

Prolonged Exposure Versus Eye Movement Desensitization and Reprocessing (EMDR) for PTSD Rape Victims

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This controlled study evaluated the relative efficacy of Prolonged Exposure (PE) and Eye Movement Desensitization and Reprocessing (EMDR) compared to a no-treatment waitlist control (WAIT) in the treatment of PTSD in adult female rape victims ($n = 74$). Improvement in PTSD as assessed by blind independent assessors, depression, dissociation, and state anxiety was significantly greater in both the PE and EMDR group than the WAIT group ($n = 20$ completers per group). PE and EMDR did not differ significantly for change from baseline to either posttreatment or 6-month follow-up measurement for any quantitative scale.

Posttraumatic stress disorder (PTSD) is a major health problem in the United States, in that as many as one half of rape victims may suffer from chronic PTSD (Rothbaum, Foa, Riggs, Murdock, & Walsh, 1992). As nearly 12 million American women have a lifetime history of PTSD because of rape (Resnick, Kilpatrick, Dansky, Saunders, & Best, 1993), rape victims may constitute the largest number of PTSD sufferers in the United States; therefore, it is imperative to study effective and efficient treatments for rape victims with this disorder.

In the treatment guidelines for PTSD psychotherapies, prepared under the auspices of the International Society for Traumatic Stress Studies (ISTSS), the strongest evidence was found for the use of cognitive behavioral techniques (CBT) to treat PTSD (Foa, Friedman, & Keane, 2000). Of the CBT techniques studied, prolonged imaginal exposure (PE) had the most evidence for its efficacy (Rothbaum, Meadows, Resick, & Foy, 2000). Based on seven controlled studies with large effect sizes, Eye Movement Desensitization and Reprocessing (EMDR)

has been deemed to be an efficacious treatment for PTSD (Chemtob, Tolin, van der Kolk, & Pitman, 2000).

Several published studies have compared PE to EMDR (Deville & Spence, 1999; Ironson, Freund, Strauss, & Williams, 2002; Lee, Gavriel, Drummond, Richards, & Greenwald, 2002; Rogers, Silver, Goss, Obenchain, Willis, & Whitney, 1999; Simon, 2000; Taylor et al., 2003) with mixed results. Most have been methodologically weak with small sample sizes ranging from 1 to 12 participants per treatment modality (see Table 1). Indeed, of the seven gold standards for PTSD treatment outcome research identified by Foa and Meadows (1997), only one published study (Taylor et al., 2003) to date met all seven standards. Taylor et al. (2003) found that PE was superior to both EMDR and relaxation at posttest and follow-up, with no differences between EMDR and relaxation outcomes. One other study (Lee et al., 2002) met five of the seven standards. Comparing EMDR to combined Stress Inoculation Training and Prolonged Exposure (SITPE), Lee et al. (2002) found that EMDR did not differ from SITPE, except on measures of PTSD intrusion; however, at follow-up, EMDR led to greater gains on all measures.

It has been suggested that PTSD occurs due to the inability to adequately process the trauma (Foa, Steketee, & Rothbaum, 1989). Foa and Kozak (1986) suggested that

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Table 1. EMDR Studies Compared on “Gold Standards”

Study	Devilley & Spence, 1999	Ironson et al., 2002	Lee et al., 2002	Rogers et al., 1999	Simon, 2000	Taylor et al., 2003
Treatment Comparison	EMDR vs. TTP	EMDR vs. PE	EMDR vs. SITPE	EMDR vs. Exposure	EMDR vs. Exposure	EMDR vs. Exposure vs. Relaxation
Sample size	23	22	24	12	2	45
Standard 1: clearly defined symptoms	Yes	Yes	Yes	Yes	Yes	Yes
Standard 2: reliable and valid measures	Yes	Yes (self-report measures only)	Yes	Yes	Yes	Yes
Standard 3: use of independent evaluators	Inconsistent ^a	No (self-report only)	Inconsistent	Yes	No	Yes
Standard 4: trained assessors	Not specified	No (self-report only)	Yes	Not specified	Not specified	Yes
Standard 5: manualized, replicable, specific treatment programs	Yes	Yes	Yes	Yes (but different therapists for each treatment)	Not specified	Yes
Standard 6: treatment adherence	Yes (but results not reported)	Yes (but not objectively measured)	Yes (but results not reported)	No	No (therapist same for both treatments and not trained in exposure)	Yes
Standard 7: unbiased assignment to treatment	Debatable ^a	Yes, except at end due to PE dropouts	Yes	Yes	Not specified	Yes

Note. Used stratified method—first 10 to TTP and second 10 to EMDR, and then random, TTP = Trauma Treatment Protocol (includes prolonged exposure); SITPE = Stress Inoculation Training Combined With Prolonged Exposure; EMDR = Eye Movement Desensitization and Reprocessing.

two conditions are required for the reduction of fear. First, the fear memory must be activated. Second, new information must be provided that changes the fear structure. Foa and Kozak proposed that any successful therapy involves correcting the pathological elements of the fear structure, and that this corrective process is the essence of emotional processing. The theoretical foundation behind EMDR is less well developed at this point. It is likely that EMDR is functioning as another form of exposure by confronting the patient with the traumatic memory, thus aiding emotional processing of the traumatic memory. The specific role of the eye movements is unclear, although they may serve as a distraction by allowing the patient to remain with the upsetting image and reactions (Barrowcliff, Gray, MacCulloch, Freeman, & MacCulloch, 2003; Devilly, 2001; Lohr, Tolin, & Lilienfeld, 1998; Rogers & Silver, 2002).

This study aimed to evaluate the relative efficacy of EMDR versus standard PE compared to a no-treatment waitlist control (WAIT) in the treatment of PTSD in adult female rape victims. The specific hypotheses tested include that (a) both EMDR and PE would be more effective in reducing PTSD symptoms than WAIT, (b) EMDR and PE would be equally effective at reducing PTSD symptoms at posttreatment, and (c) EMDR participants would improve more quickly than PE participants.

Method

Eligibility Criteria

This study was limited to female victims of a rape at least 3 months prior to study entry to allow for the natural decline in PTSD symptoms (Kilpatrick & Calhoun, 1988; Rothbaum & Foa, 1989). To obtain a diverse sample of rape victims with chronic PTSD, no maximum time since the index rape was imposed. The PTSD assessment was conducted for the participant's subjectively most traumatic rape event.

Inclusion criteria were that the index event must have been a rape in adulthood (i.e., age 12 or older) or a single incident of rape in childhood (ages 0–11) by either a family or a nonfamily member. Participants were not excluded if they had other traumas, including childhood sexual abuse. Rape was defined as any form of unwanted genital penetration including vaginal, anal, oral, and digital penetration. Fondling or touching of genitals through clothes were not included. Three participants who experienced life-threatening events that included attempted rape without actual penetration as defined earlier were allowed to participate. If on psychotropic medication, participants were required to be stable on the medication at the same dosage for 30 days prior to study entry and to agree not

to change medication or dosage for the duration of the study.

Exclusion criteria included (a) a history of schizophrenia or other psychoses, (b) current suicidal risk or practiced self-mutilation, (c) illiterate and thus unable to complete self-reports, (d) current alcohol or drug dependence as determined by the Structured Clinical Interview for the *Diagnostic and Statistical Manual of Mental Disease (DSM-IV)*; American Psychiatric Association, 1994) (SCID; First, Gibbons, Spitzer, & Williams, 1996), (e) blind or had a history of serious eye disease (e.g., detached retina) that would cause risk with rapid eye movement, (f) use of cocaine in any form within 60 days of treatment administration, (g) or in an ongoing threatening situation (e.g., domestic violence).

Participants

Phone screening was conducted by the study coordinator to determine appropriateness of this study for each potential participant and to inform her of study procedures. If appropriate, an initial evaluation was scheduled. At this evaluation, participants were evaluated by an Independent Assessor (IA) with respect to inclusion and exclusion criteria outlined previously, and the IA explained the procedures of the study to them in detail. Both written and verbal informed consent were gathered at the pretreatment assessment conducted by the IA. If the participant met criteria and gave consent, she was then randomized and scheduled accordingly: Seventy-four participants were randomly assigned to one of two active treatments (EMDR or PE) or a waitlist control group (WAIT). The informed consent form and this study were approved by the Institutional Review Board.

Measures

Interviews

The Clinician-Administered PTSD Scale (CAPS; Blake et al., 1995; Blake et al., 1990; Weathers et al., 1992) is a clinician-administered structured interview that assesses the 17 DSM-IV PTSD symptoms for both frequency and severity and totaled for the three major symptom clusters (intrusion, avoidance, and hyperarousal). The CAPS Current and Lifetime Version (1-month symptom-duration criteria) was used for pretreatment and follow-up assessments whereas the CAPS One Week Version (1-week symptom-duration criteria) was used for the postwaitlist and posttreatment assessments. For the current study, interrater reliability for the CAPS was 93.8% ($\kappa = .79$).

The Assault Information Interview (AII; Rothbaum et al., 1992) is a structured interview that gathers information during the first treatment session on relevant aspects of the assault such as acts committed, number of assailants, weapons used, and so on. Similarly, the Treatment, Legal, and Drug Update Interview (UPDATE; Rothbaum, 1997), used at posttreatment and follow-up assessments, is a structured interview that gathers information on other treatment received, legal developments of the rape case, and alcohol and drug use occurring after the onset of the study.

The Stressful Life Events Screening Questionnaire (SLESQ; Goodman, Corcoran, Turner, Yuan, & Green, 1998) is an interview developed to ascertain a comprehensive trauma history. Developed recently, the SLESQ shows good test-retest reliability, adequate convergent validity with a lengthier clinical interview of prior trauma history, and good discrimination between Criterion A and non-Criterion A events.

The SCID Non-Patient Version (First et al., 1996) is a structured diagnostic interview based on criteria from the *DSM-IV* and is used extensively in research and clinical settings. Particular modules administered included the Mood Disorders, Substance Use Disorders, and Anxiety Disorders modules to screen for other DSM-IV highly comorbid axis I disorders. For the current study, interrater reliability for the SCID was 96.8% ($\kappa = .83$).

Self-Report Measures

The PTSD Symptom Scale-Self-Report (PSS-SR; Foa, Riggs, Dancu, & Rothbaum, 1993; Rothbaum, Dancu, Riggs, & Foa, 1990) is a 17-item self-report measure that corresponds to the 17 *DSM-IV* symptoms of PTSD. The presence and severity of PTSD items are rated on a 0 (*not present*) to 3 (*very much*) scale, with subscores available for reexperiencing, avoidance, and arousal.

The Impact of Event Scale-Revised (IES-R; Weiss & Marmar, 1997) is based on the original IES (Horowitz, Wilner, & Alvarez, 1979) that was comprised of 15 items measuring intrusive and avoidance/numbing symptomatology. The IES-R is a 22-item scale that includes 7 new items to assess the third PTSD symptom cluster, hyperarousal. The frequency of each item is rated from 0 (*not at all*) to 4 (*extremely*).

The Beck Depression Inventory (BDI; Beck, Ward, Mendelsohn, Mock, & Erbaugh, 1961; Beck, Steer, & Garbin, 1988) is a 21-item self-report questionnaire widely used in research on depression to evaluate cognitive and vegetative symptoms of depression (range = 0–63).

The Dissociative Experiences Scale-II (DES-II; Bernstein & Putnam, 1986; Carlson & Putnam, 1993) is a 28-item self-report scale used to quantify the frequency and intensity of a wide range of experiences that are indicative of absorption, dissociation, derealization, amnesia, and depersonalization. In this newer version of the original DES, participants indicate the percentage of time they experience each item by circling a number from 0 to 100 (by 10s).

The State-Trait Anxiety Inventory (STAI; Spielberger, Gorsuch, & Lushene, 1970) is a 40-item widely used measure with two scales designed to assess state anxiety and trait anxiety.

Integrity Measures

To insure treatment adherence and competence, two session tapes from 50% of participants (25% of treatment session tapes) receiving either EMDR or PE were independently rated for treatment integrity. Dr. Francine Shapiro designated an EMDR expert to make these ratings for EMDR sessions, and Dr. Edna Foa designated a PE expert from her lab to make these ratings for PE sessions. For PE, the treatment integrity coding system was adapted from one originally developed by Nishith and Resick (1994) in a comparison study of PE and Cognitive Processing Therapy which followed recommendations made by Waltz, Addis, Koerner, and Jacobson (1993). It was modified for this study in cooperation with Dr. Foa. A similar coding system was developed for EMDR in cooperation with the EMDR rater.

EMDR sessions were rated as 92.09% adherent for essential and unique items while PE sessions were rated 90.46% adherent for items considered essential to each protocol. Using a scale from 1 to 7, mean EMDR therapist skill was rated 6.04 ($SD = 0.58$) or very good for essential and unique items. Mean PE therapist skill was rated 5.80 ($SD = 0.66$) or very good for essential and unique items.

Procedure

Treatment

Participants were assigned to one of three doctoral-level psychologists who were trained in both therapies. To equate the two treatments, the EMDR protocol was modified to match the standard nine-session PE protocol used in previous studies. Thus, both treatments were delivered in nine 90-min, twice weekly sessions. In both, the first two sessions consisted of information gathering, education about trauma effects, a rationale for the par-

ticular treatment, and treatment preparation. Sessions 3 to 9 consisted of administration of PE or EMDR. Assessments were conducted at pretreatment, posttreatment, and follow-up of 6 and 12 months' posttreatment. All assessments were conducted by IAs who were kept blind to the treatment condition.

The EMDR Technique. The EMDR manual distributed at the training workshops was the treatment manual for this condition. EMDR involves having the patient imagine a scene that represents the worst part of the trauma, focusing on the sensations of distress in her body, and rehearsing negative thoughts that match the picture. The patient simultaneously follows the therapist's fingers moving back and forth approximately 18 in. in front of her, a minimum of 20 times each repetition. Distress ratings are gathered using a 0 to 10 subjective units of discomfort scale (SUDs). Once the distress about this scene from the memory drops to 0 or 1, the patient is asked to track the therapist's finger while rehearsing a new, preferred belief, repeating this sequence until the new statement feels true to the patient. Cognitive work is accomplished through the use of cognitive interweaves.

The PE Treatment. The PE treatment used in this study is the same as that used in previous studies (Foa & Rothbaum, 1998; Foa, Rothbaum, Riggs, Murdock, & Walsh, 1991). A hierarchy of avoided situations is constructed for in vivo exposure homework. The next seven sessions are devoted to reliving the rape scene in imagination. Patients are instructed to try to imagine the assault scene as vividly as possible and describe it aloud in the present tense. Anxiety levels (SUDs = 0–100) are monitored every 5 min during exposure. Patients are encouraged to describe the rape in its entirety repeating it several times for 45 to 60 min per session. Following exposure, the patient's reaction to the exposure situation is discussed, and a homework assignment consonant with that day's exposure is assigned. The patient's narratives are tape-recorded, and they are instructed to listen to the tapes at home at least once daily.

WAIT. The WAIT participants met with the IA for their pretreatment assessment. They were scheduled for the next session 4 to 5 weeks later (i.e., the amount of time required for a course of treatment). WAIT participants were randomly assigned to either PE or EMDR and were provided with treatment free of charge after the posttreatment assessment.

Statistical Methods

We used multitrait, multimeasure multivariate repeated measure models for analysis to maximize power,

which is essential to evaluate our second hypothesis. To accomplish this, outcome measures were clustered into two groups to be entered simultaneously into multivariate repeated measures analyses. The first cluster consisted of the PTSD frequency and intensity total-symptom scores as measured by the CAPS, the PSS, and the IES. The second cluster consisted of PTSD intrusion, avoidance, and hyperarousal symptoms as measured by the CAPS, the PSS, and the IES. To reduce scale effects, after confirming distribution assumptions, scores for each measure were standardized to a mean of 0 and an *SD* of 1 for the entire sample.

Hypotheses were tested sequentially. Pretreatment to posttreatment change was analyzed first, with planned contrasts of PE + EMDR versus WAIT and PE versus EMDR constructed from the 2 *df* for treatment. Next, changes from pretreatment to posttreatment to 6-month follow-up were analyzed, using planned contrasts constructed to compare change from pretreatment to 6 months and from posttreatment to 6 months. Cohen's (1988, p. 471) effect sizes (ES) for multivariate tests were obtained from the Wilks's Lambda statistic using Cohen's eq. 10.2.2 (1988, p. 473). For this expression of ES, .35 is considered large, .15 is moderate, and .02 is small.

Categorical data were analyzed using log-linear models containing the same planned contrasts defined earlier at the end of treatment. When there were only two treatment groups to consider, Fisher's exact test was used.

Results

Study Sample

Completion

Of the 74 women enrolled in the study, 1 dropped out during the assessment phase, 1 was terminated and referred during treatment for not meeting treatment criteria, 12 dropped out during treatment, and 60 women (83.3%) completed the protocol. The dropout rate across the three groups was not significantly different, PE: 13.0% ($n = 3$, 2 before MID); EMDR: 20.0% ($n = 5$, 4 before MID); and WAIT: 16.7% ($n = 4$). Of the 40 active-treatment participants who completed treatment, 10.0% of PE subjects ($n = 2$) and 5.0% of EMDR subjects ($n = 1$) were not interviewed at the 6-month follow-up. Because only 2 of 14 participants who did not complete the study (1 in each of the active treatments) provide data other than baseline, intent-to-treat analyses provide

no consequentially different results and are not included here.

Demographics

In the completer sample of 60 women, mean participant age was 33.8 years ($SD = 11.0$). The majority of participants were Caucasian (68.3%), never married or divorced (73.3%), did not have children (68.3%), and were employed full-time, part-time, or were full-time students (76.7%). Almost half of the sample had earned at least a college degree or more (48.3%), but only one third (30.0%) had a household income over \$40,000. There were no significant differences among the three treatment conditions for any of these variables. As assessed by the SCID, 35% ($n = 21$) of participants had only a PTSD diagnosis, 40% ($n = 24$) had one comorbid diagnosis, and 25% ($n = 15$) had two or more diagnoses in addition to PTSD. Fisher's Exact Test for association of 0, 1, or 2+ comorbid diagnoses with treatment assignment was not significant ($p = .873$).

Assault

Index assault experiences lasted an average of 87.98 min ($SD = 144.63$) and were perpetrated by one to three assailants, with the majority (90%) perpetrated by one assailant. Most assaults occurred in the residence of the victim (28.3%) or the perpetrator (21.7%), but also were perpetrated in other residences (6.7%), abandoned buildings (3.3%), vehicles (11.7%), outdoors (18.3%), or other settings (11.7%). The majority of assaults (43.4%) were perpetrated by friends, relatives, dates, and significant others; 33.3% by strangers; and 23.3% by acquaintances. Including the index assault, participants experienced a mean of 6.0 traumas ($SD = 4.1$) prior to study entry. Mean time since assault in months varied greatly (EMDR: 145.9, $SD = 146.8$; PE: 120.9, $SD = 94.1$; WAIT: 162.9, $SD = 136.9$). There were no significant differences among the three treatment conditions on any of these variables.

Baseline Measures

Least-square means of the total scores for each of the three measures of PTSD symptoms are shown in Fig. 1 for each time point. Despite randomization, comparisons between the three groups at pretreatment revealed significant differences on some measures. As assessed by the CAPS, participants in the EMDR condition exhibited significantly higher overall PTSD symptoms,

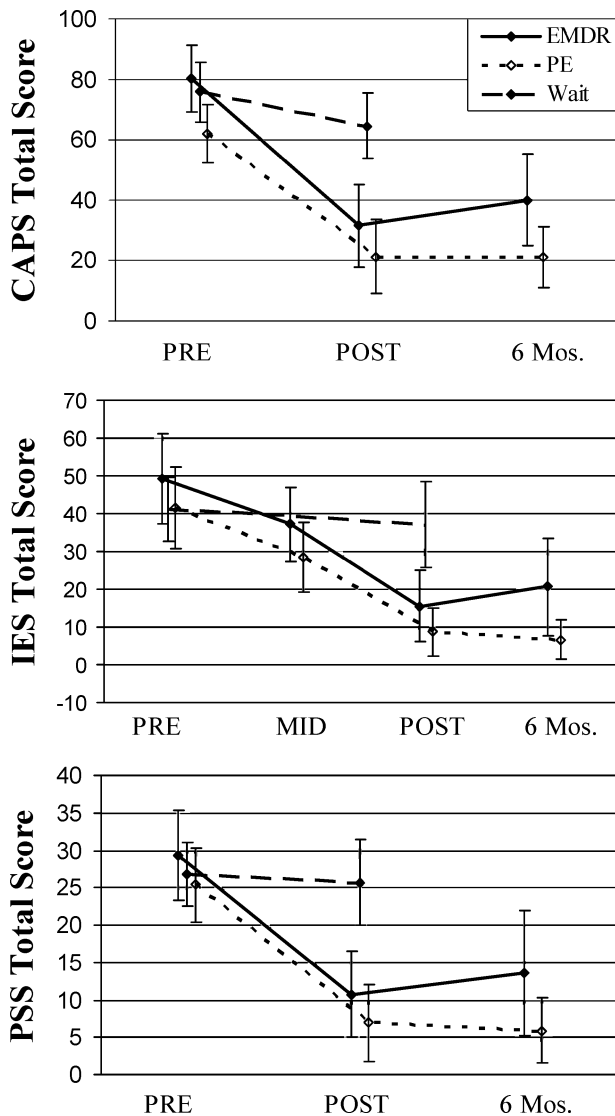


Fig. 1. Total Scores on the CAPS, IES, and PSS at pretreatment, posttreatment, and 6-month follow-up (least-square means \pm 95% confidence interval). *Note.* CAPS = Clinician Administered PTSD Scale; IES = The Impact of Events Scale; PSS = PTSD symptom Scale. PRE = pretreatment; POST = posttreatment; 6 mo FU = 6-month follow-up.

$F(1, 57) = 9.2, p < .01$, due apparently to levels of avoidance symptoms, $F(1, 57) = 13.7, p < .001$, than did PE participants. No differences between groups emerged on self-report measures of PTSD (PSS and IES-R) except that EMDR participants reported higher levels of intrusive symptoms on the PSS than did PE participants, $F(2, 57) = 5.0, p < .05$. The EMDR group also exhibited significantly higher levels of depression (BDI), $F(1, 57) = 11.3, p < .001$, dissociation (DES-II), $F(1, 57) = 7.4, p = .01$, and trait anxiety (STAI-T),

$F(1, 57) = 5.0, p = .05$, but not state anxiety (STAI-S), $F(1, 57) = 3.7, p = .059$, than the PE group. The repeated measures analyses used to compare treatments analyze the change in scale scores from baseline, thus controlling for these pretreatment differences in symptom severity.

Change From Pretreatment to Posttreatment

At posttreatment, 5% of PE participants ($n = 1$), 25% of EMDR participants ($n = 5$), and 90% of WAIT participants ($n = 18$) still met criteria for a diagnosis of PTSD. Log-linear models partitioned in the same way as the continuous models found that significantly fewer participants in PE and EMDR were PTSD positive at posttreatment than WAIT participants, $\chi^2(n = 1) = 20.10, p < .001$; however, the difference between active treatments (PE vs. EMDR) in PTSD diagnostic status was not significant, $\chi^2(n = 1) = 2.58, p = .108$. At 6-months follow-up, 5.6% of PE participants ($n = 1$) and 26.3% of EMDR participants ($n = 5$) continued to receive a diagnosis of PTSD, Fisher's exact $p = .185$.

The repeated measures test of composite total score improvement from pre- to posttreatment was significant, $F(1, 57) = 108.8, p < .001$ (ES = 1.91), as were Time \times Treatment interaction effects, $F(2, 57) = 16.0, p < .001$ (ES = 0.56). Planned contrasts showed that active-treatment participants (PE or EMDR) improved significantly more than WAIT participants, $F(1, 57) = 31.7, p < .001$ (ES = 0.56), but the change from pretreatment to posttreatment did not differ significantly between PE and EMDR, $F(1, 57) = 0.3, p = .608$ (ES = .005). Results from the PTSD symptom cluster MANOVA and analyses of individual measures and symptoms were similar. Overall improvement (time effect) was significant from pre- to posttreatment, $F(1, 57) = 116.6, p < .001$ (ES = 2.05), and there was a significant treatment effect for improvement, $F(2, 57) = 16.3, p < .001$ (ES = 0.57). Active-treatment participants improved significantly more than WAIT participants, $F(1, 57) = 32.1, p < .001$ (ES = 0.56). There were no significant differences in symptom cluster changes from pretreatment to posttreatment between PE and EMDR groups, $F(1, 57) = 0.5, p < .5$ (ES = 0.01).

End-State Functioning

Composite measures were used to examine good end-state functioning. Good end-state functioning was defined as a combined criteria on three measures: 50% or more decrease on the CAPS from pretreatment, a score

of 10 or less on the BDI, and a score of 40 or less on the STAI-S. At posttreatment, 70% ($n = 14$) of PE participants, 50% of EMDR participants ($n = 10$), and none of the WAIT participants met these criteria. Differences were not significant between PE versus EMDR groups, but were significant between Treatment versus WAIT groups, Fisher's exact $p = .001$. At 6-months follow-up, 78% ($n = 14$) of PE participants and 35.3% ($n = 6$) of EMDR participants met criteria for good end-state functioning. Significantly more PE participants met this criteria than EMDR participants at 6-months follow-up, Fisher's Exact Test $p = .017$. These are measures of status at a point in time and are therefore sensitive to differences in initial state.

6-Month Follow-Up

There was no WAIT at the 6-month follow-up as all WAIT participants were offered treatment after completion of the WAIT period. PTSD Total scores improved significantly from pretreatment through 6-month follow-up, $F(2, 33) = 68.3, p < .001$ ($ES = 4.14$), with no significant difference between the two treatments, $F(2, 33) = 1.8, ns$ ($ES = 0.11$). PTSD symptom clusters also improved significantly from pretreatment through 6-month follow-up, $F(2, 33) = 74.8, p < .001$ ($ES = 4.40$), with no significant differences between treatments, $F(2, 33) = 0.9, ns$ ($ES = 0.06$). Planned multivariate contrasts comparing change from pretreatment to 6 months and posttreatment to 6 months did not show significant differences

between the treatments for either interval for Total scores or for symptom composites.

Secondary Measures

Depression

Overall, depression scores (Table 2) decreased significantly from pretreatment to posttreatment, $F(1, 57) = 67.1, p < .001$, and participants in the active treatments improved significantly more than did WAIT participants, $F(2, 57) = 22.0, p < .001$. Improvement of PE and EMDR participants did not differ from pretreatment to posttreatment, $F(1, 57) = 1.2, ns$, or through 6 months, $F(2, 34) = 0.6, ns$. Given the significant initial differences and similar improvements, participants assigned to PE and EMDR differed in the BDI scores at each time point.

Dissociation

Dissociative symptoms (Table 2) also significantly decreased from pre- to posttreatment, $F(1, 56) = 25.6, p < .001$, and symptoms decreased significantly more in active versus WAIT conditions, $F(1, 56) = 12.1, p < .001$. Scores improved significantly more from pretreatment to posttreatment in the EMDR group $F(1, 56) = 4.1, p < .05$. This marginal difference became nonsignificant when 6-month scores were considered, $F(2, 33) = 2.2, ns$.

Table 2. SD Other Symptom Self-Report Treatment = Outcome Differences \times Treatment Condition

Measure	Assessment	Treatment condition		
		EMDR	PE	WAIT
BDI	PRE	25.95 (7.11)	16.70 (8.18)	24.05 (10.50)
	POST	10.70 (11.45)	4.65 (4.99)	22.20 (10.55)
	6 MO	10.53 (10.92)	4.44 (5.07)	-
DES-II	PRE	18.68 (12.67)	10.13 (5.45)	12.53 (10.18)
	POST	8.12 (7.98)	4.84 (4.65)	12.36 (8.51)
	6 MO	8.91 (9.10)	3.51 (2.61)	-
STAI-State	PRE	51.10 (11.05)	43.33 (12.59)	46.58 (13.48)
	POST	32.60 (11.62)	30.00 (10.44)	49.00 (13.73)
	6 MO	38.89 (14.54)	29.19 (8.79)	-
STAI-Trait	PRE	56.80 (10.95)	48.72 (8.62)	53.42 (13.07)
	POST	41.10 (14.48)	35.56 (9.88)	53.95 (13.01)
	6 MO	41.44 (13.26)	34.19 (7.52)	-

Note. EMDR = Eye Movement Desensitization and Reprocessing; PE = Prolonged Exposure; WAIT = Waitlist control; PRE = pretreatment; POST = posttreatment; 6 MO = 6-month follow-up; BDI = Beck Depression Inventory; DES-II = Dissociative Experiences Scale-II; STAI = State-Trait Anxiety Inventory; At Pretreatment, $n = 60$ for BDI and DES-II and $n = 58$ for STAI-State and STAI-Trait; At Posttreatment, $n = 60$ for BDI, $n = 59$ for DES-II and STAI-State, and $n = 58$ for STAI-Trait; At 6-month follow-up, $n = 37$ for BDI and DES-II, and $n = 36$ for STAI-State and STAI-Trait.

Anxiety

For state anxiety (Table 2), pretreatment to post-treatment scores decreased significantly, $F(1, 54) = 35.5, p < .001$, and participants in the active treatments improved significantly more than those in the WAIT condition, $F(1, 36) = 27.7, p < .001$. No significant differences in improvement of state anxiety were found between PE and EMDR from pretreatment to either posttreatment or 6 months. Similarly, trait anxiety decreased significantly from pretreatment to posttreatment, $F(1, 54) = 36.2, p < .001$, and participants in the active treatments improved significantly more than did WAIT participants, $F(1, 54) = 20.2, p < .001$. In general, pretreatment differences between groups in these secondary measures were retained at all time points.

Discussion

In summary, both PE and EMDR equally led to clinically and statistically significant improvements immediately following treatment compared to the waitlist control condition. At posttreatment, 95% of PE participants and 75% of EMDR participants no longer met criteria for PTSD, which was not significantly different. For the most part, gains were maintained at 6-months posttreatment; however, at that 6-month follow-up, PE participants evidenced higher end-state functioning (78 vs. 35%) than did EMDR participants, but not a significantly lower rate of PTSD diagnosis, and again, there were pretreatment differences on some measures that could have influenced this composite measure.

The particular methodology of the current study and implications should be noted. In this study, the goal was to compare good PE to good EMDR, so it should be clear that the data presented here cannot answer the question regarding the necessity of the eye movements. It also attempted to equate PE and EMDR as much as possible, so EMDR was expanded to nine sessions. Sessions 1 and 2 were nearly identical for both treatments and followed the typical PE format of gathering information and providing an explanation of PTSD and rationale for treatment.

The results of this study differ from the results of two other recent studies of EMDR compared to CBT (Deville & Spence, 1999; Taylor et al., 2003) in that treatments differed in improvement at posttreatment or long-term follow-up in those studies. This view is complicated by comparatively large differences in categorical end-state functioning in this study, but this measure is strongly influenced by scores of anxiety and depression scales that (a) differed at baseline between PE and EMDR

participants and (b) are not direct targets of the therapies used.

It is our contention that EMDR and PE are both exposure techniques, assisting the patient in confronting her assault memory and repeating this exposure until she can remember it with low or no anxiety. Both depend on imaginal exposure (i.e., having the patient obtain a picture of the traumatic image in her mind's eye). Both are presumed to aid emotional processing of the trauma, and both aim to achieve cognitive modifications via the treatment process.

The treatment techniques diverge in the administration and between-session instructions. As noted earlier, the exact role of the eye movements in the therapeutic process is unclear, but is thought by these authors to possibly act as a distracter which complicates the task and possibly undermines avoidance tendencies that may allow the patient to tolerate the image. In contrast, EMDR proponents (e.g., Lipke, 2003) have pointed to nonclinical studies which have found that eye movements decrease the vividness of memories and related emotions and increases in memory access. For example, Kavanagh, Freese, Andrade, and May (2001) proposed that eye movements interrupt working memory, which decreases the vividness of memories and thus leads to decreased affect. They argued eye movements may titrate the exposure to memories and related emotions.

The blank it out aspect of EMDR also is a difference between the two treatments; after thinking about a particular aspect of the trauma during the eye-movement phase, the participant is instructed to let her mind go blank for a moment before continuing. PE allows the dose of exposure to be titrated up by allowing the patient to gloss over more traumatic details in the first few sessions, gradually requesting more and more until focusing just on the hot spots repeatedly. In EMDR, the patient gets breaks from the image every few minutes when requested to blank it out. In PE, the patient usually engages in more repetitions of the same traumatic scene than in EMDR. For example, in PE, if it takes 15 min for the patient to recount what happened, it will usually be reviewed four times in a session. Additionally, in PE, patients are assigned homework to listen to the audiotaped accounts of their retelling and to practice in vivo exposure whereas no homework is assigned in EMDR other than to notice any changes in thoughts and feelings between sessions. An interesting potential clinical implication is that EMDR seemed to do equally well in the main despite less exposure and no homework. It will be important for future research to explore these issues.

The current study has many important strengths. It was methodologically rigorous and meets all seven of the

gold standards for a treatment-outcome study including clearly defined symptoms; reliable and valid measures; use of independent evaluators; trained assessors; manualized, replicable, specific treatment programs; treatment adherence; and unbiased assignment to treatment (Foa & Meadows, 1997). Table 1 compares EMDR studies on these seven gold standards and compares two active and intensive, but brief, treatments to a control condition. Furthermore, although some exclusionary criteria were necessary, this study attempted to keep these to a minimum to treat real-world PTSD sufferers so that results could be generalized to other PTSD clients.

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References

- American Psychiatric Association. (1994). *Diagnostic and statistical manual of mental disorders* (4th ed.). Washington, DC: Author.
- Barrowcliff, A.L., Gray, N.S., MacCulloch, S., Freeman, T.C.A., & MacCulloch, M.J. (2003). Horizontal rhythmical eye movements consistently diminish the arousal provoked by auditory stimuli. *British Journal of Clinical Psychology*, 42, 289–302.
- Beck, A.T., Steer, R.A., & Garbin, M.G. (1988). Psychometric properties of the Beck Depression Inventory: Twenty-five years of evaluation. *Clinical Psychology Review*, 8, 77–100.
- Beck, A.T., Ward, C.H., Mendelsohn, M., Mock, J., & Erbaugh, J. (1961). An inventory for measuring depression. *Archives of General Psychiatry*, 4, 561–571.
- Bernstein, E.M., & Putnam, F.W. (1986). Development, reliability, and validity of a dissociation scale. *Journal of Nervous and Mental Disease*, 174, 727–735.
- Blake, D.D., Weathers, F.W., Nagy, L.M., Kaloupek, D.G., Gusman, F.D., Charney, D.S., et al. (1995). The development of a clinician-administered PTSD scale. *Journal of Traumatic Stress*, 8, 75–90.
- Blake, D.D., Weathers, F.W., Nagy, L.M., Kaloupek, D.G., Klauminzer, G., Charney, D.S., et al. (1990). A clinician rating scale for assessing current and lifetime PTSD: The CAPS-1. *The Behavior Therapist*, 18, 187–188.
- Carlson, E.B., & Putnam, F.W. (1993). An update on the Dissociative Experiences Scale. *Dissociation: Progress in the Dissociative Disorders*, 6, 16–27.
- Chemtob, C.M., Tolin, D.F., van der Kolk, B.A., & Pitman, R.K. (2000). Guidelines for treatment of PTSD: Eye movement desensitization and reprocessing. *Journal of Traumatic Stress*, 13, 569–570.
- Cohen, J. (1988). *Statistical power analysis for the behavioral sciences*. Hillsdale, NJ: Academic Press.
- Devilley, G.J. (2001). The influence of distraction during exposure and researcher allegiance during outcome trials. *Behavior Therapist*, 24, 18–21.
- Devilley, G.J., & Spence, S.H. (1999). The relative efficacy and treatment distress of EMDR and a cognitive behavioral treatment protocol in the amelioration of post traumatic stress disorder. *Journal of Anxiety Disorders*, 13, 131–157.
- First, M., Gibbons, M., Spitzer, R.L., & Williams, J.B.W. (1996). *Structured Clinical Interview for DSM-IV (SCID)*. New York: New York State Psychiatric Institute, Biometrics Research Department.
- Foa, E.B., Friedman, M., & Keane, T. (2000). *Effective treatments for posttraumatic stress disorder: Practice guidelines from the International Society for Traumatic Stress Studies*. New York: Guilford Press.
- Foa, E.B., & Kozak, M.J. (1986). Emotional processing of fear: Exposure to corrective information. *Psychological Bulletin*, 99, 20–35.
- Foa, E.B., & Meadows, E.A. (1997). Psychosocial treatments for post-traumatic stress disorder: A critical review. *Annual Review of Psychology*, 48, 449–480.
- Foa, E.B., Riggs, D.S., Dancu, C.V., & Rothbaum, B.O. (1993). Reliability and validity of a brief instrument for assessing post-traumatic stress disorder. *Journal of Traumatic Stress*, 6, 459–473.
- Foa, E.B., & Rothbaum, B.O. (1998). *Treating the trauma of rape: A cognitive-behavioral therapy for PTSD*. New York: Guilford Press.
- Foa, E., Rothbaum, B.O., Riggs, D., Murdock, T., & Walsh, W. (1991). Treatment of posttraumatic stress disorder in rape victims: A comparison between cognitive-behavioral procedures and counseling. *Journal of Consulting and Clinical Psychology*, 59, 715–723.
- Foa, E.B., Steketee, G., & Rothbaum, B. (1989). Behavioral/cognitive conceptualizations of post-traumatic stress disorder. *Behavior Therapy*, 20, 155–176.
- Goodman, L.A., Corcoran, C., Turner, K., Yuan, N., & Green, B.L. (1998). Assessing traumatic event exposure: General issues and preliminary findings for The Stressful Life Events Screening Questionnaire. *Journal of Traumatic Stress*, 11, 521–542.
- Horowitz, M.J., Wilner, N., & Alvarez, W. (1979). Impact of event scale: A measure of subjective distress. *Psychosomatic Medicine*, 41, 207–218.
- Ironson, G., Freund, B., Strauss, J.L., & Williams, J. (2002). Comparison for two treatments for traumatic stress: A community-based study of EMDR and prolonged exposure. *Journal of Clinical Psychology*, 58, 113–128.
- Kavanagh, D.J., Freese, S., Andrade, J., & May, J. (2001). Effects of visuospatial tasks of desensitization to emotion memories. *British Journal of Clinical Psychology*, 40, 267–280.
- Kilpatrick, D.G., & Calhoun, K.S. (1988). Early behavioral treatment for rape trauma: Efficacy or artifact? *Behavior Therapy*, 19, 421–427.
- Lee, C., Gavriel, H., Drummond, P., Richards, J., & Greenwald, R. (2002). Treatment of PTSD: Stress inoculation training with prolonged exposure compared to EMDR. *Journal of Clinical Psychology*, 58, 1071–1089.
- Lipke, H. (2003). Comment on Hembree and Foa (2003) and EMDR. *Journal of Traumatic Stress*, 16, 573–574.
- Lohr, J.M., Tolin, D.F., & Lilienfeld, S.O. (1998). Efficacy of eye movement desensitization and reprocessing: Implications for behavior therapy. *Behavior Therapy*, 29, 123–156.
- Nishith, P., & Resick, P.A. (1994). Adherence and competence rating scale for prolonged exposure treatment. Unpublished rating scale. University of Missouri-St. Louis.
- Resnick, H.S., Kilpatrick, D.G., Dansky, B.S., Saunders, B.E., & Best, C.L. (1993). Prevalence of civilian trauma and post-traumatic stress disorder in a representative national sample of women. *Journal of Consulting and Clinical Psychology*, 61, 984–991.
- Rogers, S., & Silver, S.M. (2002). Is EMDR an exposure therapy? A review of trauma protocols. *Journal of Clinical Psychology*, 58, 43–59.
- Rogers, S., Silver, S.M., Goss, J., Obenchain, J., Willis, A., & Whitney, R.L. (1999). A single session, group study of exposure and eye movement desensitization and reprocessing in treating posttraumatic stress disorder among Vietnam War veterans: Preliminary data. *Journal of Anxiety Disorders*, 13, 119–130.
- Rothbaum, B.O. (1997). A controlled study of eye movement desensitization and reprocessing in the treatment of posttraumatic stress disorder sexual assault victims. *Bulletin of the Menninger Clinic*, 61, 1–18.
- Rothbaum, B.O., Dancu, C.V., Riggs, D., & Foa, E.B. (1990, September). The PTSD Symptom Scale. Presented at the European Association of Behavior Therapy Convention, Paris.
- Rothbaum, B.O., & Foa, E.B. (1989). Subtypes of PTSD and duration of symptoms. Position paper prepared for the DSM-IV Anxiety Disorders Workgroup, PTSD Subgroup.

- Rothbaum B.O., Foa, E.B., Riggs, D., Murdock, T., & Walsh, W. (1992). A prospective examination of post-traumatic stress disorder in rape victims. *Journal of Traumatic Stress, 5*, 455–475.
- Rothbaum, B.O., Meadows, E.A., Resick, P., & Foy, D.W. (2000). Cognitive-behavioral treatment position paper summary for the ISTSS Treatment Guidelines Committee. *Journal of Traumatic Stress, 13*, 558–563.
- Simon, M.J. (2000). A comparison between EMDR and exposure for treating PTSD: A single-subject analysis. *Behavior Therapist, 23*, 172–175.
- Spielberger, C.D., Gorsuch, R.L., & Lushene, R.E. (1970). *Manual for the State-Trait Anxiety Inventory (self-evaluation questionnaire)*. Palo Alto, CA: Consulting Psychologists Press.
- Taylor, S., Thordarson, D.S., & Maxfield, L., Fedoroff, I.C., Lovell, K., & Ogradniczuk, J. (2003). Comparative efficacy, speed, and adverse effects of three PTSD treatments: Exposure therapy, EMDR, and relaxation training. *Journal of Consulting and Clinical Psychology, 71*, 330–338.
- Waltz, J., Addis, M.E., Koerner, K., & Jacobson, N.S. (1993). Testing the integrity of a psychotherapy protocol: Assessment of adherence and competence. *Journal of Consulting and Clinical Psychology, 61*, 620–630.
- Weathers, F.W., Blake, D.D., Krinsley, K.E., Haddad, W., Huska, J., & Keane, T.M. (1992). The clinician administered PTSD scale: Reliability and construct validity. Paper presented at the 26th annual meeting of the Association for the Advancement of Behavioral Therapy, Boston.
- Weiss, D.S., & Marmar, C.R. (1997). The Impact of Event Scale-Revised. In J.P. Wilson & T.M. Keane (Eds.), *Assessing psychological trauma and PTSD* (pp. 399–411). New York: Guilford Press.