Is Traumatic Memory Special? A Comparison of Traumatic Memory Characteristics with Memory for Other Emotional Life Experiences

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SUMMARY

According to the traumatic memory argument, traumatic experiences are processed and remembered in a fundamentally different way from other life events. To investigate the validity of this theory, 306 participants were asked to give detailed accounts of two life experiences: their most traumatic experience and their most positive emotional experience (counterbalanced). Participants also described the qualities of each memory and completed psychological scales measuring severity of trauma, personality, and dissociation. Results indicated that traumatic memories differed from non-traumatic memories phenomenologically (e.g., vantage point) and qualitatively (e.g., number of details). However, the memories also showed important similarities (e.g., high degree of vividness). Only a small proportion (4.9%) of participants reported ‘recovering’ their traumatic memories after extended memory loss (most of whom reported consciously putting the experience out of awareness), and 2.6% reported forgetting their positive experiences for an extended period. Overall, traumatic memories were found to be ‘special’, but not in accordance with prominent fragmentation theories of trauma and memory. Copyright © 2001 John Wiley & Sons, Ltd.

There has been a long-standing debate over how people remember traumatic experiences (e.g., Loftus, 1993; Read and Lindsay, 1997; Toth and Cicchetti, 1998). According to one widespread perspective known as the traumatic memory argument, stressful and traumatic experiences lead to memory impairment because they are processed by cognitive mechanisms that render them difficult to retrieve as coherent verbal narratives (e.g., Herman, 1992). In contrast, a second perspective argues that traumatic stress does not impair and can even enhance the quality of memory (e.g., Shobe and Kihlstrom, 1997), a view which can be referred to as the trauma equivalency argument or trauma superiority argument. The major question addressed in the current paper is whether traumatic experiences are recalled in a fundamentally different manner than other life experiences.

The traumatic memory argument has its roots in the early psychodynamic tradition (e.g., Porter and Marxsen, 1998). The nineteenth-century philosopher Arthur Schopenhauer (1818/1896), and later Freud and his adherents, argued that aspects of stressful experiences are commonly ‘repressed’ and remain inaccessible in the recesses of the unconscious for lengthy periods of time. According to Freud (1922), a traumatic event ‘subjects the mind to such a very high increase of stimulation that assimilation or elaboration of it can no longer

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be effected by normal means, so that lasting disturbances must result’ (p. 232). Janet (1925) contended that highly stressful experiences narrow the field of consciousness and result in a dissociation of aspects of the traumatic memory from conscious awareness. He argued that such events are remembered mainly in non-verbal, sensory form and as informational fragments. Similarly, modern proponents of this view assert that traumatic experiences are processed in a manner that renders memory for the trauma difficult to retrieve explicitly as a coherent narrative. Van der Kolk (1996, 1997), for example, has proposed that elements of traumatic experiences are remembered implicitly as sensory-motor and emotional fragments, and that only these memory ‘fragments’ are available in narrative form. Consistent with this view, Herman (1992) asserted that aspects of traumatic memories lack a coherent verbal narrative and context, existing mainly as changing non-verbal images and powerful sensations. Recently, Brewin and colleagues (e.g. Brewin and Andrews, 1998; Brewin et al., 1996) concluded that cognitive mechanisms could inhibit the activation of representations of traumatic events. In their discussion of a dual processing model of post-traumatic stress, Brewin et al. (1996) elaborated these inhibitory mechanisms, proposing that traumatic memories can sometimes be represented non-verbally resulting from a non-conscious processing of the traumatic event. Writing as part of the American Psychological Association working group on memories of childhood abuse, Alpert et al. (1996) wrote that ‘trauma is by definition, so overwhelming, that it is difficult to face and to integrate psychologically. Because of this, defensive strategies for management of this overwhelming material are needed and include dissociation and numbing that, in turn, can interfere with memory processes’ (p. 52).

Antithetical to the traumatic memory argument, the trauma equivalency/superiority argument also has been long recognized. For example, Augustine observed that highly emotional events ‘clung to [his] mind’, so that they were easily remembered (see Herrmann and Chaffin, 1988). Similarly, William James (1890) remarked that an event could be so emotionally stressful that it would almost ‘leave a scar upon the cerebral tissues’ (p. 670). More recently, a growing body of research indicates that high levels of real-life stress may facilitate rather than impair the quality of memory. For example, studies of children who had been kidnapped (Torr, 1983), witnesses to a homicide (Yuille and Cutshall, 1986), survivors of a ferry sinking (Thompson et al., 1997), and concentration camp survivors (Wagenaar and Groeneweg, 1990) suggest that memories for trauma can remain unimpaired as vivid, coherent recollections. There is also a growing recognition that factors other than the severity of the event itself may have the greatest impact on memory quality (e.g. how often the event is thought about). Accordingly, many research psychologists remain highly skeptical of the traumatic memory argument in the absence of more solid scientific evidence (e.g. Loftus et al., 1998).

In addition to representing an important aspect of human cognition, the nature of memory for trauma has relevance in both clinical and legal settings (e.g. Loftus, 1997; Porter et al., 1999, in press). Research indicates that a substantial proportion of practising clinicians in the 1990s were utilizing techniques to recover traumatic memories (e.g. Poole et al., 1995). An issue at the heart of the recovered memory debate is whether such techniques serve to reconstruct lost memories or, instead, lead to the creation of mistaken memories (e.g. Lindsay and Read, 1994; Porter et al., 2000; Read, 1999). This is particularly controversial in light of research demonstrating that people can be led to recall events which never occurred (e.g. Hyman et al., 1995; Loftus and Pickrell, 1995; cf. Pezdek et al., 1997), including events that would have been stressful had they actually taken place (e.g. Porter et al., 1999). As Shobe and Kihlstrom (1997) pointed out,
approaches seen as necessary to ‘weave’ traumatic memories into the fabric of the person’s conscious awareness remain unsubstantiated.

According to some of the main arguments associated with the traumatic memory perspective (outlined above), traumatic memories should have very different qualitative and phenomenological characteristics compared to memories for other emotional life events, at least prior to the postulated integrating effects of psychotherapy. For example, compared with other highly emotional memories for life events, traumatic memories should contain richer sensory components, higher levels of emotion, a lower level of (visual) vividness/clarity, fewer narrative details, and poorer overall quality. In addition, traumatic memories should be contemplated and discussed less often following the incident (since elements of traumatic memories would not always available in verbal/narrative form) than other non-traumatic emotional memories. Finally, it would be expected that traumatic experiences may be more likely to be associated with reports of extended periods of forgetting.

Little empirical research has examined the validity of these hypotheses. One recent study found that women’s memories of rape, and to a lesser extent negative experiences in general, were less vivid, less meaningfully ordered, less well remembered, and contemplated less often than pleasant memories (Koss et al., 1996). However, only the self-reported characteristics of the memories were investigated; no objective characteristics, such as degree of detail in the memory accounts, were reported. Further, participants were not questioned about whether the traumatic memories were ever forgotten and later reconstructed in explicit narrative memory form. It also is not clear whether this pattern of findings would be restricted to sexual violence or would extend to traumatic experiences in general. Van der Kolk and Fisler (1995) studied 46 individuals who reported being haunted by memories of a terrible experience. All the participants reported previous amnesia for the experience, with the narrative memory emerging only later. However, along with other methodological problems in the study, many of the reported memories were from early childhood and the poor narrative qualities may have resulted from ordinary infantile/early childhood amnesia.

In light of the controversies surrounding the nature of traumatic memory, the present study was designed to investigate whether traumatic memories have unique qualities relative to memories for other emotional life experiences. The proportion of people who report having ‘forgotten’ and later ‘recovered’ traumatic memories compared to other types of emotional memories also was investigated. Further, the relation between individual differences (e.g., gender, personality, dissociation) and memory for traumatic events was examined. Finally, participants were surveyed about their personal experiences with recovered and false memories.

METHOD

Participants

Three hundred and six (N = 306) young adults from undergraduate university classes participated in this study. They were recruited for research examining the nature of traumatic memory and were given course credit points in exchange for their participation. From a pool of potential subjects (312) who were informed about the study beforehand, 98.1% agreed to take part. The mean age was 21.8 years (SD = 3.8) and females constituted 76.5% of the sample.
Materials and procedure

Prior to taking part, participants were required to read a detailed consent form outlining the study and the sensitive nature of the topic being addressed. Following the informed consent procedure, the participants completed a questionnaire called the ‘Emotional Experiences Questionnaire’ (EEQ) specifically designed for the present study. This questionnaire took approximately 30 to 45 minutes to complete. In order to counterbalance the order of the traumatic and positive memory descriptions, half of the participants were asked to describe their most traumatic experience first followed by their most positive emotional experience, whereas the other half of participants received the opposite order. The specific instructions for the traumatic experience were as follows:

Please take a few moments and think back to the most traumatic event you have ever experienced. Choose a specific event as opposed to a series of events or a drawn-out traumatic period. Next, take your time and report everything that you can remember. Make sure to leave nothing out. Start at the beginning and give a complete description of the entire event. Please be sure to include your age at the time of the incident.

When participants finished their report, they were asked several questions relating to the quality of their memory. The questions concerned vantage point or perspective (i.e. can you see yourself in the memory?), anxiety/stress level, frequency of event discussion, frequency of thinking about the event, vividness/clarity, sensory components (the presence of each sense), and the overall memory quality (see the Appendix). Most of the criteria for assessing memory quality were derived from the Memory Assessment Procedure (MAP), operationalized in earlier research (Porter et al., 1999). To address whether the traumatic experiences had ever been forgotten or had been inaccessible in memory, the following questions were asked: (1) To your knowledge, was there ever an extended period when you could not recall this event? (2) If so, what would you estimate was the longest period during which you did not remember this event? (3) If so, did you choose not to recall it or were you unable to recall it? (4) If so, which of the following reasons best explains it? (unconsciously repressed it, intentionally put it out of the mind, simply forgot it, not sure, other), (5) If so, please explain how you recovered the memory after that period (later coded as in therapy, discussion with another person, popped into my head, don’t know, other).

The participants were instructed to describe their most positive emotional experience with the same instructions as those used for the traumatic experience. They were also asked similar questions (as applicable) concerning the characteristics of the memories. All participants were instructed that the two experiences they chose to write about could be from either childhood or adulthood, but that the occurrence of both events should correspond to the same general life period.

After completing the EEQ, three psychological scales were administered to the participants: the Revised Impact of Event Scale (IES; Horowitz, et al., 1979, 1980), the Dissociative Experiences Scale (DES; Bernstein and Putnam, 1986; Carlson and Putnam, 1993), and the NEO-Five Factor Inventory (NEO-FFI; Costa and McCrae, 1992). The IES was intended to provide an index of the subjective level of traumatic stress and perceived impact of the traumatic event reported. The DES was used to investigate the relationship between trauma and dissociation. The NEO-FFI was administered to examine the relation between personality and the qualities of traumatic memories.
Revised Impact of Event Scale
The IES is a 15-item self-report scale that was designed specifically to assess the impact of traumatic events. It measures level of subjective traumatic stress associated with a particular event. Respondents are asked to rate each item according to the frequency of its occurrence in relation to a specific experience of trauma on a scale marked 0 (not at all), 1 (rarely), 3 (sometimes), and 5 (often). Seven items evaluate event-related intrusion memories/ideas and eight items measure avoidance of the memories, ideas, or associated stimuli, yielding two subscale scores and a total score (where higher scores reflect greater trauma impact). Horowitz et al. (1979) reported good psychometric properties for this scale. It has been found to be reliable, to have concurrent validity with other trauma inventories (e.g. Briere and Elliott, 1998), and to be sensitive to treatment effects among sexual assault victims (e.g. Rothbaum, 1997). It is one of the most widely used instruments to measure trauma symptoms and has been used with most trauma populations (e.g. Foa and Rothbaum, 1998).

Briere and Elliott (1998) recently collected normative data on the IES in a large random sample of individuals from the general population. Participants were categorized according to the presence or absence of a history of serious trauma (i.e. childhood sexual abuse, adult sexual assault, childhood physical abuse, adult physical assault, childhood/adulthood witness to interpersonal violence, childhood/adulthood exposure to major non-interpersonal stressors (e.g. fatal vehicular accidents)). In this sample, the mean total IES score for individuals with a history of trauma ($n = 360$) was 16.7, and 7.0 and 8.5 for the Intrusion and Avoidance sub-scales, respectively. The IES has been scored in a number of ways. For comparison purposes, we followed Briere and Elliott (1998) and calculated IES scores by taking the sum of the frequency ratings for each individual.

Dissociative Experiences Scale
The DES is a self-administered 28-item questionnaire that measures tendency toward dissociation (i.e. lack of the normal integration of thoughts, feelings, and experiences into the stream of consciousness and memory). Some items relate to common dissociative experiences (e.g. driving a car and recalling little of the trip) whereas others relate to more severe dissociative experiences (e.g. seeing the world through a fog). The DES yields a single score where higher scores are related to higher degrees of dissociative tendencies. A score of 30 or greater is considered an optimal cutoff score for identifying the possibility of a dissociative disorder (e.g. Bernstein and Putnam, 1986; Carlson et al., 1993; Foa and Rothbaum, 1998). Its reliability, internal consistency, and construct validity have been demonstrated (e.g. Carlson and Putnam, 1993).

NEO Five-Factor Inventory
The NEO-FFI is a 60-item questionnaire with five 12-item scales providing a comprehensive measure of each of the five major personality domains according to the Big-Five Model: Neuroticism, Extraversion, Openness to Experience, Agreeableness, and Conscientiousness. Neuroticism refers to the tendency to experience negative emotional states and to view oneself and the world negatively. Extraversion refers to the propensity to experience positive emotional states and to have a positive outlook on life (introversion is conceptualized as the absence of extraversion). Extraverts are talkative, warm, gregarious, and assertive. Openness to experience refers to the extent to which a person is original, has broad interests, and is willing to take risks. Agreeableness refers to the tendency to get along well with others and is associated with traits of trust, modesty, altruism, and
compliance. Finally, conscientiousness refers to the extent to which a person is careful, scrupulous, reliable, and persevering. The NEO-FPI is self-administered and each item is answered on a 5-point scale, with anchors of 1 (strongly disagree) to 5 (strongly agree). Its reliability, validity, and internal consistency values are high (see Costa and McCrae, 1992).

RESULTS

Preliminary analyses

Age when the emotional experiences occurred
Prior to conducting the major analyses, two potential confounding factors were examined. First, the possibility of a difference between the ages when the traumatic and highly positive experiences occurred was investigated. The mean ages for the traumatic ($M = 15.36, SD = 5.38$) and positive ($M = 15.78, SD = 5.26$) events, were highly similar, $t(268) = -1.21, p > 0.05$. Second, the possibility that memory for the emotional experiences might be negatively influenced by infantile/early childhood amnesia was explored. However, only six of the 306 participants reported traumatic experiences that occurred under age five (minimum age three) and only five reported positive experiences that occurred under age five (minimum age three). This suggested that childhood amnesia was not a significant confound.

Reliability of coded variables
Some of the memory criteria examined in this study were in the form of subjective ratings provided by the participants. However, three measures concerned the objective content of the memory reports (number of details, coherence, and references to emotional state; see the Appendix). These were coded by trained coders naïve to the nature and predictions of the experiment. Inter-coder reliabilities were computed for these criteria using 51 (16.7%) randomly selected reports. The most appropriate approach to calculating inter-coder reliability for this type of data (see Orwin, 1994) was to examine correlations between the decisions of coders followed by a mean difference test. The coders attained acceptable reliability on all criteria: number of details, $r(50) = 0.89, p < 0.0001$, $t(49) = 0.26, p > 0.05$; coherence, $r(50) = 0.76, p < 0.0001$, $t(49) = 1.8, p > 0.05$; and emotional components, $r(50) = 0.88, p < 0.0001$, $t(49) = 0.48, p > 0.05$.

Emotional experiences reported
As expected, there were several different types of experiences reported by participants for both the highly positive and traumatic memories. For the positive experiences, the most common events reported were: winning a major award/competition or achieving fame (34.6%), major relationship event (19.6%), graduation (19.0%), exciting incident on a trip/vacation (11.4%), witnessing a birth (2.9%), and other (14.5%). The most common traumatic experiences were: the death of a loved one, a serious accident, physical violence, family disintegration, serious medical condition/near-death experience, and sexual violence/abuse (see Table 1).1

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1Sample memory narratives are available to interested readers. Please contact the first author to obtain these materials.
Table 1. Categories of the most traumatic experiences reported

<table>
<thead>
<tr>
<th>Event category</th>
<th>%</th>
<th>Mean stress rating (1–7) (SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Death of a loved one</td>
<td>26.5</td>
<td>6.3(1.0)</td>
</tr>
<tr>
<td>Serious accident</td>
<td>22.5</td>
<td>6.2(1.0)</td>
</tr>
<tr>
<td>Physical violence</td>
<td>10.8</td>
<td>6.3(1.3)</td>
</tr>
<tr>
<td>Relationship breakup/divorce</td>
<td>10.5</td>
<td>6.6(0.7)</td>
</tr>
<tr>
<td>Serious medical condition/near-death experience</td>
<td>6.5</td>
<td>6.7(0.8)</td>
</tr>
<tr>
<td>Sexual assault/abuse</td>
<td>5.2</td>
<td>5.4(2.0)</td>
</tr>
<tr>
<td>Embarrassment/negative evaluation</td>
<td>4.9</td>
<td>6.6(0.5)</td>
</tr>
<tr>
<td>Death of pet</td>
<td>4.9</td>
<td>6.5(0.7)</td>
</tr>
<tr>
<td>Family moved</td>
<td>2.0</td>
<td>6.0(1.3)</td>
</tr>
<tr>
<td>Arrested/trouble with law</td>
<td>2.0</td>
<td>6.3(0.5)</td>
</tr>
<tr>
<td>Got lost for extended period</td>
<td>2.0</td>
<td>6.8(0.4)</td>
</tr>
<tr>
<td>Witnessing other’s trauma</td>
<td>2.0</td>
<td>6.7(0.6)</td>
</tr>
</tbody>
</table>

**Level of trauma reported**

The mean stress rating (1 = not at all stressful to 7 = extremely traumatic) of the 306 traumatic events reported was 6.30 (SD = 1.08). Overall, 84% of participants provided a stress rating of either ‘6’ (26.8%) or the maximum of ‘7’ (57.2%). The mean total IES score was 17.41 (SD = 18.18). The mean Intrusion sub-scale score was 9.12 (SD = 9.9) and the mean Avoidance sub-scale score was 8.29 (SD = 9.5). These scores were slightly higher than the those reported by Briere and Elliott (1998). The majority of participants reported that their dominant emotion at the time of the traumatic experience was either intense fear (38.6%) or sadness (27.1%). Together, these data suggested that the ‘most traumatic events’ reported had indeed been highly traumatic to the participants.

**Comparison of traumatic and positive memories**

To examine whether there were differences between memories for the traumatic and positive emotional experiences, a within-subjects multivariate analysis of variance (MANOVA) was conducted with the phenomenological and objective qualities of the memories as dependent variables. This analysis yielded a significant result, Hotellings $T^2 = 1.96$, $F(9, 136) = 20.95, p < 0.0001$. As Table 2 demonstrates, the data indicated that compared to highly positive memories, traumatic memories had fewer sensory components, $F(1, 144) = 15.93, p < 0.0001$, were more likely to have a ‘participant’ perspective, $F(1, 144) = 5.52, p < 0.05$, and had been thought about more often, $F(1, 144) = 7.71, p < 0.01$. Additionally, the traumatic memory accounts contained significantly more details, $F(1, 144) = 105.32, p < 0.0001$, and more references to emotional state at the time of the event, $F(1, 144) = 11.45, p < 0.001$.

Although traumatic memories had significantly fewer sensory components than positive memories, it was not clear which of the sensory modalities differed. Follow-up analyses indicated that traumatic memories had fewer taste components than positive memories, with 4.9% of participants reporting being able to remember the taste of something in their traumatic memory compared to 13.4% in their positive memory, $t(292) = 3.46, p < 0.001$. Apart from this difference, the two memory types were similar with regard to sensory components.
Table 2. Comparison of the qualities of traumatic and positive memories (means and standard deviations)

<table>
<thead>
<tr>
<th>Memory feature</th>
<th>Traumatic memory</th>
<th>Positive memory</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vividness/clarity of the memory (1–7)</td>
<td>5.76(1.29)</td>
<td>5.89(1.20)</td>
</tr>
<tr>
<td>Sensory components in the memory (1–5)***</td>
<td>2.19(8.99)</td>
<td>2.56(1.18)</td>
</tr>
<tr>
<td>Quality of the memory (1–7)</td>
<td>5.77(1.34)</td>
<td>5.78(1.23)</td>
</tr>
<tr>
<td>Perspective in the memory image (1–3)*</td>
<td>1.79(8.44)</td>
<td>1.68(8.82)</td>
</tr>
<tr>
<td>Frequency of event discussion (1–7)</td>
<td>3.76(1.88)</td>
<td>3.82(1.83)</td>
</tr>
<tr>
<td>Frequency of thinking about the event (1–7)**</td>
<td>5.13(1.76)</td>
<td>4.55(1.73)</td>
</tr>
<tr>
<td>Number of details***</td>
<td>28.52(17.93)</td>
<td>19.66(14.59)</td>
</tr>
<tr>
<td>Number of emotional components***</td>
<td>2.59(2.95)</td>
<td>2.08(1.95)</td>
</tr>
<tr>
<td>Coherence (1–3)</td>
<td>2.87(3.4)</td>
<td>2.92(0.67)</td>
</tr>
</tbody>
</table>

*p < 0.05; **p < 0.01; ***p < 0.001.

Memory quality as a function of traumatic stress

The possibility that memories for events associated with more traumatic stress symptoms had different features from events with fewer traumatic stress symptoms was considered. Based on the IES scores, the traumatic experiences were trichotomized into equal groups based on level of subjective post-event trauma symptoms (low, moderate, or severe). A between-subjects MANOVA examined possible differences in the memory qualities as a function of reported trauma symptom severity. In addition to the measures described above, DES scores also were entered as a dependent measure to examine the relationship between level of subjective impact of trauma and dissociation. The MANOVA yielded a significant result, Wilk's lambda = 0.72, F(18, 282) = 2.85, p < 0.0001. Univariate analyses indicated that different levels of perceived impact of trauma were associated with different: (a) frequencies of thinking about the event, (b) frequencies of discussing the event, (c) number of emotional components, and (d) DES scores (see Table 3).

Table 3. Memory quality as a function of severity of trauma according to IES scores (means and standard deviations)

<table>
<thead>
<tr>
<th>Memory feature</th>
<th>Low trauma</th>
<th>Moderate trauma</th>
<th>Severe trauma</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vividness/clarity of the memory (1–7)</td>
<td>5.64(1.16)</td>
<td>5.73(1.31)</td>
<td>5.91(1.38)</td>
</tr>
<tr>
<td>Sensory components (1–5)</td>
<td>2.05(0.89)</td>
<td>2.19(0.83)</td>
<td>2.35(0.96)</td>
</tr>
<tr>
<td>Quality of the memory (1–7)</td>
<td>5.56(1.27)</td>
<td>5.86(1.29)</td>
<td>5.89(1.44)</td>
</tr>
<tr>
<td>Perspective in the memory image (1–3)*</td>
<td>1.72(0.81)</td>
<td>1.84(0.85)</td>
<td>1.81(0.86)</td>
</tr>
<tr>
<td>Frequency of event discussion (1–7)*</td>
<td>3.40(1.77)</td>
<td>3.72(1.77)</td>
<td>4.14(2.04)*</td>
</tr>
<tr>
<td>Frequency of thinking about the event (1–7)**</td>
<td>4.40(1.71)</td>
<td>5.11(1.73)*</td>
<td>5.86(1.56)*</td>
</tr>
<tr>
<td>Number of details***</td>
<td>28.32(16.77)</td>
<td>30.48(19.46)</td>
<td>26.77(17.40)</td>
</tr>
<tr>
<td>Number of emotional components*</td>
<td>2.91(3.67)</td>
<td>2.00(1.84)</td>
<td>2.86(3.01)</td>
</tr>
<tr>
<td>Coherence</td>
<td>2.88(0.33)</td>
<td>2.87(0.34)</td>
<td>2.85(0.35)</td>
</tr>
<tr>
<td>Dissociative experiences scale (DES) score***</td>
<td>9.32(7.75)</td>
<td>14.66(9.45)*</td>
<td>18.24(13.35)*</td>
</tr>
</tbody>
</table>

Note: A letter superscript (a, b) indicates that the given mean was significantly (p < 0.05) higher than the mean of the other group(s) in order: a, b, c. *p < 0.05; **p < 0.01; ***p < 0.001.
Tukey comparisons ($p's < 0.05$) indicated that participants who reported higher levels of traumatic stress (as measured by the IES) reported thinking about the event more often than those who had rated their traumatic stress as lower. Moderate ratings of impact of trauma also were associated with thinking about the event more often than low ratings. Second, participants who reported high levels of traumatic stress reported discussing the event more often than those who had experienced a low level of trauma. Third, all groups differed from one another on DES scores, with a greater perceived impact of trauma associated with higher DES scores. There was a modest positive correlation between IES scores and memory vividness/clarity, $r(305) = 0.12$, $p < 0.05$, indicating that events associated with more traumatic stress symptoms were recalled more vividly.

**Were memories for sexual and non-sexual violence distinct?**

Overall, 30 participants (9.8%) reported having been sexually assaulted at least once (eight reported repeated abuse). Nine of these participants described a sexual assault as their most traumatic experience. It has been suggested that sexual violence may be recalled differently from other traumatic experiences due to elements of intrusiveness and disillusionment. To examine this hypothesis, the traumatic events were dichotomized into sexual violence/abuse and non-sexual physical violence. A MANOVA was significant, Hotelling’s $T^2 = 0.88$, $F(8, 22) = 2.43$, $p < 0.05$. Memories for sexual violence were associated with higher levels of vividness/clarity ($M = 6.38$, $SD = 0.96$) than memories for other violent events ($M = 5.30$, $SD = 6.38$), $F(1, 47) = 7.59$, $p < 0.01$. Sexual abuse memories also had more sensory components ($M = 2.58$, $SD = 0.79$) than other violent memories ($M = 1.90$, $SD = 0.91$), $F(1, 30) = 4.63$, $p < 0.05$. Further, there was a trend for the sexual abuse memories to be rated as having a higher overall quality ($p = 0.08$) than memories for other violence.

**Individual differences and the experience of trauma**

**Gender**

The possibility that males and females recalled traumatic experiences differently was investigated. A between-subjects MANOVA (gender as the independent variable) focusing on both subjective memory qualities and the perceived personal impact of the traumatic event was conducted. The MANOVA was significant, Hotelling’s $T^2 = 0.20$, $F(12, 139) = 2.34$, $p < 0.01$. Overall, there were no qualitative differences between males’ and females’ recollections of their trauma. However, females reported thinking about the traumatic experience ($M = 5.29$, $SD = 1.71$) significantly more often than males ($M = 4.63$, $SD = 1.83$), $F(1, 304) = 2.22$, $p < 0.01$, and provided more details in their memory accounts ($M = 29.97$, $SD = 18.25$) than males ($M = 23.86$, $SD = 16.10$), $F(1, 302) = 6.48$, $p < 0.05$.

**Personality**

The relationships between the five major personality factors of the NEO-FFI with IES and DES scores were examined through correlational analysis. Total scores on the IES were modestly related to neuroticism, $r(305) = 0.17$, $p < 0.01$, as were the Intrusion sub-scale ($r(305) = 0.14$, $p < 0.05$) and the Avoidance sub-scale ($r(305) = 0.13$, $p < 0.05$) scores. DES scores were significantly related to neuroticism ($r(305) = 0.21$, $p < 0.001$), agreeableness ($r(305) = -0.15$, $p < 0.05$), and conscientiousness ($r(305) = -0.14$, $p < 0.05$).
Dissociation

DES scores also showed a positive association with overall IES scores, \( r(304) = 0.30, p < 0.0001 \). In addition, there were significant positive correlations between DES scores and IES Intrusion sub-scale scores, \( r(304) = 0.28, p < 0.0001 \), and Avoidance sub-scale scores, \( r(304) = 0.19, p < 0.01 \).

Did participants ever forget the traumatic experience?

Overall, 14 of the 306 (4.6%) participants reported that there had been an extended time period during which they did not recall their traumatic experience. Eleven of the 14 (78.6%) participants indicated that they had consciously chosen not to recall the event. Specifically, six reported intentionally putting it out of their minds, three simply forgot, and two did not know. The other three participants reported that they had no conscious control over the forgetting and that they had unconsciously repressed the traumatic event. The mean reported forgetting period was 621.0 days (\( SD = 1062.55 \)) with a range of three to 3650 days (ten years). The 14 participants who reported forgetting their traumatic experience were asked to describe how they had come to recover the memory, if they knew. Six (42.9%) reported that the memory had spontaneously ‘popped’ into the mind, five (35.7%) reported that they were unsure, while three (21.4%) reported that the memory had been recovered during a discussion with another person. Two of the three participants who reported having unconsciously repressed the memory described the recovery process as spontaneous, with the memory popping into their minds. The other reported that it had been recovered in a discussion with another person.

Eight participants (2.6%) in the sample reported that there had been an extended period of forgetting for their most positive experience. This self-reported forgetting had a mean duration of 244.1 days (\( SD = 377.53 \)) and ranged from two days to three years. One participant reported an extended period of forgetting for both the traumatic and positive experiences.

Survey about repression and memory distortion

Participants were asked their view on whether it is possible to ‘repress’ a traumatic experience. Overall, 85.3% of the sample responded yes, 4.9% responded no, and 9.8% were uncertain. They also were questioned whether any friend or family member had ever disclosed their own recovery of a traumatic memory following an extended period of forgetting. Overall, 14.4% (\( n = 44 \)) responded that someone had disclosed to them such a report of a recovered memory.

Next, participants were asked whether they were aware with certainty that they had ever experienced a memory for an entire event which they later discovered had definitely not occurred. Overall, 59 respondents (19.3%) reported that they were certain they had experienced at least one complete mistaken memory. In previous studies, people who were susceptible to experimentally implanted false memories showed higher DES scores than non-susceptible individuals (e.g. Hyman and Billings, 1998; Porter et al., 2000). In the present study, participants who had experienced a false memory scored significantly higher on the DES (\( M = 17.19, SD = 11.45 \)) than their counterparts (\( M = 13.43, SD = 10.91 \)), \( r(301) = 2.35, p < 0.05 \). They also had higher scores (\( M = 55.9, SD = 10.6 \) versus \( M = 52.0, SD = 10.6 \)) on the openness to experience scale on the NEO-FFI,
\[ F(1, 287) = 6.33, \ p < 0.01, \] and there was a trend for them to score lower on the conscientiousness scale.

**DISCUSSION**

Is traumatic memory special? This question has been the focus of a lengthy scientific debate and has both basic and applied implications (e.g. Read, 1999). One view, the traumatic memory argument, has received considerable attention in clinical contexts. Proponents of this perspective maintain that traumatic experiences are recalled in an impaired (fragmented, sensory/emotional) fashion rather than as coherent verbal narratives. According to a second view, the trauma superiority/equivalency argument, traumatic experiences are recalled similarly to, and perhaps even better than, other experiences.

Overall, the results of the present study provided evidence for the latter theory. Participants reported a range of highly traumatic life experiences, from witnessing a death to sexual assault. These traumatic memories were associated with a richness of detail and more emotional information compared to positive emotional memories. Traumatic memories were recalled with fewer sensory components (as in Koss *et al.*, 1996) and were thought about more often than positive experiences. The fact that traumatic memories were thought about more often would appear, prima facie, to cast doubt on the idea that aspects of the trauma are inaccessible, contrary to fragmentation theories. On the other hand, one could conceive of a person who after experiencing trauma ‘thinks about’ the experience frequently even though he or she cannot provide a narrative account of some aspects of the experience. However, the positive and negative emotional memories shared some important phenomenological characteristics that seem to provide additional support for trauma equivalency/superiority arguments. In particular, they were similar in their high degree of vividness, coherence, and overall quality which provides evidence against any significant impairment in the traumatic memories.

It might be argued that memory impairment only occurs for experiences associated with very severe trauma. However, our results indicated that the reported level of post-event trauma symptoms had no apparent negative impact on the quality of the memories. In fact, traumatic events associated with the highest levels of perceived impact and traumatic stress were thought about and discussed more frequently than other traumatic events reported, which contradicts the traumatic memory argument. In addition, memories for sexual assault (often cited in fragmentation theories) were recalled more vividly than other memories for violence. Nonetheless, those traumatic experiences with high levels of perceived impact of trauma were associated with higher levels of dissociation (in terms of higher DES scores). This suggests that either proneness to dissociation results in perceiving negative events as more traumatic and having a greater impact on one’s life, or that a highly traumatic experience can result in dissociative symptomatology. Although it is difficult to establish the directionality of the relationship empirically, some forms of dissociation are widely understood to be responses to trauma in the clinical literature (e.g. Gershuny and Thayer, 1999; Putnam and Carlson, 1998).

One controversy surrounding memory for trauma is whether it is possible to ‘forget’ highly emotional or traumatic experiences. In the present study, rather than having been unable to recall aspects of their trauma for extended periods of time, most participants reported continuous memories of the traumatic event. In fact, participants reported
thinking about their traumatic experiences *more often* than their positive experiences – a finding that casts doubt on the idea that aspects of trauma are inaccessible in narrative form. Only 4.6% of this sample reported that there had been an extended period during which they were unable to recall their most traumatic experience. Most participants who had “forgotten” the event reported that they had consciously forced it out of their minds (suppressed the memory), rather than repressed it. Notably, 2.6% of participants reported that they had forgotten their most positive experience for an extended period, demonstrating that highly emotional events of both negative and positive valence can be ‘forgotten’ and subsequently reconstructed in memory (see also Read and Lindsay, 2000).

The role of individual differences in traumatic memory has received little attention in previous research. Here, we found that gender and personality were related (although modestly) to the quality of traumatic remembering. Specifically, women thought about the traumatic experience more often and reported more details in memory (it is unclear whether this reflects a true phenomenological difference or a difference in reporting style). As well, the perceived impact of the event was positively associated with neuroticism. Further, higher dissociation scores were positively related to neuroticism and negatively related to agreeableness and conscientiousness. Again, the directionality of these relationships is difficult to ascertain. It is possible that personality characteristics influence the perception of the event. Equally plausible is the explanation that traumatic experiences influence personality characteristics in significant ways. For example, it is certainly conceivable that neuroticism and associated anxiety could result from or be augmented by a traumatic experience.

Reflecting the continuing popularity of the concept, most participants felt that repression was a valid phenomenon. Perhaps more surprising was the significant number of participants (14.4%) who reported being told about a ‘recovered’ repressed memory by a friend or family member. Although the accuracy of these accounts is unknown, this suggests that memory recovery is a common phenomenon. Given the relevance of the issue to the recovered memory debate, participants were also asked whether they were aware if they had experienced at least one complete mistaken memory for an *entire* event that never occurred. A surprising number (19.3%) reported they were aware of such a false memory. Previous experimental research has indicated that susceptibility to false memories is positively related to dissociation (e.g. Hyman and Billings, 1998; Porter et al., 2000). Similarly, in this study, it was shown that even self-reported experiences of false memories were associated with substantially higher levels of dissociation.

This study provides important information on the phenomenology of traumatic memory. However, it is important to consider the generalizability of the findings. The participants were students whose traumatic experiences may not represent those of clinical samples. Nevertheless, most of the events described were certainly frightening, upsetting, and/or painful. Further, the stress ratings associated with the events were very high. Finally, IES scores collected here were higher than those reported previously for a large sample of individuals from the general population with a history of trauma (Briere and Elliott, 1998). Therefore, it is likely that these were indeed highly traumatic events. Nonetheless, in our future research we plan to extend this methodology to forensic and clinical samples to help to clarify the generalizability issue. Another consideration is the possibility that more severe traumatic events did not get reported (relating to a number of potential mechanisms). Although this is obviously a difficult issue to resolve empirically, it may not have been a major problem here. First, nearly all participants who were eligible to participate chose to do so (98.1%), suggesting that a bias for only those with less severe
traumatic experiences to participate is unlikely. Second, most participants in this study did report highly traumatic experiences (including sexual and physical violence) and recalled them vividly. Finally, it is possible that some participants might have chosen not to report their most traumatic experience even though they had not repressed it. However, this seems unlikely given the high stress and perceived impact of trauma ratings that were obtained.

Despite these possible limitations, our findings have significant implications for the understanding of memory and trauma. The results indicated that traumatic memories are unique in terms of how often they are thought about and discussed, their degree of sensory material, amount of detail, amount of emotional information, and the vantage point from which they are recalled. On the other hand, some memory characteristics were similar to highly positive and other negative emotional memories, and the level of perceived impact of the trauma was not a major factor in memory quality. Overall, the traumatic memories were rich, coherent, intrusive, and detailed rather than impaired in any way. Therefore, we conclude that traumatic memories are ‘special’, but not in accordance with prominent fragmentation theories.

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REFERENCES


Of course, there is no way of establishing whether there was something about the small number of participants who chose not to take part that distinguished them from their counterparts who did participate.


Orwin 1994. (to be supplied.)

APPENDIX: DESCRIPTION OF THE MEMORY CRITERIA

Also see Porter et al. (1999) for further information on the Memory Assessment Procedure (MAP)

Part 1 – Phenomenological (Subjective) Characteristics

- Item 1. *Vividness/Clarity*. This criterion refers to how vivid and clear the childhood memory is for the person experiencing it. Each participant was asked to indicate how
vivid and clear his/her memory was for each event on a scale of 1 to 7 (1 = not at all vivid and clear to 7 = completely vivid and clear).

- Item 2. Stress Ratings. Each participant was asked to rate the level of stress associated with the event in question according to a 7-point scale (1 = not at all stressful to 7 = extremely traumatic).

- Item 3. Sensory Components. This criterion assesses the level of sensory information that is re-experienced when an event is remembered (from the reality monitoring model). Each participant was asked to indicate whether each memory contained a visual, auditory, olfactory, tactile, and gustatory component. For coding purposes, each memory was scored from 1 to 5, depending on the number of sensory components.

- Item 4. Quality of the Memory. Each participant was asked to rate the overall quality of the memory in question on a 7-point scale (1 = very poor to 7 = excellent).

- Item 5. Vantage Point (Participant/Observer). This criterion measured whether a ‘participant’ or ‘observer’ perspective dominated the memory image. A participant perspective refers to a memory in which the event is re-experienced through the person’s own eyes. An observer perspective refers to a memory in which the remember can see him/herself acting in the memory image. Each participant was asked to report whether he or she could see him/herself in the memory image and which of the two perspectives best characterized the image. Participants were also given the option of reporting that the memory perspective changed (1–3; 1 = I can never see myself in the memory, 2 = the memory changes so that I can see myself in the memory image only some of the time, and 3 = I can always see myself in the memory). Thus, ratings increased from a participant perspective to a more dominant observer perspective.

- Item 6. Frequency of event discussion. Participants were asked to estimate how frequently they had discussed the event with others on average per year since its occurrence on a 7-point scale, with 1 (never), 4 (approximately three times per year), and 7 (6+ per year).

- Item 7. Frequency of thinking about the event. Participants were asked to estimate how frequently they had privately thought about the event on average per year since its occurrence according to a 7-point scale, with 1 (never), 4 (a few times per year), and 7 (7+ per year).

**Part 2 – Objective Characteristics**

Items 8 (Detail) and 10 (Coherence) derive from the Statement Validity Analysis (SVA) technique developed in Germany in the 1950s and later operationalized and formalized by an international group of researchers (see Horowitz, 1991; Landry and Brigham, 1992; Porter and Yuille, 1996; Porter et al., 1995; Raskin, 1989; Raskin and Esplin, 1991; Zaparniuk et al., 1995). They were later adopted and refined for the Memory Assessment Procedure (MAP; Porter, 1998; Porter et al., 1999).

- Item 8. Amount of Detail. This criterion refers to how much detail is contained within a memory report. This was coded via an existing scoring procedure (above) in which each distinctive piece of information offered is scored one point. For example, ‘John ran into the woods behind his house’ contains three specific details (the identified person, action, location). ‘Dad was carrying a red coat and a scarf’ contains four details – one action (carrying) and three descriptives (Dad, red coat, scarf). Very general, non-specific information such as ‘a man’ in ‘A man walked out’ warranted 1/2 point.
• Item 9. *Number of Emotional Components.* The coders scored each memory report transcript for the number of references made to the participants own emotional state (e.g. ‘I was terrified’, ‘I felt so angry’, ‘I could tell she was sad’).

• Item 10. *Coherence.* This was coded via an existing scoring procedure (e.g. Porter et al., 1995, 1999; Porter and Yuille, 1996). Each account was rated on how well it hung together and followed a logical sequence and reflected consistency over time. That is, it reflects consistency over time (the story has a beginning, middle, and an end provided in chronological order). As well, how consistent is the information provided? Does the person contradict him/herself? The coder must make a rating of how coherent and logical the memory is overall (e.g. a minor inconsistency would not render the account incoherent).