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Health Service Utilization Before and After Evidence-Based Treatment for PTSD

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Posttraumatic stess disorder (PTSD) is associated with functional impairment, co-occurring diagnoses, and increased health care utilization. Associated high demand for health care services is an important contributor to the large public-health cost of PTSD. Treatments incorporating exposure therapy are efficacious in ameliorating or eliminating PTSD symptoms. Accordingly, the Veterans Health Administration has made significant investments toward nationwide dissemination of a manualized exposure therapy protocol, prolonged exposure (PE). PE is effective with veterans; however, the relationship between PE and mental health service utilization is unknown. The current study investigates PE as it relates to actual tracked mental health service utilization in an urban VA medical center. A sample of 60 veterans with a diagnosis of PTSD was used to examine mental health service utilization in the 12-months prior to and 12-months after being offered PE. Hierarchical Linear Models and traditional repeated-measures ANOVA were used to estimate R^2- and *d*-type effect sizes for service utilization. Associated estimated cost saving are reported. PE was associated with large reductions in symptoms and diagnosis remission. Treatment was also associated with statistically significant, large reductions in mental health service utilization for veterans who completed treatment. Findings suggest that expanding access to PE can increase access to mental health services in general by decreasing ongoing demand for specialty care clinical services.

Keywords: PTSD, prolonged exposure, veterans, service utilization, cost

More than 2 million U.S. troops have been deployed to support the wars in Iraq and Afghanistan (Defense Manpower Data Center, 2009). Many of these individuals experience combat and sustained periods of threat (Friedman, 2005). Research suggests that posttraumatic stress disorder (PTSD) can be detected at rates ranging from 8% to more than 20% in veterans of these conflicts (Hoge, Auchterlonie, & Millikin, 2006; Seal, Bertenthal, Miner, Sen, & Marmar, 2007). Given the sheer scale of deployments, even more modest estimates of risk raise public health concerns that transcend the domains of the Departments of Defense (DoD) and Veterans

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Affairs (VA) health care systems. The need for mental health services for recent veterans comes in addition to ongoing needs for service delivery to Vietnam-era and other veterans, many of whom continue to suffer from PTSD (Rosenheck & Fontana, 2007). Extensive occupational and social impairment (Zatzick et al., 1997), and co-occurring depressive and substance use disorders add to the impact of PTSD on the population (Kessler, 2000).

PTSD symptoms are also linked to higher medical morbidity and poorer health status (Schnurr & Green, 2004). Iraq war veterans screening positive for PTSD report lower health-related quality of life, more sick call visits, and more missed work days than those without positive screens (Hoge, Terhakopian, Castro, Messner, & Engel, 2007). Patients with PTSD also show increased health care utilization indexed by physician visits, hospitalizations, and mental health appointments (Calhoun, Bosworth, Grambow, Dudley, & Beckham, 2002; Deykin et al., 2001; Schnurr, Friedman, Sengupta, Jankowski, & Homes, 2000). Moreover, although only about 40% of individuals returning from Iraq and Afghanistan with PTSD actually seek treatment at Veterans Affairs medical centers (VAMCs), this group uses services more frequently than those with any other mental health disorder (Cohen et al., 2010). Such high demand for services is an important contributor to the large public health cost associated with combat-related PTSD (Marshall, Jorm, Grayson, & O'Toole, 2000).

In spite of the negative impact that PTSD can have on individual functioning and mental health, behavioral treatments that incorporate exposure therapy are efficacious in ameliorating symptoms or eliminating the diagnosis altogether. At the request of the VA, the Institute of Medicine (IOM) conducted a large-scale, systematic review of the scientific literature examining close to 2,800 PTSD-related treatment outcome studies. The list of studies was narrowed down to 90 randomized-controlled trials that met predefined criteria based on scientific rigor. Thirty-seven pharmacotherapy studies and 53 psychotherapy studies were eventually considered for analysis. Of these, the final IOM report recognized exposure therapy as the only treatment approach with sufficient efficacy data for the treatment of PTSD (Institute of Medicine, 2007). The efficacy of exposure therapy for PTSD has also been recognized by multiple published expert consensus guidelines (Foa, Davidson, & Francis, 1999; VA/DoD, 2010). More generally, exposure-oriented therapies in various forms have been used for more than 40 years to treat anxiety-spectrum disorders. In this regard, exposure-oriented therapy is broadly considered a frontline intervention for anxiety and PTSD.

Prolonged exposure (PE; Foa, Hembree, & Rothbaum, 2007) is a specific manualized exposure treatment for PTSD. In PE, patients are directed to vividly recollect and recount traumatic experiences systematically and repeatedly in a supportive environment, facilitating habituation of conditioned fear and emotional processing. Additionally, patients systematically approach objectively safe, though avoided, situations to reduce anxiety and improve day-to-day functioning. The treatment is typically delivered in 7–15 weekly, 90-min sessions.

PE is the most well-researched behavioral intervention for PTSD; investigations conducted by numerous research groups provide consensus regarding treatment effectiveness and safety. Treatment effect sizes on measures of PTSD are typically close to or over one standard deviation improvement from baseline for intent to treat (ITT) samples, and close to or over two standard deviations improvement for treatment completers (e.g., Asukai, Saito, Tsuruta, Kishimoto, & Nishikawa, 2010; Foa et al., 2005; Hagenaars, van Minnen, & Hoogduin, 2010; Nacasch et al., 2011; Schnurr et al., 2007; Tuerk et al., 2011). Drop out, usually between 15& and 35%, is similar to other cognitive–behavioral treatments and can vary depending on study group and treatment setting (Hembree et al., 2003). Severe clinical presentations, such as active psychosis, suicidality, or homicidality, should be stabilized before PE is considered. Even so, investigations of PE in patients with PTSD and common co-occurring diagnoses, such as major depression, panic, substance use disorders, mood disorders, and personality disorders indicate a robust safety profile for the treatment (e.g., Back, Dansky, Carroll, Foa, & Brady, 2001; Brady, Dansky, & Back, 2001; Foa, Rothbaum, Riggs, & Murdock, 1991; Hagenaars et al., 2010; Hembree, Cahill, & Foa, 2004; Nacasch et al., 2011; Pacella et al., 2012; Rachamim, Nacasch, Shafran, Tzur, & Gilboa-Schechtman, 2009; Taylor et al., 2003). The effectiveness and safety of PE in typical veteran populations has also been demonstrated (e.g., Rauch et al., 2009; Schnurr et al., 2007; Thorp, Stein, Jeste, Patterson, & Wetherell, 2012; Tuerk, Yoder, Ruggiero, Gros, & Ron Acierno, 2010; Tuerk et al., 2011; Wolf, Strom, Kehle, & Eftekhari, 2012; Yoder et al., 2012). Cumulatively, studies in the VA present data from close to 400 veterans and provide sound evidence that PE is a safe and effective treatment for PTSD in normative trauma-exposed populations with common comorbidities. Accordingly, mental health practitioners are implementing PE with increasing frequency (IOM, 2007).

The Veterans Health Administration (VHA) is currently training providers in evidence-based mental health treatments including PE (Karlin et al., 2010; VHA, 2008). The PE training initiative is a large-scale effort that includes 4-day experiential workshops for clinicians, followed by one-on-one session review and clinical consultation by a trained supervisor for up to 6 months. Clinicians stay engaged with training supervision until they have completed a minimum of two full PE cases. Accordingly, it is a high-quality, well-resourced, and large-scale clinical education campaign.

As noted, PE has been found to be *clinically* effective in civilian and veteran populations; however, it is also important to examine the impact of PE treatment on service utilization, especially given the large institutional investments made in PE training by the VA. Kilmer and colleagues (Kilmer, Eibner, Ringel, & Pacula, 2011) estimated the 2-year social costs of depression and PTSD among Operation Enduring Freedom and Operation Iraqui Freedom (OEF and OIF, respectively) veterans at $923 million and simulated the cost saving with provision of evidence based psychotherapy to be $138 million. Formal efforts to assess the health care costs of PTSD in the VA as a whole have not been published, although health economists have developed a framework that could be used to do so (McCrone, Knapp, & Cawkill, 2003).

In addition to reliable and valid psychometric measures, service utilization, in and of itself, is a meaningful index of treatment effectiveness (Jerrell & Ridgely, 1995). Although there is evidence that perceptions of health in PTSD patients improve with PE treatment, and that such improvement is specifically related to improved PTSD symptoms (Rauch et al., 2009), few studies have examined health care utilization directly as a benefit or desired outcome of psychotherapy in the VA. Furthermore, studies have yet to examine service utilization as a function of evidence based

exposure therapy for PTSD. Patients receiving cognitive–behavioral therapy for psychiatric and substance use disorders have shown lower rates of inpatient hospitalization in the year after treatment (Worley, Trim, Tate, Hall, & Brown, 2010). Regarding PTSD treatment specifically, one study reported that veterans assigned to 30 sessions of trauma-focused group therapy (TFGT) *self-reported* using fewer outpatient and inpatient visits during the treatment and 6 months after treatment, compared with what they *self-reported* for the 6-month period prior to treatment (Schnurr et al., 2003). However, the control group also evidenced significant decreases in self-reported service utilization and there were no differences between groups in clinical outcomes, which were modest-to-small in both conditions. Accordingly, it is difficult to link decreased self-reported or actual service utilization specifically to TFGT. To summarize, behavioral therapy outcomes may be related to self-reported, perceived, and actual service utilization, but it seems particularly important to investigate how treatments with a well-developed and robust evidence base may relate to health-service-seeking behaviors. The current study investigates the hypothesis that PE therapy for PTSD delivered in regular mental health contexts is related to decreases in mental health service utilization.

Study Overview

The current investigation examined mental health service utilization 12 months before and 12 months after PE therapy for PTSD. The study considered data from a PTSD Clinical Team (PCT) in an urban VAMC. The sample included veterans diagnosed with combat-related PTSD who were treated with PE as standard clinical practice. Veterans were not subject to research-related exclusion criteria or were not given incentives to be included in analyses. Mental health service utilization was measured by the number of mental health service appointments per year pre- and post-PE therapy. A separate group of veterans assigned to PE who did not attend or complete the treatment was included for a broad-spectrum comparison. This study was conducted as part of the institutional review board-approved PTSD archival data initiative.

Method

Sample and Treatment Setting

The sample consisted of veterans with combat-related PTSD treated with PE between August 3, 2007 and January 12, 2009 for whom service utilization data were available for 12 months pre- and post-PE. To target the construct of interest (service utilization over a 2-year period), patients were not considered for analyses if there was not complete access to their service utilization data for 12 months pre- and post-PE. Accordingly, when considering all patients treated with PE between August 3, 2007 and January 12, 2009 ($N = 88$), patients were not considered for analyses if they were not locally enrolled for health care services in the 12 months prior to beginning local PE treatment ($N = 19$), or if they died ($N = 1$) or transferred their health care to another VAMC ($N = 5$) in the 12 months after PE treatment. Additionally, patients were omitted from analyses if their mental health service utilization was more than three standard deviations (99.9 percentile) above the mean in either of the 12-month periods ($n = 3$). It should be noted that omission of these three outliers resulted in *more conservative* analyses with regards to the primary hypothesis. The 28 cases that did not meet inclusion criteria did not differ from the 60 that met criteria in any measured clinical or demographic factor, including: baseline Posttraumatic Stress Disorder Check List (PCL), $t = 1.08$, $df = 86$, $p = .28$, response to treatment, $t = -8.74$, $df = 86$, $p = .38$, number of PE sessions, $t = .37$, $df = 86$, $p = .71$, dropout rate from PE ($Z = -1.5$, $n = 28, 60$, $p = .13$), mean service connection disability rating, $t = .21$, $df = 85$, $p = .84$, proportion of those having a service connection rating ($Z = -2.4$, $n = 28, 60$, $p = .81$), gender ($Z = -9.8$, $n = 28, 60$; $p = .33$), or proportion serving in OEF/OIF ($Z = -.11$, $n = 28, 60$, $p = .92$).

The resulting final sample consisted of 60 veterans diagnosed with combat-related PTSD: 5% female; 39% Black, 57% White; 5% Hispanic, mean age, 41.4 years ($SD = 16.05$, minimum = 23, maximum = 71). Table 1 displays patient characteristics including treatment status, service connected mental health disability rating, co-occurring mental health diagnoses, and pre- and posttreatment clinical outcomes. Note, *clinical outcomes* for some patients reported in Table 1 have been previously reported (Tuerk et al., 2010; Tuerk et al., 2011; Yoder et al., 2012); however, service utilization and the relationship of utilization to clinical outcomes have not been reported for these patients.

All patients were identified for treatment by facility-wide referrals to the PCT. Patients were then assessed and a PTSD diagnosis via the Clinician Administered PTSD Scale (CAPS; Blake et al., 1995) was established before assignment to PE. For the purposes of this study, a treatment completer was defined as any patient who completed at least seven sessions of PE, including at least four imaginal exposure sessions (described below), or anyone who terminated before Session 7 due to symptom improvement, defined by at least a two-standard deviation or better improvement from baseline on the PCL. Otherwise, all those who did not receive at least seven sessions were labeled as treatment noncompleters. All patients were treated by three clinical psychologists and one social worker (MSW) with VA-sponsored training and certification in PE. Fidelity to the PE protocol was safeguarded via weekly group supervision sessions.

Measures

Clinical outcomes: PCL–military version (Weathers, Huska, & Keane, 1991). The PCL is a 17-item self-report measure of symptoms based on *Diagnostic and Statistical Manual for Mental Disorders–Fourth Edition* (*DSM–IV*) criteria (American Psychiatric Association, 2000). Scores on the PCL range from 17 to 85 with higher scores reflecting greater severity. The instrument has good diagnostic efficiency (>.70) and robust psychometric properties (Blanchard, Jones-Alexander, Buckley, & Forneris, 1996).

Primary outcome: Mental health service utilization. Mental health service utilization was measured by number of appointments in the 12 months prior to and 12 months after PE therapy with a licensed mental health provider tracked in the Computerized Patient Record System. Appointment criteria included that the appointment be related to a *DSM–IV* Axis I or II mental health diagnosis, regardless of appointment content, that is, medicine management, psychotherapy, supportive counsel-

Table 1
Sample Demographics, Characteristics, and Treatment Response (—)

	n (%)	Age[a]	Pretreatment PCL[a]	Posttreatment PCL[a]
Gender				
Female	3 (5%)	27.0 (0.00)	63.0 (1.0)	28.0 (14.2)**
Male	57 (—)	42.2 (16.1)	60.9 (9.8)	39.6 (15.3)**
Race				
Black	24 (40%)	43.4 (—)	63.3 (7.4)	42.3 (16.5)**
Hispanic	1 (2%)	31.0 (—)	72.0 (—)	65.0 (—)
White	35 (58%)	40.3 (16.9)	59.1 (10.5)	36.1 (13.6)**
Theater				
OEF/OIF	40 (66%)	31.9 (9.4)	60.0 (8.9)	40.6 (17.3)**
Vietnam	20 (33%)	60.6 (6.4)	61.0 (9.6)	39.0 (15.3)**
Co-occurring diagnoses				
Depression	49 (82%)	40.7 (15.6)	61.9 (9.9)	39.5 (15.8)**
Panic disorder	1 (2%)	23.0 (—)	61.0 (—)	61.0 (—)
Substance use disorder	6 (10%)	48.7 (20.1)	60.0 (12.1)	41.7 (18.9)*
Treatment status				
Completer	44 (73%)	43.0 (16.6)	60.5 (10.0)	31.9 (8.9)**
Noncompleter	16 (27%)	37.1 (14.1)	61.0 (9.6)	57.4 (11.9)
Service connection disability rating				
None	22 (37%)			
10%	3 (5%)			
30%	17 (28%)			
50%	13 (22%)			
70%	2 (3%)			
100%	3 (5%)			
Total	60 (100%)	41.4 (16.0)	61.00 (9.6)*	39.0 (15.3)*

Note. PCL = PTSD Check List; OEF/OIF = Operation Enduring Freedom/Operation Iraqui Freedom; — = not available.
[a] Values are means with standard deviation in parentheses.
* $p < .05$. ** $p < .001$.

ing, motivational interviewing, case management, and so forth. Appointments conducted outside of the mental health service were not counted as mental health service utilization (e.g., appointments in primary care). Using these criteria, the baseline mean mental health service utilization in the 12 months prior to PE treatment for the entire ITT sample was 7.4 appointments. These local baseline data were similar to findings from a large-scale study investigating annual mental health care utilization of 29,472 recent veterans with PTSD, indicating an annual mean mental health service utilization of 8.5 mental health appointments.

Secondary outcomes: Minimum associated cost. Minimum associated cost of service utilization, $93.22 per appointment, was estimated using the published average cost per mental health VA appointment in 2009 (U.S. Department of Veterans Affairs, Health Economics Resource Center [HERC], 2010). HERC estimates are specifically designed by health economists to assist VA researchers in assessing the cost-effectiveness of health care. Although true local costs were larger than the national average, we chose the HERC estimate so that results would be standardized and more easily generalizable.

Statistical Analyses

Hierarchical linear modeling (HLM) was used to analyze the interaction between treatment status (completer/noncompleter) and time (pre- and post-PE). Statistically significant outcomes were qualified using R^2-type effect sizes in a manner consistent with the recommendations of Snijders and Bosker (Snijders & Bosker, 1994). To facilitate widely accessible and easily interpreted outcomes, a repeated-measures ANOVA also was used to compare pre- and posttreatment mental health service utilization for treatment completers and noncompleters. Statistically significant differences were qualified using *d*-type effect sizes and estimation of minimum-associated costs. To facilitate statistical assumptions of normality, the raw utilization data were transformed by adding 0.5 and applying a log transformation. This is a widely used and accepted method of transforming raw count data that include values of 0.0 (McDonald, 2009).

Results

Treatment Completion, Clinical Outcomes, and Service Utilization

Forty-four patients (73%) met criteria as treatment completers, attending at least seven PE sessions. The average number of sessions for treatment completers was 9.77 ($SD = 3.93$). Sixteen patients (27%) did not complete at least seven sessions and were classified as noncompleters. Patient characteristics, that is, age, gender, race/ethnicity, and baseline pathology, were not predictors of treatment completion. As expected, treatment completion was associated with statistically significant and large reductions in self-rated PTSD. Mean pre- and posttreatment PCL scores for the entire sample were 61.0 ($SD = 9.6$) and 39.0 ($SD = 15.3$). This difference is clinically and statistically significant ($t = 10.8$, $df = 59$, $p < .001$, $d = 2.29$). Mean pre- and posttreatment PCL scores

for treatment completers were 60.5 ($SD = 10.0$) and 31.9 ($SD = 8.9$). This difference is also clinically and statistically significant ($t = 16.1$, $df = 43$, $p < .001$, $d = 2.86$). There were no significant treatment effects for the noncompleters. Mean mental health service utilization in the 12 months pre- and post-PE treatment for the entire ITT sample was 7.4 appointments ($SD = 6.2$) and 5.4 appointments ($SD = 5.8$); for the treatment completers, it was 7.4 appointments ($SD = 6.5$) and 4.1 ($SD = 2.8$), and for those who did not complete treatment, it was 7.4 appointments ($SD = 5.6$) and 8.7 ($SD = 9.6$) appointments.

Service Utilization: HLM Results

Models of mental health service utilization were based on 120 points of measurement. The unconditional model estimated variance components for Level 1 and Level 2 units ($\sigma^2 = 31.16$, $\tau = 6.10$). The value of τ was significantly different from zero ($\chi^2 = 82.11$, $df = 59$, $p < .05$), indicating the presence of patient-level effects on service utilization. The intraclass correlation was .20, indicating that 20% of service utilization variance could be accounted for by factors associated with the patient-level (R^2-Between).

The next sequential step in modeling involved adding time of measurement (pre- and post-PE) as a Level 1 within-patients predictor. Time of measurement was a significant but not meaningfully large predictor of service utilization, accounting for no variance in service utilization outcomes. However, treatment status (i.e., completer, noncompleter) significantly predicted the slope of time on service utilization ($t = -2.13$, $df = 117$, $p < .05$). The modeled coefficient of this interaction indicated that treatment completers showed a 3.84 ($SE = 1.81$) appointment decline in mental health service utilization as compared with noncompleters over the course of 2 years. This effect accounted for 15% of the between-patient variance in outcomes. As noted, reanalysis including the three omitted outliers produced *larger* effects with regard to the primary hypothesis and are not reported here for parsimony.

Preliminary analyses indicated that the reported effect may also be continuous with respect to clinical outcomes, as there was a statistically significant negative correlation between individual treatment effect and mental health service utilization after treatment ($r = -.26$, $p < .05$, $N = 60$), such that greater treatment effects were associated with lower service utilization after treatment. However, the trend did not maintain significance in the full HLM model.

Service Utilization: Repeated-Measures ANOVA

In order to facilitate wide accessibility and interpretation of results, a repeated-measures ANOVA was also conducted. The main effect of treatment time on service utilization for the entire ITT sample was not significant, $F(1, 58) = 0.85$, $p = .36$. However, as hypothesized, a significant interaction between time and completer status, $F(1, 58) = 4.19$, $p = .04$, indicated that service utilization for the treatment completers declined from 7.4 appointments ($SD = 6.5$) to 4.1 ($SD = 2.8$), $d = .71$, whereas service utilization for those who did not complete treatment slightly increased from 7.4 appointments ($SD = 5.6$) to 8.7 ($SD = 9.6$), $d =$

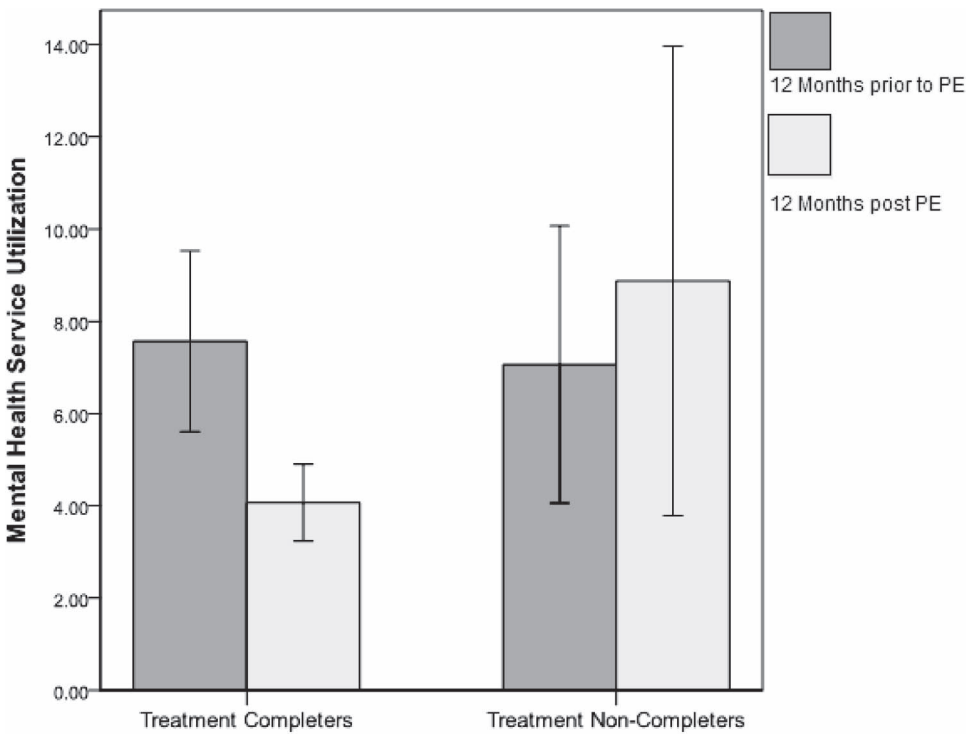

Figure 1. Mental health service appointments 12 months before and after prolonged exposure (PE) treatment for PTSD with 95% confidence intervals for treatment completers and noncompleters.

−.17. Figure 1 displays the pre- and postservice utilization means with 95% confidence intervals for the treatment completers and noncompleters. Using mean service utilization as a primary indicator may obscure a sizable proportion of veterans who showed a dramatic posttreatment reduction in need for mental health services, because 25% of treatment completers used mental health services only once or not at all in the year following treatment.

Minimum Associated Cost

The minimum associated cost of mental health service utilization for the entire 60-person sample in the year before being offered PE treatment was $41,567, and in the year after being offered PE treatment the cost for the entire sample was $29,923. The average per-person cost in the year before being offered PE was similar for both groups of veterans: $693 for those who completed PE, and $692 for those who did not. However, for treatment completers, the average per-person cost in the year after being offered PE declined to $386, whereas the cost for noncompleters was $810. Because these cost data represent linear analogs to service utilization, similar statistical relationships and effect sizes apply and are not repeated here.

Discussion

In the current study, PE was well tolerated by patients with PTSD; 73% of those who began treatment met criteria as treatment completers. Moreover, treatment with PE was associated with large reductions in PTSD symptoms. Treatment was also associated with statistically significant and meaningful declines in the need for mental health services, with approximately a 30% reduction in annual mental health service utilization and associated costs of care for the entire sample and a 45% reduction for treatment completers. Furthermore, 25% of PE treatment completers used mental health services only once or not at all in the year following treatment. There were no changes in clinical outcomes or service utilization for those who did not complete PE. These results add to growing anecdotal evidence in the VA that effective PE treatment can help mental health clinics establish some amount of throughput in place of the ongoing demand for repeat services associated with chronically impaired caseloads.

Interestingly, although we initially hypothesized that PE would be associated with declines in mental health service utilization for treatment completers, we also guessed that noncompleters also would show declines, considering that noncompleters, by definition, already displayed behaviors of rejecting services or otherwise having more barriers to accessing care consistently. However, this was not the case; noncompleters continued to use mental health services at the same level, or more, a year after being offered PE. That these two groups showed no demographic-, utilization-, or clinically related differences at baseline but significant clinical- and utilization-related differences after treatment guards against the possibility of effects being caused by regression to the mean, which is a threat in all naturalistic, nonexperimental data.

Integral to interpreting the results presented here are consistent findings that veterans with PTSD enrolled in specialty mental health care are, on average, continual, long-term, and frequent users of those services. For example, one fairly definitive study analyzed data from all veterans with a PTSD diagnosis who accessed VA specialty mental health services and reported an average of *at least* 14 mental health appointments per year, per veteran, between 1997 and 2005 (Rosenheck & Fontana, 2007). Also relevant are consistent findings in the literature demonstrating that gains associated with PE are typically maintained over time (Aderka, Foa, Applebaum, Shafran, & Gilboa-Schectman, 2011; Foa et al., 2005, 1999; Marks, Lovell, Noshirvani, Livanou, & Thrasher, 1998; Schnurr et al., 2007). Accordingly, the $11,644 in avoided service utilization costs associated with providing PE to the 60 veterans in the current sample likely will be carried forward cumulatively, in relation to these specific veterans. The projected savings over 5, 10, and 15 years associated with continued attenuated need for services would be $58,220, $116,440, and $174,660, respectively. Of course, ongoing symptom abatement or remission, and associated projected stepwise cumulative savings, cannot be expected to remain unerringly consistent. Without further research, we do not know if the average mental health treatment-seeking behaviors of PE completers will increase or decrease in the years to come. Rational arguments for both positions can be easily discerned. Our experience as VA providers and administrators leads us to expect greater-than-projected decreases in service utilization for treatment responders over time, because of continued natural recovery and readjustment to life with fewer or no symptoms. Future studies are needed to investigate this question empirically. Regardless, we believe that merely considering the potential impact of treatment completion on future cumulative utilization savings frames the issue on an appropriate scale.

In spite of large-scale and successful efforts by the VA to increase capacity and train mental health staff (Seal et al., 2010) and the worthy goal of providing access to evidence-based care to all veterans with PTSD (VHA Handbook 1160.01, 2008), demand for services remains high. Accordingly, a relevant metric in addition to cost savings is *access* to care. Extrapolating from the significant group interaction reported here and taking into account the average number of appointments for PE delivery in our clinic, we estimate that making PE available to the 60 veterans presented here allowed our clinic to provide specialty PTSD services to an additional 17 veterans per year. This is an increase in clinic efficiency of 28% with regard to unique patients. A more conservative estimate can be derived by considering pre- and posttreatment utilization for the entire ITT sample, with no group comparison, and yields an additional 12 veterans being served.

There are numerous methodologies to examine longitudinal service utilization data, with advantages and limitations associated with each approach. Electronic medical records and relatively meaningful periods of data capture are necessarily required. Accessing these data in normative health care settings can be prohibitively time-consuming and labor-intensive, whereas accessing available centralized or aggregated data sources may not provide enough specific information to address many relevant questions. These barriers may account for the relatively low evidence base regarding the relationship of service utilization and cognitive–behavioral treatments.

In the current study, balancing methodological design choices led to several limitations. For example, the current design did not capture appointments related to mental health issues conducted in primary care or other nonmental health settings, and specific types

of appointments *within* the mental health setting were not distinguished. Investigating variance in specific types of services in and outside of mental health may be especially helpful with regards to examining the behaviors of those who did not complete PE, but who continued to utilize services with the same or greater frequency. Accordingly, future studies should address mental health service utilization with increased specificity. Regardless, we do not believe this limitation exerted significant nonrandom influence on outcomes in the current study.

To our knowledge there are three contextual limitations that that may exert influence on the interpretation or generalizability of results. First, our therapists frequently offer patients 1-month follow-up "check-in" appointments after PE to assuage anxieties regarding potential symptom relapse. These one-time appointments are often celebratory in nature and usually are not indicative of service utilization moving forward. However, they are captured in the 12-month post-PE window of the current study and could obscure the true relationship between ongoing service utilization and PE treatment completion by inflating post-PE utilization. Second, the current study used treatment providers who have robust local institutional support for PE, including the allowance of 90-min sessions and no limit on available slots per week for the modality; such limits are a common barrier to evidence-based treatment in many VAMC facilities. Accordingly, study therapists have gained considerable experience and comfort with the PE protocol since being trained, which may not generalize to therapists throughout the system. Finally, an appropriate match between clinical presentation and treatment modality was facilitated by the confirmation of PTSD diagnoses via a formal CAPS assessment and the ability of the PCT to control acceptance of referrals based on assessment results. Many specialty PTSD clinics and individual VA providers do not have institutionalized protocols or the leadership support in place to shape appropriate referral streams. These caveats are likely to lead to a larger relationship between PE and decreased service utilization when compared with VAMC settings that do not encourage frequent, high-fidelity PE treatment or standardized, psychometrically valid PTSD assessments to inform access to specialty care.

The present study also has several strengths that address gaps in previous research. Primarily, measuring actual service utilization, rather than self-reported utilization and doing so in a naturalistic sample of patients with a confirmed diagnosis related to a specific evidence-based treatment constitutes a unique contribution to the field. Analyzing outcomes for an ITT sample and relative comparisons between treatment completers and noncompleters also represents a unique strength of this investigation, especially given demographic and clinical equivalency between the groups at baseline. Comparing PE-completers to veterans not offered PE offered a different treatment after assessment, or comparing to those otherwise not referred for specialty services in the first place would introduce almost certain selection biases in a naturalistic nonrandomized setting. Additionally, the availability of clinical outcomes verifying large reductions in PTSD symptoms for treatment completers provides a logical explanation for the relationship between PE completion and reduced mental health service utilization. Clinical outcome data were also helpful in investigating the potential linear relationship between treatment outcomes and service utilization. Although preliminary analyses revealed a statistically significant and clinically relevant correlation such that greater treatment effects were associated with lower service utilization after treatment, the effect did not reach statistical significance in the full model. Future studies should be powered appropriately to investigate this potential linear effect between PE treatment response and service utilization.

The current findings are relevant to a wide audience of VA clinicians, administrators, and policymakers. Many barriers still exist to the widespread implementation of PE as a frontline treatment for PTSD. Clinical managers are caught between competing demands to provide timely access to services for veterans (i.e., via shorter treatment-as-usual appointments or group therapy formats) and the need to demonstrate implementation of evidence-based treatment. If replicable, the results presented here indicate that the popular management strategy of allowing VA-trained PE providers to only schedule a few PE cases per week may be "penny wise but pound foolish" with regards to improving access to care and meeting long-term demands for mental health services. The scope and scale of the recent military deployments and the concomitant influx of citizens with PTSD, in addition to traditional rates of PTSD in the civilian population, also render these findings relevant to private insurers and other public and private health care organizations.

Still, a proportion of patients benefit from supportive mental health services, drop out of PE treatment, or do not respond to PE. Because the scientific literature has yet to develop a knowledge base to sufficiently inform clinical planning regarding those who do not respond to or who drop out of evidence-based treatment, it is reasonable to continue to provide ongoing supportive/coping, skills-based, or motivational therapies in these cases. However, focusing limited resources on front-line, high-fidelity effective treatments for PTSD will likely raise the level of services for all patients by lowering the census of those needing services over the long term. The current findings represent initial empirical evidence for this line of reasoning. Adapting institutional cultures, incentives, priorities, and habits to capitalize on this relatively new potential will be ongoing but important work.

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