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Imaginal Exposure Alone and Imaginal Exposure With Cognitive Restructuring in Treatment of Posttraumatic Stress Disorder

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This study investigated the extent to which providing cognitive restructuring (CR) with prolonged imaginal exposure (IE) would lead to greater symptom reduction than providing IE alone for participants with posttraumatic stress disorder (PTSD). Fifty-eight civilian survivors of trauma with PTSD were randomly allocated to IE/CR, IE, or supportive counseling (SC). Treatment involved 8 individual weekly sessions with considerable homework. Independent assessments were conducted pretreatment, posttreatment, and at 6-month follow-up. IE/CR and IE resulted in reduced PTSD and depression compared with SC at posttreatment and follow-up. Further, IE/CR participants had greater reductions in PTSD and maladaptive cognitive styles than IE participants at follow-up. These findings suggest that providing CR in combination with IE may enhance treatment gains.

Although there is strong evidence that cognitive–behavior therapy (CBT) is the most effective treatment for posttraumatic stress disorder (PTSD; see Bryant, 2000; Foa, 2000; Foa & Meadows, 1997), the specific therapeutic contributions of components of CBT are not fully understood. Across studies, there is strongest evidence for the effectiveness of prolonged exposure (PE) and cognitive restructuring (CR) in reducing PTSD symptoms (Foa, Dancu, et al., 1999; Foa, Rothbaum, Riggs, & Murdock, 1991; Resick, Nishith, Weaver, Astin, & Feuer, 2002). There is debate, however, concerning the relative contributions of PE and CR to treatment gains in CBT of PTSD (Marks, 2000). Exposure is based on the premise that imaginal exposure (IE) to the feared stimulus (e.g., traumatic memories or feared situations) leads to symptom reduction because prolonged activation of the traumatic memories leads to emotional processing of the affective information, habituation of anxiety, and integration of corrective information (Foa & Hearst-Ikeda, 1996). CR is based on the notion that identifying and modifying catastrophic and unrealistic interpretations of one's traumatic experience and future well-being lead to symptom reduction because the resulting cognitive schema will not result in psychopathological states. Recent models have emphasized the importance of correcting cognitive distortions in the adaptive recovery of people following trauma (Ehlers & Clark, 2000). Accordingly, it is standard practice for many treatment protocols to include CR to supplement PE (e.g., Resick & Schnicke, 1992).

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Recent attention has focused on the relative benefits of PE and CR. Marks, Lovell, Noshirvani, Livanou, and Thrasher (1998) found that PE alone, CR alone, and these interventions combined resulted in equivalent PTSD symptom reduction. Similarly, Tarrier et al. (1999) found that IE and CR resulted in equivalent outcomes. Resick et al. (2002) have found that cognitive processing therapy (which is a variant of PE combined with CR) and PE alone have resulted in comparable gains. In a study in progress, Foa and colleagues have found that IE alone is more effective than combining PE with CR (cited in Foa, 2000). Overall, these findings suggest that whereas CR and PE are effective, they do not augment therapeutic gains when they are combined.

The apparent failure of combined PE and CR to enhance therapy outcomes relative to their independent contributions requires further investigation. It has been suggested that combined treatments may not be advantageous because they are excessively demanding on participants' resources (Foa, 2000) or that previous studies have provided less of the active treatment components in the combined treatments because of time restraints (Marks et al., 1998). This study aimed to further investigate the potential benefits of providing CR in association with IE to participants with PTSD. We compared IE, IE combined with CR, and supportive counseling (SC). We used SC to discriminate between the effects of the active treatments from the nonspecific therapeutic gains of therapy attention. We used IE and did not include in vivo exposure because the latter often involves coping mechanisms (e.g., self-talk) that may be confounded with CR. In this sense, this study is closer to Tarrier et al. (1999) than Marks et al. (1998) or Foa, Dancu, et al. (1999) because it provided IE. Although previous studies have found that combined therapies do not provide additive therapeutic gains, we suggest that these results may have occurred as a result of the previously described methodological problems in those studies. On the basis that both IE and CR have demonstrated efficacy in reducing PTSD symptoms, we hypothesized that CR combined with exposure would result in greater PTSD symptom reduction than exposure alone, which in turn would have greater benefits than SC.

Method

Participants

Participants were 58 consecutive civilian trauma survivors (30 women, 28 men) who were referred to the Westmead Hospital (Sydney, Australia) PTSD Unit following nonsexual assault ($n = 31$) or a motor vehicle accident ($n = 27$) and displayed PTSD, based on the criteria defined by the fourth edition of the *Diagnostic and Statistical Manual of Mental Disorders* (*DSM–IV*; American Psychiatric Association, 1994), of at least 3 months duration. Exclusion criteria included history of psychosis, organic brain syndrome, or substance dependence, current suicidal ideation, history of childhood sexual abuse, or age of less than 17 or more than 60 years. Participants were initially screened by telephone, and full assessments were conducted only on participants who did not report any exclusion criteria on telephone screening. There were 85 participants assessed, and 27 were excluded because they declined therapy ($n = 11$), were markedly suicidal ($n = 7$), or indicated substance dependence ($n = 9$).

Assessments

Diagnostic status was determined using the Clinician Administered PTSD Scale (2nd ed.; CAPS-2; Blake et al., 1995). The CAPS-2 is a structured clinical interview that indexes the 17 symptoms described by the *DSM–IV* PTSD criteria. Each symptom is rated on a 5-point scale in terms of the severity and frequency of the symptom in the past week. To obtain an estimate of verbal intelligence, we also administered participants the National Adult Reading Test (Nelson, 1982). Additional psychopathology measures included the Beck Depression Inventory (2nd ed.; BDI-2; Beck, Steer, & Brown, 1996), the Impact of Event Scale (IES; Horowitz, Wilner, & Alvarez, 1979), and the State–Trait Anxiety Inventory (State subscale; STAI-S; Spielberger, Gorsuch, Lushene, Vagg, & Jacobs, 1983). To specifically index changes in cognitive processes, we also administered the Catastrophic Cognitions Questionnaire (CCQ; Khawaja & Oei, 1992). The CCQ is a 21-item self-report measure that indexes catastrophic thinking about emotional reactions, somatic sensations, and mental processes. It possesses sound concurrent validity with the Agoraphobic Cognitions Questionnaire and Body Sensations Questionnaire (Chambless, Caputo, Bright, & Gallagher, 1984) and strong internal consistency and test–retest reliability (Khawaja, Oei, & Baglioni, 1994). At the completion of Session 1, and after the rationale had been explained, participants rated their confidence in the treatment (from 1 = *not at all confident* to 10 = *extremely confident*) and the logic of the treatment (from 1 = *not at all logical* to 10 = *extremely logical*).

Initial assessments were conducted at pretreatment, posttreatment, and 6-month follow-up by independent clinicians who were unaware of the treatment condition of participants. Blindness was maintained by ensuring that clinicians who conducted assessments did not have access to (a) participant notes, (b) treatment allocation of participants, or (c) supervision discussions of therapy sessions. All measures were administered at each assessment with the exception of therapy confidence and logic ratings.

Treatments

Participants were informed that they would be randomly allocated to one of three treatments. Randomization was conducted by a process of minimization stratified on gender, trauma type, and PTSD total score. Participants were randomly assigned according to a random numbers system, and each month Richard A. Bryant amended the allocation to ensure that gender, trauma type, and PTSD severity were balanced across conditions. Participants receiving SC were offered an active treatment program at follow-up if they still displayed PTSD symptoms. Individual therapy was conducted by one of four master's-level clinical psychologists, who were trained to use treatment manuals and who received weekly supervision from Richard A. Bryant. Treatment comprised 8 once-weekly 90-min sessions with structured daily homework activities.

IE

Session 1 focused on psychoeducation, the rationale of exposure, and obtaining a narrative of the traumatic memory. Sessions 2 to 7 focused on IE to traumatic memories. Participants were instructed to provide a narrative of their trauma that involved reciting the experience in the first person and present tense, with explicit instructions to focus on the full range of sensory and affective responses to the trauma. This exercise occurred for 45 min each session, and the narrative was repeated if necessary to ensure that exposure occurred for 45 min. IE was not audiotaped, but participants were given explicit instructions to rehearse the exercise on a daily basis between sessions. Monitoring forms for IE were completed during the session and for daily homework. Monitoring forms were used to ensure homework completion. Each session included 25 min of SC at the end of the session to ensure that equivalent time within sessions for the IE and IE/CR groups was devoted to exposure. Session 8 focused on relapse prevention strategies that used exposure-based strategies. CR was explicitly not provided in any of these sessions.

IE/CR

Session 1 was devoted to psychoeducation and education about cognitive restructuring. We adopted the position that it was important for participants to learn CR before commencing exposure so that they were fully aware of the principles and techniques of cognitive monitoring and challenging before experiencing the distress and associated thoughts elicited by exposure. Participants were taught to identify dysfunctional, unrealistic, and catastrophic thoughts about their traumatic experience, themselves, and their future well-being (Bryant & Harvey, 2000). Twenty-five minutes were devoted to CR in each session. Participants were instructed in daily monitoring of thoughts and affective states and to modify thoughts by Socratic questioning, probabilistic reasoning, and evidence-based thinking. Participants were subsequently taught to identify and modify underlying beliefs about themselves and their world (Beck, Emery, & Greenberg, 1985). IE was commenced in Session 2 and was continued as described above for Sessions 2–7. The final session addressed relapse prevention strategies that involved both IE and CR strategies.

SC

The SC program comprised education about trauma and general problem-solving skills and provided an unconditionally supportive role. Homework comprised diary keeping of current problems and mood states. SC specifically avoided IE or CR techniques.

Treatment Fidelity

Audiotapes of 30 therapy sessions (8% of the 360 therapy sessions) were randomly selected and rated by three experts in CBT who were independent of this study (M. Creamer, G. Devilly, J. Mastrodomenico). Raters listened to audiotapes and rated the presence or absence of each of 32 treatment components, without regard to treatment condition or treatment session. Further, raters indicated the quality of each component on the therapy provided on a 7-point scale (from 0 = *unacceptable* to 6 = *very good*). No IE session included CR. No SC included IE or CR. The mean quality ratings for treatment components in IE and IE/CR was 5.9 ($SD = 1.54$)

Results

Preliminary Analyses

Fifty-eight participants entered the study and 45 completed treatment. Table 1 presents the mean participant characteristics of those who commenced treatment. Planned comparisons of treat-

Table 1
Participant Characteristics

Characteristic	Imaginal exposure *M* (*SD*)	Imaginal exposure and cognitive restructuring *M* (*SD*)	Supportive counseling *M* (*SD*)	*F* (2, 57)
Age, years	37.05 (12.31)	32.35 (10.28)	36.28 (8.41)	1.13
Time since trauma, months	8.13 (6.65)	10.22 (11.39)	9.83 (7.73)	0.30
NART	26.00 (8.25)	25.89 (11.41)	30.56 (11.44)	0.56
Years of education	10.21 (1.69)	10.10 (1.65)	10.33 (1.75)	0.09
Logic rating	8.93 (1.27)	8.65 (0.93)	8.29 (1.44)	0.99
Confidence rating	7.07 (1.86)	7.13 (1.86)	7.71 (2.16)	0.42

Note. NART = National Adult Reading Test.

ment completers and treatment dropouts indicated that those who dropped out of treatment had higher scores on the BDI-2, IES-Avoidance scale, and CCQ than did those who completed treatment. One-way analyses of variance (ANOVAs) of participants' demographic characteristics and pretreatment psychopathology measures indicated no differences between treatment groups.

Immediate Treatment Effects

Table 2 and Table 3 present the mean psychopathology scores for the intent-to-treat and treatment completer samples, respectively. Intent-to-treat values were devised by using a last-value-carried-forward procedure to provide data for missing values that occurred because of dropout. To control for the multiple dependent variables used in this study, we conducted overall multivariate analyses of covariance (MANCOVAs) on CAPS-2 Intensity, CAPS-2 Frequency, IES-Intrusions, IES-Avoidance, STAI, BDI-2, and CCQ scores for (a) posttreatment and (b) follow-up data that controlled for initial symptom severity and trauma type. Significant overall MANCOVAs were followed by analyses of covariance (ANCOVAs) of each measure and subsequent post hoc Tukey's comparisons.

Table 2
Psychopathology Measures for Intent-to-Treat Analyses

Variable	Imaginal exposure (n = 20) *M* (*SD*)	Imaginal exposure and cognitive restructuring (n = 20) *M* (*SD*)	Supportive counseling (n = 18) *M* (*SD*)
Pretreatment			
CAPS-I	32.50 (8.71)	32.70 (7.51)	32.83 (8.01)
CAPS-F	36.80 (9.82)	36.00 (8.69)	38.33 (9.64)
IES-I	23.85 (7.07)	26.60 (7.02)	28.44 (6.60)
IES-A	26.40 (6.65)	26.40 (6,65)	26.17 (8.95)
STAI	56.80 (11.22)	54.60 (8.20)	56.28 (11.12)
BDI	21.65 (11.18)	23.15 (10.05)	26.56 (11.15)
CCQ	69.20 (17.87)	66.05 (15.00)	67.28 (17.21)
Posttreatment			
CAPS-I	19.15 (11.12)	15.90 (13.36)	28.00 (15.31)
CAPS-F	20.55 (12.73)	17.20 (15.62)	30.00 (16.42)
IES-I	17.65 (7.34)	15.10 (12.86)	24.06 (10.82)
IES-A	19.45 (13.48)	16.15 (13.49)	25.50 (9.54)
STAI	43.10 (13.52)	41.45 (14.77)	51.50 (12.00)
BDI	17.45 (12.82)	13.85 (14.31)	23.78 (12.10)
CCQ	63.80 (18.15)	55.00 (18.61)	67.61 (18.58)
Follow-Up			
CAPS-I	$20.70\ (12.00)_{a}$	$15.70\ (14.79)_{b}$	$30.28\ (12.89)_{c}$
CAPS-F	$23.25\ (12.90)$	$17.00\ (15.22)_{a}$	$32.44\ (13.57)_{b}$
IES-I	$17.60\ (9.88)_{a}$	$15.95\ (12.18)_{a}$	$25.44\ (7.79)_{b}$
IES-A	$20.75\ (12.66)$	$14.95\ (12.32)_{a}$	$24.78\ (9.55)_{b}$
STAI	$42.85\ (14.90)_{a}$	$43.45\ (11.85)_{a}$	$53.33\ (9.70)_{b}$
BDI	$16.15\ (12.19)$	$14.95\ (13.99)_{a}$	$25.33\ (12.05)_{b}$
CCQ	$60.10\ (19.24)$	$48.65\ (19.30)_{a}$	$70.78\ (15.57)_{b}$

Note. Means in the same row that do not share subscripts differ at $p < .05$ in Tukey's post hoc comparison. CAPS-I = Clinician Administered Posttraumatic Stress Disorder (PTSD) Scale–Intensity; CAPS-F = Clinician Administered PTSD Scale–Frequency; IES-I = Impact of Event Scale–Intrusions; IES-A = Impact of Event Scale–Avoidance; STAI = State–Trait Anxiety Inventory (State); BDI = Beck Depression Inventory; CCQ = Catastrophic Cognitions Questionnaire.

Table 3
Psychopathology Measures for Treatment Completers

Variable	Imaginal exposure (n = 15) *M* (*SD*)	Imaginal exposure and cognitive restructuring (n = 15) *M* (*SD*)	Supportive counseling (n = 15) *M* (*SD*)
Pretreatment			
CAPS-I	30.67 (7.94)	32.73 (7.88)	31.87 (7.49)
CAPS-F	36.80 (9.82)	36.00 (8.69)	38.33 (9.64)
IES-I	23.00 (7.40)	25.27 (7.29)	27.53 (6.85)
IES-A	25.13 (6.76)	24.20 (5.56)	23.87 (7.80)
STAI	55.80 (11.85)	53.47 (9.13)	54.80 (11.65)
BDI	19.93 (7.00)	19.33 (7.00)	23.20 (8.39)
CCQ	65.60 (17.75)	62.20 (15.21)	64.67 (17.18)
Posttreatment			
CAPS-I	$14.60\ (7.96)_a$	$10.33\ (9.75)_a$	$23.73\ (12.94)_b$
CAPS-F	16.00 (10.14)	$10.93\ (11.97)_a$	$25.20\ (13.14)_b$
IES-I	$15.07\ (6.26)_a$	$8.93\ (6.25)_b$	$27.53\ (6.85)_c$
IES-A	$13.87\ (10.36)_a$	$7.80\ (7.88)_a$	$25.20\ (9.40)_b$
STAI	$37.53\ (9.44)_a$	$35.93\ (12.77)_a$	$49.07\ (11.68)_b$
BDI	$14.33\ (12.08)_a$	$6.93\ (6.86)_b$	$19.87\ (8.44)_c$
CCQ	58.40 (16.10)	$47.47\ (14.72)_a$	$65.07\ (18.89)_b$
Follow-up			
CAPS-I	$16.67\ (10.49)_a$	$8.53\ (10.25)_a$	$26.40\ (10.24)_b$
CAPS-F	$19.60\ (11.85)_a$	$10.00\ (10.04)_b$	$28.07\ (9.71)_a$
IES-I	$15.20\ (9.86)_a$	$11.07\ (9.64)_b$	$22.80\ (6.86)_c$
IES-A	$15.47\ (9.93)_a$	$9.27\ (7.69)_a$	$23.60\ (9.16)_b$
STAI	$37.20\ (11.77)_a$	$38.60\ (11.84)_a$	$51.13\ (9.06)_b$
BDI	$12.60\ (10.59)_a$	$8.40\ (7.48)_a$	$20.27\ (8.22)_b$
CCQ	$53.47\ (15.84)_a$	$39.00\ (9.80)_b$	$68.87\ (15.82)_c$

Note. Means in the same row that do not share subscripts differ at $p < .05$ in Tukey's post hoc comparison. CAPS-I = Clinician Administered Posttraumatic Stress Disorder (PTSD) Scale–Intensity; CAPS-F = Clinician Administered PTSD Scale–Frequency; IES-I = Impact of Event Scale–Intrusions; IES-A = Impact of Event Scale–Avoidance; STAI = State–Trait Anxiety Inventory (State); BDI = Beck Depression Inventory; CCQ = Catastrophic Cognitions Questionnaire.

In terms of the intent-to-treat analyses, the MANCOVA on posttreatment scores did not indicate a significant main effect, $F(14, 84) = 0.86$, *ns*. In terms of treatment completers, the one-way MANCOVA indicated a significant main effect, $F(14, 60) = 2.42$, $p < .05$. Follow-up ANCOVAs indicated main effects for CAPS-2 Intensity, $F(2, 42) = 6.47$, $p < .01$; CAPS-2 Frequency, $F(2, 42) = 5.62$, $p < .01$; IES-Intrusions, $F(2, 42) = 13.29$, $p < .01$; IES-Avoidance, $F(2, 42) = 13.62$, $p < .01$; BDI-2, $F(2, 42) = 7.17$, $p < .01$; STAI, $F(2, 42) = 5.95$, $p < .01$; and CCQ, $F(2, 42) = 4.27$, $p < .05$. Post hoc Tukey's comparisons indicated that IE/CR participants scored lower than SC participants on CAPS-2 Intensity ($p < .01$), CAPS-2 Frequency ($p < .01$), IES Intrusions ($p < .01$), IES Avoidance ($p < .01$), BDI-2 ($p < .01$), STAI ($p < .01$), and CCQ ($p < .01$). IE participants scored lower than SC participants on CAPS-2 Intensity ($p < .05$), IES Intrusions ($p < .05$), IES Avoidance ($p < .01$), and STAI ($p < .05$). In addition, IE/CR participants scored lower than IE participants on IES Intrusions ($p < .01$) and BDI-2 ($p < .05$).

Follow-Up Treatment Effects

In terms of intent-to-treat analysis, the overall MANCOVA indicated a significant main effect, $F(14, 84) = 2.26$, $p < .05$. Follow-up ANCOVAs indicated main effects for CAPS-2 Intensity, $F(2, 58) = 4.15$, $p < .05$; CAPS-2 Frequency, $F(2, 58) = 5.85$, $p < .05$; IES-Intrusions, $F(2, 58) = 4.64$, $p < .05$; IES-Avoidance, $F(2, 58) = 3.47$, $p < .05$; BDI-2, $F(2, 58) = 3.70$, $p < .05$; STAI, $F(2, 58) = 3.85$, $p < .05$; and CCQ, $F(2, 58) = 7.01$, $p < .01$. Post hoc Tukey's comparisons indicated that IE/CR participants scored lower than SC participants on CAPS-2 Intensity ($p < .01$), CAPS-2 Frequency ($p < .01$), IES Intrusions ($p < .05$), IES Avoidance ($p < .05$), BDI-2 ($p < .05$), STAI ($p < .05$), and CCQ ($p < .01$). IE participants scored lower than SC participants on CAPS-2 Intensity ($p < .05$), IES Intrusions ($p < .05$), and STAI ($p < .05$). In addition, IE/CR participants scored lower than IE participants on CAPS-2 Intensity ($p < .05$).

The overall MANCOVA for treatment completers indicated a significant main effect, $F(14, 60) = 3.60$, $p < .05$. Follow-up ANCOVAs indicated main effects for CAPS-2 Intensity, $F(2, 42) = 11.25$, $p < .01$; CAPS-2 Frequency, $F(2, 42) = 5.62$, $p < .01$; IES-Intrusions, $F(2, 42) = 13.29$, $p < .01$; IES-Avoidance, $F(2, 42) = 9.63$, $p < .01$; BDI-2, $F(2, 42) = 6.91$, $p < .01$; STAI, $F(2, 42) = 7.34$, $p < .01$; and CCQ, $F(2, 42) = 16.81$, $p < .01$. Post hoc Tukey's comparisons indicated that IE/CR participants scored lower than SC participants on CAPS-2 Intensity ($p < .01$), CAPS-2 Frequency ($p < .01$), IES Intrusions ($p < .051$), IES Avoidance ($p < .01$), BDI-2 ($p < .01$), STAI ($p < .01$), and CCQ ($p < .01$). IE participants scored lower than SC participants on CAPS-2 Intensity ($p < .05$), IES Intrusions ($p < .05$), IES

Avoidance ($p < .05$), BDI-2 ($p < .05$), STAI ($p < .01$), and CCQ ($p < .05$). In addition, IE/CR participants scored lower than IE participants on CAPS-2 Frequency ($p < .05$), IES Intrusions ($p < .05$), and CCQ ($p < .05$).

Diagnostic Outcomes

Intent-to-treat analyses indicated that at posttreatment more SC (67%) participants met criteria for PTSD than IE/CR (35%), $\chi^2(37, N = 38) = 3.80$, $p < .05$, but not more than those in IE (50%). At follow-up, more SC participants (78%) met criteria for PTSD than IE/CR (40%), $\chi^2(37, N = 38) = 5.55$, $p < .05$, and marginally more than IE (50%), $\chi^2(37, N = 38) = 3.14$, $p < .07$. In terms of treatment completers, more SC participants (60%) met criteria for PTSD at posttreatment than IE/CR participants (13%), $\chi^2(29, N = 30) = 7.03$, $p < .01$, but not more than IE (33%). At follow-up, more SC participants (73%) met criteria for PTSD than IE/CR (20%) participants, $\chi^2(29, N = 30) = 8.57$, $p < .01$, and IE (33%), $\chi^2(29, N = 30) = 4.82$, $p < .05$.

Effect Sizes

We derived Cohen's effect size by calculating the mean difference between assessments of each treatment condition and dividing this by the pooled standard deviation (Cohen, 1988). Following the International Society for Traumatic Stress Studies treatment guidelines for PTSD (Foa, Keane, & Friedman, 2000), we then used Hedges's *G* effect sizes to correct for variations due to small sample sizes (Hedges, 1982). We determined effect sizes on each psychopathology measure for (a) pretreatment to posttreatment change and (b) pretreatment to follow-up change. Cohen (1988) describes effect sizes as small (.2), medium (.5), or large (.8). Table 4 demonstrates that participants in the IE/CR condition tended to have larger effect sizes than IE, who in turn had larger effect sizes than participants in SC. Both active treatment groups uniformly displayed large effect sizes.

End-State Functioning

We defined good end-state functioning as being below specific cut-off scores for measures on both PTSD and depression at the follow-up assessment. We adopted a conservative estimate of good end-state functioning for PTSD by following the cut-off score of 19 (combining frequency and intensity scores) described by Weathers, Keane, and Davidson (2001) as a measure of the absence of PTSD. In addition, we followed Foa, Dancu, et al. (1999) by using the BDI-2 cutoff of 10 (Kendall, Hollon, Beck, Hammen, & Ingram, 1987). Using these criteria in the intent-to-treat sample, we found that more participants in the IE/CR (40%) condition achieved good end-state functioning than did participants in the SC (0%) conditions, $\chi^2(37, N = 38) = 9.12$, $p < .01$. Further, marginally more IE/CR participants achieved good end-state functioning than IE participants (15%), $\chi^2(39, N = 40) = 3.13$, $p < .07$, who in turn tended to achieve better end-state functioning than SC participants (0%), $\chi^2(37, N = 38) = 2.93$, $p < .08$. In terms of treatment completers, more participants in the IE/CR (60%) condition achieved good end-state functioning than participants in the IE (20%), $\chi^2(29, N = 30) = 5.00$, $p < .05$, and SC (0%) conditions, $\chi^2(29, N = 30) = 12.86$, $p < .01$. Marginally more IE

Table 4
Effect Sizes (and Treatment Completers Effect Sizes) on Outcome Measures for Intent-to-Treat Analyses and Treatment Completers

Measure	Pretreatment to posttreatment			Pretreatment to 6-month follow-up			Posttreatment to follow-up		
	IE/CR	IE	SC	IE/CR	IE	SC	IE/CR	IE	SC
CAPS-I	1.58 (2.47)	1.25 (1.96)	0.41 (0.77)	1.49 (2.60)	1.05 (1.50)	0.24 (0.60)	0.01 (0.17)	−0.13 (−0.21)	−0.16 (−0.22)
CAPS-F	1.52 (2.02)	1.42 (1.96)	0.63 (1.06)	1.56 (2.64)	1.17 (1.48)	0.50 (0.96)	0.01 (0.08)	−0.21 (−0.32)	−0.16 (−0.24)
IES-I	1.14 (2.45)	0.84 (1.00)	0.49 (0.64)	1.08 (1.79)	0.73 (0.79)	0.40 (0.52)	−0.06 (−0.26)	0.01 (−0.02)	−0.14 (0.67)
IES-A	1.00 (2.13)	0.69 (1.40)	0.07 (0.02)	0.90 (1.96)	0.58 (1.22)	0.15 (0.02)	0.09 (−0.18)	−0.10 (−0.15)	0.07 (0.17)
STAI	1.13 (1.55)	1.09 (1.67)	0.40 (0.47)	1.01 (1.57)	1.05 (2.03)	0.27 (0.34)	−0.15 (−0.21)	0.02 (0.03)	−0.16 (−0.19)
BDI	0.74 (1.74)	0.34 (0.47)	0.21 (0.37)	0.67 (1.47)	0.46 (0.79)	0.10 (0.34)	−0.08 (−0.20)	0.10 (0.14)	−0.13 (−0.04)
CCQ	0.65 (0.95)	0.28 (0.41)	−0.01 (0.02)	1.00 (1.80)	0.48 (0.71)	−0.20 (0.24)	0.33 (0.67)	0.19 (0.30)	−0.18 (−0.21)

Note. Effect sizes are based on intent-to-treat analyses. IE = imaginal exposure; CR = cognitive restructuring; SC = supportive counseling; CAPS-I = Clinician Administered Posttraumatic Stress Disorder (PTSD) Scale–Intensity; CAPS-F = Clinician Administered PTSD Scale–Frequency; IES-I = Impact of Event Scale–Intrusions; IES-A = Impact of Event Scale–Avoidance; STAI = State–Trait Anxiety Inventory (State); BDI = Beck Depression Inventory; CCQ = Catastrophic Cognitions Questionnaire.

participants had good end-state functioning than SC participants, $\chi^2(29, N = 30) = 3.33, p < .06$.

Discussion

The current findings reinforce the conclusion of previous studies that exposure and CR are effective interventions for the reduction of PTSD symptoms (Foa, Dancu, et al., 1991; Foa et al., 1999; Marks et al., 1998; Resick et al., 2002). In terms of 6-month functioning of the intent-to-treat sample, IE/CR and IE demonstrated greater reductions in PTSD and anxiety than SC. Moreover, there was lower incidence of PTSD cases in the IE/CR and IE groups than those in the SC condition. These results indicate that these strategies provide reasonable effectiveness in treating civilian PTSD.

The major novel finding from this study was that therapy involving both IE and CR led to greater reduction in CAPS-2 Intensity scores than therapy that involved only IE. Moreover, intent-to-treat analyses indicated that the IE/CR, but not the IE alone, participants reported fewer avoidance, depression, and catastrophic cognitions than those receiving SC. This pattern of findings is consistent with the proposition that both IE and CR are effective treatment strategies for PTSD and that adding these components should provide more effective treatment gains than IE alone. These results contrast with recent findings that adding CR to IE does not increase the efficacy of IE (Foa, Dancu, et al., 1999; Marks et al., 1998; Resick et al., 2002).

Several reasons may be offered for the discrepancy between the current pattern and these previous findings. First, this study carefully controlled for the amount of time actively spent on each treatment component. In contrast to Foa, Dancu, et al. (1999) and Marks et al. (1998), we included SC in the IE condition to ensure that therapy time was equated across the IE and IE/CR conditions while equal amounts of IE were provided in each condition. Second, we instructed our participants in CR prior to commencing IE because we wanted to ensure that they understood the CR techniques before needing to address the strong emotional components of IE. Third, and the most likely explanation, we believe, is that whereas each of the previous studies used in vivo exposure in their IE protocols, we limited our protocol to imaginal exposure. It is possible that our combined treatment achieved greater symptom reduction as our IE had limited treatment efficacy because it omitted in vivo exposure.

The finding that CR enhanced the treatment gains of IE may have been mediated by several possible mechanisms. IE and CR may involve common elements, including processing of emotional memories, integration of corrective information, and development of self-mastery (Marks, 2000). Combining both interventions may provide the individual with greater opportunity to benefit from these processes. It is also possible that CR led to greater symptom reduction because it specifically addressed identification and modification of maladaptive cognitions that may contribute to maintenance of PTSD and associated problems (Ehlers & Clark, 2000). The finding that IE/CR led to greater reduction in CCQ scores supports the conclusion that CR was associated with more adaptive appraisals than was IE. It is also possible that the combined treatment led to greater reduction in symptoms because it augmented the utilization and continued use of IE. Instruction in realistic appraisals of one's reactions to the trauma and ongoing events may have led participants in the combined treatment to manage the distress associated with IE more effectively and to benefit more from its use.

We recognize different patterns in the findings of intent-to-treat and treatment completer analyses. A number of significant treatment gains observed in participants who completed treatment were not evident in the intent-to-treat analyses. Whereas the small size of our sample may have limited some treatment effects in the intent-to-treat analyses, the observed pattern does indicate that the IE and CR approaches lack optimal efficiency in ameliorating PTSD and depression in many therapy candidates. Considering that the participants who dropped out of treatment displayed more severe avoidance and depression than treatment completers, it is possible that the current treatment protocols were not ideally suited to address the clinical needs of these particular participants. We also recognize that the last observation carried forward procedure for managing missing data at follow-up may not be the optimal method to conduct intent-to-treat analyses because it assumes that those participants who dropped out remained unchanged across the duration of the study (see Everitt, 1998).

We recognize a number of limitations in this study. First, the sample size in this study was modest and a larger sample may have indicated more differences between treatment groups, particularly in the intent-to-treat analyses. Second, as noted above, the omission of in vivo exposure in the IE limits the comparability between the current finding and previous studies (Foa, Dancu, et al., 1999; Marks et al., 1998; Resick et al., 2002). Including in vivo exposure would have allowed stronger inferences about the utility of combining CR and IE. Third, this study was commenced prior to development of more relevant measures of process variables that would have informed the mechanisms of change. For example, indexing changes in catastrophic cognitions with the Posttraumatic Cognitions Inventory (Foa, Ehlers, Clark, Tolin, & Orsillo, 1999) throughout therapy would indicate the association with treatment modalities and cognitive styles. Fourth, the provision of CR prior to IE resulted in different sequences of therapy components in the IE and IE/CR conditions. Whereas participants in the IE condition received exposure in the initial section of therapy sessions, those in the IE/CR condition received exposure after the CR activities. It is possible that the additional therapy time prior to exposure in the IE/CR treatment differentially influenced participants in this condition. Fifth, we did not index the extent to which assessors were blind to participants' treatment condition by obtaining judgments from assessors concerning their belief about participants' treatment condition.

Future studies need to conduct longer term follow-up of treated participants. There was tentative evidence in the current study of changes between assessments at posttreatment and 6-month follow-up. For example, whereas the rate of PTSD remained stable in the IE group between the following treatments, the rate increased from 13% to 20% in the IE/CR treatment completers from posttreatment to 6-month follow-up. Further, there was some evidence that effect sizes between posttreatment and 6-month follow-up assessments were negative, suggesting that initial treatment effects may have been lost over time. Although there were no significant group differences in psychopathology responses in our participants between posttreatment and 6-month follow-up, future studies should index the differential long-term effects of IE and CR.

There is a need for further study concerning the respective roles that IE and CR have to play in reducing PTSD and associated conditions following trauma. Although initial studies have indicated that CR does not produce an additive benefit, the current study suggests that further research is needed to determine the extent that treatment effectiveness can be enhanced by packaging IE and CR together more potently. Considering that current treatments enjoy only moderate success, refining IE and CR so that they complement each other may lead to greater treatment effectiveness.

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