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A Comparison of Exposure Therapy, Stress Inoculation Training, and Their Combination for Reducing Posttraumatic Stress Disorder in Female Assault Victims

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Ninety-six female assault victims with chronic posttraumatic stress disorder (PTSD) were randomly assigned to 4 treatment conditions: prolonged exposure (PE), stress inoculation training (SIT), combined treatment (PE–SIT), or wait-list control (WL). Treatment consisted of 9 twice-weekly, individual sessions. Independent evaluations were conducted at pretreatment; posttreatment; and 3-, 6-, and 12-month follow-ups. All 3 active treatments reduced severity of PTSD and depression compared with WL but did not differ significantly from each other, and these gains were maintained throughout the follow-up period. However, in the intent-to-treat sample, PE was superior to SIT and PE–SIT on posttreatment anxiety and global social adjustment at follow-up and had larger effect sizes on PTSD severity, depression, and anxiety. SIT and PE–SIT did not differ significantly from each other on any outcome measure.

Among psychosocial therapies for posttraumatic stress disorder (PTSD), cognitive–behavioral treatments have been the most extensively and rigorously studied (cf. Foa & Meadows, 1997). These include primarily variants of exposure therapy and anxiety-management programs. In exposure therapy, clients relive memories of the traumatic event (i.e., imaginal exposure) and confront situations that are avoided because they trigger distressing memories and thoughts (i.e., in vivo exposure). In anxiety-management programs, clients are taught various coping strategies to manage trauma-related anxiety (i.e., relaxation training, thought stopping, cognitive restructuring, and positive self-statements). One such program, stress inoculation training (SIT; Meichenbaum, 1974), was adapted by Veronen and Kilpatrick (1983) for use with rape victims.

Several controlled studies have found exposure therapy effective in reducing symptoms of PTSD in combat veterans (e.g., Keane, Fairbank, Caddell, & Zimering, 1989) and survivors of childhood sexual abuse (e.g., Dancu, Foa, & Smucker, 1993) or other traumas (e.g., Marks, Lovell, Noshirvani, Livanou, & Thrasher, 1998). Controlled studies of anxiety-management programs such as SIT are fewer. In a quasi-experimental design, Resick, Jordan, Girelli, Hutter, and Marhoefer-Dvorak (1988) found that SIT, assertion training, and supportive therapy resulted in mild decreases in rape-related symptoms compared with a naturally occurring wait-list control (WL) group. Resick and Schnicke (1992) developed a treatment program that combined education, cognitive therapy, and exposure, called cognitive processing therapy (CPT), and compared it with a naturally occurring WL group. Clients who received CPT showed greater reduction in PTSD symptoms and depression than did controls.

Foa, Rothbaum, Riggs, and Murdock (1991) compared the efficacy of a modified version of SIT, prolonged exposure (PE), supportive counseling (SC), and WL for assault-related PTSD in female assault victims. An independent, blind evaluation revealed that clients in all conditions improved on measures of PTSD symptoms, anxiety, and depression. For PTSD symptoms only, SIT was more effective than SC and WL immediately after treatment. At 3-month follow-up, there was a tendency ($p < .07$) for clients in the PE group to show further improvement in PTSD symptoms compared with their posttreatment scores. Clients in SIT and SC did not show such further improvement. Foa et al. suggested that different mechanisms may operate in the two treatments: SIT may effect rapid but transient relief of anxiety symptoms through the use of anxiety-management skills, whereas PE may effect more permanent change through emotional processing of the traumatic event. If so, then a combination of these two treatment strategies would show superior outcome to either treatments alone. The present study was designed to address this question.

Female victims of sexual and nonsexual assault with chronic PTSD were treated in one of three conditions (SIT, PE, or PE–SIT) and were compared with a WL group. We hypothesized that (a) all

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active treatments would be superior to WL in reducing PTSD symptoms and (b) the combined treatment (PE–SIT) would be superior to PE alone and SIT alone in reducing overall PTSD severity.

Method

Participants

Participants were 96 women who met the criteria for PTSD based on the revised third edition of the *Diagnostic and Statistical Manual of Mental Disorders* (*DSM–III–R;* American Psychiatric Association, 1987) as their primary diagnosis. Sixty-nine were victims of sexual assault (i.e., rape or attempted rape), and 27 were victims of nonsexual assault (i.e., aggravated assault or assault with a weapon). The index assault occurred after age 16. Eligibility for the study was determined in the initial evaluation, which included the Structured Clinical Interview for *DSM–III–R* Disorders with Psychotic Screen (SCID; Spitzer, Williams, & Gibbon, 1987) and the PTSD Symptom Scale—Interview (PSS–I; Foa, Riggs, Dancu, & Rothbaum, 1993). Exclusion criteria were current schizophrenia, bipolar disorder, organic mental disorder, alcohol or drug dependence, severe suicidal ideation, or being in an ongoing intimate relationship with one's assailant. Women were not invited for initial evaluations if a telephone-screening interview revealed any exclusion criteria or insufficient symptom criteria for PTSD. Twenty-one women (19 victims of sexual assault and 2 victims of nonsexual assault) were diagnosed with PTSD during initial evaluations but did not enter treatment. Thirteen of these met one of the exclusion criteria (e.g., PTSD not the primary diagnosis [5], severe suicidal ideation [3], alcohol or drug dependence [2], bipolar disorder [1], organic brain disorder [1], and psychotic symptoms [1]). The remaining 8 signed consent forms but failed to start treatment for unknown reasons. These 21 women did not significantly differ from the 96 participants on PTSD severity.

Participants averaged 34.9 years in age (SD = 10.6). Sixty-three percent were Caucasian, and 36% were African American. Most were employed either full time (46%) or part time (16%). Ten percent did not complete high school, 18% had high school diplomas, and 41% had some college education. The remainder had earned bachelor's degrees or higher. Household income was $10,000 or less for one third of the participants and above $30,000 for 38%. Forty-eight percent reported at least one physical or sexual assault in adulthood prior to the index trauma for which they were seeking treatment, and 48% reported at least one incident of childhood physical or sexual abuse.

Measures

Interview Measures

SCID. Developed by Spitzer et al. (1987), the SCID is a semistructured interview designed to assess major Axis I disorders. In the present study, it was used to assess comorbid disorders and was administered only at pretreatment.

PSS–I. The PSS–I consists of 17 questions that correspond to the *DSM–III–R* PTSD symptoms, each rated on a 0–3-point scale for frequency and severity. Interrater reliability for both the diagnosis of PTSD (κ = .91) and overall severity ratings (r = .97) are excellent (Foa et al., 1993).

Social Adjustment Scale (SAS). The SAS (Weissman & Paykel, 1974) is a semistructured interview used to assess an individual's functioning in eight specific areas (e.g., work and social activities). Here we used only the Global scale, which is rated on a 7-point scale, with higher scores indicating more severe maladjustment.

Self-Report Measures

Beck Depression Inventory (BDI). The BDI (Beck, Ward, Mendelsohn, Mock, & Erbaugh, 1961) is a 21-item inventory measuring depression. Split-half reliability was .93. Correlations with clinician ratings of depression ranged from .62 to .66.

State–Trait Anxiety Inventory (STAI). The STAI (Spielberger, 1983) contains 20 items for state anxiety and 20 items for trait anxiety. The State subscale (STAI–S) was used for this study. Chaplin (1984) reported that test–retest reliability for the STAI–S ranged from .16 to .42. Internal consistency for the STAI–S ranged from .86 to .95.

Procedure

Evaluations

Potential participants were initially screened by phone and then evaluated in person. Those who met criteria for the study and signed consent forms were randomly assigned to one of the following four conditions: PE, SIT, combined treatment (PE–SIT), or WL. After enrolling 10 participants into WL, we assigned more participants to the three active groups than to WL.

Assessments were conducted at pretreatment, posttreatment, and 3, 6, and 12 months later. Independent evaluators were female clinicians with at least a master's degree who received extensive training in administration of the instruments and were unaware of treatment assignment. All measures except for the SCID were administered at each assessment point.

Treatment

Individual treatment was conducted by seven female PhD-level clinical psychologists. Therapists were trained to use manuals that specified precise treatment guidelines for each session and received ongoing supervision by Edna B. Foa and Constance V. Dancu. Treatment consisted of nine twice-weekly sessions: two sessions of 120 min followed by seven sessions of 90 min. Following a 5-week period, WL participants were offered treatment, but their treatment data were not included in the analyses. Below is a short description of the treatments. For a more detailed description, see Foa and Rothbaum (1998).

PE

Sessions 1 and 2 were devoted to information gathering, presentation of treatment rationale, construction of in vivo exposure hierarchy, and initiation of in vivo homework. Sessions 3 to 9 included homework review, imaginal exposure, and homework assignment. Imaginal exposure consisted of reliving the traumatic event in imagination and recounting the memory in the present tense. The assault memory was repeated if necessary to allow total reliving of 45–60 min. Imaginal exposure was tape-recorded, and participants were instructed to listen to the tapes daily at home. Additional homework included in vivo exposure to objectively safe situations that caused anxiety or that were avoided.

SIT

This treatment program was adapted from Veronen and Kilpatrick (1983). In order not to confound SIT with PE, we omitted explicit in vivo homework instructions. The first two sessions were devoted to information gathering, breathing retraining, presentation of rationale, and treatment planning. The remaining seven sessions focused on teaching coping skills to manage assault-related anxiety and postassault problems. These included deep muscle relaxation, cue-controlled and differential relaxation, thought stopping, cognitive restructuring, guided self-dialogue, covert modeling, and role-play. Homework assignments consisted of practicing the various coping skills. Participants were instructed to use these skills to manage assault-related anxieties and fears that they experienced in their daily activities.

Combination Treatment (PE–SIT)

The PE–SIT treatment followed the nine-session format and included education, training in all the SIT skills, in vivo exposure, and imaginal exposure. Each session was conducted in the following order: brief homework review, imaginal exposure for 30–45 min, training in one of the coping skills, and homework consisting of both exposure and coping skill practice.

WL

Participants were informed that they could receive treatment in 5 weeks and were encouraged to call at anytime if they were having problems. During this period, they were contacted by a therapist once between assessments to determine their current status.

Results

Preliminary Analyses

Participants in the four treatment conditions did not differ significantly in their demographics and pretreatment measures of psychopathology, but there was a trend toward group differences on employment status, $\chi^2(3, N = 96) = 6.46, p = .09$. Nineteen percent of PE participants were nonworking compared with 30% of SIT, 43% of PE–SIT, and 8% of WL participants. No pre- or posttreatment differences were detected between victims of sexual and nonsexual assault.

Seventeen participants dropped out of treatment, leaving 79 completers. Dropouts were 2 (8%) of 25 PE participants, 7 (27%) of 26 SIT participants, 8 (27%) of 30 PE–SIT participants, and 0 of 15 WL participants. The dropout rate differed significantly across groups, $\chi^2(3, N = 96) = 10.62, p < .025$. More participants dropped out from SIT and PE–SIT (27%) than from the PE and WL conditions (5%), $\chi^2(1, N = 96) = 8.67, p < .01$. There were no significant differences between dropouts and completers on any of the pretreatment measures of psychopathology. A significant difference on one demographic variable emerged: nonworking participants (30%) were more likely to drop out than participants who were working full or part time (10%), $\chi^2(1, N = 96) = 5.82$, $p < .025$.

Possible therapist effects were examined in a two-way (Therapist [4] × Condition [3]) analysis of covariance (ANCOVA) on the PSS–I, adjusting for pretreatment severity. Four therapists had each treated 5 or fewer participants. They were combined for these analyses and compared with the remaining three therapists. No significant main effects or an interaction were detected. Therapists also did not differ in dropout rate, $\chi^2(3, N = 81) = 4.48, p = .21$.

Treatment Adherence

Videotapes of 63 therapy sessions (9% of the 702 sessions) were randomly selected and rated. The adherence manual listed 52 treatment components that were present in any of the three protocols. Raters were familiar with the treatment programs but had not treated any participants in this study. They reviewed videotapes and rated each component as present or absent, without regard to treatment condition. On average, therapists completed 93% (SD = 12%) of the components prescribed for a given session in the corresponding protocol (PE, SIT, or PE–SIT). Only one deviation from the protocol was detected: 1 participant in the SIT protocol was instructed in the use of the Subjective Units of Distress scale, a component prescribed in the PE and PE–SIT protocols. However, because this was not followed by exposure, this deviation was considered insignificant.

Immediate Effects of Treatment

Comparison of Group Means

We conducted one- and two-way multivariate analyses of covariance (MANCOVAs) and ANCOVAs on the intent-to-treat sample using a last-value-carried-forward procedure to impute missing data due to dropout. The intent-to-treat analyses were followed by completer analyses. Means and standard deviations for each of the four dependent measures (PSS–I, BDI, STAI–S, and SAS) for the completer sample are presented in Table 1.

To test the first hypothesis, that all three active treatments would yield superior outcome to that of the WL group, we conducted a one-way MANCOVA using scores of the PSS–I, the BDI, and the STAI–S as outcome measures and controlling for pretreatment symptom severity. For the intent-to-treat sample, a significant main effect was detected (Wilks's $\Lambda = .79$), estimated $F(9, 207.02) = 2.29, p < .05$. Follow-up ANCOVAs also detected significant main effects on each measure: for PSS–I, $F(3, 91) = 4.16$; for STAI–S, $F(3, 90) = 5.39$; and for BDI, $F(3, 90) = 5.57$ ($ps < .01$). Simple comparisons revealed that PE participants scored lower than WL participants on all three measures (for PSS–I, $t[38] = 3.53$; for STAI–S, $t[37] = 3.76$; for BDI, $t[37] = 4.03$; $ps < .001$), whereas SIT and PE–SIT participants scored lower than WL participants on the PSS–I ($t[39] = 2.22$ and $t[43] = 2.23$, respectively; $ps < .05$) and on the BDI ($t[39] = 2.63$ and $t[43] = 2.16$, respectively; $ps < .05$). A trend was found for SIT and PE–SIT to be superior to WL on the STAI–S: $t(38) = 1.63$, $p = .11$, and $t(42) = 1.50$, $p = .14$.

For the completer sample, the overall MANCOVA also detected a significant main effect for treatment (Wilks's $\Lambda = .62$), estimated $F(9, 163.21) = 3.93, p < .001$. Follow-up ANCOVAs detected significant main effects on each measure: for PSS–I, $F(3, 74) = 10.81, p < .001$; for STAI–S, $F(3, 72) = 6.02, p = .001$; and for BDI, $F(3, 72) = 8.61, p < .001$. Simple comparisons indicated that completers in all three active treatments scored significantly lower than WL completers on all three outcome measures (for PSS–I and BDI, $ps < .001$); for STAI–S, PE, $t(35) = 4.25, p < .001$; SIT, $t(31) = 2.62, p < .025$; and PE–SIT, $t(33) = 2.24, p < .05$.

To test the second hypothesis, that PE–SIT would be superior to the PE and SIT conditions, we conducted planned comparisons between the three active treatments. The results did not support the hypothesis. In the intent-to-treat analyses, participants in SIT and PE–SIT did not differ from one another, whereas PE participants scored significantly lower than SIT and PE–SIT participants on the STAI–S ($t[49] = 2.52, p < .025$, and $t[53] = 2.81, p < .01$, respectively) and significantly lower than PE–SIT participants on the BDI, $t(52) = 2.63, p < .025$. PE participants also showed trends toward lower scores on the PSS–I than both SIT and PE–SIT participants ($t[49] = 1.49, p = .14$, and $t[53] = 1.60, p = .11$, respectively) and toward lower scores on the BDI than SIT participants, $t(48) = 1.92, p = .06$. In the completer analyses, the only significant difference between the three active treatments was

Table 1
Mean Psychopathology Scores and Standard Deviations of Treatment Completers by Condition and Assessment Point

	Preassessment			Postassessment			3-month follow-up			6-month follow-up			12-month follow-up		
Condition	*n*	*M*	*SD*	*n*	*M*	*SD*	*n*	*M*	*SD*	*n*	*M*	*SD*	*n*	*M*	*SD*
							Posttraumatic Stress Disorder Symptom Scale—Interview								
PE	23	29.48	9.94	23	11.70	7.32	19	11.84	9.01	19	11.16	7.38	16	10.69	8.96
SIT	19	29.42	8.69	19	12.89	8.96	16	15.06	13.33	17	11.24	11.86	14	12.64	14.71
PE–SIT	22	29.95	6.97	22	13.55	9.35	20	11.45	9.03	18	13.17	10.98	16	12.56	12.25
WL	15	32.93	5.89	15	26.93	8.47									
							Beck Depression Inventory								
PE	23	17.58	11.29	23	5.75	4.77	19	8.02	6.77	19	6.85	5.61	15	6.15	7.73
SIT	19	21.73	11.02	19	10.05	8.06	16	14.58	12.16	17	13.54	12.51	12	11.92	14.48
PE–SIT	21	21.36	10.51	21	10.49	9.90	20	13.65	10.53	17	10.00	9.46	13	11.88	9.92
WL	15	25.21	11.20	14	22.10	14.97									
							State–Trait Anxiety Inventory—State subscale								
PE	23	49.95	13.70	23	32.43	10.93	19	37.16	11.80	19	34.95	11.45	15	34.84	12.43
SIT	19	51.50	13.37	19	39.07	11.55	16	41.26	14.02	17	43.33	17.01	13	42.46	16.98
PE–SIT	21	50.66	15.37	21	40.55	15.41	20	43.74	15.27	17	41.12	14.77	13	38.75	13.29
WL	14	51.44	12.60	15	50.40	13.80									
							Social Adjustment Scale—Global								
PE	22	3.73	0.83	22	2.45	0.60	19	2.58	0.69	18	2.33	0.84	16	2.69	0.87
SIT	19	3.79	1.23	19	2.68	1.00	16	3.00	1.37	18	2.83	1.10	14	3.00	1.30
PE–SIT	22	4.00	1.11	22	2.95	1.33	19	3.37	1.46	18	2.94	1.55	16	3.13	2.03
WL	15	3.93	1.16	15	3.73	1.10									

Note. WL was not assessed at 3-, 6-, and 12-month follow-ups. PE = prolonged exposure; SIT = stress inoculation training; WL = wait-list control.

that PE participants scored lower than PE–SIT participants on the STAI–S, $t(42) = 2.19$, $p < .05$.

End-State Functioning

Good end-state functioning was defined as being at or below a specific score on all three outcome measures. For the PSS–I, a cutoff of 20 was used, as suggested in the manual for the self-report version of the PSS–I (Foa, 1995). For the STAI–S, a cutoff of 40 was used, a score close to the mean of four normative female samples (Spielberger, 1983). The commonly used cutoff of 10 was adopted for the BDI (Kendall, Hollon, Beck, Hammen, & Ingram, 1987). Using these criteria in the intent-to-treat sample, we found that 52% of participants in the PE condition, 31% in the SIT condition, and 27% in the PE–SIT condition achieved good end-state functioning. These percentages were significantly higher than the 0% in the WL condition, $\chi^2(3, N = 96) = 16.11$, $p < .001$. There was also a trend toward differences among the active treatments, $\chi^2(2, N = 81) = 4.16$, $p = .13$. The percentage of PE participants who achieved good end-state functioning tended to be larger than the percentage for those in SIT and PE–SIT, $\chi^2(1, N = 51) = 2.39$, $p = .12$, and $\chi^2(1, N = 55) = 3.73$, $p = .05$, respectively.

Completer analyses produced a similar pattern. Fifty-seven percent of completers in the PE condition, 42% in the SIT condition, and 36% in the PE–SIT condition achieved good end-state functioning as compared with 0% of the WL completers. The active treatments were again significantly different from WL, $\chi^2(3, N = 79)$, $p < .001$, but the trend toward differences among active treatments disappeared, $\chi^2(2, N = 64) = 1.96$, $p = .37$.

Diagnostic Status

The diagnostic status of participants after treatment provides another measure of end-state functioning. In the intent-to-treat analyses, 60% of participants in PE, 42% in SIT, and 40% in PE–SIT lost their PTSD diagnosis, whereas none of the WL participants did so, $\chi^2(3, N = 96) = 19.43$, $p < .001$. The three active-treatment conditions were not significantly different from each other, $\chi^2(2, N = 81) = 2.52$, $p = .28$. When only treatment completers were examined, 65% of participants in PE, 58% in SIT, and 54% in PE–SIT lost their PTSD diagnosis. This was also significantly higher than for WL participants (0%), $\chi^2(3, N = 79) = 23.50$, $p < .001$. The active treatments again did not differ from each other, $\chi^2(2, N = 64) = 0.56$, $p = .76$.

Effect Size

Cohen's *d* statistics were calculated to compare each of the three treatment conditions with the WL condition at posttreatment. The effect sizes for PE in the intent-to-treat sample were 1.46 for the PSS–I, 1.42 for the BDI, and 1.32 for the STAI–S; for the completer sample, the effect sizes were 1.92, 1.47, and 1.44, respectively. In SIT, the effect sizes for the intent-to-treat sample

were 0.85 for the PSS–I, 0.73 for the BDI, and 0.37 for the STAI–S; in the completer sample, effect sizes were 1.61, 1.00, and 0.89, respectively. For PE–SIT, the effect sizes in the intent-to-treat sample were 0.82 for the PSS–I, 0.57 for the BDI, and 0.45 for the STAI–S; in the completer sample, the effect sizes were 1.50, 0.91, and 0.67, respectively. Thus, the effect sizes for the PE condition were the largest on all three outcome measures in both samples.

2 × 2 Analyses

To evaluate the separate effects of PE and SIT, we conducted a series of 2 × 2 analyses on the posttreatment scores, comparing (a) participants who received PE (PE and PE–SIT) versus those who did not (SIT and WL) and (b) participants who received SIT (SIT and PE–SIT) versus those who did not (PE and WL).

First, we conducted a 2 × 2 MANCOVA using PTSD, BDI, and STAI–S scores as dependent variables. A main effect for PE participation was detected in the intent-to-treat analysis (Wilks's $\Lambda = .89$), $F(3, 86) = 3.38$, $p < .025$, as well as a significant PE × SIT interaction (Wilks's $\Lambda = .85$), $F(3, 85) = 4.84$, $p < .01$. No effect for SIT participation was detected (Wilks's $\Lambda = .99$), $F(3, 85) = 0.26$, $p = .853$. Subsequent ANCOVAs showed similar results on all three outcome measures. Participants receiving PE had significantly lower scores on all three measures than those who did not receive PE: for PSS–I, $F(1, 91) = 7.30$; for STAI–S, $F(1, 90) = 7.82$; and for BDI, $F(1, 90) = 7.64$ ($ps < .01$). Participants who received SIT did not differ from those who did not receive SIT: $F(1, 91) = 0.41$, $F(1, 90) = 0.29$, and $F(1, 90) = 0.20$, respectively, $ps > .05$. Significant interactions between PE and SIT were detected on all measures: for PSS–I, $F(1, 91) = 7.67$, $p < .01$; for STAI–S, $F(1, 90) = 9.39$, $p < .01$; and for BDI, $F(1, 90) = 12.54$, $p = .001$. Simple comparisons revealed that PE participants scored significantly lower than WL participants on all three outcome measures: for PSS–I, $F(1, 37) = 13.32$; for STAI–S, $F(1, 36) = 14.27$; and for BDI, $F(1, 36) = 17.30$ ($ps < .001$). SIT participants scored significantly lower than WL participants on the PSS–I, $F(1, 38) = 4.19$, $p < .05$, and on the BDI, $F(1, 38) = 5.79$, $p < .05$. PE–SIT participants scored significantly lower than WL participants only on the PSS–I, $F(1, 42) = 4.30$, $p < .05$. PE participants also scored significantly lower than SIT and PE–SIT participants on both the STAI–S ($F[1, 48] = 5.96$, $p < .025$, and $F[1, 52] = 8.42$, $p < .01$, respectively) and the BDI ($F[1, 47] = 4.19$, $p < .05$, and $F[1, 51] = 6.81$, $p < .025$, respectively). Active treatments did not differ significantly on the PSS–I: for PE versus SIT, $F(1, 48) = 2.43$; for PE versus PE–SIT, $F(1, 52) = 2.82$; and for SIT versus PE–SIT, $F(1, 53) = 0.00$ ($ps > .05$).

Somewhat different results emerged for the completer sample. The MANCOVA again detected both a main effect for PE participation (Wilks's $\Lambda = .81$), $F(3, 67) = 5.29$, $p < .01$, and a significant PE × SIT interaction (Wilks's $\Lambda = .75$), $F(3, 67) = 7.54$, $p < .001$. However, the main effect for SIT participation was also significant (Wilks's $\Lambda = .87$), $F(3, 67) = 3.42$, $p < .05$. Subsequent ANCOVAs revealed that on all three measures, the main effects for PE were significant (for PSS–I, $F[1, 74] = 13.89$, $p < .001$; for STAI–S, $F[1, 72] = 7.58$, $p < .01$; for BDI, $F[1, 72] = 11.17$, $p = .001$) as were the PE × SIT interactions (for PSS–I, $F[1, 74] = 15.57$, $p < .001$; for STAI–S, $F[1, 72] = 11.63$, $p = .001$; for BDI, $F[1, 72] = 14.94$, $p < .001$). The main effect for SIT was significant for the PSS–I and the BDI ($F[1, 74] = 9.24$, $p < .01$, and $F[1, 72] = 5.05$, $p < .05$, respectively) but not for the STAI–S, $F(1, 72) = 0.33$, $p = .567$.

Simple comparisons revealed that completers in all three treatment conditions had significantly lower posttreatment scores than WL completers on all three outcome measures (for PSS–I, $ps < .001$; for STAI–S, $ps = .05$; for BDI, $ps < .01$). The only difference between active treatments was that PE completers scored significantly lower than PE–SIT completers on the STAI–S, $F(1, 41) = 4.84$, $p < .05$.

Follow-Up Analyses

To assess long-term effects, we conducted repeated measures analyses on the PSS–I, BDI, and STAI–S scores at posttreatment and at 3-, 6-, and 12-month follow-up. Only the 64 active-treatment completers were included in these analyses. Four of these completers did not have any follow-up data, 56 had data for the 3-month follow-up, 54 had data for the 6-month follow-up, and 46 had data for the 12-month follow-up. Of the latter group, 16 were in PE, 14 in SIT, and 16 in PE–SIT. Missing data were estimated either with the mean of the scores at the assessment points preceding and following the missing assessment or with the last observation carried forward. One-way ANOVAs revealed no differences between those who completed the final assessment and those who did not.

Comparison of Group Means

Separate 4 × 3 mixed ANCOVAs, with occasion and condition as independent variables, detected a main effect for condition on the STAI–S, $F(2, 60) = 3.34$, $p < .05$, but not on the PSS–I or the BDI: $F(2, 60) = 0.26$, $p = .77$, and $F(2, 60) = 2.05$, $p = .14$, respectively. Simple effects analyses revealed that PE completers scored significantly lower on the STAI–S than did SIT and PE–SIT completers: $F(1, 39) = 5.98$, $p < .025$, and $F(1, 42) = 5.06$, $p < .05$, respectively. No difference emerged between SIT and PE–SIT conditions, $F(1, 38) = .01$, $p = .91$. No main effects of occasion and no Condition × Occasion interactions were detected on any of the measures. Figure 1 depicts mean PSS–I, BDI, and STAI–S scores for the three treatment groups at each assessment point.

End-State Functioning

Of the 64 participants in active treatment, 52% in PE, 42% in SIT, and 36% in PE–SIT achieved good end-state functioning 1 year after treatment. The difference was not significant, $\chi^2(2, N = 64) = 1.17$, $p = .56$. The percentage of treatment completers who no longer met diagnostic criteria for PTSD 1 year after treatment was 65% for PE, 68% for SIT, and 68% for PE–SIT. These were also not significant, $\chi^2(2, N = 64) = 0.06$, $p = .97$.

Effects of Treatment on General Social Functioning

To examine the effect of treatment on general functioning, we calculated the means and standard deviations of the global functioning scores on the SAS. An ANCOVA on the posttreatment scores of the intent-to-treat sample detected a significant effect for treatment, $F(3, 90) = 3.53$, $p < .05$. Simple comparison tests revealed that the PE participants had significantly lower scores (i.e., greater social adjust-

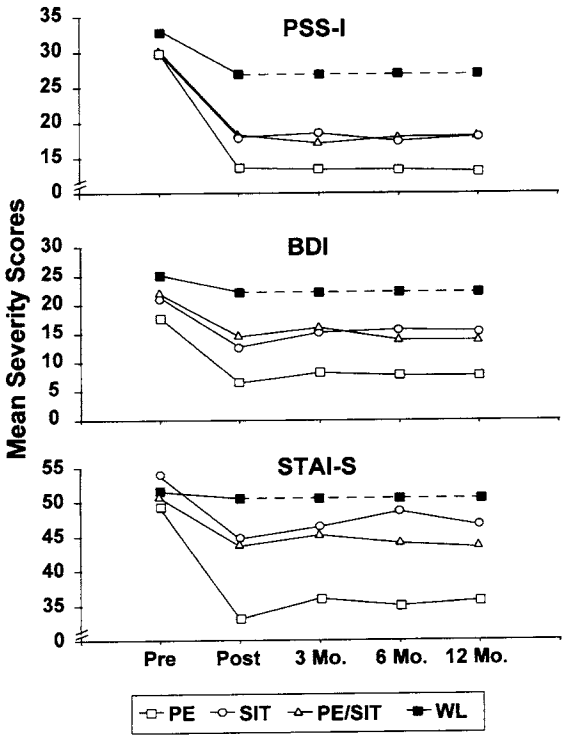

Figure 1. Mean PSS–I, BDI, and STAI–S scores at each assessment point for the four conditions (intent-to-treat sample, last value carried forward). Dashed lines indicate absence of follow-up data for WL participants. PSS–I = Posttraumatic Stress Disorder Symptom Scale—Interview; BDI = Beck Depression Inventory; STAI–S State–Trait Anxiety Inventory—State subscale; Pre = preassessment; Post = postassessment; Mo. = months; PE = prolonged exposure; SIT = stress inoculation training; WL = wait-list control.

ment) than the WL participants, $t(37) = 3.22$, $p < .01$. SIT and PE–SIT participants showed trends toward lower scores as compared with WL participants: $t(39) = 1.80$, $p = .08$, and $t(45) = 1.71$, $p = .09$, respectively. The three active treatments did not differ from one another, $F(2, 76) = 2.04$, $p = .14$.

A similar pattern was detected for the completer sample. A significant effect for condition was detected, $F(3, 73) = 5.15$, $p < .01$, with PE participants scoring significantly lower than WL participants, $t(37) = 2.50$, $p < .05$. No differences were detected between SIT and WL, $t(34) = 1.30$, $p = .20$; between PE–SIT and WL, $t(37) = .33$, $p = .74$; or between the three active treatments, $F(2, 59) = 0.96$, $p = .39$.

Analysis of the follow-up data for the intent-to-treat sample indicated a significant effect for condition, $F(2, 77) = 3.53$, $p < .01$, but not for occasion, $F(3, 234) = 0.77$, $p = .51$, or for the interaction, $F(6, 234) = 0.25$, $p = .96$. Simple effect analyses revealed that PE participants scored significantly lower than both SIT, $F(1, 48) = 5.74$, $p < .05$, and PE–SIT participants, $F(1, 51) = 6.15$, $p < .05$, but there was no difference between SIT and PE–SIT participants, $F(1, 54) = .05$, $p = .83$.

Discussion

The results of the present study support the first hypothesis that PE, SIT, and PE–SIT were superior to WL in ameliorating PTSD severity. In addition, a larger number of participants in active treatment lost their PTSD diagnosis and reached clinically improved end-state functioning compared with WL participants. These results are congruent with Foa et al.'s (1991) findings about the greater efficacy of PE and SIT compared with WL in ameliorating chronic PTSD in female assault victims. All three treatments also reduced depression symptoms and, in completers, anxiety symptoms. PE was the only treatment that significantly reduced anxiety symptoms in the intent-to-treat sample. The immediate effects of treatment were maintained at the 12-month follow-up in all three active treatments.

Our hypothesis that the PE–SIT treatment would be superior to PE alone and to SIT alone in reducing PTSD and related symptoms was not supported. Contrary to our expectations, when differences between treatments reached significance, PE was consistently superior. In the intent-to-treat sample, PE was superior to SIT and PE–SIT on four of seven indexes of treatment outcome: It had fewer dropouts; larger effect sizes on the PSS–I, the BDI, and the STAI–S; lower anxiety; and, at follow-up, greater social adjustment. On depression, PE participants scored lower than PE–SIT participants and tended to score lower than SIT participants. Furthermore, treatments that included exposure (PE and PE–SIT) yielded significantly superior outcome compared with treatments that did not include exposure. No differences emerged between treatments that included SIT and those that did not. A similar pattern was found for the completer sample, but PE emerged as superior on two of the seven outcome indexes: PE produced lower anxiety than PE–SIT at posttreatment and larger effect sizes than both SIT and PE–SIT on the PSS–I, the BDI, and the STAI–S.

The findings suggesting PE superiority may have been due to the significantly lower dropout rate in that condition. PE had only 2 dropouts, whereas SIT had 7 and PE–SIT had 8. The dropout rate of 8% found in the PE condition is lower than the rate found in our previous study (Foa et al., 1991). One possible explanation for the differential dropout rate is the relatively lower number of nonworking participants in the PE group.

Several factors may be responsible for the unexpected lack of superiority of the combined treatment. First, because session length was kept constant across treatment conditions, several procedures were packed into the PE–SIT sessions, perhaps leading to information overload for the participants. Second, homework assignments in the PE–SIT treatment were double those given in the single-component treatments (PE and SIT). Thus, participants may not have had sufficient opportunity to practice each of the procedures included in the program, although review of homework compliance was not systematic enough to permit statistical analysis of group differences. An adequate test of the efficacy of a combined treatment may entail allotting more therapy time for such a program.

A similar pattern of results was reported by Marks et al. (1998), who compared exposure, cognitive restructuring, their combination, and a relaxation control condition. Although the posttreatment means do not indicate differences among the three active treatments, exposure seems to have yielded superior outcome at follow-up on all measures. Moreover, similar to our findings, exposure yielded the greatest number of participants achieving good end-state functioning (53% for exposure, 32% for cognitive restructuring, 32% for their combination, and 15% for relaxation), although these differences failed to reach significance.

As noted earlier, the SIT program used in the present study and in the Foa et al. (1991) study was modified from the version adapted by Veronen and Kilpatrick (1983). To minimize the confound between SIT and PE, we omitted homework instructions to confront feared and avoided rape-related situations. Instead, we instructed participants to use the SIT skills to manage assault-related fear and anxiety in their day-to-day lives. Perhaps this omission decreased the efficacy of SIT.

Two other aspects of the study should be borne in mind in interpreting the results. We did not conduct assessments during the active-treatment phase and therefore do not have information on the status of dropouts at the time of termination. It is possible that some participants dropped out because they were doing well and were not motivated to complete the treatment. Because more participants dropped out from SIT and PE–SIT than from PE, this could have resulted in underestimating the efficacy of the former treatments. Second, we did not evaluate interrater reliability systematically for the PSS–I, the SAS, and the SCID throughout the 5 years of this study, allowing for the possibility of rater drift. However, participants from the first 3 years of this study were all included in a psychometric study that demonstrated high reliability of the PSS–I (Foa et al., 1993).

In selecting a treatment for a given disorder, a prime consideration is its efficacy in ameliorating the severity of the targeted disorder (e.g., PTSD). Some experts (e.g., Jacobson, Follette, & Revenstorf, 1984) have suggested that the evaluation of treatment efficacy should involve a broader spectrum of symptoms. On this index, PE was superior to SIT and PE–SIT in reducing anxiety and superior to PE–SIT in reducing depression. Yet another consideration is the ease of disseminating the treatment among nonexpert clinicians. SIT consists of multiple components, all of which must be effectively taught by the therapist and learned by the participant. PE is less complex and thus may be more readily accessible to clinicians outside of specialized settings.

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