

Comparisons of Memories for Traumatic Events and Other Experiences

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SUMMARY

In the present study, we examined the similarities and differences between memory ratings for traumatic, negative, and positive life experiences. A sample of 113 female undergraduates completed a packet of questionnaires that included memory rating scales for all three types of experiences and measures of psychological functioning. Analyses revealed that traumatic experiences and negative experiences were less well-recalled than positive experiences with regard to some sensory information and some aspects of the narrative structure of the event. In addition, there were no differences between some memory ratings for different types of life events. Additionally, no clear relationships emerged between memory ratings and measures of psychological functioning. Findings tend to support theoretical perspectives that emphasize more limited memory for traumatic experiences relative to memory for other experiences. Copyright © 2001 John Wiley & Sons, Ltd.

What is the effect of trauma on memory? The application of different theoretical perspectives suggests a variety of possible answers to this question. Brown and Kulik (1977) proposed that very surprising, important, and emotional events result in flashbulb memories; memories that are long-lasting, detailed, and accurate. In contrast, repression theories state that certain events, such as psychological traumas, are often buried in the unconscious (Freud, 1915/1957, 1901/1974; Herman and Schatzow, 1987; Terr, 1991). Still other views of emotion and memory suggest that arousal affects either encoding or retrieval, resulting in memories that are less clear and detailed than memories of other experiences. Additionally, individuals who experience post-traumatic stress disorder (PTSD) following traumatic events may exhibit symptoms that imply problems with memory. The DSM-IV (American Psychiatric Association, 1994) diagnostic criteria for PTSD include three symptom clusters: re-experiencing the event, avoidance of stimuli associated with the event and numbing of general responsiveness, and symptoms of increased arousal. Re-experiencing symptoms include recurrent and intrusive distressing recollections of the traumatic event, suggesting that traumatic events may be well remembered. Avoidance symptoms include an inability to recall an important aspect of the event, indicative of forgetting. Thus, theoretical perspectives on memory and clinical knowledge supply inconsistent and at times contradictory views of memory for traumatic experiences.

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THEORETICAL PERSPECTIVES

Flashbulb memory

Brown and Kulik (1977) proposed that very emotional, surprising, and important events cause a special memory mechanism to become active. This 'now print' mechanism is a rarely used memory device that essentially takes a snapshot of the current mental state. Brown and Kulik suggested that the resultant flashbulb memory may be immune from the normal flaws introduced by the memory system. Thus, the memory does not fade over time, the details remain clear, and the memory is more accurate than typical memories.

Brown and Kulik (1977) developed the flashbulb memory theory from their research examining individuals' memories for learning that John F. Kennedy had been killed (and memories of receiving other disturbing news). They found that, more than 12 years following the event, individuals claimed to have very detailed memories for learning the news. Brown and Kulik could not, however, study whether the individuals' memories were accurate.

More recently, other researchers have examined the consistency of memories for such events and found that individuals' memories are not particularly consistent, indicating that the memories are not accurate. For example, Neisser and Harsch (1992) asked people to report when and how they had learned of the Space Shuttle Challenger explosion the day after the event and again two years later. They found that individuals made many errors in reporting who had told them the news, where they had been at the time, and what activity had been interrupted. Thus, learning very surprising, emotional news did not result in accurate memories, even though individuals believed that their memories were accurate.

In addition to doubts about the accuracy of flashbulb memories, there are other concerns with flashbulb memory theory as an explanation of traumatic memories. First, it is unclear how the consistency of memory for these events compares to the consistency of memory for other events during the same time period. Rubin and Kozin (1984) suggested flashbulb memories are not different from other vivid memories. In addition, though events such as learning about JFK's assassination and the Challenger explosion are emotional and surprising, they may not actually be traumatic events. The DSM-IV (APA, 1994) defines a traumatic event as one that involves 'actual or threatened death or serious injury, or other threat to one's physical integrity; or witnessing an event that involves death, injury, or a threat to the physical integrity of another person; or learning about unexpected or violent death, serious harm, or threat of death or injury experienced by a family member or other close associate' (p. 424). Additionally, 'the person's response to the event must involve intense fear, helplessness, or horror (or in children, the response must involve disorganized or agitated behavior)' (p. 424).

Repression

If traumatic memories are not long-lasting, detailed, and accurate, then perhaps they are more likely than other memories to be forgotten. Freud (1915/1957, 1901/1974) originally suggested repression theory as a way of explaining a variety of clinical phenomena. In essence, a repression mechanism is, like the flashbulb memory mechanism, a special memory device. For certain types of events, but not all events, the mind may bury the information in the unconscious. The type of events that will be repressed depends on the theorist. Modern views claim that trauma (Fredrickson, 1992; Herman and Schatzow, 1987), repeated traumas (Terr, 1991), or traumatic experiences that violate trust, such as incest (Freyd, 1996) are very likely to be repressed. While the information is repressed, it

is not available for conscious consideration and thus a person can not remember the experience. Nonetheless, the experience continues to trouble the individual, often leading to various psychological problems. Although repressed memories can not generally be remembered, special circumstances may lead to the recovery of the memory.

Research seeking evidence that memories for traumatic experiences are repressed is troubled by limitations. Much of the evidence for repressed memories derives from clinical case studies or surveys of individuals who report having experienced traumatic events (e.g. Briere and Conte, 1993; Herman and Schatzow, 1987). In these studies, there is seldom evidence that the events occurred, that there was a period of forgetting, or that the memories were recovered in a fashion predicted by repression theories. To address these concerns, Schooler *et al.*, (1997) conducted a series of case studies in which they attempted to investigate more systematically the experience of recovering repressed memories. In their investigations, they have found several cases in which there was compelling evidence that the traumatic event occurred, that the individuals could not remember the event for a long period of time, and that the individuals eventually recovered memory for the experience. The events were most often recovered in contexts similar to the original trauma. Additional evidence for forgetting and remembering traumatic experiences is found in Williams' (1994, 1995) prospective study of adult women with documented histories of sexual abuse during childhood. Williams (1994) found that 38% of participants did not report the childhood abuse. In her follow-up study, Williams (1992) found that 16% of the women indicated they had recovered memories of the abuse after a period of forgetting.

It seems clear that it is possible for individuals to forget a traumatic experience for a period of time and later remember the experience. However, this finding does not necessitate that traumatic events are unique in the memory process. The answer to this question depends on whether such periods of forgetting occur for other events as well, and if forgetting is more or less common for traumatic experiences. In an effort to address this issue, Read (1997) asked individuals to report whether they had ever had an experience of remembering something after a time of believing that they had never had such an experience. Read found that individuals reported memory recovery experiences for a variety of events other than traumatic events. Thus, forgetting and later remembering may be a typical occurrence for many memories and not specific to memory for traumatic experiences.

Easterbrook hypothesis

In addition to views postulating that traumatic experiences result in very clear or repressed memories, there is also reason to suspect that traumatic experiences may result in memories that are somewhat less clear than memories for non-traumatic experiences. Here, the focus is on the potential for trauma to adversely affect the encoding of the event. Easterbrook (1959) argued that as arousal increases, attentional focus narrows. This may be an advantage with moderate levels of arousal. However, when arousal is extreme, an individual may no longer be able to track all the information needed to solve problems or to clearly remember an event later in time (Heuer and Reisberg, 1992). Ellis and his colleagues (Ellis and Ashbrook, 1988; Seibert and Ellis, 1991) also argued for poorer encoding for very emotional events, but for a slightly different reason. They have suggested that mood states take up attentional resources resulting in individuals becoming distracted by thoughts of their own emotional experiences.

Laboratory research on memory has typically supported poorer encoding of more emotional experiences relative to less emotional experiences (Burke *et al.*, 1992; Christianson and Loftus, 1987, 1991; Heuer and Reisberg, 1990). These researchers have demonstrated that the details lost are usually not the central focus of the event. This implies that attention has narrowed so that central items are recalled well, whereas other information is never encoded. A major limitation of this research is that the emotional events used in research studies are seldom extreme on the arousal scale. Because it is ethically impossible to introduce traumatic experiences as part of a psychology experiment, lab researchers have used only negative events that are not traumatic. Thus, whether traumatic experiences are simply a continuation on the scale or whether some new mechanism is involved cannot be determined from the lab studies. Reynolds and Brewin (1999) recently suggested that an Easterbrook-type effect may explain less detailed memories for non-traumatic events, but they argued special mechanisms may come into play with highly traumatic experiences.

CURRENT STUDY

In order to address how traumatic experiences are recalled, it is important to compare memories of traumatic experiences to memories of other experiences. In a large survey of women, Tromp *et al.* (1995) compared memories of rape to memories of other experiences. Women who acknowledged having experienced rape were asked to rate their memories of the rape. Women who had not been raped were asked to rate their memory of some other negative experience or of a very positive experience. Participants rated their memories using the Memory Characteristics Questionnaire (Johnson *et al.*, 1988). This measure consists of a series of items asking an individual to rate various aspects of their memory, from the basic sensory qualities through the importance of the event and their confidence in accuracy of the memory.

Of particular interest to understanding the relationship between trauma and memory is how the participants in the Tromp *et al.* (1995) study responded to questions concerning the clarity of their memories on visual and other sensory detail. If the rape memories were more clear than the other memories, this would support the concept of flashbulb memories. If, in contrast, the women had almost no memories of the experience other than awareness that they had been raped, this would support repression theory. If the memories were rated as somewhat less clear than the other memories, this would imply less complete encoding of the traumatic memories consistent with the Easterbrook hypothesis.

Tromp *et al.* (1995) found that women who experienced rape rated their memories as less clear than did the women who rated memories for other negative life experiences and those who rated memories for positive life experiences. This appears to support the idea that traumatic events result in impaired coding. Yet, there are other possible explanations. First, there is the possibility that rape, but not other traumatic experiences, may result in less clear memories. In addition, because the study compared memory ratings by different groups of women, the findings may reflect group differences—perhaps traumatic experiences influence the clarity of all memories for an individual, not simply memory for the trauma. Finally, this finding may result from retrieval processes rather than encoding processes. The individuals may have difficulty retrieving memories of rape or may choose to think less deeply about that experience.

The purpose of the current study is to build upon the Tromp *et al.* (1995) findings by gathering data that allow for within-group comparisons on memories for different types of emotional experiences. We are also interested in how current psychological functioning may be related to how individuals rate memories for these experiences.

METHOD

Participants

Participants were 113 female undergraduate students at a mid-sized university. They were recruited through the undergraduate research participant pool and received research credit in their psychology classes for participating in the study.

Participants averaged 19.9 years of age ($SD = 2.6$) and most were in their first (47%) or second (23%) year of college. The majority of participants were European-American (90%), and the remainder were Asian-American (6%) or Hispanic (4%). Over half of the participants reported annual family incomes over \$50,000, approximately 30% reported incomes between \$20,000 and \$50,000, and 17% reported family incomes of less than \$20,000 per year.

Seventy-seven participants reported having experienced a potentially traumatic event. Similar to the total sample, these participants averaged 19.9 years of age ($SD = 2.9$) and most were in their first (44%) or second (26%) year of college. The majority (90%) of these participants were European-American, 7% were Asian-American, and 3% were Hispanic. Just over half reported annual family incomes over \$50,000, 34% reported incomes between \$20,000 and \$50,000, and the remainder reported incomes of less than \$20,000 per year.

Measures

The Traumatic Stress Survey (TSS; Gallagher *et al.*, 1998) was used to identify potentially traumatic events in participants' lives. A variation of the Memory Characteristics Questionnaire (MCQ; Johnson *et al.*, 1988; Hyman *et al.*, 1998) was used to obtain participants' ratings of memories for their 'worst' TSS event, a very negative life event, and a very positive life event. Several measures were used to assess psychological functioning, including the PTSD Checklist (PCL; Weathers *et al.*, presentation at the Ninth Annual Meeting of the International Society for Traumatic Stress Studies, San Antonio, TX, 1993), the Beck Depression Inventory (BDI; Beck *et al.*, 1979), the Brief Symptom Inventory (BSI; Derogatis and Melisaratos, 1983), and the Dissociative Experiences Scale (DES; Bernstein and Putnam, 1986).

Traumatic Stress Survey (TSS)

A modified version of the TSS (Gallagher *et al.*, 1998) was used to assess the occurrence of a variety of potentially traumatic life events. This self-report measure includes events such as natural disasters, accidents, child abuse, relationship violence, sexual assault, and other types of crime victimization. Respondents indicated which of the 21 events they experienced, if any, by providing their age(s) at the time of each event. Additionally, we asked respondents to identify what they consider to be the 'worst' event from those they experienced.

Memory Characteristics Questionnaire (MCQ)—Modified

We asked participants to rate the phenomenological characteristics of their memories on several dimensions. Questions were based on the Memory Characteristics Questionnaire developed by Johnson *et al.* (1988) and modified by Hyman *et al.* (1998). The measure consisted of 27 questions covering various aspects of the memory and participants' current consideration of the memory.

The first five questions asked about the sensory qualities of the memory: if the memory involved visual detail, sound, smell, touch, or taste. These questions were rated from involving little or none (1) to a lot (7). The participant answered two items concerning their overall memory for the event: overall vividness, from vague (1) to very vivid (7); and memory for the event from sketchy (1) to very detailed (7). There were three questions concerning memory for the spatial layout of the environment: overall memory for the location rated from vague (1) to clear/distinct (7); relative spatial arrangement of objects rated from vague (1) to clear/distinct (7); and relative spatial arrangement of people rated from vague (1) to clear/distinct (7).

There were four questions concerning participants' emotions: did the participant remember their feelings rated from not at all (1) to definitely (7); a rating of the emotions at the time of the event from negative (1) to positive (7); a rating of the emotional intensity at the time from not intense (1) to intense (7); and a rating of the emotional intensity as the participant is currently considering the event rated from not intense (1) to intense (7). Three questions asked about the memory for the structure of the event. One asked about participants' memory for the order of the event rated from confusing (1) to comprehensible (7) whereas the other two asked about memory for events before the event and after the event, both rated from no memory (1) to clear memory (7). Three questions concerned the importance of the event: at the time the event seemed like it would have serious implications rated from not at all (1) to definitely (7); looking back the event did have serious implications, also rated from not at all (1) to definitely (7); and the importance of the event for self definition rated from not at all (1) to very important (7).

The participants were asked to rate their confidence in the accuracy of their memory from a great deal of doubt (1) to no doubt whatsoever (7). Finally, six questions focused on various sorts of rehearsal: frequency of thinking about the event and frequency of talking about the event with family, friends, partner, counselor/therapist, and some other type of person. The rehearsal questions were all rated from not at all (1) to many times (7).

PSTD Checklist (PCL)

The PCL (Weathers *et al.*, 1993) is a 17-item self-report measure used to assess symptoms of post-traumatic stress disorder. Items correspond to the DSM-IV diagnostic criteria for the disorder, including five re-experiencing symptoms, seven avoidance and numbing symptoms, and five hyperarousal symptoms. Respondents indicated the extent to which they had been bothered by each symptom in the past month using a 5-point Likert type scale, with responses ranging from 'Not at all' to 'Extremely'. The PCL is internally consistent and appears to be a valid measure of PTSD symptomatology (Weathers *et al.*, 1993).

Beck Depression Inventory (BDI)

The BDI (Beck *et al.*, 1979) is a widely used self-report rating scale of depression. Respondents rated 21-items using a 4-point scale reflecting increasing symptom severity. Total scores range from 0 to 63, with guidelines for interpretation as follows: no or minimal depression (0 to 9); mild to moderate depression (10 to 18); moderate to severe

depression (19 to 29); and severe depression (30 or higher) (Kendall *et al.*, 1987). In a comprehensive review, Beck *et al.* (1988) concluded the BDI possesses adequate reliability and validity.

Brief Symptom Inventory (BSI)

The BSI (Derogatis and Melisaratos, 1983) is a 53-item self-report scale designed to assess psychological symptoms. Respondents rated the extent to which they were distressed by a variety of problems and complaints during the past week (e.g. nervousness, feeling lonely, difficulty making decisions, feeling uneasy in crowds) using a 5-point scale ranging from 'not at all' to 'extremely.' The BSI contains nine clinical syndrome scales and three global indices of distress. The GSI (General Severity Index), used in this study, is a global index of current distress levels. The BSI has been shown to have adequate reliability and validity (Derogatis and Melisaratos, 1983).

Dissociative Experiences Scale (DES)

The DES (Bernstein and Putnam, 1986) is a 28-item self-report measure developed to assess the extent to which individuals experience dissociation. Respondents indicated the percentage of time (0% to 100%) they experienced the dissociative symptoms described by the items. Responses were averaged to compute the total DES score. The DES appears to be a valid and reliable measure of dissociation (Bernstein and Putnam, 1986; Dubester and Braun, 1995; Holtgraves and Stockdale, 1997).

Procedure

Groups of 15 or fewer participants assembled in classrooms to take part in the study. Desks were spread out in the rooms to ensure privacy of responses. After participants read and signed the consent forms, a female experimenter handed out the questionnaire packets.

The questionnaire packets began with a demographic information form. Participants next completed the Traumatic Stress Survey (TSS). After identifying their 'worst' event on the TSS, participants were asked to identify a very negative event and a very positive event that occurred within a year or two of the 'worst' stressful event. Participants who did not indicate they had experienced an event on the TSS were asked to first identify a very negative event and then a very positive event that occurred during the same time period as the negative event. Participants then rated their memories for the different life events using the revised MCQ. They subsequently completed the remaining measures described above. Participants were asked to complete the PCL with reference to the 'worst' event from the TSS; participants who did not report the occurrence of an event on the TSS were instructed to skip the PCL.

Recognizing the possibility that some participants may not have felt comfortable disclosing difficult life experiences, we gave participants the opportunity to indicate on the last page of the questionnaire packet that they had experienced an event listed on the TSS but had chosen not to disclose this information while completing the questionnaire. However, all participants indicated they had responded openly and accurately to the TSS.

Finally, when participants completed the questionnaires, they were debriefed as to the theoretical background and goals of the research project. During the debriefing, all participants were given information regarding campus and community resources that could assist them in the event they experienced psychological distress after taking part in the study.

RESULTS

We were concerned with two basic questions: Are there differences between traumatic memories and memories for other emotional experiences and are there relationships between how people rate their memories and current psychological functioning? In looking for differences in how the participants rated their memories, we conducted a series of within-subjects ANOVAs. Means and standard deviations for all ratings of all events are presented in Table 1. For these comparisons, we used the 77 participants who had experienced a potentially traumatic event (34 with interpersonal traumas, 12 with natural disasters, and 31 with other traumatic experiences). To investigate relationships with psychological functioning, we correlated the ratings of each memory on each question with the scores on the Brief Symptom Inventory (BSI), PTSD Checklist (PCL), the Beck Depression Inventory (BDI) and the Dissociative Experiences Scale (DES).

Table 1. Comparisons of ratings for traumatic memories with other memories

Memory rating item	Event type		
	Traumatic event	Negative event	Positive event
<i>Sensory details</i>			
Visual detail***	5.21 (1.75)	5.34 (1.65)	5.92 (1.49)
Smell***	2.46 (1.87)	2.42 (2.04)	3.49 (2.23)
Sound*	4.34 (1.99)	4.45 (2.11)	4.96 (2.04)
Taste***	1.97 (1.59)	1.57 (1.34)	2.27 (1.81)
Touch*	3.87 (2.29)	3.14 (2.35)	3.86 (2.32)
Overall vividness	5.51 (1.36)	5.31 (1.58)	5.48 (1.45)
Sketchiness/detailed	5.51 (1.32)	5.21 (1.68)	5.39 (1.46)
<i>Event structure</i>			
Events before***	4.35 (2.07)	4.71 (1.99)	5.32 (2.00)
Events after	4.75 (1.89)	4.97 (1.90)	5.33 (1.85)
Order of the event	5.23 (1.67)	4.93 (2.00)	5.18 (1.76)
<i>Emotional responses</i>			
Negative/positive***	1.55 (0.86)	1.71 (1.10)	6.39 (1.00)
Memory of feelings	6.29 (1.15)	5.91 (1.45)	6.08 (1.27)
Intensity then	5.88 (1.46)	5.88 (1.41)	5.56 (1.40)
Intensity now	4.50 (1.66)	4.39 (1.67)	4.32 (1.88)
<i>Importance</i>			
Implications then***	5.21 (1.86)	5.30 (2.02)	4.08 (2.16)
Implications now***	5.43 (1.82)	5.05 (1.91)	4.40 (2.31)
Understanding self	4.88 (2.14)	4.86 (2.12)	5.14 (2.08)
<i>Spatial memory</i>			
Location	6.46 (1.04)	6.17 (1.61)	6.28 (1.35)
Object location	4.99 (1.82)	4.96 (2.16)	5.14 (1.76)
People location	5.41 (1.63)	5.05 (2.03)	4.85 (1.94)
<i>Confidence</i>			
Accuracy doubts	5.79 (1.36)	5.47 (1.57)	5.75 (1.29)
<i>Rehearsal</i>			
Thought about event	5.47 (1.69)	5.43 (1.90)	5.42 (1.78)
Talked w/family**	3.58 (2.14)	4.08 (2.38)	4.51 (2.17)
Talked w/friends	4.50 (2.05)	4.64 (2.13)	5.01 (1.91)
Talked w/partner	3.18 (2.04)	3.17 (2.21)	3.29 (2.36)
Talked w/counsellor***	1.81 (1.72)	1.74 (1.65)	1.20 (0.83)

Note: * $p < 0.10$; ** $p < 0.05$; *** $p < 0.01$.

Comparisons of traumatic memories with other memories

Several of the comparisons indicated that traumatic experiences were less clearly recalled than positive experiences. The nature of the event affected the rating of visual details, $F(2, 150) = 5.044$, $MSE = 2.153$, $p = 0.008$, and Tukey's *post-hoc* comparisons demonstrated that positive events were rated as containing more visual detail than either negative or traumatic experiences. Similarly, the event affected the rating of the amount of smell in the memory, $F(2, 150) = 8.090$, $MSE = 3.430$, $p < 0.001$, and Tukey's *post-hoc* comparisons again indicated that positive events were rated as involving more smell than either negative or traumatic experiences. For the extent of sound remembered, the data indicated a similar, but non-significant, trend, $F(2, 150) = 2.867$, $MSE = 2.902$, $p = 0.060$, such that positive events involved more sound.

For both memory for taste and touch, positive events were rated as involving more sensory detail than negative events; for taste $F(2, 150) = 4.816$, $MSE = 1.886$, $p = 0.009$, and for touch a non-significant trend $F(2, 150) = 2.769$, $MSE = 4.706$, $p = 0.066$. In addition to showing that positive events involved more sensory details than negative events, the follow-up comparisons also indicated that traumatic events involved more sensory detail than negative events and that traumatic events did not differ from positive events for involving touch or taste. This may reflect the nature of the event because many of the traumatic experiences intimately involve violations of the individual's body.

Memory for things that happened just before the event indicated that positive events are better recalled than negative and traumatic experiences. The nature of the event affected the rating of the clarity of memory for things that happened before the event, $F(2, 148) = 6.142$, $MSE = 2.957$, $p = 0.003$, and Tukey's comparisons indicated that positive events resulted in better memory than negative or traumatic events. This findings may reflect either genuinely better recall of positive events or the possibility that unpleasant events often are interruptions of ongoing activities. As such, they do not flow from an ongoing set of activities and may provide fewer cues to temporally related events.

For ratings of the emotional responses to the events, the findings are straightforward. Not surprisingly, the nature of the events affected the rating of the valence of the event, $F(2, 148) = 743.655$, $MSE = 0.762$, $p < 0.001$. The positive events were rated as more positive than either the negative or traumatic experiences. There was no effect of event type of the reported ability to remember the emotions, on the rating of the intensity of the emotional reaction at the time of the event, nor on ratings of current intensity of feelings.

Other questions indicated some evidence that traumatic and negative experiences were considered more important than positive experiences. There was an effect of the event on the rating of the extent to which the events seemed like they would have serious implications at the time of the event, $F(2, 144) = 12.333$, $MSE = 2.752$, $p < 0.001$, and follow-up comparisons showed that both negative and traumatic experiences seemed more important at the time than positive experiences. A similar finding was revealed for the participants' current appraisal of the event implications, $F(2, 148) = 5.938$, $MSE = 3.411$, $p = 0.003$. *Post-hoc* comparisons indicated that traumatic events and negative events were rated as having had more serious implications than positive events. The nature of the event did not affect participants' ratings of the event's importance in terms of self understanding.

In general, there were few differences in reported rehearsals. There was no effect of event on the reported frequency of thinking about the event. There was an effect for frequency of talking about the event with family, $F(2, 150) = 4.147$, $MSE = 4.005$, $p = 0.018$, and follow-up comparisons indicated that traumatic experiences were less

frequently talked about than positive events. There were no differences in how frequently participants rated talking about the events with friends or partners. Although most people reported seldom talking about any of the events with a counselor or therapist, there was an effect of event, $F(2, 128) = 8.811$, $MSE = 0.933$, $p < 0.001$, and follow-up comparisons indicated that people talked with a counselor or therapist about positive events less frequently than either negative or traumatic experiences. In response to the open-ended question regarding other rehearsals, people rarely volunteered any other individuals with whom they talked about the events.

For several other items, there were no differences in the ratings of the traumatic, negative, and positive events. There were no differences for the overall vividness rating, for the overall memory of the event ranging from sketchy to detailed, and for the memory for the order the events. In addition, there were no differences in the ratings of location memory, memory for spatial layout of objects, and spatial layout of people. Finally, there was no difference in ratings of confidence in the accuracy of memories.

Relationships between memory ratings and current psychological functioning

First, we looked at the pattern of correlations among the indexes of current psychological functioning. We did this for all participants ($n = 112$, see Table 2(a)) and for the participants who identified a traumatic experience ($n = 77$, see Table 2(b)). When looking at all participants we used the Beck Depression Inventory (BDI), the Brief Symptom Inventory (BSI), the Dissociative Experiences Scale (DES), and the number of traumatic events identified on the stress check list. When considering those participants who identified a traumatic experience, we also included the PTSD Checklist (PCL) since they had an event to which the questions were related (participants without a traumatic event did not fill out this questionnaire about responses to the traumatic experience). The pattern of correlations is consistent in both cases: the scales are highly inter-related and are tied to the number of traumatic events identified. Generally the correlations are stronger with the entire sample reflecting the greater variability in scores. The exception is the relationship of the scales to the number of traumatic experiences: These relationships are stronger with the limited sample of people who have experienced at least one trauma.

Table 2. Correlations among indexes of current psychological functioning
(a) For all participants

	BDI	BSI	DES
Beck Depression Inventory (BDI)	—		
Brief Symptom Inventory (BSI)	0.759**	—	
Dissociative Experiences Scale (DES)	0.400**	0.554**	—
Number of traumas	0.324**	0.276**	0.124

(b) For trauma participants

Memory rating item	BDI	BSI	DWS	PCL
Beck Depression Inventory (BDI)	—			
Brief Symptom Inventory (BSI)	0.696**	—		
Dissociative Experiences Scale (DES)	0.289*	0.534**	—	
PTSD Checklist (PCL)	0.488**	0.517**	0.530**	—
Number of traumas	0.377**	0.333**	0.259**	0.387**

Note: * $p < 0.05$; ** $p < 0.01$.

To investigate the relationship between traumatic memory and psychological functioning, we correlated the participants' ratings of the traumatic events with the Beck Depression Inventory, the Brief Symptom Inventory, the PTSD Checklist, and the Dissociative Experiences Scale. The findings are easily summarized: There was no clear pattern of correlations between memory ratings with the measures of psychological functioning. The memory for smells was positively correlated with scores on the PTSD Checklist ($r = 0.286$), the memory for touch was correlated with scores on the Brief Symptom Inventory ($r = 0.251$) and the PTSD Checklist ($r = 0.324$), memory for events before the experience was negatively related to the Beck Depression Inventory ($r = -0.234$) and the Brief Symptom Inventory ($r = -0.299$), and claiming the memory was important for understanding the self was related to the PTSD Checklist ($r = 0.351$). Given the number of correlations calculated, these correlations would not be significant with appropriate corrections.

There was a slight pattern indicated for the relationship of rehearsals with psychological functioning. The rating of frequency of talking with family was negatively related to the Beck Depression Inventory ($r = -0.391$), the Brief Symptom Inventory ($r = -0.395$), and the Dissociative Experiences Scale ($r = -0.361$). In addition, talking with friends was negatively related to the Brief Symptom Inventory ($r = -0.279$). Thus there is some evidence that talking about the traumatic experience relates to less psychological distress. In contrast, reported frequency of thinking about the event was related to higher scores on the PTSD Checklist ($r = 0.325$), perhaps indicating intrusive recollections. Reported frequency of talking with a counsellor about the experience was also positively related to the PTSD Checklist ($r = 0.250$). This may simply reflect that greater distress leads people to seek counseling.

We also computed correlations between the ratings of the negative and positive experiences and the various measures of psychological functioning. Again, there were few significant correlations, no clear pattern, and the few correlations did not match those observed for the traumatic event. Finally we investigated whether differences in the ratings of the traumatic, negative, and positive memories correlated with psychological functioning. We found few correlations and no clear pattern. In total, single ratings of memory characteristics do not correlate in a clear fashion with psychological functioning.

DISCUSSION

Since our findings allow comparisons of traumatic experiences with other experiences, the results should contribute to the growing body of research devoted to understanding how trauma influences memory. For many aspects of the events, traumatic and negative experiences were less well recalled than positive experiences. This was seen in how participants rated their memories on many of the sensory details and their memory for the things that occurred before the event (an aspect of the narrative structure of the experience). For other memory aspects, such as memory for emotional reactions, there were no differences. These findings are consistent with other recent comparisons of traumatic and non-traumatic experiences (Christianson and Loftus, 1987, 1991; Porter and Birt, this issue; Tromp *et al.*, 1995).

One possible limitation of the differences between traumatic and positive memories we found is that all participants rated the events in the same order. Perhaps the order of the events determined the manner in which people rated the events. However, given that these

findings mirror the differences observed by Tromp *et al.* (1995) in their comparison between groups of participants, we suspect the differences reflect underlying differences between traumatic and pleasant memories. In addition, recent work in our lab (Hyman and Byrne, presentation at the meeting of the Psychonomic Society, New Orleans, LA, 2000) and by Porter and Birt (this issue) has varied event order and found no effect on ratings.

Through providing comparisons of traumatic and non-traumatic experiences, we should begin to discriminate among the competing theories regarding trauma and memory. First, our findings are inconsistent with the Flashbulb Memory mechanism (Brown and Kulik, 1977; Conway *et al.*, 1994). The flashbulb memory mechanism is activated by surprising, emotional, and important experiences and it results in long-lasting, detailed, and accurate memories. The traumatic experiences that our participants rated should be experiences that result in flashbulb memories. Similar to the positive experiences, they were rated as emotional. In addition, the traumatic experiences were rated as more important than the positive experience and should thus be more likely to result in flashbulb memories. Finally, the traumatic experiences resulted in memories with less information from events prior to the experience—an indication that the experiences were interruptions of ongoing events and thus surprising. Nonetheless, the memories were rated as less clear and complete with respect to many sensory details. Of course comparisons to less emotional experiences will be needed before we can firmly conclude that there is no flashbulb memory mechanism. Since all of the experiences rated by our participants were highly emotional, all the memories may be clear compared to normal memories and the differences among these very emotional experiences may be relatively small.

We are unable to comment directly on repression theories (Freud, 1901/1974, 1915/1957; Fredrickson, 1992; Freyd, 1996; Herman and Schatzow, 1987; Terr, 1991) based on our findings. We did not find that individuals were aware of their 'worst' traumatic experiences without being able to remember anything about the event. However, there may have been participants who chose a specific 'worst' event in part because they remembered it more clearly than other traumatic events. We also did not assess whether any of the memories participants described were of experiences that had previously been remembered after a period of forgetting. Future research should ask whether individuals experienced forgetting while keeping in mind that there are problems interpreting the responses to such a question since people may respond to questions about the previous availability of memories based on the current way the memory feels (Schooler *et al.*, 1997; Belli *et al.*, 1998).

Our findings tend to support views that emphasize more limited memory for traumatic experiences. For example, the traumatic memories may be limited because of poorer encoding. Easterbrook (1959) proposed that arousal narrows attention. While the narrowing of attention may be an advantage with moderate levels of arousal, when people are extremely aroused they may no longer be able to track all relevant information. This suggests that less peripheral information may be encoded for traumatic experiences (Heuer and Reisberg, 1992). In order for our findings to support the Easterbrook hypothesis, we would need to find differences in the rated intensity of traumatic and positive events. Unfortunately, we found no differences in the ratings of emotional intensity between traumatic and positive experiences. Instead, views that suggest negative experiences result in poorer encoding because of attentional distraction by the negative emotional state (Ellis and Ashbrook, 1988; Seibert and Ellis, 1991) may be more consistent with our findings.

In addition, our findings could be consistent with retrieval difficulties reflective of traumatic experiences. Encoding specificity (Tulving and Thomson, 1973) suggests that a poor match between the encoding and retrieval contexts leads to less ability to retrieve information. Since our participants' emotional state may currently be closer to the positive than the traumatic event, there may have been a poor match of the emotional context. In addition, people may retrieve over-general memories in response to requests for traumatic experiences (Reynolds and Brewin, 1999), and this would lead people to rate the traumatic experiences as less clear than the positive experiences. As with the flashbulb hypothesis, comparisons to a variety of experiences would help in interpreting these findings.

With respect to the relationship between memory ratings and psychological functioning, we found no clear pattern of results to support the idea that psychological functioning influences or is influenced by the memory characteristic assessed in this study. These results must be interpreted with several limitations in mind. First, participants in this study were a relatively high-functioning group of young women. Although experiencing one or more potentially traumatic events was common, few participants reported significant psychological distress. It is possible that a sample that covered a broader range of psychological functioning would result in a more clear pattern of relationships. Second, the ratings are a single snapshot of the contents of memory. The ratings force the participants to consider particular aspects of their memories rather than allowing the participants to select aspects that they consider important. Personally selected aspects, such as aspects that are described in narratives, might be related to psychological functioning. Further, changes in event memories over time may be related to psychological functioning. (Foa *et al.*, 1995; Pennebaker, 1993; Southwick *et al.*, 1997). In keeping with the importance of talking about traumatic experiences, the few consistent correlations we observed indicated that individuals who reported more frequently talking about the experience with family and friends reported less psychological distress.

In conclusion, our research contributes to the growing body of findings indicating that traumatic experiences are remembered less clearly than positive experiences. This appears to be the case even though all experiences were rated as equally emotionally intense. To better understand these findings, future researchers will need comparisons to a variety of events, not just very emotional experiences. In addition, researchers will need to look at narratives and perhaps consider changes in memories over time. Finally, we have grouped together a variety of traumatic events in our study. Clearly there may be differences among various types of experiences in terms of the ramifications for autobiographical memory. Nonetheless, we believe that the results fail to support a special mechanism, such as a flashbulb memory mechanism, and instead should lead researchers to investigate more normal memory mechanisms, such as limited encoding and retrieval difficulties.

ACKNOWLEDGEMENTS

We would like to thank Ben Egbers, Shelly Johnson, Jennifer Loren, and Meghan Pierce for their help with data collection and data entry.

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