Behaviour Research and Therapy 118 (2019) 7–17

Contents lists available at ScienceDirect

Behaviour Research and Therapy

journal homepage: www.elsevier.com/locate/brat

Predictors of attendance and dropout in three randomized controlled trials of PTSD treatment for active duty service members

Danielle S. Berke[a,b,*,1], Nora K. Kline[a,2], Jennifer Schuster Wachen[b,c], Carmen P. McLean[d,e], Jeffrey S. Yarvis[f,3], Jim Mintz[g,h], Stacey Young-McCaughan[g], Alan L. Peterson[g,i,j], Edna Foa[k], Patricia A. Resick[l], Brett T. Litz[a,b,m], for the STRONG STAR Consortium

[a] Massachusetts Veterans Epidemiological Research and Information Center, VA Boston Healthcare System, Boston, MA, USA
[b] Department of Psychiatry, Boston University School of Medicine, Boston, MA, USA
[c] National Center for PTSD, VA Boston Healthcare System, Boston, MA, USA
[d] National Center for PTSD, VA Palo Alto Healthcare System, Menlo Park, CA, USA
[e] Stanford University School of Medicine, Stanford, CA, USA
[f] Carl R. Darnall Army Medical Center, Fort Hood, TX, USA
[g] Department of Psychiatry, University of Texas Health Science Center at San Antonio, San Antonio, TX, USA
[h] Department of Epidemiology and Biostatistics, University of Texas Health Science Center at San Antonio, San Antonio, TX, USA
[i] Research and Development Service, South Texas Veterans Health Care System, San Antonio, TX, USA
[j] Department of Psychology, University of Texas at San Antonio, San Antonio, TX, USA
[k] Department of Psychiatry, University of Pennsylvania, USA
[l] Duke University Medical Center, USA
[m] Department of Psychological and Brain Sciences, Boston University, Boston, MA, USA

ARTICLE INFO

Keywords:
PTSD
Clinical trial
Attendance
Dropout
Active duty service members

ABSTRACT

Dropout from first-line posttraumatic stress disorder (PTSD) treatments is a significant problem. We reported rates and predictors of attendance and dropout in three clinical trials of evidence-based PTSD treatments in military service members ($N = 557$). Service members attended 81.0% of treatment sessions and 30.7% dropped out. Individually delivered treatment was associated with greater attendance rates ($\beta = 0.23$, $p < .001$) than group therapy; trauma-focused treatments were associated with higher dropout ($\beta = 0.19$, $p < .001$) than Present-Centered Therapy. Age was a significant predictor of session attendance ($\beta = 0.17$, $p < .001$) and drop out ($\beta = -0.23$, $p < .001$). History of traumatic brain injury (TBI) predicted lower attendance rates ($\beta = -0.26$, $p < .001$) and greater dropout ($\beta = 0.19$, $p < .001$). Regardless of treatment type or format, patients who did not drop out were more likely to experience clinically significant gains ($d = 0.49$, $p < .001$). Results demonstrate that dropout from PTSD treatments in these trials was significantly associated with treatment outcome and suggest that strategies are needed to mitigate dropout, particularly in group and trauma-focused therapies, and among younger service members and those with TBI.

Abbreviations: AUDIT, Alcohol Use Disorders Identification Test; BDI-II, Beck Depression Inventory-II; CBT, cognitive-behavioral therapy; CEQ, Credibility and Expectancy Questionnaire; CPT, Cognitive Processing Therapy; DVBIC-3, Defense and Veterans Brain Injury Center 3-Item Screening Tool; ICC, intraclass correlation; IRB, Institutional Review Board; MA-PN, multiple arm; partial nesting, OR; odds ratio, PCL-M; PTSD Checklist-Military Version, PCL-S; The PTSD Checklist, Stressor-Specific treatment version for *DSM-IV*; PE, Prolonged Exposure; PTSD, posttraumatic stress disorder; RC, reliable change; RCT, randomized controlled trial; STRONG STAR, South Texas Research Organizational Network Guiding Studies on Trauma And Resilience; TBI, traumatic brain injury; VA, Department of Veterans Affairs

* Corresponding author. author. VA Healthcare System, 150 South Huntington Ave., Boston, MA 02130, USA.
E-mail addresses: db2800@hunter.cuny.edu (D.S. Berke), nkline@clarku.edu (N.K. Kline), jennifer.wachen@va.gov (J.S. Wachen), carmen.mclean4@va.gov (C.P. McLean), jeffrey.s.yarvis.mil@mail.mil (J.S. Yarvis), mintz@uthscsa.edu (J. Mintz), youngs1@uthscsa.edu (S. Young-McCaughan), petersona3@uthscsa.edu (A.L. Peterson), foa@pennmedicine.upenn.edu (E. Foa), patricia.resick@duke.edu (P.A. Resick), brett.litz@va.gov (B.T. Litz).
[1] Danielle Berke is now at Hunter College of the City University of New York, New York, NY, USA.
[2] Nora Kline is now at Clark University, Worcester, MA, USA.
[3] Jeffrey Yarvis is now at the 21st Combat Support Hospital, Fort Hood, TX, USA.

https://doi.org/10.1016/j.brat.2019.03.003
Received 25 September 2018; Received in revised form 12 February 2019; Accepted 4 March 2019
Available online 08 March 2019
0005-7967/ Published by Elsevier Ltd.

1. Introduction

Although there have been significant advancements in the development and dissemination of evidence-based psychotherapies for posttraumatic stress disorder (PTSD) in survivors of military- or deployment-related trauma—chiefly Prolonged Exposure (PE) and Cognitive Processing Therapy (CPT)—in efficacy trials of these interventions, a significant proportion of patients (30–51%) fail to demonstrate clinically significant symptom change (Steenkamp, Litz, Hoge, & Marmar, 2015). Some evidence suggests that PTSD treatment outcomes tend to be better among civilians than among veterans (Bradley, Greene, Russ, Dutra, & Western, 2005; Watts et al., 2013). For example, a meta-analysis of predominantly civilian studies found that 44–54% of patients experienced clinically significant improvement; patients treated for combat-related PTSD showed the least change from pre-to post-treatment (Bradley, Greene, Russ, Dutra, & Westen, 2005).

The potential for worse PTSD treatment outcomes in military and veteran samples may, in part, reflect insufficient treatment attendance and high rates of dropout (Hoge, Lee, & Castro, 2017; Najavits, 2015; Szafranski, Gros, Menefee, Norton, & Wanner, 2014). In a recent review of randomized controlled trials (RCTs) for military-related PTSD (which included five RCTs of CPT—four with veterans and one with active duty military—and four RCTs of PE in veterans) dropout rates from first-line PTSD treatments ranged from 13 to 39% (Steenkamp et al., 2015). In effectiveness studies of PE and CPT provided in routine clinical care, dropout rates were even higher, ranging from 30 to 50% (Chard, Schumm, Owens, & Cottingham, 2010; Davis, Walter, Chard, Parkinson, & Houston, 2013; Gros, Yoder, Tuerk, Lozano, & Acierno, 2011; Jeffreys et al., 2014; Mott et al., 2014).

Regardless of the patient population, patients who prematurely terminate first-line PTSD treatment miss putative required elements and experiences of treatments that have distinct beginnings, middle portions, and ends, and patients who drop out have been found to exhibit poorer treatment outcomes (e.g., Ehlers et al., 2013; Tuerk et al., 2013). In group therapy, session non-attendance and therapy dropout may disrupt group cohesion and adversely impact other group members. Furthermore, the costs of absences and dropout (e.g., inefficiency in scheduling) arguably affect the entire mental health care system. Finally, given the stigma associated with treatment-seeking (Wright et al., 2009), dropout may be demoralizing and affect future care-seeking behavior. Thus, it is not surprising that numerous researchers have attempted to examine predictors of PTSD treatment attendance and dropout (see Schottenbauer, Glass, Arnkoff, Tendick, & Gray, 2008).

In studies of any cohort of patients in treatment for PTSD (i.e., in military and/or civilian samples), demographic variables such as age, gender, race/ethnicity, level of education, marital status, and, for veterans, service-connected disability status have been tested as predictors of dropout (Chard et al., 2010; Garcia, Kelley, Rentz, & Lee, 2011; Gros et al., 2011; Jeffreys et al., 2014; Mott et al., 2014; Rizvi, Vogt, & Resick, 2009; Taylor et al., 2003; van Minnen, Arntz, & Keijsers, 2002). Among these, younger age was the only demographic variable to predict dropout in more than one trial (Garcia et al., 2011; Gros et al., 2011; Jeffreys et al., 2014; Rizvi et al., 2009). Regarding baseline symptom burden and comorbid disorders as predictors of treatment attendance and dropout, several studies have found that greater baseline PTSD and depression symptom burden are associated with dropout (Chard et al., 2010; Garcia et al., 2011; Gros et al., 2011; Mott et al., 2014; Rizvi et al., 2009; Taylor et al., 2003; van Minnen et al., 2002; van Minnen & Hagenaars, 2002; Zayfert et al., 2005). Patients with comorbid substance use disorders have also been shown to be more likely to drop out of PTSD treatment (Zanberg, Rosenfeld, Alpert, McLean, & Foa, 2016). Moreover, in military samples, service members with a history of traumatic brain injury (TBI) endorse more severe symptoms of PTSD in comparison to those with no such history (e.g., Davis et al., 2013) and may therefore be more likely to drop out of PTSD treatment.

In terms of treatment type and modality, in a meta-analysis of dropout from PTSD treatment including both military and civilian samples, group treatment was associated with increased dropout relative to individual therapy (Imel, Laska, Jakupcak, & Simpson, 2013). In a mixed (i.e., military and civilian) review of 25 controlled studies of PTSD treatment, there was no evidence of differences between trauma-focused treatments (i.e., treatments that focus on the memory of the traumatic event or its meaning such as PE and CPT) and nontrauma focused treatments (e.g., stress inoculation training; Hembree et al., 2003). However, the more recent meta-analytic review (Imel et al., 2013) found that trauma-focused treatment had substantially higher dropout rates (i.e., on average, 36%) relative to Present-Centered Therapy (i.e., on average, 18%), a nontrauma focused treatment focused on current-life concerns and patient-directed problem-solving (Schnurr et al., 2003).

Credibility (i.e., the degree to which a patient believes that the therapy will work for him or her personally) and expectancy (i.e., the degree to which a patient believes that therapy will result in improvement) of treatment have also been studied as predictors of dropout and attendance from PTSD treatment. In one civilian study, greater perceived pretreatment credibility predicted less dropout, regardless of therapy type (Taylor et al., 2003). Although outcome expectancy has been associated with improved outcomes among combat-veterans receiving trauma-focused treatment (Price et al., 2015), the association between expectancy and attendance/dropout from PTSD treatment has not been studied extensively.

Unfortunately, research on predictors of treatment dropout has been hampered by the lack of uniformity or consensus in operationalizing dropout (Schottenbauer et al., 2008). The Clinical Data Interchange Standards Consortium (2011) recommended categorizing a dropout as any participant who, for any reason, fails to continue in the trial until the last visit. Although a number of PTSD treatment studies used this definition (Gros et al., 2011; Imel et al., 2013; Szafranski, Gros, Menefee, Wanner, & Norton, 2014), others defined a dropout as a case who did not complete some number or percentage of sessions (Jeffreys et al., 2014; Mott et al., 2014; Resick, Nishith, Weaver, Astin, & Feuer, 2002; Rizvi et al., 2009; Tuerk et al., 2013). Other studies based their definition on varying agreements between patient and therapist (e.g., failing to return to a scheduled appointment, leaving treatment before reaching a predetermined treatment goal: Chard et al., 2010; Garcia et al., 2011; Zayfert et al., 2005). Problematically, a number of researchers failed to specify how dropout was defined (Taylor et al., 2003; van Minnen et al., 2002; van Minnen & Hagenaars, 2002).

It is also uncertain what can be gleaned from existing studies of attendance and dropout from PTSD treatments, because studies that examined how attendance/dropout relates to PTSD symptom change used a range of methods for evaluating the significance of this change. For example, Szfranski and colleagues (2014) showed that lower overall symptom improvement predicted a shorter length of stay among veteran inpatient PTSD treatment noncompleters. However, symptom change was measured using a clinician-rated single-item assessment of "rate of improvement during treatment," and symptom change among treatment completers was not examined. Tuerk et al. (2013) examined effect size and statistical significance of differences between PTSD symptoms among treatment completers versus dropouts before and after PE. Results showed that treatment completion was associated with large effect size reductions in self-rated PTSD symptoms as measured by the PTSD Checklist-Military Version (PCL-M); there were no significant treatment effects for dropouts.

Although effect size is the modal way of indexing the magnitude of change in clinical trials, this method is chiefly applied to groups and therefore fails to capture important individual variability. Moreover, effect size calculations assume normal distributions and equal standard deviations between conditions, and because confidence intervals are rarely reported, the degree of stability of effect sizes, particularly for studies with small samples, is uncertain (see Steenkamp et al., 2015 for

a review and critique of the use of effect size calculations in PTSD trials in military populations). Finally, reliance on effect sizes to evaluate clinical significance is limited by the absence of a consensus or validated standard for determining how large a magnitude difference should inform practice. Galovski, Blain, Mott, Elwood, and Houle (2012) used what they called a *good end state criterion*, defined as a total PTSD symptom score below a cut-point to evaluate the clinical significance of symptom change among treatment dropouts and completers. However, the cutoff was not statistically determined but was instead selected on the basis of clinical judgment and precedence (Foa et al., 1999; van Minnen & Foa, 2006). This point criterion fails to capture participants above the cutoff who may display statistically reliable improvement.

In contrast to these approaches, Jacobson and Truax (1991) recommended a way of indexing clinically significant change that categorically classifies the end-state of individuals following treatment. Their method determines whether reliable change from baseline occurs, accounting for measurement error, and whether the magnitude of posttreatment scores are indicative of an end-state that is substantially different (at least two standard deviations) from either a normal reference group or the baseline distribution of all scores. These indices are particularly attractive because each individual is categorized separately, unpacking group means (Bauer, Lambert, & Neilsen, 2004). Only one study to date (described below) used the Jacobson and Truax methods to evaluate the impact of attendance/dropout on PTSD symptom change (Szafranski, Smith, Gros, & Resick, 2017).

Tuerk et al. (2013) hypothesized that treatment dropout may be due to low or flat symptom change over the course of treatment, ostensibly a proxy for dissatisfaction with care. Alternatively, some patients may drop out of therapy because they have already made sufficient gains. Szafranski et al. (2017) tested this latter hypothesis in a sample of civilian women with PTSD treated with CPT by assessing clinically significant change using Jacobson and Truax methods. They found that a sizable proportion (37.7%) of the dropouts in their sample (defined as a participant who initiated treatment but did not complete 100% of sessions) were what they called “early treatment responders; ” that is, they were categorized as recovered or improved based on clinically significant change criteria (the remaining 62.3% were categorized as unchanged or deteriorated; Szafranski et al., 2017).

To date, no study has described attendance and dropout rates and predictors of attendance and dropout from first-line PTSD therapies in clinical trials of active duty service members. This omission is significant, as service members face both high-rates of PTSD (Kok, Herrell, Thomas, & Hoge., 2012) and unique barriers to treatment engagement. For example, compared to military veterans, active-duty service members must contend with the potential impact of mental-health stigma on their military career (Hoge et al., 2014; Kim, Thomas, & Wilk, 2010; Sareen et al., 2007), and may therefore be less willing to fully engage in treatment for fear that disclosing mental health symptoms may negatively impact their professional standing. To address the shortcomings reviewed above, we leveraged the combined results of three randomized controlled trials of psychotherapy targeting active-duty service members with PTSD to examine attendance and dropout from first-line PTSD treatments. We had three aims: (1) to describe the rate and frequency of attendance and dropout across the three trials; (2) to examine demographic, mental health, and treatment delivery modality and type predictors of attendance and dropout; and (3) to test whether patients who drop out of treatment differ from those who complete treatment in terms of clinically significant improvement in PTSD over the course of treatment.

Based on prior findings, we hypothesized that younger age, greater baseline mental health symptom burden, and worse expectancies about treatment efficacy and credibility would predict attendance and dropout. We expected that younger service members would be less likely to overcome the imposition of time and effort due to competing interests (e.g., physical training, recreational activities, etc.). We assumed that baseline mental health symptom severity, including comorbid substance use problems, would be a proxy for case and problem complexity, which arguably affects attendance because various problems and symptoms negatively affect motivation for focal PTSD treatment. We assumed that service members who found the treatments less credible or had less confidence that the therapies would help them would be more likely to drop out of treatment and have attendance problems. Consistent with results of a recent meta-analysis (Imel et al., 2013), we also hypothesized that trauma-focused treatments would be associated with a lower rate of attendance and greater dropout compared to nontrauma-focused therapy and that group treatments would be associated with lower attendance and greater dropout than treatment delivered in an individual therapy modality. Finally, we hypothesized that participants who dropped out of treatment would be less likely to experience clinically significant PTSD symptom reduction than those who completed treatment.

2. Method

2.1. Participants and procedures

Participants were military service members recruited, assessed, and treated at the Carl R. Darnall Army Medical Center at Fort Hood, Texas, under the auspices of the *South Texas Research Organizational Network Guiding Studies on Trauma And Resilience* (STRONG STAR Consortium). We merged identical data elements from three separate clinical trials among service members who were randomized and initiated treatment. These trials were chosen for several reasons. First, these trials are the first large-scale RCTs of PTSD treatments conducted among active duty service members while in garrison. Second, consistent with the President's National Research Action Plan recommendations (Interagency Taskforce on Military and Veterans Mental Health, 2013), the three trials were conducted in the same setting, used common data elements and measures, a standardized method for inclusion/exclusion, and a common primary end-point, derived from the same cohort of highly reliable independent evaluators/interviewers (see, Barnes et al., 2018). The first trial examined the efficacy of a trauma-focused treatment, Cognitive Processing Therapy (CPT), relative to Present-Centered Therapy (PCT) in a sample of 108 service members; each therapy was provided in a 90-min group format delivered twice weekly (Trial 1; Resick et al., 2015). A second trial compared the efficacy of CPT conducted in a 90-min group format delivered twice weekly to CPT conducted in a 60-min individual therapy format (total $N = 268$; Trial 2; Resick et al., 2017). The third trial compared 10 individual, 90-min sessions of Prolonged Exposure (PE) delivered over 8 weeks (PE-spaced; PE-S); 10 individual, 90-min spaced PCT sessions delivered over 8 weeks; and 10 individual, 90-min sessions of massed PE delivered over 2 weeks (PE-M; total $N = 326$; Trial 3; Foa et al., 2018).

The Institutional Review Boards (IRB) at Brooke Army Medical Center and the University of Texas Health Science Center at San Antonio, as well as the U.S. Army Medical Research and Materiel Command Human Research Protection Office, approved the three clinical trials. All study participants provided informed consent. In order to monitor safety during the progress of the trial and to ensure that participants’ benefits exceeded risk, a Data Safety Monitoring Board, which was independent from the investigators and the research sponsor, monitored the trials. Our archival analyses were approved by the IRB at VA Boston Healthcare System. Across trials, recruitment was based on referrals by providers and self-referrals by service members. Prescreening criteria included active duty military status, previous deployment in support of Iraq and/or Afghanistan wars, aged 18–65 years, willing to participate in the format of treatments used in the research, available for the duration of the study, and psychiatric medication stability. Randomized participants were eligible to continue for the duration of treatment in each trial, with the exception of participants assigned to the group therapy treatment arm of Trial 2 (N = 122).

In this treatment arm only, participants who missed more than three sessions (N = 49) were discontinued from treatment. For a detailed description of study procedures please see Foa et al. (2018) and Resick et al. (2015; 2017).

Because massed PE entailed an atypically condensed treatment schedule and because there was no massed PCT arm in any of the three trials, the massed PE participants were excluded in the current study (N = 110). Additionally, participants who were randomized to treatment but did not initiate therapy (N = 42) were also excluded. Because they only had baseline data, change in PTSD symptoms could not be evaluated for these participants. The resulting N was 557 service members (7 participants who did not initiate therapy were assigned to PE-M).

2.2. Measures

Attendance and dropout. Centralized visit record data was used to calculate mean attendance rate and treatment dropout. Attendance rate was defined as the number of sessions attended divided by the total number of expected sessions within each treatment arm. Trials 1 and 2 entailed 12 sessions of treatment, and Trial 3 used 10 sessions of treatment for the spaced treatments. Consistent with recent examinations of dropout from evidence-based treatment for PTSD (e.g., Kehle-Forbes, Meis, Spoont, & Polusny, 2016) and best-practice guidelines for clinical trials research (Clinical Data Interchange Standards Consortium, 2011)), a service member was defined as a dropout if he or she failed to attend the last session of treatment.

Treatment characteristics. In order to assess the relationship between treatment type (i.e., CPT, PCT, PE), treatment modality (i.e., individual, group), and treatment focus (i.e., trauma-focused, present-centered), a series of dummy coded variables was created. Each characteristic was uniquely coded, such that the presence of the characteristic was coded a 1 and the absence of the characteristic was coded a 0. For example, participants who received CPT received a 1 for the CPT variable, and participants who received PCT or PE received a 0 for the CPT variable. See the Results for more information.

Demographics and military service characteristics. Standard demographic and military service information was collected to allow for assessment of age, gender, education, race/ethnicity, and years in the military as predictors of attendance and dropout.

2.3. Baseline symptom burden

Beck Depression Inventory - II (BDI-II). The BDI-II, a 21-item self-report measure, was used to assess affective and somatic symptoms of depression. Items are scored on a 0 (*no disturbance*) to 3 (*maximal disturbance*) scale. Total scores are characterized by the following ranges: minimal (0 − 13), mild (14–19), moderate (20–28), or major depressive symptom severity (29–63; Beck, Steer, & Brown, 1996). Scores on the BDI-II evidence adequate to good concurrent and discriminative validity (Beck et al., 1996). This measure's total score has also been shown to yield high internal reliability in a sample of post-9/11 military veterans (α = 0.93; Palmer et al., 2014) and in the current sample (α = 0.91).

Defense and Veterans Brain Injury Center 3-Item Screening Tool (DVBIC-3). A modified version of the DVBIC 3-Item Screening Tool was used to assess for a history of head injuries (Schwab et al., 2006). The instrument, which was initially called the Brief Traumatic Brain Injury Screen, captures the number of head injuries and indexes the checklist of peri-head trauma symptoms to the worst injury. Having experienced a head injury during deployment was assessed as a baseline predictor of attendance and dropout. This score has demonstrated good concurrent validity in a sample of service members returning from deployment (Schwab et al., 2007).

Credibility and Expectancy Questionnaire (CEQ). The CEQ (Devilly & Borkovec, 2000), a 6-item measure, was used to assess treatment expectancy and rationale credibility in the current study. The CEQ consists of two subscales. The 3-item expectancy subscale assesses whether the person affectively believes that the therapy will work for him or her personally; the 3-item credibility subscale assesses whether the person cognitively understands how the therapy works. The CEQ's subscale scores have demonstrated strong psychometric properties, such as internal consistency and test-retest reliability in Vietnam veterans (Devilly & Borkovec, 2000). Moreover, evidence from veteran samples supports the discriminant and predictive validity of the CEQ's subscale scores (Devilly & Borkovec, 2000). In this study, the internal consistency of the expectancy and credibility subscales were (α = 0.77; α = 0.85), respectively.

Alcohol Use Disorders Identification Test (AUDIT) - Self-report Version. The AUDIT (Babor, Higgins-Biddle, Saunders, & Monteiro, 2001), which is a 10-item, self-report measure consisting of three subscales (alcohol consumption, drinking behavior and alcohol-related problems), was used to identify people with hazardous or harmful patterns of alcohol consumption and to index the severity of these problems. The AUDIT's subscale scores have good internal consistency, as well as strong construct validity (Saunders, Aasland, Babor, De La Fuente, & Grant, 1993; see Reinert & Allen, 2007, for review). The internal consistency of the AUDIT was (α = 0.78) in this study.

The PTSD Checklist - Stressor-Specific treatment version for DSM-IV (PCL-S). The PCL-S (Weathers, Litz, Herman, Huska, & Keane, 1993), a 17-item, self-report measure, was used to assess PTSD severity. When administered at baseline, scoring is based on how much the patient has been bothered by PTSD symptoms in the past month; when administered during treatment, scoring is based on how much the patient has been bothered by PTSD symptoms since the last session. Total scores at baseline were assessed as possible predictors of attendance and dropout. Baseline and within-treatment PCLs were also utilized to index clinically significant change. Within-session PCLs were administered at every session in Trial 3 (excluding session 1 and session 10) and at even-numbered sessions (i.e., weekly) in Trials 1 and 2. PCL-S total severity score from the last session attended in Trial 3 or the last even-numbered session attended in Trials 1 and 2 was used to assess clinically significant change. The PCL-S's total symptom severity score has excellent internal reliability (α = 0.96) as well as convergent and discriminant validity (Bovin et al., 2016). In this study, the PCL-S had strong internal consistency (α = 0.85).

2.4. Data analysis plan

Descriptive analyses. Mean attendance rates and frequency of treatment dropout were calculated within each treatment arm of the three clinical trials. Descriptive statistics were also generated by treatment type (i.e., CPT, PE, and PCT) and in terms of trauma-focused versus present-focused treatments, as well as modality (individual versus group).

Multilevel modeling. Participants in the combined dataset were clustered within one of the three clinical trials, and all participants were nested within therapists (i.e., multiple service members were treated by the same therapist; total therapist n = 27). Participants assigned to a trial arm in which therapy was delivered in a group format were further nested into group cohorts, each with two therapists. Thus, the combined trials data has three levels of nesting in the group therapy arms (Level 1 = Participants; Level 2 = Group Cohorts; Level 3 = Therapists) and two levels of nesting in the individual therapy arms. Taking this clustered structure into account was important for several reasons. First, clustered sampling violates the assumptions of independence of observations for ordinary least square regression analyses and analysis of variance, because there may be dependencies within observations from the same cluster. Second, use of conventional statistical approaches to analyze clustered data without proper adjustment can lead to an underestimation of effect sizes (Compas et al., 2015).

Therefore, multi-level modeling was employed to evaluate the data structure. First, a series of null models (otherwise called intercept-only models) was constructed to estimate the intraclass correlation (ICC) of the dependent variables (i.e., attendance rate and dropout). The ICC measures the degree of dependence of observations. The larger the ICC, the more individual participant variation is due to differences between clusters (Geiser, 2013). Separate null-models were specified for each cluster (i.e., trial, therapist, group cohort) and each dependent variable. In order to account for the fact that participants in the combined dataset are partially nested within groups (i.e., half the participants in Trial 2 and all Trial 3 participants were delivered treatment in an individual therapy modality), multiple-arm partial nesting (MA-PN) models were specified (Sterba, 2017) by constraining group variance to zero for participants in individual therapies. As such, variability between group cohorts was only estimated among those participants assigned to group interventions.

Intercept-only models specifying trial cluster produced significant intraclass correlations for both attendance rate (ICC = .07, $p < .001$) and dropout (ICC = 0.05, $p < .001$), indicating that trial membership accounted for a substantial portion of individual differences in these variables. In other words, a nontrivial amount of the variance in attendance and dropout was due to average differences between the three clinical trials. As such, in all subsequent models of attendance and dropout, trial was entered as a covariate in a series of one-way random effects analyses of covariance (ANCOVA) to account for differences in attendance and dropout mean between trials (Luke, 2004). Intercept only models also indicated that, for those assigned to a group therapy treatment arm, group cohort accounted for a significant proportion of individual differences in dropout (ICC = .19, p = .005). However, this effect is likely an artifact of the operationalization of dropout in the current study paired with the rules in the group therapy arm of Trial 2 wherein participants were discontinued from the treatment if more than three sessions were missed. This rule artificially inflates the number of participants designated as a treatment dropout in Trial 2 group cohorts. Based on the unique discontinuation rule for participants in the group therapy arm of Trial 2 and evidence for a significant trial-level cluster effect, the significant group-level ICC likely reflects trial-level predictors of dropout. In keeping with Sterba (2017) recommendations for the construction and interpretation of multiple-arm partially nested (MA-PN) models, to avoid accounting for this source of dropout variance twice, trial was the only covariate included in subsequent analyses.

Next, a series of one-way random effects ANCOVA multilevel regression models were constructed to evaluate treatment characteristics including therapy (CPT; PE; PCT), modality (group; individual), and focus (i.e., trauma-focused; present-centered) as predictors of attendance rate and dropout, including difference in attendance rate and dropout means that emerged between trial clusters in the null-models as covariates. A series of one-way random effects ANCOVA multilevel regression models were also constructed to evaluate demographic characteristics, baseline symptom burden, and perception of treatment as predictors of dropout and attendance. Separate models were specified for each independent variable of interest, with the clustering effects of trial entered in each model as a covariate. Given the large number of separate regression analyses conducted on each dependent variable, a Bonferroni Correction was applied to mitigate the inflated risk of Type I error (Cabin & Mitchell, 2000). Bonferroni corrected *p*-values were calculated by dividing the α-critical value ($p = .05$) by the number of analyses (15) on each dependent variable. Thus, a more stringent α-critical value of $p \leq .003$ was used as a conservative estimate of statistical significance of each regression model.

For multilevel models examining the effects of treatment type on attendance and dropout, we selected CPT as a single reference group against which PE and PCT were compared, as participants assigned to CPT (across trials) had the lowest attendance and highest dropout rate compared to those assigned to either PE or PCT (see Table 2). Thus, four separate models were specified to examine the effects of therapy type on attendance and dropout. Specifically, the first two models contrasted PCT with CPT on attendance and dropout while the second two models contrasted PE with CPT. For multilevel models of treatment modality, participants assigned to an individual therapy condition were coded 1; participants assigned to individual therapy were coded 0. This variable was then entered in two separate models, one predicting attendance rate, and one predicting dropout. Finally, for multilevel models of treatment focus as a predictor of attendance and dropout, participants assigned to PE or CPT (i.e., treatments that focus on the memory of the traumatic event or its meaning) were coded 1, and participants assigned to PCT were coded 0. Importantly, each model was tested separately and each included the clustering effects of trial entered as a covariate.

Analyses of clinically significant change. Clinically significant change was calculated by the method recommended by Jacobson and Truax (1991) and as recommended in a review of clinical change indices (e.g., Bauer, Lambert, & Nielsen, 2004). This method entails a two-step criterion. The first task is to generate a reasonable cutoff between the patient/dysfunctional and non-patient/functional populations. Because there is no consensus-based recommendation for these values in the field, we used Jacobson and Traux's *cutoff A*, defined as the point 2 *SD*s beyond the range of the pretherapy mean of the clinical phenomenon of interest. For the current analyses, the pretreatment PCL-S total score was used (i.e., cutoff A = 34.96 = PCL-S baseline mean - 2 *SD* PCL-S baseline mean). The second criteria for determining clinically significant change involves the calculation of a reliable change index (RC) for each participant to ensure that symptom changes are not due to an artifact of measurement error. The RC is computed according to the following formula: RC = (x2 – x1)/Sdiff, where x1 is the participant's pretreatment PCL-S total score and x2 represents the participant's PCL-S total score when therapy was terminated. For participants who dropped out of treatment, x2 represents their PCL-S score in the treatment session prior to drop out. Sdiff represents the standard error of difference between these two test scores and was calculated from the internal consistency of the PCL-S at baseline, as suggested by Martinovich, Saunders, and Howard (1996). An RC larger than 1.96 is assumed to reflect substantive clinical and valid change (Jacobson & Truax, 1991).

Based on the two-step criterion specified by Jacobson and Truax (1991), individuals were classified as *recovered* (passed both cutoff A and RC criteria), *improved* (pass RC criterion but not cutoff A), *unchanged* (did not pass RC criteria), or *deteriorated* (passed RC criterion but symptom scores increased). We conducted chi-square analyses to compare participants who dropped out of treatment to those who completed treatment on two outcomes: (1) recovered or improved and (2) unchanged or deteriorated. Of note, participants who dropped out of treatment after Session 1 did not have PCL-S data available and were therefore excluded from analyses of clinically significant change ($n = 15$). Five additional participants were excluded due to missing PCL-S data from the session prior to dropout. Therefore, the total sample from which clinically significant change analyses were calculated totaled 537 participants.

3. Results

3.1. Rates of treatment attendance and dropout

Service members attended 81.0% of treatment sessions in all the trials and therapies combined, and 30.7% dropped out of treatment. When we included the 35 service members who were randomized to treatment but did not initiate care, the dropout rate increased to 34.8%, and the percentage of treatment sessions attended decreased to 76.2%. Among service members who initiated treatment and dropped out, there was a roughly equivalent percentage who dropped out early versus late in the therapies; 46.80% [$n = 80$] dropped out before or at Session 6 (in Trials 1 and 2) or Session 5 (in Trial 3), while 53.2%

Table 1
Attendance, dropout, and demographics by trial.

	Trial 1		Trial 2		Trial 3	
	CPT grp	PCT grp	CPT grp	CPT indv	PE-S indv	PCT indv
N	53	51	122	122	106	103
Number of sessions	12	12	12	12	10	10
Mean attendance rate (*SD*) [95% CI]	0.74 (0.24) [0.67, 0.81]	0.83 (0.16) [0.78, 0.87]	0.69 (0.29) [0.63, 0.74]	0.78 (0.32) [0.72, 0.84]	0.88 (0.23) [0.84, 0.93]	0.95 (0.18) [0.91, 0.98]
% Dropped out	39.6 (n = 21)	19.6 (n = 10)	46.7 (n = 57)	38.5 (n = 47)	25.5 (n = 27)	8.7 (n = 9)
Mean age (*SD*)	32.32 (7.18)	33.22 (7.87)	33.93 (7.92)	32.52 (6.96)	32.92 (7.07)	32.79 (7.44)
% Male sex	92.5 (n = 49)	92.2 (n = 47)	92.6 (n = 113)	89.3 (n = 109)	90.6 (n = 96)	84.5 (n = 87)
Mean years in the military (*SD*)	9.81 (5.91)	10.83 (6.83)	11.25 (6.16)	10.61 (6.50)	11.05 (6.38)	10.93 (6.16)
Educational levelGED/high school	32.1 (n = 17)	33.3 (n = 17)	4.1 (n = 5)	18.9 (n = 23)	34.0 (n = 36)	5.8 (n = 6)
Associates/bachelor's degree	67.9 (n = 36)	66.7 (n = 34)	95.9 (n = 117)	78.7 (n = 96)	64.2 (n = 68)	94.2 (n = 97)
Advanced degree	0	0	0	2.4 (n = 3)	1.8 (n = 2)	0
Race % White	66.0 (n = 35)	60.8 (n = 31)	48.4 (n = 59)	45.1 (n = 55)	58.5 (n = 62)	63.1 (n = 65)
% Black or African American	18.9 (n = 10)	21.6 (n = 11)	31.1 (n = 38)	31.1 (n = 38)	24.5 (n = 26)	20.4 (n = 21)
% Native Hawaiian /Other Pacific Islander	3.8 (n = 2)	0	.8 (n = 1)	2.5 (n = 3)	.9 (n = 1)	1 (n = 1)
%American Indian/Alaskan Native	3.8 (n = 2)	2 (n = 1)	2.5 (n = 3)	1.6 (n = 2)	0	3.9 (n = 4)
% Asian	1.9 (n = 1)	0	0	2.5 (n = 3)	1.9 (n = 2)	0
% Other	5.6 (n = 3)	15.6 (n = 8)	17.2 (n = 21)	17.2 (n = 21)	14.2 (n = 15)	11.7 (n = 12)

Note. CPT grp = Cognitive Processing Therapy, group treatment; PCT grp = Present-Centered Therapy, group treatment; CPT indv = Cognitive Processing Therapy, individual treatment; PE-S indv = Prolonged Exposure–Spaced, individual treatment; PCT indv = Present-Centered Therapy, individual treatment; CI = confidence interval.

Table 2
Attendance and dropout by treatment type.

	PE	PCT	CPT	Group	Individual	Trauma Focused	Present Centered
N	106	154	297	226	331	403	154
Number of sessions	10	10 & 12	12	12	10 & 12	10 & 12	10& 12
Mean attendance rate (*SD*) [95% CI]	0.88 (0.23) [0.84, 0.93]	0.91 (0.18) [0.88, 0.94]	0.74 (0.30) [0.70, 0.77]	0.73 (0.26) [0.70, 0.76]	0.86 (0.26) [0.84, 0.89]	0.77 (0.29) [0.74, 0.80]	0.91 (0.18) [0.88, 0.94]
% Dropped out	25.5 (n = 27)	12.3 (n = 19)	42.1 (n = 125)	38.9 (n = 88)	25.1 (n = 83)	37.7 (n = 152)	12.3 (n = 19)

Note. PE = Prolonged Exposure; PCT = Present-Centered Therapy; CPT = Cognitive Processing Therapy; CI = confidence interval.

[n = 91] dropped out after completing half of the treatment or more (proportion difference = −0.06, 95% CI [-0.21, 0.09]). Participants who completed treatment attended an average of 95.7% of sessions (*SD* = 0.08). The majority (91%) of those who attended treatment regularly (defined as attending a least 9 sessions in 12-session treatment arms or 7 sessions in 10-session treatment arms), also attended the final session. The mean number of sessions attended by participants who dropped out was 5.53 (*SD* = 2.93). Table 1 provides mean attendance rates and frequency of treatment dropout within each treatment arm of the three clinical trials. Descriptive statistics for dropout and frequency by treatment type (i.e., CPT, PE, PCT; trauma-focused versus present-focused) and modality (individual versus group) are also provided in Table 2.

3.2. Predictors of attendance and dropout

Results of one-way random effects ANCOVA multilevel regression models of attendance and dropout are presented in Table 3. Results indicated that participants assigned to PCT (β = 0.26, p < .001) and PE (β = 0.21, p < .001) had higher attendance rates, relative to participants assigned to a CPT condition. Participants assigned to PCT (β = −0.27, p < .001) and PE (β = −0.14, p = .001) were also less likely to drop out of treatment compared to participants assigned to a CPT treatment. Consistent with hypotheses, participants assigned to an individual therapy arm (individual PCT, CPT, or PE in any trial) attended significantly more sessions of treatment than those participating in group therapy (β = .23, p < .001). Also in keeping with our prediction, participants randomized to a trauma-focused treatment (any CPT or PE arm in any trial) had a significantly higher dropout rate than service members randomized to any PCT arm (β = 0.19, p < .001). Compared to PCT, participants in trauma-focused treatment were also more likely to drop out (β = 0.19, p < .001).

Table 4 presents results of one-way random effects ANCOVA multilevel regression models of demographic and military service characteristics, baseline mental health symptom burden (severity scores), and pretreatment expectancy and credibility ratings as predictors of attendance rate and dropout. Again, separate models were specified for each independent variable of interest, with the clustering effects of trial entered in each model as a covariate. As predicted, age was a significant predictor of treatment attendance (β = 0.17, p < .001), indicating that older participants had a higher rate of treatment attendance and were less likely to drop out of treatment (β = −0.23, p < .001). Participants who were in the military the longest also had a higher rate of treatment attendance (β = 0.16, p < .001) and were less likely to drop out of treatment (β = −0.21, p < .001). In contrast, history of TBI negatively predicted treatment attendance (β = −0.26, p < .001) and positively predicted dropout (β = 0.19, p < .001). Unexpectedly, no other measure of baseline symptom burden emerged as a significant predictor of attendance or dropout. As hypothesized, participants' pretreatment perceptions of the credibility of the treatment positively predicted attendance rate (β = 0.15, p = .003). However, contrary to our hypotheses, credibility did not emerge as a significant predictor of drop

Table 3
Effects of treatment characteristics on attendance and dropout.

Predictor	Attendance Rate			Dropped Out		
	β	*SE*	95% CI	β	*SE*	95% CI
Therapy (reference: CPT)						
PCT	0.16**	0.03	[0.10, 0.22]	−0.27**	0.04	[-0.35, −0.19]
PE	0.21**	0.03	[0.15, 0.27]	−0.14**	0.04	[-0.22, −0.06]
Modality (reference: group therapy)	0.23**	0.05	[0.13, 0.33]	−0.12	0.05	[-0.22, −0.02]
Trauma-focused (reference: PCT)	−0.13	0.05	[-0.23, −0.03]	0.19**	0.05	[0.09, 0.29]

Note. **$p \leq .003$; Due to application of the Bonferonni Correction, some effects with 95% CIs excluding zero are not designated as significant. CPT = Cognitive Processing Therapy; PCT = Present-Centered Therapy; PE = Prolonged Exposure. Table summarizes results of ($n = 8$) separate models: Model 1) contrasts PCT with CPT as predictors of attendance; Model 2) contrasts PCT and CPT as predictors of dropout; Model 3) contrasts PE with CPT as predictors of attendance; Model 4) contrasts PE with CPT as predictors of dropout; Model 5) contrasts individual therapy and group therapy as predictors of attendance; Model 6) contrasts individual therapy and group therapy as predictors of dropout; Model 7) contrasts PE or CPT (i.e., trauma-focused treatments) with PCT as predictors of attendance; Model 8) contrasts PE or CPT with PCT as predictors of dropout. The clustering effects of trial was entered as a covariate in all models.

out ($\beta = -0.08$, $p = .14$), nor did expectancy predict either attendance ($\beta = 0.01$, $p = .889$) or dropout ($\beta = -0.04$, $p = .521$).

3.3. Rates of clinically significant change

Results of the clinically significant change analyses are presented in Table 5. Participants who completed treatment were significantly more likely to recover or experience significant improvements in their PTSD symptoms than those who dropped out ($d = 0.49$, $p < .001$). Conversely, those who completed treatment were significantly less likely to stagnate or experience a worsening of symptoms during treatment than those who dropped out ($d = 0.35$, $p < .01$). To explore the impact of timing of dropout, we conducted a logistic regression comparing early (before or at Session 5) versus late (Session 6 and onward) dropouts as a predictor of clinically significant change in PTSD symptoms. Results were nonsignificant ($\beta = -2.10$, $SE = 0.40$, OR = 0.12, $p = .95$), indicating no difference in reliable change among those who dropped out early versus late.

4. Discussion

Dropout from evidence-based treatments for military-related PTSD is a significant problem in clinical trials and practice in the military and in the Department of Veterans Affairs (VA; Hoge et al., 2017; Najavits, 2015; Szafranski et al., 2014). Existing research has yet to identify a consistent or generalizable set of circumstances or predictors of dropout that might be translated into strategies to mitigate the problem. This is in part due to the varied definitions of dropout and the lack of power to test moderators of dropout. To address these problems, using a standard definition of dropout, we investigated the rates and predictors of attendance and dropout among active duty service members randomized into three large, randomized controlled clinical trials of first-line evidence-based treatments for PTSD. We predicted that younger age, greater baseline mental health symptom burden, and worse expectancies and ratings of the credibility of the treatments would predict dropout. We also predicted that trauma-focused and group treatments would be associated with greater dropout and that dropouts would have worse outcomes.

Despite applying a conservative definition of dropout (relative to many prior trials), the overall dropout rate (30.7%) in this study was consistent with prior PTSD trials conducted in VA settings (Steenkamp et al., 2015). With respect to predictors of dropout, several of our predictions were confirmed. Older service members attended more sessions and had fewer dropouts relative to younger participants. This finding is consistent with prior studies of treatment dropout in veteran samples (Garcia et al., 2011; Gros et al., 2011; Jeffreys et al., 2014). It may be that younger service members have more competing life responsibilities, demands, or needs. On the other hand, older service members may feel that more is at stake with respect to their mental health and the need to make sure that these problems do not interfere with their professional responsibilities. Older service members in this sample also tended to report higher levels of education and lower levels of alcohol use problems (see Supplementary Table 1). Therefore, it is also possible that older service members may have attended more

Table 4
Effects of Individual Difference Variables on Treatment Attendance Rate and Dropout.

Predictor	Attendance Rate			Dropped Out		
	β	*SE*	95% CI	β	*SE*	95% CI
Demographic						
Age	0.17**	0.04	[0.09, 0.25]	−0.23**	0.04	[-0.31, −0.15]
Gender	−0.06	0.04	[-0.14, 0.02]	0.03	0.04	[-0.05, 0.12]
Years in the military	0.17**	0.04	[0.09, 0.25]	−0.21**	0.04	[-0.29, −0.13]
Education	0.07	0.04	[-0.01, 0.15]	−0.11	0.04	[-0.19, −0.03]
Race	0.01	0.04	[-0.07, 0.09]	0.02	0.04	[-0.06, −0.10]
Baseline symptoms						
PCL-S total	0.07	0.04	[-0.01, 0.15]	−0.05	0.04	[-0.13, 0.03]
BDI-II total	−0.03	0.04	[-0.11, 0.05]	0.04	0.04	[-0.04, 0.12]
History of TBI	−0.26**	0.05	[-0.36, −0.16]	0.19**	0.05	[0.09, 0.29]
AUDIT total	0.06	0.04	[-0.02, 0.14]	−0.05	0.04	[-0.13, 0.03]
Therapy credibility and expectancy						
CEQ credibility	0.15**	0.05	[0.05, 0.25]	−0.08	0.05	[-0.18, 0.02]
CEQ expectancy	0.01	0.06	[-0.12, 0.13]	−0.04	0.06	[-0.16, 0.08]

Note. **$p \leq .003$; Due to application of the Bonferonni Correction, some effects with 95% CIs excluding zero may not be designated as significant; Parameter estimates for each predictor were calculated in separate regression models; PCL-S = PTSD Checklist-Stressor Specific Treatment Version for *DSM-IV*; BDI-II = Beck Depression Inventory-II; TBI = traumatic brain injury; AUDIT = Alcohol Use Disorders Identification Test; CEQ = Credibility and Expectancy Questionnaire.

Table 5
Classification categories by completers and dropouts.

	Recovered	Improved	Unchanged	Deteriorated
Completers	28.6% (n = 110)	15.9% (n = 61)	51.0% (n = 196)	4.4% (n = 17)
Dropouts	11.1% (*n* = 17)	13.7% (*n* = 21)	68.6% (*n* = 105)	6.5% (*n* = 10)
	Recovered/Improved Combined		Unchanged/Deteriorated Combined	
Completers	44.5% (*n* = 171)		55.4% (*n* = 213)	
Dropouts	24.8% (*n* = 38)		75.1% (*n* = 115)	

Completers versus Dropouts Comparisons

	z-score	*p*-value	*d* (effect size)
Recovered/Improved	3.52	< .001	0.49
Unchanged/Deteriorated	3.17	< .01	0.35

Note. Completer *N*: 384; Dropout *N*: 153.

treatment sessions due to lower levels of treatment competing factors (i.e., comorbid alcohol use problems) and/or the presence of treatment supporting factors (i.e., educational background).

Credibility ratings, but not expectancy ratings, at Session 1 predicted attendance rate but not dropout, regardless of therapy type. Patients who perceived treatment to be logical attended more sessions, which is consistent with Taylor et al. (2003). Based on these findings, it is recommended that therapists be prepared to correct misperceptions about the treatment and find ways of generating greater patient buy-in, if possible. Because patients may be unassertive about misgivings, therapists should empathically test the limits of patients' understanding of the treatment and take concerns about the plausibility or viability of the treatment seriously. Current best practices in the VA recommend that therapists briefly explain CPT and PE and offer patients a choice between these first-line treatments (Department of Veterans Affairs and Department of Defense, 2017). This practice is putatively designed to allow patients to select the treatment they find most credible. The hope is that this may provide a context for shared decision making and an opportunity for respectful, empowering dialogue aimed at addressing patients' potential misunderstanding, fears, or other barriers to buy-in.

Consistent with the results of a recent a meta-analysis of dropout in PTSD treatment (Imel et al., 2013), service members randomized to group treatments attended a significantly lower rate of treatment sessions. This finding may reflect the fact that treatment administered in a group may lack the flexibility available in individual therapy for patients to make up missed sessions. Manualized group treatment is recommended over no treatment in the *VA/DoD Clinical Practice Guideline for the Treatment of Posttraumatic Stress Disorder and Acute Stress Disorder* (Department of Veterans Affairs and Department of Defense, 2017). Moreover, group treatment is a very common therapy modality in VA settings (rates are not known in the military) because it is an efficient way to use therapist time and may provide opportunities to reduce veterans' isolation. However, group therapies typically have substantially smaller effect sizes (Schnurr et al., 2003; Sloan, Feinstein, Gallagher, Beck, & Keane, 2013; see), and Resick et al. (2017; Trial 2) found that individually provided CPT was superior to group CPT. The amount of variance in outcome in group PTSD treatment that can be attributed to treatment dropout is uncertain but should be studied.

Also, in keeping with Imel and colleagues' (2013) meta-analysis, CPT and the combined trauma-focused therapies (CPT and PE) were associated with greater dropout relative to PCT, accounting for differences in dropout mean variance between trials. This finding contributes to the ongoing debate about whether or not trauma-focused treatments, which ask the patient to directly confront thoughts or memories of traumatic events, are especially challenging for patients to tolerate (e.g., Foa, Zoellner, Feeny, Hembree, & Alvarez-Conrad, 2002; Hembree et al., 2003; Imel et al., 2013). Findings from this study align with evidence from three other clinical trials comparing trauma versus non trauma-focused treatments that dropout is lower in PCT that trauma-specific treatments (Imel et al., 2013) but we cannot know whether the degree of trauma-focus was the specific reason. Moreover, given evidence that PCT may be of comparable efficacy to trauma-focused treatment and is included among the Society of Clinical Psychology's empirically supported treatments for PTSD (Society of Clinical Psychology, 2012), results from the current study suggest that PCT should be considered as a treatment option for service-members with PTSD, particularly those who are at risk of dropout.

Contrary to expectations, history of TBI was the only baseline mental health predictor associated with less attendance and greater dropout. This finding may be related to the cognitive demands of treatment (e.g., cognitive flexibility, sustained attention, memory retrieval: Scholten, Vasterling, & Grimes, 2017). Therapists should consider conducting brief mental status examinations and generating strategies to help service members with these deficits engage and attend treatment to the best of their abilities.

Finally, consistent with our hypotheses, we found that participants who completed treatment were more likely to recover or experience improvements in their PTSD symptoms than those who dropped out. Treatment completers were less likely to stagnate or experience a worsening of symptoms during treatment than those who dropped out. Although it is not surprising that completers made more substantive gains than dropouts, this effect appears not to be simply explained by "dose" in that participants who dropped out early (lower dose) did not have lower rates of clinically significant change relative to participants who dropped out later in treatment. This suggests that, on average, service members who dropped out of PTSD treatment in these trials were not doing so because they made sufficient early gains. In contrast to the claim that some dropouts may be better characterized as "early treatment responders" (Szafranski et al., 2017), we found that the vast majority of patients who did not attend the final therapy session (75.1%) either experienced no clinically significant improvement or declined. However it is important to note that our findings reflect our use of best practice definition of dropout for clinical trials research (i.e., a subject who for whatever reason fails to continue in the trial until the last visit required of him/her by the study protocol; Clinical Data Interchange Standards Consortium, 2011), which is a more conservative classification than the definition of dropout used by Szafranski and colleagues (i.e., not attending 100% of sessions).

There are several strengths to this study. The three trials included in these analyses were high quality, and each used state-of- the-art common data elements and procedures that enhance the validity of the meta-data (e.g., the study benefited from the wide variety of independent variables available in this context). The size of the overall study group obviated the power problems in prior studies of dropout,

and a conservative alpha level correction was applied minimizing the potential for Type-I error. We appealed to the best practice definition of dropout for clinical trials research (Clinical Data Interchange Standards Consortium, 2011). Moreover, benchmarking the impact of dropout on PTSD symptom change (Jacobson & Truax, 1991) enhanced the clinical utility and comparability of the findings.

This study also has noteworthy limitations. First, participants were predominately white, not-hispanic/latino men, which limits the generalizability to women and more racially/ethnically diverse samples. Other important demographic variables (e.g., religion, sexual orientation) were not assessed, further limiting complete understanding of the contributions of cultural identity to our findings. Second, the extent to which these findings generalize to clinical practice remains an empirical question. Third, although a weekly or since your last session version of the PCL is routinely used in clinical practice and in trials, there is no empirical study if the relative validity of these symptom ratings. Fourth we could not include cases that dropped out prior to initiation of treatment or those who dropped out at the first session in the analyses of clinically significant change, because these analyses require both pre- and post-PTSD symptom ratings. As such, this source of dropout is not represented in the findings. Finally, variability in protocol across trials for discontinuing participants from treatment presented a potentially confounding influence on the association between treatment attendance and dropout. However, results of supplementary analyses indicate that our findings are highly robust with respect to the way dropout is defined across trials.[4]

Despite these limitations, there are practice implications of these results. Results from this study suggest that dropping out of treatment is an important predictor of treatment failure. As such, therapists should consider having sustained and frank conversations with their prospective service member patients about the demands of various psychotherapies and solicit any concern about attendance and obstacles to completion before they enter into a therapy contract with the patient. In the military, therapists may also need to have conversations about role expectations and anticipate military and other life demands, which may make attendance problematic. Factors likely to be particularly important for promoting retention and effectiveness of treatment among active-duty military populations include addressing stigma associated with mental health care and acknowledging patient concerns about confidentiality (Hoge at al., 2014). In comparison to veterans, active-duty service members receiving PTSD treatment must balance the potentially competing demands of recovery (which requires disclosure of symptoms and distress) with the desire to maintain professional standing in the military occupational context (which requires ongoing mental fitness for duty). Clinicians treating active duty service members should be well informed of confidentiality policies and prepared to identify and address patient fears about the potential interpersonal and/or career consequences of engaging in PTSD treatment. Moreover, therapists and patients should check in regularly and openly discuss treatment progress in order to promote ongoing treatment buy-in, engagement, and completion. Indeed, collecting patient feedback about treatment progress has been identified by the American Psychological Association Division 29 (Society for the Advancement of Psychotherapy) Task Force on Empirically Supported Therapy Relationships as a demonstrably effective treatment practice (Lambert & Shimokawa, 2011). Results from the current study highlight the particular importance of engaging in efforts to promote patient buy-in for trauma-focused treatments and suggest that dropout may be reduced to the extent that patients are offered individual treatment when available. Finally, PCT should be considered as an alternative when dropout is expected to be a problem.

In conclusion, these results show that dropout from evidence-based for military-related PTSD is a significant problem in clinical trials. To the extent to which these findings generalize to practice, clinicians should consider strategies to mitigate dropout, particularly in group and trauma-focused therapies and among younger service members, and those with TBI.

[4] To examine how our results might change had we adopted an alternative definition of dropout, we calculated frequencies of dropout defined as attending less than 9 session in 12-session treatment arms or less than 7 sessions in 10-session treatment arms. Using this new definition, 134 participants would be classified as dropouts; 18 from Trial 1; 27 from Trial 3, and 89 from Trial 2 (49 in the group therapy arm and 40 individuals in the individual therapy arm). All of those classified as dropouts by this new definition in Trial 1, Trial 3 and the individual therapy arm of Trial 2 also failed to complete the last session (these data were unavailable for the group therapy arm of Trial 2 since these participants were automatically discontinued). Therefore, recoding the dropout variable using this alternative definition constitutes a constant transformation; it produces an identical dropout variable as the one calculated using our best-practice definition (failure to complete the final treatment session). These analyses suggest that our findings are highly robust with respect to the way dropout is defined.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.brat.2019.03.003.

Acknowledgments

Potential conflicts of interest

None.

Funding and support

This work was supported by the U.S. Department of Defense through the U.S. Army Medical Research and Materiel Command, Congressionally Directed Medical Research Programs, Psychological Health and Traumatic Brain Injury Research Program awards W81XWH-08-02-109 (Alan Peterson), W81XWH-08-02-0111 (Edna Foa), W81XWH-08-02-0114 (Brett Litz), and W81XWH-08-02-0116 (Patricia Resick).

Role of the funding sources

The funding source had no involvement in the study design, the collection, analysis and interpretation of data, the writing of this report, or the decision to submit this article for publication.

Disclaimer

The views expressed herein are solely those of the authors and do not reflect an endorsement by or the official policy or position of the U.S. Army, the Department of Defense, the Department of Veteran Affairs, or the U.S. Government.

References

Babor, T. F., Higgins-Biddle, J., Saunders, J., & Monteiro, M. (2001). *The alcohol use disorders identification test–guidelines for use in primary care* (2nd ed.). Geneva, Switzerland: World Health Organization. http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.505.4146&rep=rep1&type=pdf.

Barnes, J. B., Presseau, C., Jordan, A. H., Kline, N. K., Young-McCaughan, S., Peterson, A. L., et al. the Consortium to Alleviate PTSD. (2018). Common data elements for military-related PTSD research applied in the Consortium to alleviate PTSD. *Military Medicine*. https://doi.org/10.1093/milmed/usy226 online-first.

Bauer, S., Lambert, M. J., & Nielsen, S. L. (2004). Clinical significance methods: A comparison of statistical techniques. *Journal of Personality Assessment, 82*, 60–70. https://doi.org/10.1207/s15327752jpa8201_11.

Beck, A. T., Steer, R. A., & Brown, G. K. (1996). *Manual for the BDI-II.* San Antonio, TX: Psychological Corporation.

Bovin, M. J., Marx, B. P., Weathers, F. W., Gallagher, M. W., Rodriguez, P., Schnurr, P. P., et al. (2016). Psychometric properties of the PTSD checklist for diagnostic and

statistical manual of mental disorders – fifth edition (PCL-5) in veterans. *Psychological Assessment, 28*, 1379–1391. https://doi.org/10.1037/pas0000254.
Bradley, R., Greene, J., Russ, E., Dutra, L., & Westen, D. (2005). A multidimensional meta-analysis of psychotherapy for PTSD. *American Journal of Psychiatry, 162*(2), 214–227. https://doi.org/10.1176/appi.ajp.162.2.214.
Cabin, R. J., & Mitchell, R. J. (2000). To Bonferroni or not to Bonferroni: When and how are the questions. *The Bulletin of the Ecological Society of America, 81*, 246–248. https://doi.org/10.1348/014466503321903553.
Chard, K. M., Schumm, J. A., Owens, G. P., & Cottingham, S. M. (2010). A comparison of OEF and OIF veterans and Vietnam veterans receiving cognitive processing therapy. *Journal of Traumatic Stress, 23*, 25–32. https://doi.org/10.1002/jts.20500.
Clinical Data Interchange Standards Consortium (2011). *CDISC and industry collaborative group lead FDA critical path initiative opportunity for data collection standards.* http://www.appliedclinicaltrialsonline.com/cdisc-clinical-research-glossary.
Compas, B. E., Forehand, R., Thigpen, J., Hardcastle, E., Garai, E., McKee, L., ... Sterba, S. (2015). Efficacy and moderators of a family group cognitive–behavioral preventive intervention for children of parents with depression. *Journal of Consulting and Clinical Psychology, 83*, 541–553. https://doi.org/10.1037/a0039053.
Davis, J. J., Walter, K. H., Chard, K. M., Parkinson, R. B., & Houston, W. S. (2013). Treatment adherence in cognitive processing therapy for combat-related PTSD with history of mild TBI. *Rehabilitation Psychology, 58*, 36–42. https://doi.org/10.1037/a0031525.
Department of Veterans Affairs and Department of Defense (2017). *VA/DoD clinical practice guideline for the management of posttraumatic stress disorder and acute stress disorder.* (Washington DC: Author).
Devilly, G. J., & Borkovec, T. D. (2000). Psychometric properties of the credibility/expectancy Questionnaire. *Journal of Behavior Therapy and Experimental Psychiatry, 31*, 73–86. https://doi.org/10.1016/S0005-7916(00)00012-4.
Ehlers, A., Grey, N., Wild, J., Stott, R., Liness, S., Deale, A., ... Clark, D. M. (2013). Implementation of cognitive therapy for PTSD in routine clinical care: Effectiveness and moderators of outcome in a consecutive sample. *Behaviour Research and Therapy, 51*, 742–752. https://doi.org/10.1016/j.brat.2013.08.006.
Foa, E. B., Dancu, C. V., Hembree, E. A., Jaycox, L. H., Meadows, E. A., & Street, G. P. (1999). A comparison of exposure therapy, stress inoculation training, and their combination for reducing posttraumatic stress disorder in female assault victims. *Journal of Consulting and Clinical Psychology, 67*, 194–200. https://doi.org/10.1037/0022-006X.67.2.194.
Foa, E. B., McLean, C. P., Zang, Y., Rosenfield, D., Yadin, E., Yarvis, J. S., ... Peterson, A. L. for the STRONG STAR Consortium. (2018). Effect of prolonged exposure therapy delivered over 2 weeks vs 8 weeks vs present-centered therapy on PTSD symptom severity in military personnel: A randomized clinical trial. *The Journal of the American Medical Association, 319*, 354–364. https://doi.org/10.1001/jama.2017.21242.
Foa, E. B., Zoellner, L. A., Feeny, N. C., Hembree, E. A., & Alvarez-Conrad, J. (2002). Does imaginal exposure exacerbate PTSD symptoms? *Journal of Consulting and Clinical Psychology, 70*, 1022–1028. https://doi.org/10.1037/0022-006X.70.4.1022.
Galovski, T. E., Blain, L. M., Mott, J. M., Elwood, L., & Houle, T. (2012). Manualized therapy for PTSD: Flexing the structure of cognitive processing therapy. *Journal of Consulting and Clinical Psychology, 80*, 968–981. https://doi.org/10.1037/a0030600.
Garcia, H. A., Kelley, L. P., Rentz, T. O., & Lee, S. (2011). Pretreatment predictors of dropout from cognitive behavioral therapy for PTSD in Iraq and Afghanistan war veterans. *Psychological Services, 8*, 1–11. https://doi.org/10.1037/a0022705.
Geiser, C. (2013). *Data analysis with mplus* (English ed.). New York: Guilford.
Gros, D. F., Yoder, M., Tuerk, P. W., Lozano, B. E., & Acierno, R. (2011). Exposure therapy for PTSD delivered to veterans via telehealth: Predictors of treatment completion and outcome and comparison to treatment delivered in person. *Behavior Therapy, 42*, 276–283. https://doi.org/10.1016/j.beth.2010.07.005.
Hembree, E. A., Foa, E. B., Dorfan, N. M., Street, G. P., Kowlaski, J., & Tu, X. (2003). Do patients drop out prematurely from exposure therapy for PTSD? *Journal of Traumatic Stress, 16*, 555–562. https://doi.org/10.1023/b:jots.0000004078.93012.7d.
Hoge, C. W., Grossman, S. H., Auchterlonie, J. L., Riviere, L. A., Miliken, C. S., & Wilk, J. E. (2014). PTSD treatment for soliders after combat deployment: Low utilization of mental health care and reasons for dropout. *Psychiatric Services, 65*, 997–1004. https://doi.org/10.1176/appi.ps.201300307.
Hoge, C. W., Lee, D. J., & Castro, C. A. (2017). Refining trauma-focused treatments for service members and veterans with posttraumatic stress disorder: Progress and ongoing challenges. *JAMA Psychiatry, 74*, 13–14. https://doi.org/10.1001/jamapsychiatry.2016.2740.
Imel, Z. E., Laska, K., Jakupcak, M., & Simpson, T. L. (2013). Meta-analysis of dropout in treatments for posttraumatic stress disorder. *Journal of Consulting and Clinical Psychology, 81*, 394–404. https://doi.org/10.1037/a0031474.
Interagency Taskforce on Military and Veterans Mental Health. (2013). *National research action plan: Responding to the executive order "improving access to mental health services for veterans, service members, and military families (August 31, 2012).".* Department of Defense, Department of Veterans Affairs, Department of Health and Human Services, Department of Education. Washington, DC, Departments of Defense, Veterans Affairs, Health and Human Services, and Education, 2013 https://www.ninds.nih.gov/sites/default/files/NRAP_AUG2012_508C.pdf, Accessed date: 4 December 2018.
Jacobson, N. S., & Truax, P. (1991). Clinical significance: A statistical approach to defining meaningful change in psychotherapy research. *Journal of Consulting and Clinical Psychology, 59*, 12–19. https://doi.org/10.1037//0022-006x.59.1.12.
Jeffreys, M. D., Reinfeld, C., Nair, P. V., Garcia, H. A., Mata-Galan, E., & Rentz, T. O. (2014). Evaluating treatment of posttraumatic stress disorder with cognitive processing therapy and prolonged exposure therapy in a VHA specialty clinic. *Journal of Anxiety Disorders, 28*, 108–114. https://doi.org/10.1016/j.janxdis.2013.04.010.
Kehle-Forbes, S. M., Meis, L. A., Spoont, M. R., & Polusny, M. A. (2016). Treatment initiation and dropout from prolonged exposure and cognitive processing therapy in a VA outpatient clinic. *Psychological Trauma: Theory, Research, Practice, and Policy, 8*, 107–114. https://doi.org/10.1037/tra0000065.
Kim, P. Y., Thomas, J. Y., & Wilk, W. E. (2010). Stigma, barriers to care, and use of mental health services among active duty and National Guard soldiers after combat. *Psychiatric Services, 61*, 582–588. https://doi.org/10.1176/ps.2010.61.6.582.
Kok, B. C., Herrell, R. K., Thomas, J. L., & Hoge, C. W. (2012). Posttraumatic stress disorder associated with combat service in Iraq or Afghanistan: Reconciling prevalence differences between studies. *The Journal of Nervous and Mental Disease, 200*, 444–450. https://doi.org/10.1097/NMD.0b013e3182532312.
Lambert, M. J., & Shimokawa, K. (2011). Collecting client feedback. In J. C. Norcross (Ed.). *Psychotherapy relationships that work*(2nd ed.). New York, NY: Oxford University Press.
Luke, D. A. (2004). *Multilevel modeling.* Thousand Oaks, CA: Sage.
Martinovich, Z., Saunders, S., & Howard, K. (1996). Some comments on "Assessing clinical significance.". *Psychotherapy Research, 6*, 124–132. https://doi.org/10.1080/10503309612331331648.
van Minnen, A., Arntz, A., & Keijsers, G. P. J. (2002). Prolonged exposure in patients with chronic PTSD: Predictors of treatment outcome and dropout. *Behaviour Research and Therapy, 40*, 439–457. https://doi.org/10.1016/S0005-7967(01)00024-9.
van Minnen, A., & Foa, E. B. (2006). The effect of imaginal exposure length on outcome of treatment for PTSD. *Journal of Traumatic Stress, 19*(4), 427–438. https://doi.org/10.1002/jts.20146.
van Minnen, A., & Hagenaars, M. (2002). Fear activation and habituation patterns as early process predictors of response to prolonged exposure treatment in PTSD. *Journal of Traumatic Stress, 15*, 359–367. https://doi.org/10.1023/A:1020177023209.
Mott, J. M., Mondragon, S., Hundt, N. E., Beason-Smith, M., Grady, R. H., & Teng, E. J. (2014). Characteristics of U.S. veterans who begin and complete prolonged exposure and cognitive processing therapy for PTSD. *Journal of Traumatic Stress, 27*, 265–273. https://doi.org/10.1002/jts.21927.
Najavits, L. M. (2015). The problem of dropout from "gold standard" PTSD therapies. *F1000Prime Reports, 7*. https://doi.org/10.12703/P7-43.
Palmer, G. A., Happe, M. C., Paxson, J. M., Jurek, B. K., Graca, J. J., & Olson, S. A. (2014). Psychometric properties of the Beck Depression Inventory-II for OEF/OIF veterans in a polytrauma sample. *Military Medicine, 179*, 879–884. https://doi.org/10.7205/MILMED-D-14-00048.
Price, M., Maples, J. L., Jovanovic, T., Norrholm, S. D., Heekin, M., & Rothbaum, B. O. (2015). An investigation of outcome expectancies as a predictor of treatment response for combat veterans with PTSD: Comparison of clinician, self-report, and biological measures. *Depression and Anxiety, 32*, 392–399. https://doi.org/10.1002/da.22354.
Reinert, D. F., & Allen, J. P. (2007). The alcohol use disorders identification test: An update of research findings. *Alcoholism: Clinical and Experimental Research, 31*, 185–199. https://doi.org/10.1111/j.1530-0277.2006.00295.x.
Resick, P. A., Nishith, P., Weaver, T. L., Astin, M. C., & Feuer, C. A. (2002). A comparison of cognitive-processing therapy with prolonged exposure and a waiting condition for the treatment of chronic posttraumatic stress disorder in female rape victims. *Journal of Consulting and Clinical Psychology, 70*, 867–879. https://doi.org/10.1037/0022-006X.70.4.867.
Resick, P. A., Wachen, J. S., Dondanville, K. A., Pruiksma, K. E., Yarvis, J. S., Peterson, A. L., et al. the STRONG STAR Consortium. (2017). Effect of group vs individual cognitive processing therapy in active-duty military seeking treatment for posttraumatic stress disorder: A randomized clinical trial. *JAMA Psychiatry, 74*, 28–36. https://doi.org/10.1001/jamapsychiatry.2016.2729.
Resick, P. A., Wachen, J. S., Mintz, J., Young-McCaughan, S., Roache, J. D., Borah, A. M., ... Peterson, A. L., on behalf of, the STRONG STAR Consortium (2015). A randomized clinical trial of group cognitive processing therapy compared with group present-centered therapy for PTSD among active duty military personnel. *Journal of Consulting and Clinical Psychology, 83*, 1058–1068. https://doi.org/10.1037/ccp0000016.
Rizvi, S. L., Vogt, D. S., & Resick, P. A. (2009). Cognitive and affective predictors of treatment outcome in cognitive processing therapy and prolonged exposure for posttraumatic stress disorder. *Behaviour Research and Therapy, 47*, 737–743. https://doi.org/10.1016/j.brat.2009.06.003.
Sareen, J., Cox, B. J., Afifi, T. O., Stein, M. B., Belik, S. L., Meadows, G., et al. (2007). Combat and peacekeeping operations in relation to prevalence of mental disorders and perceived need for mental health care: Findings from a large representative sample of military personnel. *Archives of General Psychiatry, 64*, 843–852. https://doi.org/10.1001/archpsyc.64.7.843.
Saunders, J. B., Aasland, O. G., Babor, T. F., De La Fuente, J. R., & Grant, M. (1993). Development of the alcohol use disorders identification test (AUDIT): WHO collaborative project on early detection of persons with harmful alcohol consumption-II. *Addiction, 88*, 791–804. https://doi.org/10.1111/j.1360-0443.1993.tb02093.x.
Schnurr, P. P., Friedman, M. J., Foy, D. W., Shea, M. T., Hsieh, F. Y., Lavori, P. W., et al. (2003). Randomized trial of trauma-focused group therapy for post- traumatic stress disorder: Results from a Department of Veterans Affairs cooperative study. *Archives of General Psychiatry, 60*, 481–489. https://doi.org/10.1001/archpsyc.60.5.481.
Scholten, J., Vasterling, J. J., & Grimes, J. B. (2017). Traumatic brain injury clinical practice guidelines and best practices from the VA State of the Art Conference. *Brain Injury, 31*, 1246–1251. https://doi.org/10.1080/02699052.2016.1274780.
Schottenbauer, M. A., Glass, C. R., Arnkoff, D. B., Tendick, V., & Gray, S. H. (2008). Nonresponse and dropout rates in outcome studies on PTSD: Review and methodological considerations. *Psychiatry, 71*, 134–168. https://doi.org/10.1521/psyc.2008.71.2.134.
Schwab, K. A., Baker, G., Ivins, B. J., Sluss-tiller, M., Lux, W., & Warden, D. (2006). The brief traumatic brain injury screen (BTBIS). *Neurology, 66*, A235.

Schwab, K. A., Ivins, B., Cramer, G., Johnson, W., Sluss-Tiller, M., Kiley, K., ... Warden, D. (2007). Screening for traumatic brain injury in troops returning from deployment in Afghanistan and Iraq: Initial investigation of the usefulness of a short screening tool for traumatic brain injury. *The Journal of Head Trauma Rehabilitation, 22*, 377–389. https://doi.org/10.1097/01.HTR.0000300233.98242.87.

Sloan, D. M., Feinstein, B. A., Gallagher, M. W., Beck, J. G., & Keane, T. M. (2013). Efficacy of group treatment for posttraumatic stress disorder symptoms: A meta-analysis. *Psychological Trauma: Theory, Research, Practice, and Policy, 5*, 176–183. https://doi.org/10.1037/a0026291.

Society of Clinical Psychology. (2012). *Present-centered therapy for posttraumatic stress disorder.* http://www.div12.org/PsychologicalTreatments/treatments/ptsd_present.html.

Steenkamp, M. M., Litz, B. T., Hoge, C. W., & Marmar, C. R. (2015). Psychotherapy for military-related PTSD: A review of randomized clinical trials. *The Journal of the American Medical Association, 314*, 489–500. https://doi.org/10.1001/jama.2015.8370.

Sterba, S. K. (2017). Partially nested designs in psychotherapy trials: A review of modeling developments. *Psychotherapy Research, 4*, 425–436. https://doi.org/10.1080/10503307.2015.1114688.

Szafranski, D. D., Gros, D. F., Menefee, D. S., Wanner, J. L., & Norton, P. J. (2014). Predictors of length of stay among OEF/OIF/OND veteran inpatient PTSD treatment noncompleters. *Psychiatry, 77*, 263–274. https://doi.org/10.1521/psyc.2014.77.3.263.

Szafranski, D. D., Smith, B. N., Gros, D. F., & Resick, P. A. (2017). High rates of PTSD treatment dropout: A possible red herring? *Journal of Anxiety Disorders, 47*, 91–98. https://doi.org/10.1016/j.janxdis.2017.01.002.

Taylor, S., Thordarson, D. S., Maxfield, L., Fedoroff, I. C., Lovell, K., & Ogrodniczuk, J. (2003). Comparative efficacy, speed, and adverse effects of three PTSD treatments: Exposure therapy, EMDR, and relaxation training. *Journal of Consulting and Clinical Psychology, 71*, 330–338. https://doi.org/10.1037/0022-006X.71.2.330.

Tuerk, P. W., Wangelin, B., Rauch, S. A. M., Dismuke, C. E., Yoder, M., Myrick, H., ... Acierno, R. (2013). Health service utilization before and after evidence-based treatment for PTSD. *Psychological Services, 10*, 401–409. https://doi.org/10.1037/a0030549.

Watts, B. V., Schnurr, P. P., Mayo, L., Young-Xu, Y., Weeks, W. B., & Friedman, M. J. (2013). Meta-analysis of the efficacy of treatments for posttraumatic stress disorder. *Journal of Clinical Psychiatry, 74*, 541–550. https://doi.org/10.4088/JCP.12r08225.

Weathers, F. W., Litz, B. T., Herman, D. S., Huska, J. A., & Keane, T. M. (1993, October). The PTSD Checklist (PCL): Reliability, validity, and diagnostic utility. *Paper presented at the annual meeting of the international society for traumatic stress studies, san Antonio, TX*.

Wright, K. M., Cabrera, O. A., Bliese, P. D., Adler, A. B., Hoge, C. W., & Castro, C. A. (2009). Stigma and barriers to care in soldiers postcombat. *Psychological Services, 6*, 108–116. https://doi.org/10.1037/a0012620.

Zanberg, L. J., Rosenfield, D., Alpert, E., McLean, C. P., & Foa, E. (2016). Predictors of dropout in concurrent treatment of posttraumatic stress disorder and alcohol dependence: Rate of improvement matters. *Behaviour Research and Therapy, 80*, 1–9. https://doi.org/10.1016/j.brat.2016.02.005.

Zayfert, C., Deviva, J. C., Becker, C. B., Pike, J. L., Gillock, K. L., & Hayes, S. A. (2005). Exposure utilization and completion of cognitive behavioral therapy for PTSD in a "real world" clinical practice. *Journal of Traumatic Stress, 18*, 637–645. https://doi.org/10.1002/jts.20072.