

# A Randomized, Controlled Proof-of-Concept Trial of an Internet-Based, Therapist-Assisted Self-Management Treatment for Posttraumatic Stress Disorder

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**Objective:** The authors report an 8-week randomized, controlled proof-of-concept trial of a new therapist-assisted, Internet-based, self-management cognitive behavior therapy versus Internet-based supportive counseling for posttraumatic stress disorder (PTSD).

**Method:** Service members with PTSD from the attack on the Pentagon on September 11th or the Iraq War were randomly assigned to self-management cognitive behavior therapy (N=24) or supportive counseling (N=21).

**Results:** The dropout rate was similar to regular cognitive behavior therapy (30%) and unrelated to treatment arm. In the

intent-to-treat group, self-management cognitive behavior therapy led to sharper declines in daily log-on ratings of PTSD symptoms and global depression. In the completer group, self-management cognitive behavior therapy led to greater reductions in PTSD, depression, and anxiety scores at 6 months. One-third of those who completed self-management cognitive behavior therapy achieved high-end state functioning at 6 months.

**Conclusions:** Self-management cognitive behavior therapy may be a way of delivering effective treatment to large numbers with unmet needs and barriers to care.

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Cognitive behavior therapy for posttraumatic stress disorder (PTSD) entails a set of strategies designed to help trauma survivors understand and manage symptoms, correct maladaptive cognitions, and process trauma memories therapeutically (1). Although it has been shown to be efficacious (2, 3), cognitive behavior therapy is not widely available nor routinely employed (4). In addition, cognitive behavior therapy requires significant professional training and expertise to administer, as well as patient time and resources. Consequently, there is ample justification for considering self-management and telehealth-based treatments to enhance treatment fidelity, effectiveness, and accessibility (5). We conducted a randomized, controlled proof-of-concept trial of a therapist-assisted, Internet-delivered self-management cognitive behavior therapy (6) and a comparison condition comprising Internet-based supportive counseling. If cognitive behavior therapy can be efficiently deployed and conveniently delivered, it can be more accessible and widely disseminated, especially to individuals who experience various barriers to care.

## Method

### Participants

The patients were Department of Defense service members in the Washington, D.C., area who had PTSD as a result of the Penta-

gon attack on September 11th or combat in Iraq/Afghanistan. Exclusion criteria were 1) active substance dependence, 2) current suicidal ideation, 3) history of psychotic disorder, 4) <21 or >65 years of age, 5) PTSD or depression immediately before the trauma, 6) current psychiatric treatment, 7) marked ongoing stressors, and 8) inadequate social supports. Medications varied but were stable and maintained.

The participants were recruited through advertisements and presentations at Department of Defense sites. One hundred forty-one participants were screened; 41 were ineligible, 31 did not consent, and 26 could not be contacted for assessment. Forty-five participants were randomly assigned, and 33 completed treatment. Five patients dropped out after random assignment but before treatment; seven dropped out during treatment; 24 patients completed the 3-month follow-up, and 18 completed the 6-month follow-up (some service members were hard to locate). There were no differences in dropouts between the two study arms overall (likelihood ratio=1.19, df=1, N=45, p>0.05; at post-treatment: likelihood ratio=0.40, df=1, N=45, p>0.05) or at the 3-month (likelihood ratio=1.75, df=1, N=45, p>0.05) and 6-month follow-ups (likelihood ratio=0.43, df=1, N=45, p>0.05). Treatment arms did not differ in trauma type (likelihood ratio=1.99, df=1, N=45, p>0.05) (56% September 11th; 44% combat).

Completers were not different from noncompleters on gender (likelihood ratio=4.31, df=1, N=45), minority status (likelihood ratio=0.04, df=1, N=45), or baseline anxiety (t=1.01, df=45). Non-completers were significantly older (t=2.18, df=43, p<0.05; 40.82 years old, versus 34.75 for completers) and more likely enlisted (likelihood ratio=4.59, df=1, N=43, p<0.05).

There were no differences in any variable between those who completed the posttreatment or 3-month follow-up assessments. In the self-management cognitive behavior therapy arm, those

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with 6-month follow-up data had higher socioeconomic status ( $t=2.09$ ,  $df=22$ ,  $p<0.05$ ), lower baseline anxiety ( $t=3.23$ ,  $df=21$ ,  $p<0.01$ ), and lower baseline PTSD scores ( $t=2.60$ ,  $df=22$ ,  $p<0.05$ ), similar to other published studies (7). There were no differences between completers and noncompleters within the supportive counseling arm at both follow-up intervals.

### Measures

**Online ratings.** At each log on, service members were required to make ratings of their PTSD symptoms with a modified PTSD checklist (8, 9) and a global rating of their level of depression on a scale of 1–10 before they were allowed to proceed with that particular log on's activities. The PTSD Checklist evaluated the severity of PTSD symptoms in the last 24 hours with Likert-type scaling from 1=not at all to 5=extremely. The PTSD Checklist items employed were the following:

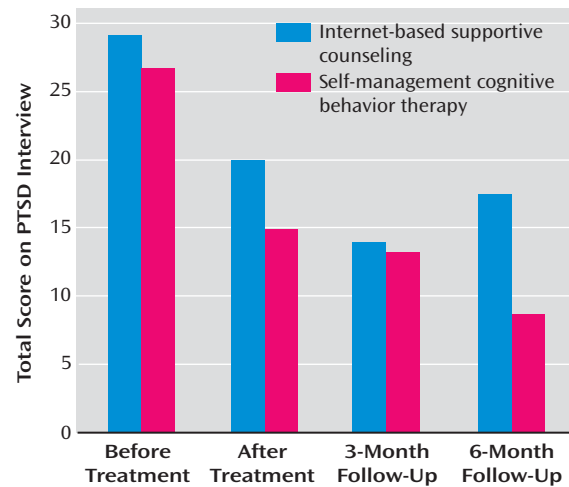
1. Repeated disturbing memories, thoughts, or images of events surrounding your traumatic experience
2. Repeated disturbing dreams of upsetting events surrounding your traumatic experience
3. Feeling very upset and stressed (e.g., heart pounding, trouble breathing, sweating) when something reminded you of your stressful experience or events surrounding the traumatic experience
4. Avoiding thinking about or talking about your traumatic experience or avoiding having feelings related to these events
5. Avoiding activities or situations because they reminded you of your stressful experience or events surrounding the traumatic experience
6. Trouble falling asleep or staying asleep since your traumatic experience
7. Feeling irritable or having angry outbursts since your traumatic experience

The global depression item was worded in the following manner: "On a scale of 1–10, please rate how depressed, down, or lethargic you have felt in general over the last 24 hours (1=not at all depressed, 10=severe incapacitating depression)." The repeated log-on assessments of PTSD symptoms and global depression were used to track outcome and to monitor clinical status. Study therapists were automatically notified if the patients endorsed depression item 7 or above. In addition, the therapists monitored the patients' daily symptom reports by logging on to a special back end to the website (the back end also allowed therapists to review homework submissions and to determine time since last log on).

**Baseline and follow-up assessment measures.** The study therapists conducted the baseline assessments in order to initially establish rapport. Clinicians blind to study arm conducted the follow-up evaluations. The primary outcome measure was the PTSD Symptom Scale—Interview Version (10), which is a structured interview that asks participants to rate how much they were bothered by each of the PTSD symptoms specified in DSM-IV, ranging from 0 (never) to 3 (five times per week or more), yielding a sum score measuring overall PTSD symptom severity. Internal consistencies ranged from  $\alpha=0.76$  to 0.92, and the scale has been found to have excellent diagnostic utility.

Depression symptoms were assessed with the 21-item Beck Depression Inventory—II (11). The participants rated the severity of each symptom (e.g., sadness, worthlessness) on a 4-point scale ranging from 0 (not at all) to 3 (severely), and scores were summed to form an overall composite score. The Beck Depression Inventory—II is used widely to assess symptoms of depression among clinical and normal populations and has shown to be a reliable and valid measure in several investigations of treatment outcome studies of combat-related PTSD (12, 13). Anxiety symptoms were

**FIGURE 1. Score on PTSD Symptom Scale—Interview Version of Subjects Who Underwent Internet-Based Supportive Counseling or Self-Management Cognitive Behavior Therapy Before and up to 6 Months After Treatment**



measured with the Beck Anxiety Inventory (14). The Beck Anxiety Inventory is a 21-item self-report measure. Like the Beck Depression Inventory, symptom ratings range from 0 to 3, which are summed for a total anxiety score. The Beck Anxiety Inventory has been used in many PTSD outcome studies with combat-related PTSD (15). Cronbach's alpha for the Beck Depression Inventory—II and the Beck Anxiety Inventory range from 0.90 to 0.94.

### Procedure

The participants provided written informed consent. They were evaluated at baseline, after treatment, and at 3 and 6 months after baseline. Each intervention arm was therapist-assisted and Internet-delivered and lasted 8 weeks, with 56 total possible log ons (daily). At each log on, the participants made online symptom ratings, reported homework compliance and homework content, acquired new content (or content was restated), and received a new homework assignment.

At baseline, each patient had an approximately 2-hour face-to-face meeting with the study therapist who, in addition to conducting the initial evaluation, introduced the study and intervention procedures; provided psychoeducation about PTSD and the benefits of stress management, a unique log-on ID, and password; and demonstrated the respective Internet sites. The patients in both arms also had periodic and ad lib study therapist contact via e-mail and telephone (they could also request a call back or an e-mail message from their therapist).

### Study Interventions

Two highly specialized web applications were developed to automatize the delivery of the two interventions, collect outcome and process data (e.g., compliance), and assist study therapists and their supervisors to monitor patient participation (e.g., homework compliance). On each web site, patients had ad lib access to educational information about PTSD, stress, and trauma, as well as common comorbid problems and symptoms they might experience (e.g., depression, survivor guilt). The participants were also provided unrestricted access to information on strategies to manage their anger and sleep hygiene.

In order to reduce stigma and to emphasize the self-care aspects of the self-management cognitive behavior therapy, we employed the following title: DELIVERY OF SELF-TRAINING AND EDUCATION

TABLE 1. Continuous and Categorical Demographic and Outcome Variables for Completer Study Group

Variable	Treatment Condition	Baseline		Posttreatment		
		Mean	SD	Mean	SD	
<b>Demographics</b>						
Age	Supportive counseling	39.86	7.72	—		
	Self-management cognitive behavior therapy	38.63	9.41	—		
Socioeconomic status <sup>a</sup>	Supportive counseling	3.50	1.28	—		
	Self-management cognitive behavior therapy	2.88	1.33	—		
Rank <sup>a</sup>	Supportive counseling	9.05	3.90	—		
	Self-management cognitive behavior therapy	8.83	4.49	—		
		N	%	N	%	
	Supportive counseling	17	81 men	—		
		4	19 women	—		
	Self-management cognitive behavior therapy	18	75 men	—		
		6	25 women	—		
Minority	Supportive counseling	13	65 no	—		
		7	35 yes	—		
	Self-management cognitive behavior therapy	18	75 no	—		
		6	25 yes	—		
<b>Outcome</b>						
Group size	Supportive counseling	20		17	14	
	Self-management cognitive behavior therapy	23		14	10	
		Mean	SD	Mean	SD	Differential Effect Size
Anxiety <sup>b</sup>	Supportive counseling	20.92	15.00	12.59	13.45	
	Self-management cognitive behavior therapy	18.70	10.60	8.43	5.93	d=0.40
Depression <sup>c</sup>	Supportive counseling	24.43 <sup>††</sup>	12.08	17.47	11.19	
	Self-management cognitive behavior therapy	18.87 <sup>††</sup>	9.52	12.14	9.56	d=0.51
Total posttraumatic stress disorder symptoms <sup>d</sup>	Supportive counseling	29.16	9.93	20.00	11.50	
	Self-management cognitive behavior therapy	26.71	9.02	14.86	13.35	d=0.41
		N	%	N	%	Differential Effect Size
Beck Anxiety Inventory score below 12 <sup>e</sup>	Supportive counseling	7	33.3	11	62.5	
	Self-management cognitive behavior therapy	7	30.4	8	60.0	φ=0.03
Beck Depression Inventory—II score below 12 <sup>f</sup>	Supportive counseling	2	9.5	7	43.8	
	Self-management cognitive behavior therapy	2	8.3	7	50.0	φ=0.06
PTSD Symptom Scale—Interview Version below 6 (≤5) <sup>g</sup>	Supportive counseling	0	0.0	1*	6.3	
	Self-management cognitive behavior therapy	0	0.0	6*	42.9	φ=0.43
High end-state functioning	Supportive counseling	—		0**	0.0	
	Self-management cognitive behavior therapy	—		4**	35.7	φ=0.48

<sup>a</sup> Both rank and socioeconomic status are coded in an ordinal scale. Rank was coded from the lowest to this highest rank (enlisted level 1 [E1]=1 to officer level 8 [O8]=17). Socioeconomic status was operationalized in terms of income and coded in \$25,000 increments (1=<\$25,000, 2=\$25,001 to \$50,000, etc.).

<sup>b</sup> Beck Anxiety Inventory.

<sup>c</sup> Beck Depression Inventory—II.

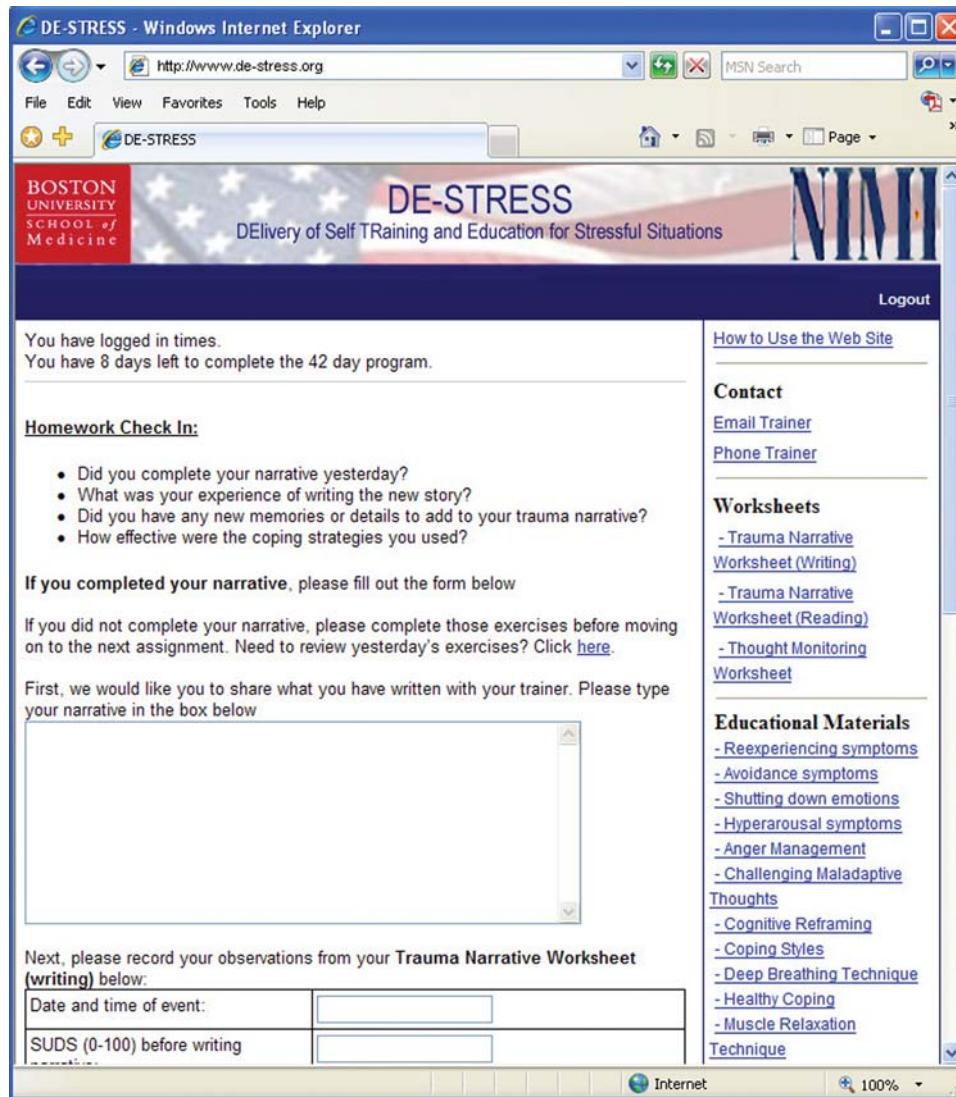
<sup>d</sup> PTSD Symptom Scale—Interview Version.

<sup>e-g</sup> Indicators of clinically significant change.

††p=0.10. †p=0.06. \*p<0.05. \*\*p<0.01.

3-Month Follow-Up			6-Month Follow-Up		
Mean	SD		Mean	SD	
—			—		
—			—		
—			—		
—			—		
—			—		
N	%		N	%	
—			—		
—			—		
—			—		
			10		
			8		
Mean	SD	Differential Effect Size	Mean	SD	Differential Effect Size
9.92	8.19		14.43†	9.96	
6.11	5.69		6.38†	5.21	
		d=0.54			d=1.01
13.23	9.08		16.84*	8.66	
12.51	6.53		8.50*	7.54	
		d=0.09			d=1.03
13.96	8.63		17.50†	10.40	
13.20	7.05		8.67†	7.98	
		d=0.10			d=0.95
N	%	Differential Effect Size	N	%	Differential Effect Size
10	69.2		5††	50.0	
9	88.9		8††	87.5	
		φ=0.23			φ=0.40
8	53.8		4	40.0	
6	55.6		3	35.7	
		φ=0.02			φ=0.35
1	7.7		0*	0.0	
2	20.0		4*	44.4	
		φ=0.19			φ=0.54
0†	0.0		0*	0.0	
1†	20.0		3*	33.3	
		φ=0.25			φ=0.45

FIGURE 2. Screen Capture of One of the Web Pages From the DELivery of Self-TRaining and Education for Stressful Situations (DE-STRESS) System



tion for Stressful Situations or DE-STRESS. The DE-STRESS acronym was particularly well received in the military context and by patients.

**Internet-delivered self-management cognitive behavior therapy.** The self-management cognitive behavior therapy was designed to teach patients strategies to help them cope and manage their reactions to situations that triggered recall of traumatic experiences (and negative affect and arousal). The intervention taught, promoted, and prompted stress and negative affect management strategies applied to a personalized hierarchy of trauma triggers (stressful contexts) through a series of homework assignments. The goal was to reduce PTSD symptom burden and to promote greater self-efficacy and confidence in coping capacities. The specific components of the self-management cognitive-behavior therapy were the following:

1. Self-monitoring of situations that triggered trauma-related distress (first 2 weeks)
2. The generation of a serial ordering (hierarchy) of these trigger contexts in terms of their degree of threat or avoidance (starting week three)

3. Didactics on stress management strategies that, once practiced (starting day 1), were used for
4. Graduated, self-guided, in vivo exposure to items from the personalized hierarchy (starting with the least threatening or least avoided item in week 3)
5. Seven online trauma writing sessions (week 7, see below)
6. A review of progress (charts of daily symptom reports were presented), a series of didactics on relapse prevention, and the generation of a personalized plan for future challenges (week 8)

In the initial meeting with the study therapist, an initial hierarchy of stressful situations was generated collaboratively. It was assumed that most patients with PTSD are not sufficiently aware of what triggers the recall of trauma memories. As a result, in the first 2 weeks, the patients were asked to monitor their reactions to various stressful and demanding situations. After this period, the therapists assisted the patients in generating a final personalized stress hierarchy (with e-mail).

In the face-to-face session, the study therapists also provided initial training in two stress-management strategies (deep, slow

diaphragmatic breathing and simple, progressive muscle relaxation) and initial training in simple cognitive reframing techniques (how to challenge unhelpful thought patterns and alter self-talk to effectively manage demanding situations). Subsequently, homework assignments were given online to further acquire these skill sets (e.g., see Figure 1).

At the end of week 6, the study therapists had a planned phone conversation with the patients to determine if they were ready to do the trauma narrative portion of the self-management cognitive behavior therapy (no patients were deemed incapable or ineligible). In week 7, the participants were asked to write (type) a detailed first-person, present-tense account of a particularly salient and troubling traumatic experience. They were then asked to read their trauma narrative and encouraged to experience any emotions or memories that they may have been avoiding, while using coping skills acquired in the program. In the subsequent six log ons, the patients were asked to rewrite and process their traumatic memory, including any other memories that might not have occurred to them initially. The writing task is a variant of techniques employed in cognitive behavior therapy and cognitive processing therapy to target PTSD (13, 16). The goal was to promote mastery and to reduce avoidance, as opposed to maximizing emotional processing to promote extinction, as is the case in exposure therapy (2).

**Internet-delivered supportive counseling.** The majority of the supportive counseling intervention entailed participants being asked to self-monitor daily *nontrauma*-related concerns and hassles and online writing about these experiences. Psychoeducation materials were available about the psychological, emotional, and cognitive effects of trauma, but there was no skills training or prescriptions for proactive action. The supportive counseling group was asked to visit the web site daily to report their symptoms, read about stress and stress management, and write about current concerns. The web site allowed the participants to ask for an immediate telephone call from their therapists, and they were called periodically by their study therapist to check in on how they were doing and to answer any questions they might have about the self-help program. Through e-mail and the telephone, supportive counseling therapists were instructed to be empathic and validating, nondirective and supportive, and to focus on nontrauma-related present-day concerns. In week 8, patients in the supportive counseling arm were asked to plan ways of using what they learned in the course of the therapy from that point forward and to plan for future stressors; they also were shown graphs of the course of their progress (symptom reporting).

### Analysis Plan

**Online ratings.** We used hierarchical linear modeling (17) to analyze models of individual change or growth in the online PTSD and depression symptom ratings over the 56 (possible) repeated ratings by intervention group. The advantage of using hierarchical linear modeling is the ability to account for all of the 56 possible repeated measures and the ability to use an expectation-maximization algorithm for full maximum likelihood estimation of missing data during model fit (18).

We used a two-level hierarchical linear model to analyze online symptom ratings across the repeated online assessments (level 1) and to determine if the slope was related to the intervention arm (level 2) in the intent-to-treat group. In these analyses, the level 1 model specifying change or growth rate in symptoms ( $Y$ ) for person  $i$  at time  $t$  was:  $Y_{it} = \beta_{0i} + \beta_{1i}(\text{Time}) + e_{it}$ . In this equation,  $\beta_{0i}$  represents the average level of adjustment at a specific time and  $\beta_{1i}$  represents the expected change in a fixed period of time. In these analyses, the unit of time was one day. To examine the effect of intervention arm on symptom ratings over time on level 2, we used the model-building approach, with the augmented models as fol-

### Patient Perspective

“Mr. C” was 24 years old, Caucasian, and recently married. His baseline posttraumatic stress disorder (PTSD) score was 28. He presented with pervasive concerns about personal safety, which resulted in attempts at overcontrol and distrust of others. Mr. C used relaxation skills in trigger situations, such as crowded places. In the narrative portion of the program, he wrote the following:

My best friend is blown up 10 feet from me by a landmine. He is there, living, breathing, and laughing; after the explosion, nothing. I do not even get to see him one more time. I am lying on the ground shaking, quivering, weeping. I think, ‘Why could not it have been me?’ I am single; he is not. Why did I not see the mine? I could have pushed him out of the way! How can I show my face to his wife? I told her I would look after him.

After repeated processing of this memory, he wrote the following:

I cannot always stop things that I do not like happening to people around me. Sometimes things are out of my control. Lately, that has started to be a relief to me. It can be a relief in this area also. It was not my decision; it was out of my control. I am learning that I do not need to control everything all the time to have things end up the way I would like them to.

At the 6-month follow-up, Mr. C’s PTSD score was 15.

lows:  $\beta_{0i} = \gamma_{00} + \gamma_{01}(\text{intervention arm}) + \mu_{0i}$ ;  $\beta_{1i} = \gamma_{10} + \gamma_{11}(\text{intervention arm}) + \mu_{1i}$ .

**Assessment measures.** We used repeated-measures analysis of covariance (ANCOVA), with baseline outcome scores as the covariate, to compare improvement over time in each arm. We also conducted planned comparisons examining a priori hypotheses that the active intervention (self-management cognitive behavior therapy) would lead to greater change in symptoms and clinical outcomes. All analyses were conducted on the intent-to-treat and completer groups.

## Results

### Participant Characteristics

There were no pretreatment differences between the two arms demographically or in baseline levels of depression, anxiety, or PTSD symptoms (see Table 1). Supportive counseling participants (mean=41.05, SD=20.10) logged on more often than self-management cognitive behavior therapy participants (mean=23.63, SD=17.52) ( $t=3.11$ ,  $df=43$ ,  $p<0.01$ ). The two arms did not differ on time spent in treatment ( $t=1.35$ ,  $df=39$ ,  $p>0.10$ ) (supportive counseling: mean=46.76 days, SD=24.03; self-management cognitive behavior therapy: mean=36.92 days, SD=22.84) or in average days between sessions ( $t=-1.43$ ,  $df=39$ ,  $p>0.10$ ) (supportive counseling: mean=1.23 days, SD=0.66; self-man-

agement cognitive behavior therapy: mean=1.60 days, SD=0.98).

### Online Symptom Reports

For both arms, mean total PTSD symptoms, criterion C avoidance, and criterion D hyperarousal symptom ratings declined over the course of treatment ( $\gamma_{10}=-0.02$ ,  $p<0.001$ ,  $\gamma_{10}=-0.003$ ,  $p<0.001$ , and  $\gamma_{10}=-0.004$ ,  $p<0.001$ , respectively). However, patients in the self-management cognitive behavior therapy arm had a sharper decline in mean total PTSD symptom severity,  $\gamma_{11}=-0.02$ ,  $p<0.001$ ; avoidance,  $\gamma_{11}=-0.003$ ,  $p<0.05$ ; and hyperarousal symptoms,  $\gamma_{11}=-0.007$ ,  $p<0.001$ . PTSD criterion B reexperiencing symptom ratings did not decrease significantly across treatment ( $\gamma_{10}=-0.0004$ ,  $p>0.10$ ), nor were there differential treatment effects ( $\gamma_{11}=0.004$ ,  $p>0.10$ ). Global depression ratings decreased significantly over treatment ( $\gamma_{10}=-0.01$ ,  $p>0.10$ ). In addition, the self-management cognitive behavior therapy group had marginally significant higher depression scores ( $\gamma_{01}=1.00$ ,  $p=0.08$ ) but a significantly sharper decline in depression symptoms relative to the supportive counseling arm ( $\gamma_{11}=-0.007$ ,  $p<0.01$ ). Analysis of the online symptom ratings for the completer group produced similar results although no differences in depression ratings.

### Assessment Data

The patients in each arm improved over time for the intent-to-treat and completer groups (see Table 1). Repeated-measures ANCOVAs, with baseline scores as the covariate, revealed a significant main effect of time for total PTSD interview scores ( $F=25.26$ ,  $df=1, 43$ ,  $p<0.001$ ), depression ( $F=7.13$ ,  $df=1, 40$ ,  $p<0.001$ ), and anxiety ( $F=14.58$ ,  $df=1, 38$ ,  $p<0.001$ ).

For the intent-to-treat and completer groups, at the 3-month follow-up, there were no significant differences in the two arms on any outcome. However, for the completers, at the 6-month follow-up, the self-management cognitive behavior therapy arm had significantly lower depression ( $t=2.15$ ,  $df=16$ ,  $p<0.05$ ), anxiety ( $t=2.06$ ,  $df=16$ ,  $p=0.06$ ), and total PTSD symptoms ( $t=2.02$ ,  $df=16$ ,  $p=0.06$ ) (Figure 2). The controlled effect sizes (self-management cognitive behavior therapy relative to supportive counseling) for these changes were  $d=1.03$ ,  $d=1.01$ , and  $d=0.95$ , respectively. Also, in the completer group, a greater percentage of cases in the self-management cognitive behavior therapy arm no longer met criteria for PTSD (operationalized as a PTSD Symptom Scale—Interview Version score below 6) compared to the supportive counseling arm at posttreatment and the 6-month follow-up (Table 1). A significantly greater percentage of self-management cognitive behavior therapy cases in the intent-to-treat group no longer met criteria for PTSD compared to the supportive counseling arm at posttreatment (likelihood ratio=3.89,  $df=1$ ,  $N=45$ ,  $p<0.05$ ) (25% versus 5%) and at the 6-month follow-up (likelihood ratio=8.35,  $df=1$ ,  $N=45$ ,  $p<0.01$ ) (25%

versus 3%). With respect to high end-state functioning (19) (Beck Depression Inventory—II and Beck Anxiety Inventory scores  $<12$  and PTSD Symptom Scale—Interview Version scores  $<6$ ) in the completer group, the two arms differed at posttreatment (self-management cognitive behavior therapy=29% versus supportive counseling=0%) (likelihood ratio=6.81,  $df=1$ ,  $N=30$ ,  $p<0.01$ ) and at the 6-month follow-up interval (self-management cognitive behavior therapy=33% versus supportive counseling=0%) (likelihood ratio=4.76,  $df=1$ ,  $N=18$ ,  $p<0.05$ ). Finally, also with respect to high end-state functioning in the intent-to-treat group, the two arms differed at the 3-month follow-up (self-management cognitive behavior therapy=25% versus supportive counseling=0%) (likelihood ratio=8.35,  $df=1$ ,  $N=45$ ,  $p<0.01$ ) and at the 6-month follow-up interval (self-management cognitive behavior therapy=25% versus supportive counseling=0%) (likelihood ratio=8.35,  $df=1$ ,  $N=45$ ,  $p<0.01$ ).

## Discussion

Intent-to-treat analyses of online symptom reporting and indicators of end-stage functioning, as well as completer analyses of other outcome data, indicated that participants who received self-management cognitive behavior therapy reported greater gains than those who received supportive counseling. One-third of those who completed self-management cognitive behavior therapy achieved high end-state functioning 6 months after treatment (one-quarter of the intent-to-treat group). The intervention was tolerated well, and the dropout rate was similar to that of face-to-face trials. Because many military and emergency service personnel with PTSD often do not receive evidence-based treatment (20), these initial results point to a potentially viable means to deliver rapid and effective PTSD treatment to a large population with otherwise unmet needs for PTSD care.

These results are somewhat tempered by the fact that younger and more symptomatic service members were less likely to be located at 6 months (they were arguably more likely to be redeployed). Also, there was a tendency for fewer people to complete self-management cognitive behavior therapy than supportive counseling, and future research should study factors that enhance web usage for cognitive behavior therapy.

We recognize that our pilot study had a small group size, which limits the generalizability of the findings and reduces power to detect moderators of treatment outcome. Nevertheless, these promising results suggest the need for future research into Internet-based therapies to assist patients with PTSD. Self-management cognitive behavior therapy is a potential solution to the demand for efficient, low-cost, and stigma-reducing interventions for traumatic stress, especially in the military, in disaster contexts, and in the emergency services. This approach should be considered (and evaluated) within a tiered system of self-

management approaches, ranging from an Internet-based companion to face-to-face treatment to guide and systematize cognitive behavior therapy components to free up therapists' time and resources to a completely self-help approach by means of the Internet, DVDs, or booklets.

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### CME Disclosure

All authors report no competing interests.

APA policy requires disclosure by CME authors of unapproved or investigational use of products discussed in CME programs. Off-label use of medications by individual physicians is permitted and common. Decisions about off-label use can be guided by scientific literature and clinical experience.

### References

- Keane TA, Barlow DH: Posttraumatic stress disorder, in *Anxiety and Its Disorders: The Nature and Treatment of Anxiety and Panic*, 2nd Ed. Edited by Barlow DH. New York, Guilford, 2002, pp 418–453
- Rothbaum BO, Meadows EA, Resick P, Foy DW: Cognitive-behavioral therapy, in *Effective Treatments for PTSD: Practice Guidelines from the International Society for Traumatic Stress Studies*. Edited by Foa EB, Keane TM, Friedman MJ. New York, Guilford, 2000, pp 60–83
- Litz BT, Bryant R: Early intervention for trauma in adults: cognitive-behavioral therapy, in *Effective Treatments for PTSD: Practice Guidelines from the International Society for Traumatic Stress Studies* (2nd ed). Edited by Foa E, Friedman M, Keane T, Cohen J. New York, Guilford (in press)
- Zayfert C, Deviva JC, Becker CB, Pike JL, Gillock KL, Hayes SA: Exposure utilization and completion of cognitive behavioral therapy for PTSD in a “real world” clinical practice. *J Trauma Stress* 2005; 18:637–645
- Taylor CB, Luce KH: Computer- and Internet-based psychotherapy interventions. *Curr Dir Psych Science* 2003; 12:18–22
- Litz BT, Williams L, Wang J: A therapist-assisted Internet self-help program for traumatic stress. *Prof Psych Res Prac* 2004; 35:628–634
- Bryant RA, Moulds ML, Nixon RD: Cognitive behaviour therapy of acute stress disorder: a four-year follow-up. *Behav Res Ther* 2003; 41:489–494
- Weathers FW, Litz BT, Herman DS, Huska JA, Keane TM: *The PTSD Checklist (PCL)*. Boston, National Center for PTSD, 1993
- Blanchard EB, Jones-Alexander J, Buckley TC, Forneris CA: The psychometric properties of the PTSD checklist (PCL). *Behav Res Ther* 1996; 34:669–673
- Foa EB, Tolin DF: Comparison of the PTSD Symptom Scale—Interview Version and the Clinician-Administered PTSD Scale. *J Trauma Stress* 2000; 13:181–191
- Beck AT, Steer RA, Brown GK: *Beck Depression Inventory Manual*, 2nd Ed. San Antonio, Tex, Psychological Corporation, 1996
- Bolton EE, Lambert JF, Wolf EJ, Raja S, Varra AA, Fisher LM: Evaluating a cognitive-behavioral group treatment program for veterans with posttraumatic stress disorder. *Psychiatr Serv* 2004; 1:140–146
- Monson CM, Schnurr PP, Resick P, Friedman MJ, Young-Xu Y, Stevens SP: Cognitive processing therapy for veterans with military-related posttraumatic stress disorder. *J Consult Clin Psychol* 2006; 74:898–907
- Beck AT, Epstein N, Brown G, Steer RA: An inventory for measuring clinical anxiety: psychometric properties. *J Consult Clin Psychol* 1998; 56:893–897
- Rothbaum BO, Ruff AM, Litz BT, Han H, Hodges L: Virtual reality exposure therapy of combat-related PTSD: a case study using psychophysiological indicators of outcome. *J Cogn Psychotherapy* 2003; 17:163–177
- Taylor S: *Clinicians' Guide to PTSD: A Cognitive Behavioral Approach*. New York, Guilford, 2006
- Bryk AS, Raudenbush SW: *Hierarchical Linear Models: Applications and Data Analysis Methods*. Newbury Park, Calif, Sage Publications, 1992
- Schafer JL, Graham JW: Missing data: our view of the state of the art. *Psychol Methods* 2002; 7:147–177
- Ehlers A, Clark DM, Hackmann A: A randomized controlled trial of cognitive therapy, a self-help booklet, and repeated assessments as early interventions for posttraumatic stress disorder. *Arch Gen Psychiatry* 2003; 60:1024–1032
- Hoge CW, Auchterlony JL, Milliken CS: Mental health problems, use of mental health services, and attrition from military service after returning from deployment to Iraq or Afghanistan. *JAMA* 2006; 296:1023–1032