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Cognitive Processing Therapy for Veterans With Military-Related Posttraumatic Stress Disorder

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Sixty veterans (54 men, 6 women) with chronic military-related posttraumatic stress disorder (PTSD) participated in a wait-list controlled trial of cognitive processing therapy (CPT). The overall dropout rate was 16.6% (20% from CPT, 13% from waiting list). Random regression analyses of the intention-to-treat sample revealed significant improvements in PTSD and comorbid symptoms in the CPT condition compared with the wait-list condition. Forty percent of the intention-to-treat sample receiving CPT did not meet criteria for a PTSD diagnosis, and 50% had a reliable change in their PTSD symptoms at posttreatment assessment. There was no relationship between PTSD disability status and outcomes. This trial provides some of the most encouraging results of PTSD treatment for veterans with chronic PTSD and supports increased use of cognitive–behavioral treatments in this population.

Keywords: posttraumatic stress disorder, treatment, cognitive–behavioral therapy, disability, combat

Military personnel are among the most at-risk populations for exposure to traumatic events and the development of posttraumatic stress disorder (PTSD; Prigerson, Maciejewski, & Rosenheck, 2001; Schlenger et al., 2002). Moreover, research with active duty personnel in Iraq and Afghanistan suggests that we are creating a new generation of veterans with high levels of PTSD and related mental health symptoms (Hoge, Auchterlonie, & Milliken, 2006; Hoge et al., 2004). Thus, it is of utmost importance to identify effective treatments for military-related PTSD.

In civilian samples, there is a solid evidence base supporting the efficacy of cognitive–behavioral treatments (CBT) for PTSD, perhaps over drug treatments (Van Etten & Taylor, 1998). A recent meta-analysis of psychotherapies for PTSD comparing active treatments with wait-list control at the end of treatment revealed intention-to-treat effect size improvements in PTSD symptoms ranging from Cohen's $d = 1.26$ for exposure interventions to 1.53 for the combination of exposure and cognitive interventions (Bradley, Greene, Russ, Dutra, & Westen, 2005). However, surprisingly few controlled studies have been conducted with veterans suffering from military-related PTSD. In Bradley et al.'s meta-analysis, only 5 of the 26 studies focused on combat veterans, and the overall effect size from the veteran studies was statistically lower than the effect sizes found in other trauma groups (i.e., pre- vs. posttreatment effect size of $d = .81$ for combat, 1.24 for mixed trauma, and 1.82 for assault). Some have argued that the chronic nature of PTSD suffered by many veterans served within the Veterans Affairs (VA) system, as well as secondary gain issues related to disability compensation for their PTSD, may account for these relatively smaller effects of treatment (Frueh et al., 2003).

In addition, the psychotherapies tested with veterans to date have primarily consisted of exposure techniques. As indicated above, there may be an advantage to treatments such as cognitive processing therapy (CPT; Resick & Schnicke, 1992), which includes both cognitive and exposure components. Although originally developed for women suffering sexual assault-related PTSD, CPT seems well suited to the veteran population and VA treatment setting. CPT focuses on the range of emotions, in addition to anxiety, that may result from traumatization (e.g., shame, sadness, anger), can be generalized to comorbid mental health conditions and day-to-day problems, is in a manualized format amenable to widespread dissemination, and can be delivered in a group format. In a large study comparing CPT to a well-validated exposure treatment for PTSD, prolonged exposure (PE; Foa et al., 1999, Foa, Rothbaum, Riggs, & Murdock, 1991), Resick, Nishith,

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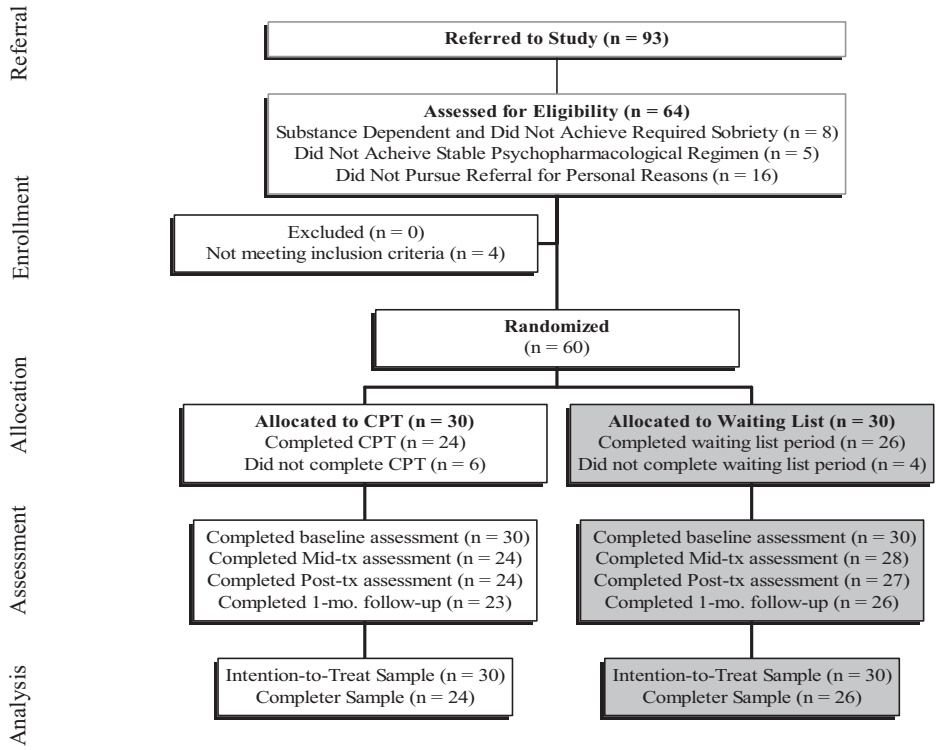

Figure 1. Flow diagram illustrating participation from referral to analyses. CPT = cognitive process therapy; tx = treatment; mo. = month.

Weaver, Astin, and Feuer (2002) found no statistical differences between the treatments in improving assault-related PTSD and depression. However, across outcomes and assessment points, the effect size advantages for CPT were between *d*s of .10 and .29 better than PE. CPT also produced statistically significant improvements compared with PE in some aspects of trauma-related guilt (i.e., hindsight bias, lack of justification).

Given the current state of outcome research with veterans in the evolution of psychotherapy trials, a wait-list controlled trial of CPT in this population was undertaken (see Borkovec & Miranda, 1999, for discussion). A wait-list control addresses a number of methodological issues (e.g., effects of repeated measurement, fluctuating course of PTSD symptoms), while avoiding the costliness of proceeding with a more sophisticated design when the efficacy of the treatment has not been established. The primary hypothesis of this wait-list controlled trial was that CPT would result in greater reductions in clinician-rated PTSD symptoms across treatment and at follow-up assessment compared with the wait-list condition. Secondary hypotheses were that CPT, as compared with WL, would result in lower self-reported PTSD symptoms and frequently co-occurring symptomatology across treatment and at follow-up assessment. Because of concerns about the role of disability compensation in veterans' PTSD treatment outcomes, we also hypothesized that those veterans receiving disability compensation for PTSD, in comparison with those not receiving these benefits, would have significantly smaller reductions in PTSD severity and would be less likely to have a remission in their PTSD diagnosis.

Method

Participants

To be eligible for the study, participants had to be diagnosed with PTSD due to a military-related stressor. If they were receiving psychopharmacological treatment, they were allowed to maintain their psychopharmacological treatment, but they had to be on a stable regimen for at least 2 months prior to study entry. Participants were also allowed to continue in psychotherapeutic interventions not specifically focused on the treatment of PTSD. Exclusion criteria were the following: current uncontrolled psychotic or bipolar disorder, substance dependence (those with substance abuse diagnoses were included), prominent current suicidal or homicidal ideation, and significant cognitive impairment.

A total of 93 patients were referred to the study from a VA medical center, and 64 patients were fully assessed for eligibility. Sixty veterans (54 men, 6 women) were randomized into the trial (see Figure 1). The overall dropout rate was 16.6% (20% from CPT, 13% from the wait-list condition). Table 1 provides descriptive information about the sample overall and by condition. There were no statistically significant differences between the two conditions in baseline characteristics.[1] These sample characteristics are consistent with those found in veterans seeking PTSD treatment within the VA (Rosenheck & Fontana, 2004).

Measures

Structured interviews. The Structured Clinical Interview for *DSM–IV,* Patient Version (SCID–P; First, Spitzer, Gibbon, & Williams, 1995) was

[1] These analyses are available from the first author, Candice M. Monson.

Table 1
Description of the 60 veterans Randomized in the Trial

Variable	Cognitive processing therapy(n = 30)	Waiting list (n = 30)	Total (n = 60)
Age in years, *M* (*SD*)	54.9 (6.5)	53.1 (6.1)	54.0 (6.3)
Male	28 (93.3)	26 (86.7)	54 (90.0)
Non-White race[a]	2 (6.7)	2 (6.7)	4 (6.7)
Married	21 (70.0)	22 (73.3)	43 (71.7)
PTSD disability	15 (50.0)	14 (46.7)	29 (48.3)
Period of service			
Korean War	1 (3.3)	1 (3.3)	2 (3.3)
Vietnam War	25 (83.3)	23 (76.7)	48 (80.0)
Post-Vietnam	2 (6.7)	2 (6.7)	4 (6.7)
Gulf War I	2 (6.7)	4 (13.3)	6 (10.0)
Served in war zone: Index trauma	24 (80.0)	26 (86.7)	50 (83.3)
Combat	24 (80.0)	23 (76.7)	47 (78.3)
Sexual	3 (10.0)	7 (23.3)	10 (16.7)
Noncombat physical assault	3 (10.0)	0 (0.0)	3 (5.0)
Current comorbid diagnoses	22 (73.3)	22 (73.3)	44 (73.3)
Mood disorder	16 (53.3)	17 (56.7)	33 (55.0)
Other anxiety disorder	13 (43.3)	16 (53.3)	29 (48.3)
Substance abuse or dependence	1 (3.3)	0 (0.0)	1 (1.7)
Lifetime comorbid diagnoses	29 (96.7)	30 (100.0)	59 (98.3)
Mood disorder	25 (83.3)	28 (93.3)	53 (88.3)
Other anxiety disorder	17 (56.7)	19 (63.3)	36 (60.0)
Substance abuse or dependence	25 (83.3)	23 (76.7)	48 (80.0)
Number of psychiatric medications			
No medication	4 (13.3)	8 (26.7)	12 (20.0)
One medication	4 (13.3)	4 (13.3)	8 (13.3)
Two medications	9 (30.0)	7 (23.3)	16 (26.7)
Three or more medications	13 (43.3)	11 (36.7)	24 (40.0)
Psychiatric medication type			
SSRI	11 (36.7)	11 (36.7)	22 (36.7)
Other antidepressant	18 (60.0)	13 (43.3)	31 (51.7)
Benzodiazepine/barbiturate	12 (40.0)	12 (40.0)	24 (40.0)
Mood stabilizer	1 (3.3)	5 (16.7)	6 (10.0)
Antipsychotic	10 (33.3)	4 (13.3)	14 (23.3)
Other psychotherapy during the trial			
Individual therapy	4 (13.3)	7 (23.3)	11 (18.3)
Group therapy	10 (33.3)	8 (26.7)	18 (30.0)
Family/couples therapy	1 (3.3)	2 (6.7)	3 (5.0)
Self-help	1 (3.3)	0 (0.0)	1 (1.7)

Note. Data are given as number (percentage) of participants, except where indicated otherwise. PTSD = posttraumatic stress disorder; SSRI = selective serotonin reuptake inhibitor.
[a] Ethnicity of non-White participants was 3.3% American Indian/Alaskan, 1.7% Asian, and 1.7% unknown/other (total).

used to determine exclusion criteria and to describe the veterans' comorbid mental health diagnoses at study entry. The Clinician-Administered Posttraumatic Stress Disorder Scale (CAPS; Blake et al., 1995) was used to determine PTSD diagnostic status and severity. The CAPS is a widely used and validated clinician interview for the assessment of PTSD (Weathers, Keane, & Davidson, 2001). PTSD diagnosis on the CAPS was based on meeting the symptom criteria as defined in the *Diagnostic and Statistical Manual of Mental Disorders* (4th ed., text revision; *DSM–IV–TR*; American Psychiatric Association, 2000), as well as having a minimum severity score of 45. Symptoms were considered to be present when they had a frequency rating of at least 1 and a severity rating of at least 2 on the CAPS. On the basis of previous research (Asmundson, Frombach, & McQuaid, 2000; King, Leskin, King, & Weathers, 1998), we also examined four symptom clusters on the CAPS (i.e., reexperiencing, behavioral avoidance, emotional numbing, hyperarousal).

Self-report questionnaires. The Posttraumatic Stress Disorder Checklist (PCL; Weathers, Litz, Herman, Huska, & Keane, 1993) is a 17-item self-report measure of the severity of PTSD symptoms found in the *DSM–IV–TR.* Its psychometric properties have been established in various trauma populations (Blanchard, Jones-Alexander, Buckley, & Forneris, 1996; Forbes, Creamer, & Biddle, 2001). The Beck Depression Inventory (BDI; Beck, Ward, Mendelsohn, Mock, & Erbaugh, 1961) is a 21-item self-report measure designed to assess degree of depressive symptomatology. It is a frequently used measure of depression symptoms that has been well validated (Beck, Steer, & Garbin, 1988). The Spielberger State–Trait Anxiety Inventory (STAI; Spielberger, 1983) is an established measure of general anxiety that consists of two 20-item scales: State Anxiety and Trait Anxiety. Consistent with previous PTSD trials (e.g., Foa et al., 1999; Resick et al., 2002), the State scale of the STAI was used to assess general anxiety symptom outcomes, because of its greater sensitivity to change in comparison with the Trait scale.

In an effort to minimize participant burden, several tertiary outcomes were assessed at pre- and posttreatment only. The three scale scores of the Trauma-related Guilt Inventory (TRGI; Kubany et al., 1996), the Global Guilt, Distress, and Guilt Cognitions, were included. The Affect Control Scale (ACS; Williams, Chambless, & Ahrens, 1997) is a psychometrically

validated 42-item self-report scale designed to measure fear of experiencing emotion and losing control over internal and behavioral reactions to one's emotions. Total ACS scores were used in the current study. The 20-item Toronto Alexythymia Scale–20 (TAS-20; Bagby, Steer, & Garbin, 1988) was used to assess (a) the degree of difficulty in identifying and distinguishing emotions from bodily sensations, (b) the degree of difficulty of describing emotions to others, and (c) having an externally oriented style of thinking. Total scores on the TAS-20 were also used. Total scores on the Social Adjustment Scale (SAS; Weissman & Bothwell, 1976), a well-known and frequently used measure in PTSD trials, was administered to measure functioning across a range of areas (i.e., spouse, housework, family).

Procedure

This study was conducted in full compliance with the ethical guidelines of the Dartmouth College Institutional Review Board, which provided oversight of the study. A three-phase screening process was used to enroll participants (see Figure 1). In Phase 1, a referring clinician provided provisional diagnoses and medical records were reviewed for inclusion/exclusion criteria. In Phase 2, participants were given an overview of the study and reviewed the informed consent form. Demographic information was also collected. In Phase 3, veterans provided informed consent and were interviewed to assess inclusion/exclusion criteria. They also completed the self-report materials.

Eligible participants were randomized to receive the treatment immediately or to wait for 10 weeks to receive the treatment (10 weeks was equivalent to the ideal 6 weeks of twice weekly sessions and the 1-month follow-up period for those in the CPT condition). The study biostatistician provided the participants' condition assignment to the study coordinator. The independent clinician assessors were blinded to condition assignment and participants were instructed to not disclose their condition assignment to them. Participants were assessed with the complete outcome battery at baseline, midtreatment (or after 3 weeks of waiting), posttreatment (or after 6 weeks of waiting), and 1-month posttreatment (or after 10 weeks of waiting). Participants were asked to participate in the assessments regardless of their treatment completion.

Seven master's- and doctoral-level clinicians, who were unaware of condition assignment and study assessment period, conducted the interviews. All SCID-P and CAPS assessments were audiotaped; 10% of the SCID-P and 7.5% of the CAPS administered were evaluated by an independent doctoral-level clinical psychologist for reliability. The intraclass correlation for PTSD severity on the CAPS showed excellent agreement (rs = .72 to .99 across symptom clusters). Kappas for SCID-P diagnoses showed good agreement across the various diagnoses (κs = .71 to 1.00).

Treatment

Cognitive processing therapy. CPT (Resick, 2001a) is a manualized, 12-session, specific form of CBT for PTSD that has a primary focus on cognitive interventions. The initial session of CPT is psychoeducational; the symptoms of PTSD are explained within a cognitive and information-processing theory (Lang, 1977) framework. At the conclusion of this initial session, patients are asked to write an "impact statement." The statement includes writing about the meaning of the traumatic event, as well as beliefs about why the event happened. The impact statement is read and discussed in Session 2, with an eye toward identifying problematic beliefs and cognitions ("stuck points"). Patients are then taught to identify the connection between events, thoughts, and feelings and to practice this as homework. Session 3 includes a review of the self-monitoring homework, and patients are instructed to write a detailed account of their most traumatic event at home and to read it every day prior to Session 4. When there are multiple experiences of trauma (in the majority of cases), patients write about the "worst" experience, particularly the one that is related to intrusive symptoms.

The goals of Sessions 4 and 5 are to recall and better contextualize traumatic events and to experience the natural emotions that they may have suppressed following these events. CPT includes exposure to the traumatic memory through writing and reading accounts, with a focus on feelings, beliefs, and thoughts that emanated from the traumatic events. At the conclusion of Session 4, patients are asked to rewrite the trauma account with more details and emotions and to document their current thoughts and beliefs as they write the account. They are also asked to read the new account daily prior to Session 5. In Session 5, patients read the second account, and the therapy transitions to cognitive challenging. Using a Socratic style of questioning, the therapist teaches patients to ask questions regarding their assumptions and self-statements in order to begin challenging them. Patients are taught in Sessions 5, 6, and 7 how to use worksheets in their day-to-day lives to challenge and modify maladaptive thoughts and beliefs related to their traumatic experiences.

In the final five sessions, overgeneralized beliefs in five areas (i.e., safety, trust, power/control, esteem, intimacy) are challenged as they relate to self and other. Treatment gains are consolidated in the final session.

Treatment delivery. Six doctoral-level clinicians (two licensed psychologists; four postdoctoral fellows) with prior experience in treating PTSD and in using CBT provided the treatment on an individual basis. Four of the six therapists received a formal day-long training in CPT by Patricia A. Resick, and three of these therapists had an additional day-long informal training session with her. The remaining two therapists were trained in CPT by Candice M. Monson (recipient of the above two trainings), who supervised the therapists in CPT on a weekly and as needed basis.

Therapy sessions were conducted on a twice weekly basis whenever possible. All of the sessions were videotaped, and an expert clinician in CPT, who was independent of the study, rated 10% of the possible treatment sessions (36 sessions). Each session was rated for protocol adherence and therapist competence in delivering the specific prescribed elements of that session. In addition, the therapist was rated on a variety of nonspecific, but essential elements (e.g., warmth, genuineness, empathy) for each session. Adherence to the essential elements of the therapy was good, with 93% of these elements delivered. Competence in providing these treatment elements was likewise good, with an average rating of 5.4 (5 = *good*, 6 = *very good*). Adherence to the nonspecific, but essential, elements was excellent, with 100% of the elements delivered. Competence in providing these treatment elements was very good, with an average rating of 6.1 (6 = *very good*, 7 = *excellent*). The overall therapist skill rating across all sessions was good, with an average rating of 5.0.

Statistical Analyses

Power calculations. Sample size estimates were calculated to test the primary hypothesis that CPT would result in significantly lower clinician-rated overall PTSD symptoms in comparison with the wait-list condition. Resick et al. (2002) used Hedge's g effect sizes in their trial comparing CPT and wait-list conditions in assault victims. Hedge's g includes a correction for sample size, and is calculated as:

$$g = \frac{M_1 - M_2}{s_{\text{pooled}}},$$

where

$$s_{\text{pooled}} = \sqrt{\frac{s_1^2(n_1 - 1) + s_2^2(n_2 - 1)}{n_1 + n_2 - 2}}.$$

It can also be computed from Cohen's d: $g = d/\sqrt{(N/df)}$, where df = degrees of freedom for the MS_{error} and N = total number of cases. Resick et al. (2002) found an intention-to-treat effect size of Hedge's g = .97 for the comparison between CPT and WL in assault victims. To ensure

adequate power to find a significant difference between the two conditions in the current study focused on veterans, we estimated that 26 participants would be needed per condition in order to have .80 power for a two-tailed test at $p = .05$. Adjusting for a projected 10% possible loss to measurement, 60 patients were recruited, with 30 in each condition.

Data analyses. We adopted random regression modeling (SAS Proc Mixed; SAS Institute, 1999) as our primary data analysis strategy for several reasons. First, random regression addresses the problems of missing data, correlated repeated measures for each participant, and individual variability in change. Second, random regression can account for variable measurement intervals. This was of particular relevance to the current study because of some variability in the timing of assessments, primarily in the CPT condition, because the assessment interval was solely dependent on the completion of therapy sessions and irrespective of the amount of time it took to complete the sessions. To illustrate this issue, suppose Wait-list Patient A's midtreatment assessment occurs 23 days after baseline assessment, CPT Patient B's midtreatment assessment is conducted at 25 days post-baseline because of biweekly therapy attendance, and CPT Patient C's midtreatment assessment occurs at 46 days post-baseline on account of an average weekly therapy schedule. Treating the assessment interval as a discrete variable (i.e., mid-treatment) assumes that the actual time difference of when the mid-treatment assessments occurred for each participant is irrelevant. To avoid this potentially problematic assumption, time was treated as a continuous versus categorical variable in the model to more accurately capture the assessment intervals. For each outcome measure, our random regression model included as fixed effects condition, time, and the condition by time interaction. Consistent with previous research (e.g., Carroll et al., 2004) and review of individual data and testing of various models in this study, the variable of time (in weeks) was log-transformed to represent the greater improvements (slope) in the early phase of treatment. A random intercept and a random time slope for individuals were also included. To ensure the correct estimation of variance and covariance structure, we included baseline measures in the model as the first of all repeated measures, that is, at log(time) = 0.

In addition, we calculated least squares means at midtreatment, posttreatment, and follow-up to calculate Hedge's *g* effect sizes for the CPT versus wait-list conditions at each assessment interval. Although there were no statistically significant differences at baseline in any of the outcome measures, we adopted a conservative approach of adjusting for pretreatment levels to account for any possible differences in the two conditions.

Primary analyses were performed according to the intention-to-treat principle; data from all participants were used regardless of their treatment completion. We also examined data from participants who completed the treatment (50 of 60 participants), and the results were highly consistent with the results found in the intention-to-treat sample (see Footnote 1). Thus, results from only the ITT sample are presented in full. Effect size estimates are presented for both ITT and completer samples showing the similarity of findings.

To determine whether PTSD-related disability status was associated with PTSD severity outcomes, veterans in the CPT condition only were divided on the basis of their PTSD-related disability status. Parallel to the above data-analytic strategy, baseline severity was controlled in the analysis. The interaction of time by disability status was of interest.

We determined the proportion of veterans who no longer met PTSD diagnostic criteria according to the CAPS at posttreatment, as well as the proportion of patients who had a reliable change in their PTSD symptoms on this measure from pre- to posttreatment. The reliable change index, originally outlined by Jacobson and Truax (1991) takes into account the reliability of the measurement instrumentation and a confidence interval to determine reliable change. Prior psychometric studies of the CAPS (Weathers et al., 2001) were utilized to calculate the total CAPS standard error of difference ($SE_{diff} = SD_1 \sqrt{2} \sqrt{1 - r} = 4.74$, where SD = standard deviation at baseline and r = test–retest reliability of the measure). We then used a rigorous 99% confidence interval ($SD = 2.58$) with the standard error of difference to yield a criterion level of reliable change ($2.58 \times 4.74 = 12.22$) of greater than 12-point change in total CAPS. Thus, less than 1% of the time would a change of this magnitude on the CAPS occur by unreliability of measurement alone.

To determine the potential effects of CPT on tertiary outcomes related to affect functioning and social adjustment, we conducted univariate ANOVAs comparing CPT and wait-list control on these posttreatment outcomes, adjusting for pretreatment levels of each outcome. Random regression analyses of these outcomes were not possible, because only two assessment points were collected. There were incomplete data for 13 participants, of whom 11 were dropouts. Thus, analyses for the available completers only are presented.

Results

It is important to note that there were no serious adverse events in either condition.

Random Effects Regression Modeling

Results of random effects regression analyses are presented in Table 2 and Figure 2. On the primary outcome of the total CAPS, there was a significant time by condition interaction, indicating that participants receiving CPT, as compared with wait-list control participants, had a significant reduction in the severity of their PTSD symptoms across time. The time by condition interaction was also significant for the CAPS Reexperiencing and Emotional Numbing clusters, the PCL, and the STAI. The time by condition effect on the BDI approached significance.

Least Squares Means and Effect Sizes

Table 3 contains the descriptive information for the intention-to-treat sample for the primary and secondary outcomes, at each assessment, for the two conditions separately, using the least squares mean approach. As shown in Table 4, the effect sizes at posttreatment between CPT and wait-list for the intention-to-treat sample were about 1.00 across the outcomes. Although the effect size difference on the BDI at posttreatment was .49 at 1-month follow-up, this appears to be related to a decline in the wait-list condition's BDI scores at follow-up rather than an increase in the CPT condition's BDI scores at follow-up. The effect sizes for the completers were similar to those found in the intention-to-treat sample.

As shown in Table 5, there were statistically significant improvements in the tertiary outcomes of affect control, alexythymia, guilt distress, and overall social adjustment within the sample of completers assessed on these measures at pre- and posttreatment.

Diagnostic and Reliable Change Status

In the intention-to-treat sample, 40% ($n = 12$) of the CPT condition and 3% ($n = 1$) of the wait-list condition did not meet diagnostic criteria for PTSD at post-treatment, $\chi^2(1, N = 60) = 11.88$, $p < .001$. With regard to reliable change in total CAPS in the CPT versus wait-list conditions, respectively, at posttreatment, 50% ($n = 15$) versus 10% ($n = 3$) had reliable improvement, 50% ($n = 15$) versus 80% ($n = 24$) had no reliable change, and 0% ($n = 0$) and 10% ($n = 3$) had reliable deterioration in their symptoms, $\chi^2(2, N = 60) = 13.04$, $p < .001$. At 1-month follow-up, 30% ($n = 9$) of the CPT condition and 3% ($n = 1$) of the wait-list

Table 2
Random Regression Effects of Condition, Time, and Condition by Time for Each Primary Outcome Variable

Effect	Outcome measure		
	B (95% CI)	*F*	*df*
CAPS Total			
Condition (WL as reference)	1.58 (−7.36, 10.51)	0.12	1, 57.6
Time	−7.44 (−10.44, −4.44)	14.78***	1, 57.2
Condition (WL as reference) × Time	6.31 (1.85, 10.78)	8.02**	1, 57.2
CAPS Reexperiencing			
Condition (WL as reference)	−3.29 (−7.02, 0.45)	3.11†	1, 57.2
Time	−2.89 (−4.04, −1.75)	15.43***	1, 61.7
Condition (WL as reference) × Time	2.37 (0.63, 4.10)	7.40**	1, 61.7
CAPS Behavioral Avoidance			
Condition (WL as reference)	0.75 (−1.07, 2.58)	0.69	1, 58.9
Time	−1.07 (−1.69, −0.44)	9.45**	1, 57.2
Condition (WL as reference) × Time	0.68 (−0.26, 1.63)	2.10	1, 57.2
CAPS Emotional Numbing			
Condition (WL as reference)	3.52 (0.14, 6.90)	4.33*	1, 58.6
Time	−2.16 (−3.45, −0.87)	3.33†	1, 58.5
Condition (WL as reference) × Time	2.58 (0.67, 4.49)	7.28**	1, 58.5
CAPS Hyperarousal			
Condition (WL as reference)	0.55 (−2.53, 3.63)	0.13	1, 57.9
Time	−1.20 (−2.00, −0.41)	9.26**	1, 152
Condition (WL as reference) × Time	0.51 (−0.73, 1.75)	0.66	1, 152
PCL			
Condition (WL as reference)	0.54 (−4.38, 5.45)	0.05	1, 56.5
Time	−5.35 (−7.07, −3.64)	30.51***	1, 51.5
Condition (WL as reference) × Time	3.77 (1.25, 6.29)	9.04**	1, 51.5
BDI			
Condition (WL as reference)	3.70 (−1.12, 8.51)	2.27	1, 56.8
Time	−2.93 (−4.29, −1.56)	16.11***	1, 54.8
Condition (WL as reference) × Time	1.79 (−0.20, 3.77)	3.11†	1, 54.8
STAI			
Condition (WL as reference)	2.06 (−2.73, 6.85)	0.71	1, 56.0
Time	−3.70 (−4.57, −1.43)	3.40†	1, 52.8
Condition (WL as reference) × Time	3.80 (1.46, 6.14)	10.09**	1, 52.8

Note. CI = confidence interval; CAPS = Clinician-Administered PTSD Scale; WL = waiting list; PCL = PTSD Checklist; BDI = Beck Depression Inventory; STAI = State–Trait Anxiety Inventory—State scale; PTSD = posttraumatic stress disorder.
† $p < .08$. * $p < .05$. ** $p < .01$. *** $p < .001$.

condition did not meet diagnostic criteria, $\chi^2(1, N = 60) = 7.68$, $p = .01$. With regard to reliable change in total CAPS in the CPT versus wait-list conditions, respectively, at 1-month follow-up, 47% ($n = 14$) versus 30% ($n = 9$) had reliable improvement, 43% ($n = 13$) versus 53% ($n = 16$) had no reliable change, and 10% ($n = 3$) versus 17% ($n = 5$) had reliable deterioration, respectively, in their symptoms, $\chi^2(2, N = 60) = 1.90$, $p > .10$.

Disability Analyses

Within the CPT condition, there were 15 veterans who were classified with a PTSD-related disability and 15 with no PTSD-related disability. These groups did not differ in CAPS severity at baseline, $t(29) = 1.04$, $p = .15$. Moreover, contrary to hypothesis, the interaction between time and disability status was not statistically significant, $F(1, 24.2) < 1$, $p = .47$, $\eta^2 = .001$, indicating that participants with a PTSD-related disability, as compared with those without, had similar reductions in their PTSD symptoms over time. PTSD-related disability status was also not associated with PTSD diagnostic status in the intention-to-treat sample at posttreatment or follow-up within the CPT condition, $\chi^2(1, N = 30) < 1$, $p = .46$, and $\chi^2(1, N = 30) < 1$, $p = .69$, respectively. At posttreatment, 33% of the disabled group and 47% of the nondisabled group did not meet criteria for PTSD. At 1-month follow-up, 33% of the disabled group and 27% of the nondisabled group did not meet criteria for PTSD.

Discussion

This randomized controlled trial provides some of the most encouraging results to date about the effects of PTSD treatment for veterans with military-related PTSD. The intention-to-treat results indicate significant improvements in both clinician- and self-reported PTSD symptoms; 40% did not meet criteria for PTSD and 50% had a reliable change in their PTSD symptoms at posttreatment assessment. Moreover, the positive effects of CPT extended beyond PTSD symptoms to include improvements in frequently co-occurring symptoms of depression and general anxiety, affect functioning, guilt distress, and social adjustment.

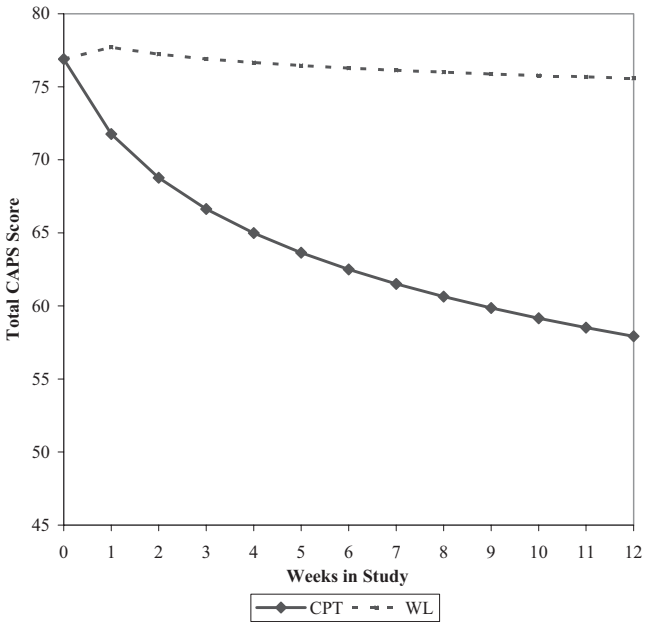

Figure 2. Random regression analysis of change in Clinician-Administered PTSD Scale (CAPS) severity scores for the cognitive processing therapy (CPT) and wait-list (WL) conditions over time (Week 0 = baseline).

In this sample comprised predominantly of men with Vietnam-related chronic PTSD, the effect size differences between the CPT and wait-list conditions at posttreatment were mostly consistent with previous wait-list–controlled psychosocial treatment trials in civilian samples (Blanchard et al., 2003; Resick et al., 2002). The pattern of findings for type of PTSD symptoms was somewhat contrary to previous research in veteran and non-veteran samples. In civilian samples, all symptom clusters are generally found to improve (e.g., Foa et al., 1991; Nishith, Resick, & Griffin, 2002; Taylor et al., 2003) and, in veteran samples, the emotional numbing/avoidance symptoms tend to be less treatment responsive (e.g., Glynn et al., 1999). In this study, reexperiencing and emotional numbing symptoms significantly improved in the CPT versus the wait-list condition, but behavioral avoidance and hyperarousal symptoms did not differentially improve in CPT as compared with the wait-list condition. There was a significant main effect for time in these symptoms. Thus, the lack of significant differences between participants in the CPT and wait-list conditions with regard to these symptoms may be related to improvements in the wait-list condition as well as inadequate power to find the interaction effect in this small sample. Further studies with larger sample sizes will help evaluate the stability of these findings.

In our experience, we believe an important aspect of CPT that makes it well suited to the veteran population is the ability to address cognitions related to committing, witnessing, and experiencing acts of violence, which often co-occur in the context of combat traumatization. Others have noted that cognitive interventions may be particularly helpful in addressing these often guilt- and shame-associated traumatic experiences (Kubany & Watson, 2002). It is interesting to note that the existence of guilt-related cognitions in the CPT condition was not significantly different

Table 3
Descriptive Statistics as a Function of Condition and Time of Measurement: Intention-to-Treat Sample (N = 60)

Measure	Cognitive processing therapy (n = 30)								Waiting list (n = 30)					
	Baseline		Midtreatment[a]		Posttreatment[a]		1-month follow-up[a]		Baseline		Midtreatment[a]		Posttreatment[a]		1-month follow-up[a]	
	M	(*SE*)	*M*	(*SE*)	*M*	(*SE*)	*M*	(*SE*)	*M*	(*SE*)	*M*	(*SE*)	*M*	(*SE*)	*M*	(*SE*)
CAPS Total	76.73	(2.6)	67.69	(3.4)	52.14	(3.9)	58.13	(4.5)	79.10	(3.5)	75.56	(3.2)	76.03	(3.7)	74.37	(4.3)
CAPS Reexperiencing	23.00	(1.2)	19.33	(1.5)	14.70	(1.7)	13.52	(1.7)	20.70	(1.5)	19.24	(1.4)	19.55	(1.6)	19.92	(1.6)
CAPS Avoidance	10.57	(0.6)	9.79	(0.8)	7.07	(0.8)	8.15	(0.9)	11.77	(0.6)	9.81	(0.8)	10.23	(0.8)	10.61	(0.8)
CAPS Numbing	18.13	(1.2)	14.55	(1.7)	11.06	(1.6)	13.63	(1.7)	20.93	(1.2)	21.86	(1.6)	22.28	(1.6)	20.61	(1.7)
CAPS Hyperarousal	25.03	(1.1)	24.10	(0.8)	19.27	(1.3)	22.99	(1.3)	25.70	(1.0)	24.44	(0.8)	23.80	(1.2)	23.24	(1.3)
PCL	60.66	(1.5)	49.58	(2.1)	44.62	(2.2)	45.55	(2.4)	61.50	(1.8)	57.91	(2.0)	56.38	(2.0)	57.23	(2.3)
BDI	25.39	(1.8)	20.15	(1.6)	17.42	(1.6)	18.75	(1.9)	28.53	(1.6)	27.08	(1.4)	27.06	(1.4)	23.92	(1.8)
STAI	54.38	(2.1)	47.28	(2.2)	46.92	(2.1)	47.51	(2.4)	55.62	(1.8)	58.23	(2.1)	58.16	(2.0)	56.98	(2.3)

Note. CAPS = Clinician-Administered Posttraumatic Stress Disorder Scale; PCL = PTSD Checklist; BDI = Beck Depression Inventory; STAI = State-Trait Anxiety Inventory—State scale; PTSD = posttraumatic stress disorder.
[a] Least squares means adjusted for pretreatment values.

Table 4
Effect Sizes Computed as Hedge's g (and Confidence Intervals) for Cognitive Processing Therapy (CPT) Versus Waiting List for Intention-to-Treat and Completer Samples

	Intention-to-treat (n = 60)			Completers (n = 50)		
Measure	Midtreatment	Posttreatment	1-month follow-up	Midtreatment	Posttreatment	1-month follow-up
CAPS total	0.43 (−0.08, 0.94)	1.12 (−0.58, 1.67)	0.67 (0.15, 1.19)	0.44 (0.12, 1.00)	1.14 (0.54, 1.74)	0.69 (0.12, 1.26)
CAPS Reexperiencing	0.01 (−0.49, 0.52)	0.53 (0.01, 1.04)	0.70 (0.18, 1.22)	0.06 (−0.61, 0.50)	0.52 (−0.04, 1.09)	0.70 (0.13, 1.27)
CAPS Numbing	0.80 (0.27, 1.32)	1.26 (0.71, 1.82)	0.74 (0.22, 1.26)	0.82 (0.24, 1.39)	1.25 (0.64, 1.86)	0.72 (0.15, 1.30)
CAPS Avoidance	0.00 (−0.51, 0.50)	0.71 (0.19, 1.23)	0.52 (0.01, 1.04)	0.04 (−0.51, 0.60)	0.79 (0.22, 1.37)	0.61 (0.04, 1.17)
CAPS Hyperarousal	0.08 (−0.58, 0.43)	0.65 (0.13, 1.17)	0.03 (−0.47, 0.54)	0.29 (−0.27, 0.85)	0.79 (0.21, 1.37)	0.11 (−0.45, −0.66)
PCL	0.73 (0.21, 1.25)	1.01 (0.47, 1.55)	0.90 (0.36, 1.43)	0.72 (0.15, 1.30)	1.00 (0.41, 1.59)	0.91 (0.32, 1.49)
BDI	0.84 (0.31, 1.36)	1.16 (0.61, 1.70)	0.49 (0.02, 1.01)	0.82 (0.25, 1.40)	1.14 (0.54, 1.74)	0.48 (0.08, 1.04)
STAI	0.93 (0.40, 1.46)	0.99 (0.46, 1.53)	0.72 (0.20, 1.25)	1.00 (0.41, 1.59)	1.17 (0.57, 1.77)	0.72 (0.21, 1.36)

Note. Positive values favor cognitive processing therapy over the wait-list control. CAPS = Clinician-Administered Posttraumatic Stress Disorder Scale; PCL = PTSD Checklist; BDI = Beck Depression Inventory; STAI = State–Trait Anxiety Inventory—State scale; PTSD = posttraumatic stress disorder.

from those in the wait-list condition at posttreatment. However, guilt-related distress significantly decreased in the CPT versus the wait-list condition at posttreatment. This suggests that the nature but not the presence of these cognitions may change, at least immediately following treatment, in veterans. Elsewhere we have also discussed the fit of the cognitive focus of CPT for male patients, as well as the flexibility of CPT for treating these patients who often have histories of multiple and/or developmental traumas (Monson, Price, & Ranslow, 2005).

The effect size estimates based on the least squares means raise the question of whether gains at posttreatment were maintained at follow-up, whereas the random regression analyses indicate that gains continue or were at least maintained at follow-up. It is important to consider the differences in these analytic procedures. One of the most attractive advances of random regression modeling is that each individual's trajectory of change is accounted for in the model. This is in contrast to comparing mean values of groups at particular points in time. In a related vein, the random regression model acknowledges variability in the actual timing of assessments in this and other studies, whereas the group means approach assumes discrete assessment points that may not necessarily be equivalent in real time between the conditions (see Gibbons et al., 1993, for further discussion of application to mental health trials). Treating time as a continuous variable provided a better fit to this study's methodology and actual data. In any event, longer term follow-up of these patients in future studies will help shed light on this question, and inform the potential need for treatment aimed at maintenance of treatment gains in this chronic population and particular system of care.

Table 5
Descriptive Statistics for Tertiary Outcomes by Condition at Posttreatment Assessment: Available Completers

	Cognitive processing therapy (n = 20)		Waiting list (n = 25)			
Measure	M[a]	SE	M[a]	SE	$F(1, 42)$	g
ACS total	3.97	0.13	4.48	0.12	8.10**	.85
TAS-20 total	60.47	2.00	67.18	1.72	6.53*	.75
TRGI						
Global guilt	1.70	0.21	2.25	0.19	3.73†	.57
Distress	2.72	0.14	3.27	0.13	8.56**	.84
Guilt cognitions	1.59	0.19	1.54	0.17	0.04	.06
SAS total	2.30	0.09	2.59	0.08	5.48*	.71

Note. ACS = Affect Control Scale (lower scores reflect more affect control); TAS–20 = Toronto Alexythymia Scale–20; TRGI = Trauma-Related Guilt Inventory; SAS = Social Adjustment Scale (lower scores reflect better adjustment).
[a] Least squares means adjusted for pretreatment values.
† $p = .06$. * $p < .05$. ** $p < .01$.

In contrast to previous PTSD outcome studies (e.g., Blanchard et al., 2003; Bryant, Moulds, & Guthrie, 2003; Resick et al., 2002), there were remarkably similar treatment effects in our intention-to-treat and completer samples. To better understand these findings, we inspected the individual outcomes of the participants who dropped out. Two of the six participants who dropped out of CPT improved with less than the full course of therapy. These findings, in tandem with other recent reports (Resick, Williams, Orazem, & Gutner, 2005), reinforce that treatment dropout is not necessarily an indicator of poor tolerance of therapy. Studies that allow for more flexible dosing of therapy sessions to meet individual treatment needs are indicated.

Contrary to some previous PTSD treatment studies with veterans (Creamer, Morris, Biddle, Elliot, & Rabin, 1999; Johnson et al., 1996; Monson, Schnurr, Stevens, & Guthrie, 2004), the self-

reported improvements in PTSD symptomatology in this study were comparable to the clinician-rated improvements. These results are particularly salient within the context of continued emphasis on patient-focused outcomes (Glasgow, Magid, Beck, Ritzwoller, & Estabrooks, 2005) and concerns that veterans with chronic PTSD may not recognize or report improvement (Frueh et al., 2003). In this vein, it is remarkable that about one third of the veterans with a VA-rated disability for PTSD were not diagnosed with PTSD at the end of treatment or at follow-up. Moreover, the degree of improvement in PTSD symptoms was not related to disability status; disability status accounted for only 0.1% of the variance in PTSD outcomes in the random regression analyses. There have been concerns that disability compensation for PTSD creates a context in which secondary gain issues create obstacles and disincentives for treatment improvements (Mossman, 1996). This study and others (DeViva & Bloem, 2003; Fontana & Rosenheck, 1998; Taylor et al., 2001) suggest that this is not necessarily true for all veterans receiving disability compensation for their PTSD.

There are several limitations to the current study to be considered in future research. First, the results of this study may not generalize to all veterans presenting for PTSD treatment in the VA system, or to veterans in general. However, the inclusion/exclusion criteria were designed to be as liberal as possible to allow for greater generalizability. For example, veterans were not required to discontinue their psychopharmacological regimen, were allowed to maintain most of their psychotherapy treatment, could be abusing substances, and could have suicidal ideation. Second, ethical concerns of keeping patients on a waiting list for an extended period of time prevented a sufficiently long controlled follow-up period. With the initial efficacy of CPT established, further studies are needed to determine how well treatment gains are maintained in veterans. Third, because some of the therapists treated only a few participants in the trial, it was not possible to evaluate individual therapist effects. Larger future trials should evaluate these potentially important effects. Fourth, this study design cannot rule out the essential, but nonspecific factors of any effective psychotherapy, because it did not include such a control condition. Future studies that include a nonspecific therapy control group are needed.

There is discussion within the trauma field about the extent to which chronic PTSD can be treated. On one end of the spectrum is the contention that the etiology of PTSD can be addressed, leading to a potential "cure" to the condition (Foa, Keane, & Friedman, 2000; Resick, 2001b). The opposite end considers PTSD to be a chronic mental health condition, with an unremitting course—a disorder that should be classified alongside other serious mental illnesses such as schizophrenia and major mood disorder (Johnson, Fontana, Lubin, Corn, & Rosenhack, 2004). The current study suggests that substantial improvements can be made in a group of patients considered to be among the most chronic and treatment recalcitrant. We are hopeful for them, as well as for the new generation of veterans who have not suffered for decades.

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