

## Outcomes of Prolonged Exposure Therapy for Veterans With Posttraumatic Stress Disorder

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Prolonged Exposure (PE) is an evidenced-based psychotherapy for posttraumatic stress disorder (PTSD) that is being disseminated nationally within the U.S. Department of Veterans Affairs (VA) with promising initial results. Empirical evidence, however, regarding the effectiveness of PE for treatment of PTSD in military veterans is limited. Building on previous treatment outcome research, the current study investigated the effectiveness of PE in a diverse veteran sample. One-hundred fifteen veterans were enrolled in PE at an urban VA medical center and its surrounding outpatient clinics. PTSD and depression symptoms as well as quality of life were measured before and after treatment. Several baseline patient characteristics were examined as predictors of treatment response. Eighty-four participants completed treatment. Participants experienced a 42% reduction in PTSD symptoms, a 31% reduction in depression symptoms, and an increase in quality of life following PE. Veterans not prescribed psychotropic medication reported greater PTSD symptom reduction than veterans prescribed such medication. The implications of these results for treatment programs targeting PTSD in veterans are discussed.

Posttraumatic stress disorder (PTSD) is a chronic and disabling condition estimated to affect 19%–21% of treatment-seeking Operation Enduring Freedom (OEF) and Operation Iraqi Freedom (OIF) veterans (Seal et al., 2009). Elevations in PTSD are found among other veteran populations as well, with lifetime prevalence rates among Gulf war and Vietnam veterans estimated at 12% and 30%, respectively (Kang, Natelson, Mahan, Lee, & Murphy, 2003; Kulka et al., 1990).

The U. S. Department of Veterans Affairs (VA) is charged with providing effective treatment for veterans with PTSD and the need for treatment efficiency increases as the number of veterans seeking treatment rises. A survey of VA health care utilization found that 8.3 million veterans received health care through the VA in 2010, and that number is generally expected to increase (National Center for Veterans Analysis and Statistics, 2011).

The Office of Mental Health Services disseminated evidence-based treatments for PTSD (including Prolonged Exposure [PE]) throughout the VA Health Care System to make effective treatments more accessible. PE has been identified as an

effective treatment for PTSD (Powers, Halpern, Ferenschak, Gillihan, & Foa, 2010) and has demonstrated efficacy with civilians in many randomized controlled trials (Foa et al., 2005; Taylor et al., 2003). Fewer studies have been conducted with veteran populations, although results from initial studies are encouraging. Evaluation data from the dissemination initiative revealed a 30% overall reduction in symptoms for veterans who complete PE (Karlin et al., 2010). Likewise, local program evaluation reports demonstrated significant symptom reduction in veterans following PE (Albrecht, 2007; Rauch et al., 2009; Thorpe, Stein, Jeste, Patterson, & Wetherell, 2012). Although the sample sizes were small, these early reports provide preliminary evidence in support of PE dissemination efforts. Tuerk and colleagues (2011) examined the effect of PE for 65 OIF/OEF veterans who completed treatment and found significant reductions in self-reported symptoms of PTSD and depression. In a randomized controlled trial of PE, Schnurr and colleagues (2007) examined treatment effectiveness for female veterans and active-duty service members, comparing PE with a trial of present-centered therapy. At follow-up, participants who completed PE demonstrated a greater reduction of PTSD symptoms than those who received present-centered therapy, and were 1.8 times more likely to no longer meet diagnostic criteria for PTSD. This study was influential in PE being rolled out as a national VA training initiative.

We sought to replicate these findings across a large veteran population with varied trauma histories who received treatment in a VA outpatient setting. Consistent with a naturalistic design, treating clinicians were from different disciplines, located in different clinics, and had varying levels of clinical experience.

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This manuscript was prepared with the support of the VISN 4 Mental Illness Research, Education, and Clinical Center, Philadelphia Veterans Affairs Medical Center, Philadelphia, PA.

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DOI: 10.1002/jts.21830

We hypothesized that veterans who completed PE would show significant improvements on self-report measures of PTSD, depression, and quality of life.

Another goal of this study was to examine several baseline characteristics as predictors of treatment response, including (a) trauma category (i.e., type of index trauma and service era), (b) service connection status (i.e., veteran receiving VA service connected disability benefits for PTSD or another mental disorder); (c) chronic pain diagnosis (i.e., medical record documentation of a chronic pain-related condition); (d) prescription for psychiatric medications (i.e., active prescription[s] for psychiatric medication[s] documented in the veteran's medical record at the time of treatment); and (e) consultation status (i.e., the treating clinician received formal consultation regarding the case through the PE training initiative).

The selection of these particular variables was based on the availability of data in the electronic medical record and previous findings about factors related to PTSD treatment response. For instance, trauma type and category have been studied as moderators of treatment outcome, but findings have been mixed. Meta-analytic reviews found Vietnam veterans to have poorer PTSD treatment outcomes (Bisson et al., 2007; Bradley, Greene, Russ, Dutra, & Westen, 2005) than civilians with PTSD, whereas other studies have reported good treatment responses for Vietnam and other combat veterans (Cooper & Clum, 1989; Glynn et al., 1999; Ready et al., 2008). Service connection and its potential effect on PTSD treatment is an unsettled issue among VA clinicians and researchers. Service connection has been speculated to both impede the recovery process through secondary gains (i.e., rewarding veterans who continue to report PTSD symptoms (Fontana & Rosenheck, 1998; Frueh et al., 2003)) and to have little impact on treatment outcome (Laffaye, Rosen, Schnurr, & Friedman, 2007). Chronic pain is often comorbid with PTSD and the co-occurrence of these conditions may be associated with higher levels of symptom severity, dysfunction, and disability (Asmundson, Coons, Taylor, & Katz, 2002; Beckham et al., 1997). Combined treatment (pharmacotherapy and psychotherapy) may be the most common approach to treating PTSD in VA clinics. Because research suggests that combined treatments for anxiety disorders tend to be no more effective than monotherapeutic approaches (Otto, Smits, & Reese, 2005), examining the effect of psychiatric medications on PE response was of particular interest in the current study. Finally, the timing of the PE training initiative and our ongoing data collection provided a unique opportunity to compare outcomes of cases completed under consultation with independently completed cases (i.e., certified PE providers who have completed training and consultation requirements).

## Method

### Study Overview

We conducted a naturalistic effectiveness study that included a chart-review component, evaluating the effectiveness of PE

for PTSD at an urban VA medical center and its surrounding community-based outpatient clinics. All participants were veterans actively engaged in outpatient treatment. Pre- and post-treatment measures of PTSD, depression, and quality of life, gathered as part of routine clinical care and program evaluation, were used to evaluate the effectiveness of PE. In addition, several variables were extracted through chart review and analyzed as potential predictors of treatment outcome, including trauma category, service connection for mental health conditions, chronic pain diagnosis, prescription of psychiatric medication, and clinician consultation status. The project was determined by the Philadelphia Veterans Affairs Medical Center's Internal Review Board to meet criteria for quality management and was approved to be published as such.

### Participants

Participants were 115 veterans who received PE through several different outpatient clinics, including the PTSD clinical team ( $n = 58$ ), general mental health clinic ( $n = 22$ ), community-based outpatient clinics ( $n = 12$ ), addictions recovery unit ( $n = 11$ ), primary care mental health ( $n = 7$ ), opioid treatment program ( $n = 3$ ), and polytrauma unit ( $n = 2$ ). All participants carried a diagnosis of PTSD and were deemed appropriate for PE by their treating clinicians (i.e., no immediate threat of harm to self or others, no non-PTSD related psychosis or uncontrolled bipolar disorders, no active alcohol or substance dependence, and no severe traumatic brain injury). A standard preassessment battery was not used for all PE cases, although cases completed under consultation (50%) included a semistructured interview for PTSD (Posttraumatic Stress Scale-Interview [PSSI]; Foa & Rothbaum, 1998). Participants completed self-report measures of PTSD, depression, and quality of life pre- and posttreatment.

### Measures

PTSD symptoms were measured using the PTSD Checklist-Military Version (PCL-M; Blanchard, Jones-Alexander, Buckley, & Forneris, 1996), a 17-item, self-report measure designed to assess the severity of PTSD symptoms. The PCL-M is frequently used in VA settings and has well-established psychometric properties, including internal reliability ( $\alpha = .94$ ; Blanchard et al., 1996). Respondents rated the severity of each item on a 5-point scale (1 = *not at all*; 5 = *extremely*). Individual items were summed to provide a total score (17–85) with higher scores suggesting greater severity of PTSD symptoms. Among combat veterans, a score of 50 or above is typically used as the clinical significance point (Weathers, Litz, Herman, Huska, & Keane, 1993).

Depression symptoms were measured using the Patient Health Questionnaire-9 (PHQ-9; Kroenke, Spitzer, & Williams, 2001), a 9-item, self-report measure designed to assess symptoms of depression. The diagnostic validity for major depression has been established for the PHQ-9 in several studies and it has excellent internal consistency ( $\alpha = .86$  to  $.89$ ; Kroenke et al., 2001). Respondents rate the frequency with which they

experience each of the symptoms of depression on a 4-point scale (0 = *not at all*; 3 = *nearly every day*). Individual items are summed to provide a total score, with higher scores indicative of greater depression severity.

Quality of life was measured using the Behavioral Health Questionnaire-20 (BHQ-20; Kopta & Lowry, 2002), a 20-item measure that assesses global mental health. The BHQ-20 has been found to be reliable and valid with adequate internal consistency ( $\alpha = .65$  to  $.90$ ), test-retest reliability, and construct validity (Kopta & Lowry). Two subscales (Wellbeing and Life Functioning) were used to assess veterans' quality of life. The Wellbeing subscale consists of three items that assess distress, life satisfaction, and energy/motivation. The Life Functioning subscale consists of four items assessing work/school, intimate relationships, social relationships, and overall life enjoyment. Each item on these two measures consists of a 5-point scale (0 = *terrible*; 4 = *very well*) with higher scores suggestive of greater quality of life.

Data regarding chronic pain, prescription for psychiatric medications, and service connection status were extracted from patients' medical charts and coded dichotomously for each (0 = *no/not present*, 1 = *yes/present*). Data regarding consultation status and trauma type were collected throughout the PE initiative for program evaluation purposes and also coded dichotomously. Consultation status was scored with a 0 or 1 depending on whether clinicians received consultation for a particular case. Trauma type ratings included five coding options (1 = *combat Vietnam*; 2 = *combat OEF/OIF*; 3 = *combat Gulf war*; 4 = *sexual trauma*; 5 = *other*).

## Procedure

All 25 study therapists completed the initial 4-day training through the Prolonged Exposure Mental Health Training Initiative. During consultation, sessions were recorded and reviewed by consultants and protocol fidelity checks were conducted. Eighteen of the therapists completed at least two cases under consultation and became certified PE providers. The remaining seven therapists completed fewer than two cases under consultation and did not complete the certification process (and no longer practice PE), but the cases they completed under supervision are included in this study. Thus, all cases were either completed by officially trained and certified PE therapists or therapists receiving supervision from an official VA PE consultant. Therapists were drawn from several different disciplines, including psychology ( $n = 19$ ), nursing ( $n = 3$ ), social work ( $n = 2$ ), and psychiatry ( $n = 1$ ).

PE is a behaviorally based treatment designed to address trauma-related symptoms and distress. The core interventions of PE include psychoeducation, breathing retraining, *in vivo* exposure, and imaginal exposure. PE is typically delivered in 9–12 weekly or twice-weekly, 90-minute sessions. Psychoeducation and breathing retraining are offered in the first two sessions. The remainder of sessions focuses largely on *in vivo* and imaginal exposure. *In vivo* exposure is focused on real-life situations

that are avoided or difficult to tolerate by the patient. Construction of an *in vivo* exposure hierarchy guides the patient through structured exposure to progressively more anxiety-provoking situations. Imaginal exposure involves the revisiting of the index trauma memory in a safe environment and the processing of negative affect associated with the memory. Over the course of treatment, clients begin to differentiate between safe and unsafe settings and habituate to anxiety elicited both by their memories and real-life situations. Readers may refer to Foa and Rothbaum (1998) for a comprehensive review of PE.

## Data Analysis

Analyses were performed using SAS version 9.2 statistical software package (SAS Institute, Cary, NC). Descriptive statistics for demographic variables and participant characteristics at baseline were calculated using PROC FREQ and PROC MEANS. One-way analysis of variance and  $\chi^2$  tests were used to assess differences at baseline between treatment completers and noncompleters. Primary analyses were changes in pre- and post-self-reported symptoms of PTSD, depression, and quality of life for the entire sample. These were carried out with paired samples *t* tests using PROC MIXED (with maximum likelihood estimation) with time entered as a repeated measures, within subjects factor, and PTSD symptom and depressive symptom scores as dependent variables in separate models. Secondary analyses were carried out using the same procedures with treatment completers only. For each model, time, age, and the five predictor variables (trauma category, service connection status, chronic pain diagnosis, psychiatric medications, and consultation status) were entered as fixed factors. Within group effect sizes were computed as *d*, the standardized mean difference, for each of the outcome variables using Cohen's (1988) definition of effect sizes as small ( $d = 0.20$ ), medium ( $d = 0.50$ ), and large ( $d = 0.80$ ).

The above analytical methods were chosen particularly to account for missing data. As an evaluation of the ongoing implementation of PE at our facility, measures for outcome assessment were implemented at various stages of the program. Some measures, including the PHQ-9 and BHQ-20, were added as routine assessment tools to the ongoing use of the PCL at later dates, resulting in more missing data for these measures. In total, we were missing 26 PHQ-9 scores (14 for completers and 12 for dropouts) and 78 quality of life scores (58 for completers and 20 for dropouts). Additionally, we were missing five PCL scores (limited to dropouts) and chart review data for nine participants. Finally, while all available data were used in the analyses, only total scores for each measure were available as these were gathered as part of routine clinical care.

## Results

### Sample Description

Of the 115 veterans who began PE, 31 (27%) dropped out and 84 completed treatment (i.e., at least 8 sessions). Included

as treatment completers were two veterans who made sufficient gains by Sessions 5 and 6, respectively, such that they no longer reported reexperiencing symptoms. In both cases, the veterans' PTSD symptoms at baseline were relatively mild with limited behavioral avoidance, the patients showed rapid habituation during imaginal exposures, and their PCL-M scores reduced to subthreshold levels. The mean age of the sample was 51 years, and 86% were male. Approximately 70% were service-connected for PTSD or another mental health condition. Forty-seven percent of the participants identified as African American, 41% White, and 8% Hispanic or other, with relevant data missing for 4% of participants. Seventy-five percent ( $n = 87$ ) reported combat-related index traumas (Vietnam = 42%; OEF/OIF = 28%; and Persian Gulf war = 5%), and the remaining 25% experienced noncombat-related index traumas [sexual trauma/military sexual trauma = 11%; other (e.g., motor vehicle accident, abduction) = 13%]. Slightly less than half of the participants ( $n = 51$ , 44%) carried a chronic-pain related diagnosis, with musculoskeletal pain as the most common ( $n = 33$ ), followed by headache ( $n = 6$ ), neuropathic pain ( $n = 5$ ), rheumatoid pain ( $n = 4$ ), and sensory pain ( $n = 3$ ). The majority of participants (86%) had at least one comorbid mental health diagnosis, with 73% ( $n = 78$ ) diagnosed with a depressive disorder followed by substance use disorder (30%;  $n = 32$ ), non-PTSD anxiety disorder (12%;  $n = 13$ ), and traumatic brain injury (TBI) (12%;  $n = 13$ ). Finally, 83% were prescribed at least one psychotropic medication (see Table 1 for breakdown of medications by classes).

Treatment completers attended an average of approximately 12 sessions ( $SD = 3$ ; range = 5–19) while noncompleters attended an average of 3.5 ( $SD = 1.75$ ) sessions. Determinations to provide additional sessions beyond the standard 9–12 were based on several factors including PCL scores, reported distress levels during imaginal exposure (i.e., evidence of nonhabituation), and remaining items on veteran's in vivo exposure hierarchy. Veterans who dropped out of treatment ( $n = 31$ ) were compared to veterans who completed treatment ( $n = 84$ ) on age, ethnicity, sex, trauma category, and pretreatment PTSD and depression scores. There was a significant effect of age on treatment completion,  $F(1, 109) = 9.53$ ,  $p = .003$  such that completers were older ( $M = 53.50$  years;  $SD = 12.90$ ) than those who dropped out of treatment ( $M = 44.68$  years;  $SD = 12.49$ ). No other differences between dropouts and completers were observed.

### Symptom Reduction and Quality of Life Improvement Following PE

We hypothesized that veterans who completed PE would show significant reductions in symptoms of PTSD and depression and improvement in quality of life. Means and standard errors for each outcome variable are presented in Table 2. With respect to PTSD symptoms, dependent samples  $t$  tests revealed significant reductions in PCL-M scores from pre- to posttreatment,  $t(109) = 13.02$ ,  $p < .001$ . Participants' scores decreased an

Table 1  
Patient Characteristics at Baseline

Variable	All participants $N = 115$		Completers $n = 84$	
	$M$ or $n$	$SD$ or %	$M$ or $n$	$SD$ or %
<b>Demographics</b>				
Age	51.3	13.2	53.5	12.9
Ethnicity AA	55	47	39	46
Ethnicity Caucasian	48	41	36	43
<b>Diagnoses</b>				
Comorbid MH	92	86	70	83
Depressive disorder	72	67	55	65
Substance use	32	30	23	29
Anxiety disorder	13	12	10	12
TBI	13	12	8	10
<b>Trauma type</b>				
Combat—VTN	48	42	40	47
Combat—OEF/OIF	33	28	22	26
Combat—PG	6	5	3	4
Noncombat—sexual	13	11	7	8
Noncombat—other	15	13	12	14
<b>Disability</b>				
Service connection	80	70	59	70
Chronic pain	51	44	37	44
<b>Medications</b>				
Psychiatric meds	88	83	64	76
Antidepressant	78	73	58	73
Antipsychotic/mood stabilizer	19	18	13	16
Benzodiazepines	20	19	15	19
Other meds	31	29	21	24
<b>Clinician status</b>				
Under consultation	58	50	43	51

Note. Ethnicity AA = African American; Comorbid MH = comorbid mental health diagnoses; TBI = traumatic brain injury; Combat—VTN = combat trauma in Vietnam; combat—OEF/OIF = combat trauma in Operation Enduring Freedom / Operation Iraqi Freedom; Combat—PG = combat trauma in Persian Gulf; Psychiatric meds = prescription for psychiatric medications; Antidepressant = prescription for antidepressant medications; Antipsychotic / mood stabilizer = prescription for antipsychotic or mood stabilizer medications; other meds = prescription for other psychiatric medications; Under consultation = case was completed with the clinician under consultation by a certified prolonged exposure consultant.

average of 19 points, which corresponds to a 41% reduction in symptoms and a Cohen's  $d$  effect size of 1.45. With respect to depression, dependent samples  $t$  tests revealed significant reductions in PHQ-9 scores,  $t(95) = 6.91$ ,  $p < .001$ . On average, participants' scores decreased 4.9 points from pre- to posttreatment, which corresponds to an effect size of .90. Similar effects were seen in participants' quality of life; dependent samples  $t$  tests revealed significant improvements in Wellbeing,  $t(36) = -3.96$ ,  $p < .001$ , and Life Functioning,  $t(34) = -3.26$ ,

Table 2  
Mixed Model Paired Sample T-Test for Intent-to-Treat and Completers

Measures	Intent-to-treat N = 115					Completers n = 84				
	Pretreatment		Posttreatment		t value	Pretreatment		Posttreatment		t value
	M	SE	M	SE		M	SE	M	SE	
PCL-M <sup>a</sup>	63.91	1.01	44.92	1.51	13.02**	63.55	1.16	44.79	1.50	12.27
PHQ-9 <sup>b</sup>	15.93	0.60	11.00	0.73	6.91**	15.48	0.68	10.63	0.74	6.29
Wellbeing <sup>c</sup>	3.67	0.40	5.43	0.53	-3.96**	3.90	0.44	5.74	0.55	-3.82
Life Functioning <sup>d</sup>	5.54	0.41	7.65	0.70	-3.23*	5.83	0.41	7.96	0.70	-3.14

Note. PCL-M = PTSD Checklist-Military Version; PHQ-9 = Patient Health Questionnaire-9; Wellbeing = Wellbeing subscale on the Behavioral Health Questionnaire-20; Life Functioning = Life Functioning subscale on the Behavioral Health Questionnaire-20.

<sup>a</sup>Six missing values. <sup>b</sup>Twenty-one missing values. <sup>c</sup>Seventy-eight missing values. <sup>d</sup>Eighty missing values.

\*p < .01. \*\*p < .001.

p = .003. These changes corresponded to effect sizes of .80 and .79, respectively.

Similar results were found when examining treatment completers only (n = 84). Treatment completers showed significant reductions in PTSD symptoms, t(83) = 12.22, p < .001, depression symptoms, t(69) = 6.05, p < .001, and improvements in Wellbeing, t(26) = -3.71, p < .001 and Life Functioning, t(26) = -3.09, p = .008. Effect sizes remained the same for PTSD (d = 1.47) and Wellbeing (d = 0.79), but were slightly smaller for depression (d = 0.78) and Life Functioning (d = 0.64).

Table 3 presents the linear mixed modeling analysis of the relationship between individual predictor variables and PTSD symptoms. Only the use of psychiatric medication was associated with PTSD symptom reduction (p < .001), with veterans who were not taking medications reporting greater pre- to post-treatment PTSD symptom reduction (M = 21.53, SD = 12.09) than those taking medication (M = 17.48, SD = 13.87). None of the selected variables were related to outcome on depression scores.

Table 3  
Predictors of PTSD Symptom Reduction Assessed With PROC MIXED Effects Linear Modeling Procedures

Variable	b	df <sub>num</sub>	df <sub>den</sub>	F
Pre-PCL-M	18.45	1	78	165.22**
Trauma category	-1.11	4	78	0.96
Service connection	1.13	1	78	0.22
Chronic pain	-4.17	1	78	3.87
Psychiatric meds	9.93	1	78	15.76**
Under consultation	2.54	1	78	1.62

Note. N = 103. PCL-M = PTSD Checklist-Military Version; df<sub>num</sub> = degrees of freedom in numerator; df<sub>den</sub> = degrees of freedom in denominator.

\*\*p < .001.

### Discussion

The objective of the current study was to offer additional support for the effectiveness of PE in a large veteran sample. We also investigated the effects of several patient characteristics at baseline on treatment response, including trauma category, service connection status, chronic pain, prescription of psychotropic medications, and the effects of clinician training status on treatment outcome. Results of the current study suggest that the effectiveness of PE is robust and not affected by many patient characteristics examined in the present study. Additionally, treatment can be effectively provided within the VA by clinicians with varying levels of experience with PE.

Consistent with our hypotheses, veterans experienced a significant decrease in symptoms of PTSD and depression, and improvement in quality of life following PE. The decrease in PTSD scores represented a large effect that was clinically meaningful (Monson et al., 2008). Changes in depressive symptoms were significant, of large effect size, and reflected a decrease from moderate to mild symptoms of depression over the course of PE. Increases in Wellbeing and Life Functioning were also significant and of large effect size. Our findings are consistent with previous research demonstrating the effectiveness of exposure therapy in general, and PE specifically, in veteran populations (Cooper & Clum, 1989; Glynn et al., 1999, Rauch et al., 2009; Schnurr et al., 2007; Tuerk et al., 2011).

Individuals who dropped out of PE in our study tended to be younger than those who completed PE. This result could reflect a number of factors, including increased work, school, or family demands in a younger population that may make a time-intensive treatment such as PE difficult to complete. Our findings are consistent with other studies that found younger participants were more likely to drop out of PTSD treatment than their older counterparts (Cloitre, Stovall-McClough, Miranda, & Chemtob, 2004; Rizvi, Vogt, & Resick, 2009).

We investigated potential moderators of treatment response and found that posttreatment decreases in PTSD symptoms

were not predicted by service-connection for mental health conditions, trauma category, or a diagnosis of chronic pain. These encouraging findings suggest that PE is effective for veterans with physical and mental health comorbidities. Our results also suggest that for those disabled service-connected veterans who engage in PE, treatment gains are comparable with their nonservice-connected counterparts, and these findings support those presented by Laffaye et al. (2007).

Although most of our chosen variables did not moderate treatment response, we did find that veterans who were prescribed psychiatric medications experienced less of a reduction in PTSD symptoms than those not prescribed such medications. A possible explanation for this finding is that patients prescribed psychotropic medications may attribute improvements to medication effects (as opposed to internal resources), thereby limiting their sense of competence and/or the generalization of exposure (Oken, 2008; Smits, Reese, Powers, & Otto, 2010). This unexpected finding requires replication in future studies to allow for more informed explanation.

The current study did not employ a randomized treatment outcome design and thus comparisons of treatment response could not be made across treatment conditions. Although naturalistic research offers valuable and generalizable information about the benefits of ongoing treatment in a real-world setting (Moller, 2011), future research efforts should include randomized treatment outcome trials of PE at VA medical centers. Our naturalistic design also did not permit collection of information about predictor variables in a manner that allowed for analyses of many questions of interest. For example, because chart review was used to gather data about comorbidities and concurrent psychopharmacological treatment, specific information such as type of chronic pain and patient adherence to medications were not available. Additionally, standardized measures of alcohol and drug use are not consistently administered before or after PE in our clinics, so changes in substance abuse could not be adequately assessed in this study.

Although the current sample of veterans was larger than samples used in many previous studies, it was not large enough to allow for additional comparisons that may be helpful. For example, we planned to investigate the effect of TBI on treatment response because TBI in combination with PTSD can present particular challenges to clinicians and 8%–15% of returning OEF/OIF veterans are estimated to suffer with TBI (Hoge et al., 2008; Vasterling et al., 2006). However, because only 10% of our patients had a diagnosis of TBI, there was not sufficient statistical power to include this variable as a covariate in our analyses. Future research with large samples is needed to determine whether the presence of TBI predicts treatment response.

Additionally, follow-up data were not systematically obtained for either completers or noncompleters. Approximately 27% of participants who began PE dropped out of treatment. Although the dropout rate is comparable to the rate noted in several studies of treatment for PTSD (Hembree et al., 2003), the rate is concerning and speaks to the need to better understand factors that contribute to dropout. We are also unable

to assess the long-term maintenance of treatment gains for PE completers. Future studies would benefit from follow-up with completers and noncompleters to better understand the response to PE for those who prematurely end treatment, and to compare veterans' long-term treatment gains with those of civilians.

Our findings build on previous studies by investigating several baseline predictors of treatment and the effect of clinician training status among a large veteran sample. In particular, we found PE to be effective in a diverse sample of veterans, with significant comorbidity, independent of disability status, and when delivered by clinicians with varying levels of expertise in PE. Our results also highlight the greater attrition rate for younger veterans and the need to explore ways of engaging these veterans in treatment. Building on the results of previous evaluations of PE (e.g., Schnurr et al., 2007; Tuerk et al., 2011.), our results support the use of PE as an effective treatment for veterans with PTSD.

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