Research Report

FALSE MEMORIES IN WOMEN WITH SELF-REPORTED CHILDHOOD SEXUAL ABUSE: An Empirical Study

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Abstract—*Although controversy exists about the validity of memories of childhood abuse, little is known about memory function in individuals reporting childhood abuse. This study assessed memories for previously presented words, including the capacity for false memory of critical lures not actually present in the word list, in 63 subjects, including abused women with posttraumatic stress disorder (PTSD), abused women without PTSD, and men and women without abuse or PTSD. Abused women with PTSD had a higher frequency of false recognition memory of critical lures (95%) than abused women without PTSD (78%), nonabused women without PTSD (79%), or nonabused men without PTSD (86%). PTSD women also showed poorer memory for studied words and increased insertions of nonstudied words other than critical lures. These findings are consistent with a broad range of memory alterations in abused women with PTSD.*

A large number of women in this country (16%) report having been sexually abused in childhood (McCauley et al., 1997), which sometimes leads to chronic psychiatric disorders including posttraumatic stress disorder (PTSD; Kessler, Sonnega, Bromet, Hughes, & Nelson, 1995). There has been considerable controversy, however, surrounding the validity of memories of childhood abuse (Bremner, Krystal, Charney, & Southwick, 1996; Kihlstrom, 1995, 1998; Loftus, 1993; Pezdek & Banks, 1996; Schacter, Coyle, Fischbach, Mesulam, & Sullivan, 1995), with some authors criticizing self-reported abuse as representing false memories suggested by overzealous psychotherapists or the media and popular culture (Lindsay & Read, 1994; Loftus, 1993). Memories can in fact be susceptible to insertions, deletions, and distortions, often resulting in a situation in which the individual remains convinced of the validity of the memory as experienced in its altered form (Kihlstrom, 1996; Loftus, Miller, & Burns, 1978; McCloskey & Zaragoza, 1985; Roediger, 1996; Schacter et al., 1995).

One paradigm for assessing false memory involves asking subjects to learn lists of words that are all highly associated with a primary associate that is not, however, part of the list of studied words (Deese, 1959; Roediger & McDermott, 1995). For example, during recall of a list of words like *thread, pin, eye, sewing, sharp, point, prick, thimble, haystack, thorn, hurt, injection, syringe, cloth,* and *knitting,* the *critical lure, needle,* is falsely recalled about half the time. Although findings related to false memory effects in normal individuals using paradigms such as this one have frequently been cited in the false memory controversy, little is known about the capacity for false memory in individuals who self-report abuse in childhood. Assessing abuse and PTSD is important because PTSD has been associated with a wide range of memory disturbances (Bremner, Randall, Capelli, et al., 1995; Bremner, Scott, et al., 1993; Bremner, Steinberg, Southwick, Johnson, & Charney, 1993; McNally, English, & Lipke, 1993; McNally, Kaspi, Riemann, & Zeitlin, 1990). The purpose of the present study was to assess memory function, including the capacity for false memory, using the Deese paradigm in women with self-reported histories of childhood sexual abuse. In a recent article, Clancy, Schacter, McNally, and Pitman (2000) found that women with recovered memories of childhood sexual abuse showed high levels of false recognition in the Deese paradigm. The present study also examined the occurrence of false memory in women with self-reported histories of childhood sexual abuse, with and without a diagnosis of PTSD, and compared the results with those obtained for women and men presenting neither a self-reported history of childhood sexual abuse nor symptoms of PTSD.

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METHOD

Subject Selection

Sixty-three physically healthy subjects greater than 18 years of age were included in the study. Subjects included 27 healthy individuals (16 women and 11 men) without a history of psychiatric disorder or childhood abuse (nonabused, non-PTSD), 23 women with a self-reported history of severe childhood sexual abuse as measured with the Early Trauma Inventory (ETI; Bremner, Vermetten, & Mazure, in press) and the current diagnosis of PTSD based on the Structured Clinical Interview for DSMIV (SCID; First, Spitzer, Williams, & Gibbon, 1995) (abused, PTSD), and 13 women who had a self-reported history of severe childhood sexual abuse as measured by the ETI but who did not have PTSD based on the SCID (abused, non-PTSD). Criteria of severe childhood sexual abuse based on the ETI assessment included reports of unwanted penetrative sexual abuse before the age of 18. All women with abuse histories had continuous recollection of the abuse since the time of its occurrence. All subjects in this study gave written informed consent for participation. Subjects were recruited by newspaper advertisement, were not recruited from clinical pools, and were not in medication or psychotherapy treatment at the time of the study. Subjects with neurological or medical disorder or current alcohol or substance abuse were excluded. Nonabused, non-PTSD subjects with a history of exposure to traumas as defined in the fourth edition of the *Diagnostic and Statistical Manual of Mental Disorders* (American Psychiatric Association, 1994) were excluded. There was no significant difference in years of education or age among the different groups of subjects (Table 1).

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Table 1. *Demographic and psychometric-assessment data*

Measure	Abused, PTSD women (n = 23)	Abused, non-PTSD women (n = 13)	Nonabused, non-PTSD women (n = 16)	Nonabused, non-PTSD men (n = 11)	F	p
Age	33 ± 8	30 ± 9	30 ± 8	29 ± 8	n.s.	n.s.
Years of education	15 ± 3	17 ± 3	17 ± 3	18 ± 3	n.s.	n.s.
ETI sexual abuse score	508.5 ± 744.1	75.6 ± 133.4	2.2 ± 3.5	0.4 ± 1.2	3.08	.04
Mississippi score	116 ± 25	77 ± 10	69 ± 10	68 ± 7	33.8*	<.0001
CADSS score	15.6 ± 14.8	1.7 ± 27	0.2 ± 0.6	0.3 ± 0.9	12.8*	<.0001
DES score	21.8 ± 16.5	4.4 ± 4.1	2.5 ± 1.8	2.4 ± 2.6	14.8*	<.0001
BSI score	1.40 ± 0.66	0.19 ± 0.17	0.24 ± 0.22	0.15 ± 0.14	34.2*	<.0001

Note. PTSD = posttraumatic stress disorder; ETI = Early Trauma Inventory (Bremner, Vermetten, & Mazure, in press); Mississippi = Civilian Mississippi Scale for PTSD (Vreven, Gudanowski, King, & King, 1995); CADSS = Clinician Administered Dissociative States Scale (Bremner et al., 1998); DES = Dissociative Experiences Scale (Bernstein & Putnam, 1986); BSI = Brief Symptom Inventory (Derogatis & Savitz, 1999).
*Abused, PTSD group greater than abused, non-PTSD and nonabused, non-PTSD groups by Duncan's multiple-range test, $p < .05$.

Psychometric Assessments

As already noted, diagnosis of PTSD was based on the SCID, and self-reported childhood abuse was assessed with the ETI, a measure of childhood trauma with established psychometric properties including acceptable test-retest reliability, interrater reliability, and validity. Subjects were also assessed with the Clinician Administered Dissociative States Scale (CADSS), a measure of state level of dissociative symptomatology shown to be reliable and valid (Bremner et al., 1998); the Dissociative Experiences Scale (DES), a validated measure of general dissociative symptoms (Bernstein & Putnam, 1986); the Brief Symptom Inventory (BSI), a self-report measure of general psychiatric symptomatology (Derogatis & Savitz, 1999); and the Civilian Mississippi Scale for PTSD, a continuous measure of PTSD symptomatology (Vreven, Gudanowski, King, & King, 1995). Data from these psychometric assessments are summarized in Table 1.

Procedure

All subjects underwent assessment with the paradigm originally developed by Deese (1959) and recently modified by Roediger and McDermott (1995; hereafter referred to as the Deese paradigm). This paradigm involves reading word lists, each of which is highly associated with a critical lure that is not actually in the list. For example, for the critical lure *needle*, subjects would be read a list of 15 words including *eye*, *thread*, and other words that are associated with *needle* during free association, but not including the word *needle*. We used six 15-word lists as modified by Roediger and McDermott (1995) using critical lures found by Deese (1959) to be most likely to induce false recall. Each list included the first 15 associates to the critical lure (Russell & Jenkins, 1954, word-association norms, as cited in Roediger & McDermott, 1995). These word lists corresponded to Roediger and McDermott's (1995) lists for the critical lures (presented in this order) *chair*, *mountain*, *needle*, *rough*, *sleep*, and *sweet*.

Subjects were told that they would hear several lists of words, and that following each they would be asked to write the words down, as a memory test. They were told to write the last few words they heard first, and then to fill in the rest in any order. They were to write down everything that they could remember that they were reasonably confident had occurred on the lists. The words were read out loud at the rate of one word every 1.5 s. Before reading each list, the interviewer announced the number of the list. Subjects were given 2.5 min to recall each list.

After the sixth list, there was a brief conversation lasting 2 to 3 min, and then the subjects were told that they would receive another test in which they would see words on a sheet and were to rate how confident they were that each had occurred on a list. In this test of recognition memory for words from the six previously presented lists, subjects were presented with a list of words that included 12 of the studied words (i.e., words that were in the original lists read to the subjects) and 30 unstudied words. The unstudied words included the 6 critical lures (e.g., *needle*), 12 words unrelated to any words on the lists, and 12 words weakly related to words on the lists. The test sequence was constructed in blocks of 7 items, with each block corresponding to a study list, with 2 studied words, 2 related words, 2 unrelated words, and the critical nonstudied lure. Each block began with a studied word and ended with the critical lure, with the other items arranged randomly in between. Subjects rated the words on a scale from 1 to 4 following the method of Roediger and McDermott (1995): 1 = *definitely new* (i.e., unstudied), 2 = *probably not new*, 3 = *probably old* (i.e., studied), 4 = *definitely old*. Data were then collapsed for analysis into two categories, "definitely or probably old" or "definitely or probably new."

RESULTS

Recall Memory of Studied Words and Critical Lures

Table 2 shows the results of the recall memory test. Analyses of variance (ANOVAs) followed by Duncan's multiple-range tests showed that the abused, PTSD group recalled fewer studied items (50%) than the abused, non-PTSD (61%) and nonabused, non-PTSD

Table 2. *Proportion of recalled nonstudied critical lures, previously studied words, and nonstudied words other than critical lures*

Kind of word	Abused, PTSD women (n = 23)	Abused, non-PTSD women (n = 13)	Nonabused, non-PTSD women (n = 16)	Nonabused, non-PTSD men (n = 11)	F	p
Nonstudied critical lure	.51 ± .50	.53 ± .50	.57 ± .50	.46 ± .50	n.s.	n.s.
Previously studied word	.50 ± .14	.61 ± .14	.61 ± .14	.57 ± .10	15.70*	<.0001
Nonstudied word other than critical lure	.31 ± .65	.15 ± .43	.25 ± .58	.09 ± .34	3.00**	.03

Note. PTSD = posttraumatic stress disorder.
*Abused, PTSD group less than other groups by Duncan's multiple-range test, $p < .05$. **Abused, PTSD group greater than abused, non-PTSD group and men by Duncan's multiple-range test, $p < .05$.

(61%) women or the men (57%). The groups showed equivalent rates of false recall of the critical lures, with the abused, PTSD group recalling more nonstudied words (31%) than abused, non-PTSD women (15%) and men without abuse or PTSD (9%).

Recognition Memory of Studied and Nonstudied Words and Critical Lures

Table 3 shows the results of the recognition memory test. ANOVAs followed by Duncan's multiple-range tests showed that the abused, PTSD group recognized more critical lures (95%) than the abused, non-PTSD (78%) and nonabused, non-PTSD (79%) women or the men (86%). The abused, PTSD group also recognized more nonstudied words (26%) than abused, non-PTSD women (13%) and men without abuse or PTSD (12%). When the specificity of false recognition of critical lures was examined by subtracting false recognition of nonstudied words (other than critical lures) from false recognition of critical lures, the abused, PTSD women showed a higher proportion of false recognition than the nonabused, non-PTSD women (69% vs. 58%). This difference approached statistical significance, $F(1, 228) = 3.05$, $p = .08$. There was no difference between abused, PTSD women and either abused, non-PTSD women (65%) or men without abuse or PTSD (74%). Examination of Table 3 shows that women with PTSD falsely recognized both critical lures and nonstudied words (other than critical lures) more often than all other groups.

Overall, there was a strong negative correlation between correct recall of previously studied words and false recognition of critical lures ($r = -.62$, $p < .0001$). That is, the more items subjects correctly recalled during the recall memory test, the fewer critical lures they falsely recognized during the recognition test. This strong negative relationship was also obtained for the abused, non-PTSD women ($r = -.82$, $p = .0006$), nonabused, non-PTSD women ($r = -.69$, $p = .003$), and nonabused, non-PTSD men ($r = -.73$, $p < .05$), but not for the abused, PTSD women ($r = -.32$, $p = .13$). There was no correlation between false recognition of critical lures and correct recognition of studied words in any group.

Relationship Between False Recall and Clinical Variables

In the abused, PTSD group, there was a significant negative correlation between score on the Civilian Mississippi Scale and recall memory of previously studied words (declarative memory), $r(20) = -.50$, $p < .05$. This correlation indicates that higher levels of PTSD symptoms were associated with poorer recall of previously studied words. There was no relationship between Mississippi score and recall of critical lures in the PTSD group. There was no relationship between measures of dissociation (DES, CADSS) or general psychiatric symptoms (BSI) and recall of critical lures in any group.

Table 3. *Proportion of recognized nonstudied critical lures, previously studied words, and nonstudied words other than critical lures*

Kind of word	Abused, PTSD women (n = 23)	Abused, non-PTSD women (n = 13)	Nonabused, non-PTSD women (n = 16)	Nonabused, non-PTSD men (n = 11)	F	p
Nonstudied critical lure	.95 ± .22	.78 ± .42	.79 ± .40	.86 ± .35	5.79*	.0007
Previously studied word	.93 ± .26	.90 ± .31	.99 ± .10	.93 ± .27	n.s.	n.s.
Nonstudied word other than critical lure	.26 ± .44	.13 ± .34	.23 ± .42	.12 ± .44	2.94**	.03

Note. PTSD = posttraumatic stress disorder.
*Abused, PTSD group greater than other groups by Duncan's multiple-range test, $p < .05$. **Abused, PTSD group greater than abused, non-PTSD group and men by Duncan's multiple-range test, $p < .05$.

DISCUSSION

Women with a self-reported history of childhood sexual abuse and the diagnosis of PTSD had high levels of false recognition of critical lures that had not been previously studied. Women with PTSD falsely recognized critical lures 95% of the time, which was even higher than their frequency (93%) of correctly recognizing words that had actually been studied. Frequency of false recognition was higher than that seen in abused, non-PTSD (78%) and nonabused, non-PTSD (79%) women, as well as men without abuse or PTSD (86%). Women with PTSD also had lower rates of correct recall of previously studied words than the other groups, and a pattern of greater recognition of nonstudied words (other than critical lures) compared with the other groups.

When recognition of nonstudied words (other than critical lures) was subtracted from recognition of nonstudied critical lures, abused, PTSD women had greater (corrected) recognition of critical lures than nonabused, non-PTSD women only. These results suggest that abused, PTSD women overendorsed both critical lures and other nonstudied words. However, the failure to find a difference between abused, PTSD and abused, non-PTSD women was largely related to a decrease in false recognition of nonstudied words other than critical lures in the abused, non-PTSD group (at least in comparison with the "normal" group of women who had not been abused). It is possible that a difference in cognition (as demonstrated here) conferred a protective effect as regards developing PTSD following exposure to childhood abuse in the abused, non-PTSD women. Therefore, although the results are suggestive of an increase in false memory in abused, PTSD women (at least compared with nonabused, non-PTSD women), we cannot conclude whether this increase is specific to PTSD diagnosis or history of abuse.

What the findings do suggest is that abuse-related PTSD is associated with a wide range of memory alterations. PTSD has been associated with deficits in verbal declarative memory (Bremner, Randall, Scott, et al., 1995; Bremner, Scott, et al., 1993), which may be mediated by stress-induced structural deficits in the hippocampus (Bremner, 1998; Bremner, Randall, Scott, et al., 1995; Bremner et al., 1997). Cognitive deficits in PTSD have also been hypothesized to represent a risk factor for the development of PTSD (McNally & Shin, 1995). A finding consistent with prior reports is that PTSD patients in the current study had lower levels of accurate memory for previously studied words than did non-PTSD subjects. A failure to inhibit intrusive memories and behavioral responses is characteristic of the clinical presentation of patients with PTSD, and this deficit may be related to prefrontal cortical dysfunction in this disorder (Bremner, 1998). A failure of inhibition of responses may explain the greater propensity for false recognition of both critical lures and nonstudied words in patients with PTSD. In summary, our study results show a broad pattern of distortions and deletions in abuse-related PTSD that is not limited to false recognition memory as measured with this paradigm.

An increase in symptoms of dissociative amnesia has also been associated with PTSD (gaps in memory in daily life; Bremner, Steinberg, et al., 1993). It was surprising that we did not find a correlation between dissociation measures (DES and CADSS) and false recall in this study, although we did find a correlation with Civilian Mississippi Scale scores. The findings of this study are largely congruent with those of Clancy et al. (2000). In that study, women with recovered memories of childhood sexual abuse had higher PTSD symptoms than women with continuous memories or no memory of abuse, and a linear contrast analysis showed that all three groups showed higher levels of false memory than control subjects. In the present study, women with a self-reported history of childhood sexual abuse and a diagnosis of PTSD were more susceptible to the false memory illusion than women without a history of PTSD or abuse.

There were high levels of false recognition of critical lures in all of the groups. This result is at least partially related to the use of word lists selected from prior studies as being particularly likely to stimulate false recognition, so that abused, PTSD patients typically falsely recalled close to six of the six critical lures, whereas the other groups recalled about five critical lures. In the future, using lists that are not as likely to stimulate false recall will be more advantageous in this population.

We cannot, of course, conclude that reports of childhood abuse are false memories, but our findings suggest that abused women with PTSD have a wide range of alterations in memory function, including an increased capacity for false memories, as well as deletions and insertions of memory material.

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