions in the past, more than half of the respondents (57.4%) became a victim of physical or emotional abuse at least once in their lifetime and 22.9% of the subjects were sexually abused at least once in their lives.

Consistency of memory

Memory reports of the assault were fairly consistent over time. The mean number of consistencies was 33.2 ($SD=5.3$, range=21-42). Subjects were unable to give information on a mean of 2.7 ($SD=3.5$) items on both assessments. The number of commission and omission errors was fairly equal ($M=9.5$, $SD=2.9$; respectively $M=10.1$, $SD=3.8$). The mean total consistency score for memory of violent assault between interview 1 and 2 was .74 ($SD=.08$). The mean total consistency of situational aspects was .79 ($SD=.09$) and .61 ($SD=.15$) for emotional aspects. The consistency score of central items ($M=.75$, $SD=.09$) was significantly higher than

the consistency score of peripheral items ($M=.64$, $SD=.16$), $t(60)=-5.04$, $p<.0001$. See also table 1.

Table 1 *Memory Consistency*

	Total $n=61$	
	<i>M</i>	<i>SD</i>
Consistencies (0-43)	33.2	5.3
Absence of information (0-43)	2.7	3.5
Omissions (0-43)	10.1	3.8
Commissions (0-43)	9.5	2.9
Mean consistency score (0-1)	.74	.08
Mean consistency score situational aspects (0-1)	.79	.09
Mean consistency score emotional aspects (0-1)	.61	.15
Mean consistency score central items (0-1)	.75	.09
Mean consistency score peripheral items (0-1)	.64	.16

Type of information

Looking at the individual items of the MAI, it appeared that information regarding the assailant or the assault was remembered very consistently. For example, questions on the location of the assault or injuries of the victim were answered highly consistent over time. More subjective or emotional aspects regarding the assault, such as questions on emotions or reactions of the victim in response to the assault were remembered less consistently. Table 2 displays which questions of the MAI were answered highly consistent and highly inconsistent.

Table 2 *Consistency Scores of MAI items*

Question on the MAI	Mean score	consistency	SD
<i>Most consistently remembered items</i>			
Did you know the assailant?	.99		.06
What was the location of the assault?	.96		.16
What was the gender of the assailant?	.96		.19
<i>Least consistently remembered items</i>			
What were your Physical reactions after the assault?	.30		.34
What were your Physical reactions during the assault?	.31		.36
What were your Emotional reactions during the assault?	.47		.37

Consistency and assault characteristics

Characteristics of the assault (i.e. duration of the event, severity of the event, number of assailants) were not related to memory consistency ($p > .10$).

Consistency and prior traumatization

With regard to prior traumatization, participants who had experienced the same crime as the reported assault earlier on in their lives appeared to be significantly more inconsistent in reporting on the situational aspects [$t(59)=-2.01$, $p<.05$]. Victims who witnessed a crime in the past were less consistent with regard to the situational aspects [$t(59)=-2.18$, $p<.05$], central aspects [$t(59)=-2.49$, $p<.05$] and total consistency [$t(59)=-1.99$, $p=.05$] than victims who never witnessed a crime. No other aspects of prior traumatization were related to consistency of memory reports ($p > .10$).

Consistency and psychopathology

Mean scores on the self-report questionnaires at T1 and T2 are shown in Table 3. Paired t-tests were used to analyze the differences in mean scores. Scores on the WBSI and IES- intrusions and IES-total were significantly lower at T2. Mean STAI, DES, IES-avoidance, and EPQ-scores did not change significantly over the 3 month follow-up period. The percentage of participants fulfilling the DSM-IV diagnostic criteria for PTSD somewhat declined from T1 (29.5%) to T2 (23%). Ten (16.4%) of the victims had a PTSD diagnosis on both assessments and 39 (63.9%) did not fulfil the diagnostic criteria at both times. Eight participants had a PTSD diagnosis at T1, but not at T2, while 4 victims had a diagnosis at T2, but not at T1. McNemar's repeated measures chi square showed no significant improvement or decline over the assessments ($p > .10$).

Table 3 Mean scores on IES, WBSI, DES, PDEQ, EPQ and BDI at T1 and T2

	Time 1 (n=61)	Time 2 (n=61)
STAI	45.4 (5.4)	45.0 (4.3)
IES-avoidance	13.7 (10.7)	11.9 (9.6)
IES-intrusions	18.1 (10.9)	11.1 (10.1)***
IES-total	31.8 (19.7)	22.8 (17.9)***
DES	11.3 (12.3)	10.1 (10.6)
PDEQ	28.7 (10.4)	-
WBSI	46.2 (13.2)	41.9 (13.9)**
BDI	12.0 (10.7)	-
EPQ-P	2.7 (1.6)	3.0 (1.9)
EPQ-N	4.4 (3.3)	4.3 (3.2)
EPQ-E	8.9 (2.9)	8.8 (3.0)

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

In order to examine whether consistency of memory was associated with psychopathology, correlation coefficients were calculated (see table 4). A log transformation was performed on DES T1 and T2 scores to correct for extreme positive skewness.

Level of psychopathology at T1 and T2 appeared not to be associated with either total consistency scores, consistency for emotional or situational aspects or consistency for central or peripheral items. Investigating the association of a PTSD diagnosis at T1 and T2 with memory consistency using t-tests for independent samples also did not reveal a significant difference on any of the aspects of memory consistency ($p > .10$).

Subsequent explorative analyses were performed to analyse whether psychopathology or a PTSD diagnosis at T1 predicted the number of consistencies +, the number of consistencies -, the number of omissions and the number of commissions. Results showed a significant correlation between consistency + and DES T1 scores ($r = -.31$, $p < .02$). Higher scores for general dissociative tendencies corresponded with higher levels of inconsistency. Also, absence of information on both T1 and T2 (consistency -) and PDEQ-scores ($r = .33$, $p < .01$) and DES-scores ($r = .31$, $p < .02$) at T1 were significantly associated. Victims who reported more peritraumatic dissociation or general dissociative tendencies at the first interview showed more absence of information on both assessments. None of the relationships between both number of omissions and number of commissions with level of psychopathology or PTSD diagnosis reached the level of significance.

Table 4 Bivariate correlations

	2.	3.	4.	5.	6. STAI T1	7. IES- intrusions T1	8. IES- avoidance T1	9. IES- total T1	10. WBSI T1	11. PDEQ T1	12. DES T1	13. BDI T1	14. STAI T2	15. IES- intrusions T2	16. IES- avoidance T2	17. IES- total T2	18. WBSI T2	19. DES T2
1.consistency of situational items	.29*	.91**	.42*	.51**	-.02	.05	.19	.14	.07	-.06	-.16	- .19	-.11	.04	-.05	-.01	.04	-.09
2.consistency of emotional items		.61*	.10	.28	-.03	.03	.15	.10	.03	.11	.02	.13	.11	-.07	-.08	-.09	-.04	-.08
3. total consistency			.37*	.54**	-.02	.06	.20	.14	.05	-.01	-.13	- .11	-.06	-.02	-.09	-.07	-.01	-.10
4.consistency of central aspects				.06	-.13	.04	.12	.09	.04	-.06	-.12	- .08	-.04	-.12	.05	-.03	-.03	-.10
5.consistency of peripheral aspects					-.05	-.11	.03	-.04	.08	-.06	-.10	- .18	-.11	-.08	-.19	-.21	-.13	-.10

* $p < .05$. ** $p < .01$.

Discussion

The main purpose of this prospective study was to examine consistency of memory for assault over a 3-month period. Additionally, we investigated which factors were predictive of memory consistency. The current study shows that information in relation to the assault remained fairly consistent over time. However, the situational items were more consistently remembered than the emotional items and the central items were more consistently remembered than the peripheral items.

Consistency rates in our study were somewhat higher than those of other studies on consistency of memory reports of assault (Mechanic et al., 1998; Zoellner, Sacks, & Foa, 2001). However, it should be noted that studies are difficult to compare because of differences in measuring instruments, population and procedure. The finding that situational aspects were more consistently remembered than the emotional aspects is in line with findings by Christianson and Safer (1995) and Zoellner et al. (2001), who state that central factual information of an emotional event is relatively accurate, whereas memory reports for emotions seem to be fairly inaccurate. Our findings also concur with those of Ouimette, Read, and Brown (2005) who in their study on the consistency of DSM-IV criterion A trauma reports found that recall of an emotional response to a traumatic event is more likely to be inconsistent than the recall of the occurrence of the event.

Contrary to what would be expected based on the literature on consistency of memory of assault victims and also among military samples (see Van Giezen et al., 2005), no evidence was found for amplification of memory over time in victims of assault (hypothesis A). Several authors (e.g. Van der Kolk & Fisler, 1995) have stated that emotional arousal may interfere with the construction of declarative memory and that information can become available at a later stage, for example as commissions. It has also been hypothesized that among participants with higher levels of psychopathology memory amplifications signify a process of “effort after meaning” with more traumatic events justifying elevated and persistent complaints. Contrary to these views, the current results show that the number of additions and omissions was limited and of about equal size. There are several possible explanations for this lack of memory amplification in our study. First, the length of time between occurrence of the traumatic event and first and subsequent assessments of memory reports varies across studies. In the present study the first memory assessment took place relatively soon following trauma exposure with a relatively short follow-up period. Second, in contrast to most other studies the present study comprises a non-clinical, non-treatment seeking population with an equal gender distribution. Furthermore, consistency of memory was often not defined and measured in a standard way across studies. For example, the present study used specific and detailed questions to assess memory, whereas other studies used more general questions.

In line with our hypothesis (B), the central items of the MAI were more consistently recalled as the peripheral items. This finding concurs with the literature. Of those studies who investigated differences between consistency of reports of central and peripheral information, all found that central aspects of the event were more consistently remembered than the specific details (Christianson, 1989, 1992; Herlihy et al., 2002).

We also tried to identify demographic and assault characteristics, as well as psychological and psychiatric variables predictive of memory consistency (hypothesis C). Dissociation appeared to be

the only significant predictor of memory consistency. This result concurs with findings of a previous study in which it was found that both general dissociative tendencies and peritraumatic dissociation during assault resulted in a less complete recall of situational aspects of the trauma (Van Giezen, Arensman, & Spinhoven, submitted) and with those of several other studies which found that state dissociation may affect information processing leading to incoherence at the time of encoding and subsequent memory fragmentation at recall (e.g. Engelhard, Van den Hout, Kindt, Arntz, & Schouten, 2003). Our study extends these findings by showing that not only completeness or fragmentation of memory but also consistency of recall is affected by dissociation. Interestingly, these results indicate that dissociation is not only confined to the realm of subjective reality denoting a subjective evaluation of memory functioning (Kindt, Van den Hout, & Buck, 2005), but proves to be associated with actual memory performance over time.

Our data suggest that especially the aspect of being overwhelmed by intense emotions and not longer being able to encode situational aspects of a traumatic situation is related to being unable to provide information about the trauma situation or inconsistent information over time. It could be argued that the association of dissociation with memory inconsistency is overestimated or even spurious because peritraumatic dissociation is rated retrospectively and forgetting or underestimating these and other emotional experiences is common (Candel & Merckelbach, 2004). Unfortunately, there is no golden standard to verify the occurrence of subjective experiences as peritraumatic dissociation. However, by only including victims of recent assault less than two months ago we tried to diminish memory effects as much as possible. Although our study indicated that recall of emotional aspects of a trauma was fairly consistent after three months, emotional aspects were remembered less consistent than situational aspects. In this regard our findings are in line with previous studies in which Vietnam veterans were asked to go back more than 30 years in time in order to rate their peritraumatic experiences. Unreliable memories are to be expected (Krinsley et al., 2003). Moreover, we cannot exclude that first asking participants about their trauma experiences with the MAI and then to retrospectively rate their peritraumatic experiences on the PDEQ may have influenced their recall in that participants who were less able to give a complete recall on the MAI may have overendorsed peritraumatic experiences on the PDEQ as a possible cause for their memory impairment on the MAI. However, since we used a prospective design and actually measured memory performance instead of subjective evaluations of memory consistency, it is unlikely to expect a spurious relationship between dissociation and memory consistency.

Overall, contrary to our hypothesis most demographic and assault characteristics, as well as psychological and psychiatric variables were not predictive of memory consistency. The finding that consistency was not associated with intrusions and thought suppression is remarkable, because intrusions and suppression are believed to produce more thoughts and therefore more information about the event over time (King et al., 2000; Rassin, Merckelbach, & Murris, 2000). The absence of an association with consistency may be partly explained by the fact that intrusions and suppression influence the frequency of thoughts about the event, but not the contents of the memory. In contrast with previous work (King et al., 2000; Ouimette et al. 2005), we did not find an association of avoidance with changes in memory reports.

As to the findings in relation to PTSD symptomatology, no relation was found with consistency of memory reports. These results are not in line with the literature (Southwick et al., 1997; King et al., 2000; Roemer, Litz, Orsillo, Ehlich, & Friedman, 1998). One possible explanation for the absence of a relation with PTSD symptom severity is the relatively short follow-up period in the present study. Other studies used a longer follow-up period which provided a longer time span to assess the development of chronic posttraumatic stress symptoms and their association with memory consistency. It is also possible that the effect of 'effort after meaning' becomes more important when the follow-up period is longer and more chronic forms of psychopathology are involved.

An important strength of this study is that it focused on consistency of a personally experienced traumatic event. A heterogeneous and representative sample of victims of assault was used. Hopefully, this has resulted in more ecologically valid information compared to results obtained in an experimental setting in which it is very difficult and often unethical to reinstate the emotionality of a crime scene.

Some limitations of the present study have to be considered. Firstly, this study did not investigate accuracy of memory, as no objective evidence of what had occurred was available. Therefore, no conclusions can be drawn on the reliability of memory for assault. Questions that are answered consistently can be accurate but are not necessary so, while inconsistent answers mean that at least one of the answers is inaccurate. Secondly, consistency of memory can be assessed using various instruments and scoring systems. The current study used a standardised interview with open-ended and yes or no questions. This form of questioning was found to lead to more correct answers than multiple choice questions (Ibabe & Sporer, 2004). Unfortunately, although the MAI was standardized and piloted prior to this study, the validity has to be further investigated. Thirdly, consistency of memory for a neutral or positive control event was not assessed. As a result, it was not possible to determine whether these results are specific for memories of a traumatic event.

The results of the present study have implications for legal and clinical practice. First, results show that there are no individual characteristics which critically affect memory consistency. Only the level of peritraumatic symptoms predicts consistency of memory reports to a certain extent and consequently it seems advisable to assess dissociative symptoms, while it is likely that these symptoms will influence a testimony. Second, situational aspects were more consistently remembered than emotional aspects. The situational aspects are often those used in the investigation and prosecution of the assault case. Situational descriptions of the perpetrator were quite consistently remembered and likely to be accurate. Third, results show that most of the emotional problems of the assault victims tend to decline over time without therapy and are not related to memory performance. As has been found in previous studies, initially high symptom levels tend to normalize during the first months post-assault in the majority of victims without professional aid (Riggs, Rothbaum, & Foa, 1995). Their symptoms appear to be a normal reaction on an abnormal event. Interventions in the first few months after the assault do not seem necessary for all victims of violent assault.

In conclusion, the present study shows that memory reports of violent assault are fairly stable over a 3-month period in particular with respect to the situational and central aspects of the assault. Among several demographic and assault characteristics, as well as psychological and psychiatric

variables, only higher levels of dissociation were associated with absence of information or inconsistent recall of the assault over time. These results suggest that dissociation may not only impair encoding of information resulting in memory fragmentation at recall, but may also affect the consistency of memory reports of emotional events over time. Future studies must be more attentive to which pathogenic mechanisms of dissociation underlie this memory inconsistency.

