Journal of Traumatic Stress
August 2021, *34,* 808–818

ISTSS International Society for Traumatic Stress Studies

Posttraumatic Stress Disorder Treatment Dropout Among Military and Veteran Populations: A Systematic Review and Meta-Analysis

Amanda Edwards-Stewart,[1] Derek J. Smolenski,[2] Nigel E. Bush,[1] Betty-Ann Cyr,[3] Erin H. Beech,[1] Nancy A. Skopp,[1] and Bradley E. Belsher[1]

[1]Department of Health Affairs, Psychological Health Center of Excellence, Research Branch, Tacoma, Washington, USA
[2]Department of Health Affairs, Psychological Health Center of Excellence, Performance & Analytics Branch, Tacoma, Washington, USA
[3]Alliant International University, the California School of Professional Psychology, Clinical Psychology, San Francisco, California, USA

High treatment dropout rates reported in recent literature have brought into question the effectiveness of trauma-focused posttraumatic stress disorder (PTSD) treatments among military populations. The aim of the current systematic review was to evaluate PTSD treatment dropout rates among military populations by treatment type and other study-level variables. We searched four databases as well as gray literature for randomized controlled trials that evaluated evidence-based PTSD treatments in samples of active duty personnel and/or veterans. In total, 26 studies were included in this review, with a total of 2,984 participants. We analyzed dropout rates across treatment types using multivariate meta-analysis. Across all forms of treatment, the aggregated dropout rate was 24.2%. Dropout percentages based on treatment type were 27.1% for trauma-focused treatments, 16.1% for non–trauma-focused treatments, and 6.8% for waitlist groups. We found substantial heterogeneity between studies that was not explained by military status or other study-level covariates. Summary risk ratios (*RR*s) comparing relative dropout between treatment groups indicated that trauma-focused treatment groups had a higher risk of dropout compared to non–trauma-focused treatments, $RR = 1.60$. The statistical heterogeneity of within-treatment dropout risk ratios was negligible. Dropout rates among military patients receiving trauma-focused therapies were only slightly higher than those reported in the literature among civilian populations and were not explained by study-level covariates.

Psychotherapy dropout is considered a significant problem that limits the effectiveness of treatment. Although treatment dropout does not preclude some degree of symptom improvement, both naturalistic studies and randomized clinical trials have demonstrated an association between attending more treatment sessions and a higher degree of symptom improvement (Szafranski et al., 2017; Zieve et al., 2019). Furthermore, research has found that in some cases, prematurely ending psychotherapy may lead to poorer outcomes than if treatment was never sought (Masi et al., 2003; Pekarik, 1985). Several meta-analyses have investigated dropout rates from PTSD treatment. One such meta-analysis, which included both randomized and nonrandomized trials, compared eight different PTSD treatment types. Dropout rates ranged from 8.8%, 95% CI [2.9%, 23.7%], for integrated approaches to 28.5%, 95% CI [22.4%, 35.6%], for full cognitive behavioral therapy. Dropout from trauma-focused treatments (TFTs), including cognitive processing therapy (CPT; 95% CI 16.3%, 33.1%) and behavior exposure therapy (BET; 95% CI [19.3%, 27.6%]), was closest to the rate for full CBT at 23% (Swift & Greenberg, 2014).

Another meta-analysis of dropout from PTSD randomized clinical trials (RCTs) found an average dropout rate of 18%, 95% CI [14.8%, 21.8%] (Imel et al., 2013). Dropout rates were higher for group treatment modalities and treatments with a higher number of sessions but not for TFTs. Variability in dropout rates was associated with between-study differences except when comparing TFTs to present-centered therapy (PCT) (Imel et al., 2013).

Evidence suggests that PTSD treatment dropout rates are higher among military than civilian study populations. In a study of outpatient veterans being treated with either prolonged exposure (PE) or CPT, Kehle-Forbes et al. (2016) reported an average dropout rate of 38.5%, with veterans who were younger and being treated with PE most likely to drop out of treatment. In another investigation of PTSD treatment dropout, using data

No grant funding was used to support the present study. No conflicts of interest need to be disclosed for any of the present authors.

Correspondence concerning this article should be addressed to Amanda Edwards-Stewart, 9933 West Hayes St., JBLM, Tacoma, WA 98433. E-mail: amanda.e.stewart7.civ@mail.mil

DOI: 10.1002/jts.22653

from three RCTs conducted with active duty military samples, Berke and colleagues (2019) found a lower average dropout rate than those reported in veteran samples (30.7%, 95% CI [26.9%, 34.5%]) but a similar dropout rate for TFTs (37.7%, 95% CI [30.0%, 45.4%]). Moreover, a systematic review of dropout from PTSD treatments, which combined studies of Iraq or Afghanistan combat veterans with studies of active duty military, found similar dropout rates to those reported by both Kehle-Forbes et al. (2016) and Berke et al. (2019) (i.e., 36%, 95% CI [26.2%, 43.9%]; Goetter et al., 2015). This review, however, included studies of routine clinical practice, which may have affected the dropout rate.

Research has further demonstrated that treatment dropout rates for TFTs appear to be higher relative to non-TFTs (Belsher et al., 2019; Berke et al., 2019; Imel et al., 2013; Kitchiner et al., 2019). However, first-line evidence-based treatments for PTSD are, almost exclusively, TFTs (U.S. Department of Veterans Affairs [VA] & Department of Defense [DoD], 2017). This reliance on TFTs for PTSD in military populations has been questioned due to high dropout rates, among other factors (Steenkamp et al., 2020; Straud et al., 2019). Steenkamp and colleagues (2020) speculate that high dropout rates among military patients may be attributable to a mismatch between this clinically complex disorder and current manualized TFTs, whereas other researchers point to the unique barriers that might influence military dropout rates (Hoge et al., 2014).

Military-specific barriers to treatment, which could influence dropout, include frequent changes of duty station, deployment, and training exercises in remote locations. Further barriers identified by military personnel include feeling they could handle behavioral health (BH) problems without professional treatment, work-related interferences, the stigma associated with receiving treatment, and concerns regarding confidentiality (Hoge et al., 2014). Veterans have reported similar barriers to seeking or completing BH treatments, including logistic concerns and negative beliefs about treatment beliefs, but with unique additions, such as not wanting to talk about past painful events, not trusting VA providers, and negative experiences following their return from war (Sayer et al., 2009).

Although past research seems to indicate that treatment dropout is higher for TFTs than non-TFTs among military populations, researchers have identified methodological problems with meta-analyses that have compared dropout numbers between studies instead of within the same study (Imel et al., 2013). Imel and colleagues (2013) argue that variations in treatment dropout may be an artifact of between-study treatment comparison rather than a function of the difference between TFTs and non-TFTs. For example, the influence of differing study sample compositions, treatment lengths, or treatment formats on treatment effects across studies cannot be discounted. In a direct within-study comparison of TFTs and non-TFTs, Imel and colleagues (2013) found no difference in dropout rates except between TFTs and PCT. However, Imel and colleagues' meta-analysis included studies composed of mostly civilian samples. To our knowledge, there are no published meta-analyses that focus on within-study dropout comparisons of TFTs and non-TFTs in samples of military participants.

For the current systematic review, we compared the differences in PTSD treatment dropout rates reported in RCTs that included active duty military and veteran study populations. We evaluated the within-study dropout rates found for TFTs compared to non-TFTs. We also evaluated whether any between-study variations (i.e., study country, sample size, session length or duration, telehealth vs. in-person modality, incentivization) explained the differences in dropout rates between TFTs and non-TFTs. As no consistent predictors of PTSD treatment dropout have been found in military study populations, we included several variables that have not been reported in past analyses but may have impacted dropout propensities (e.g., incentivization, manualized developer on the study team, and non-U.S. samples).

Method

Search Strategy

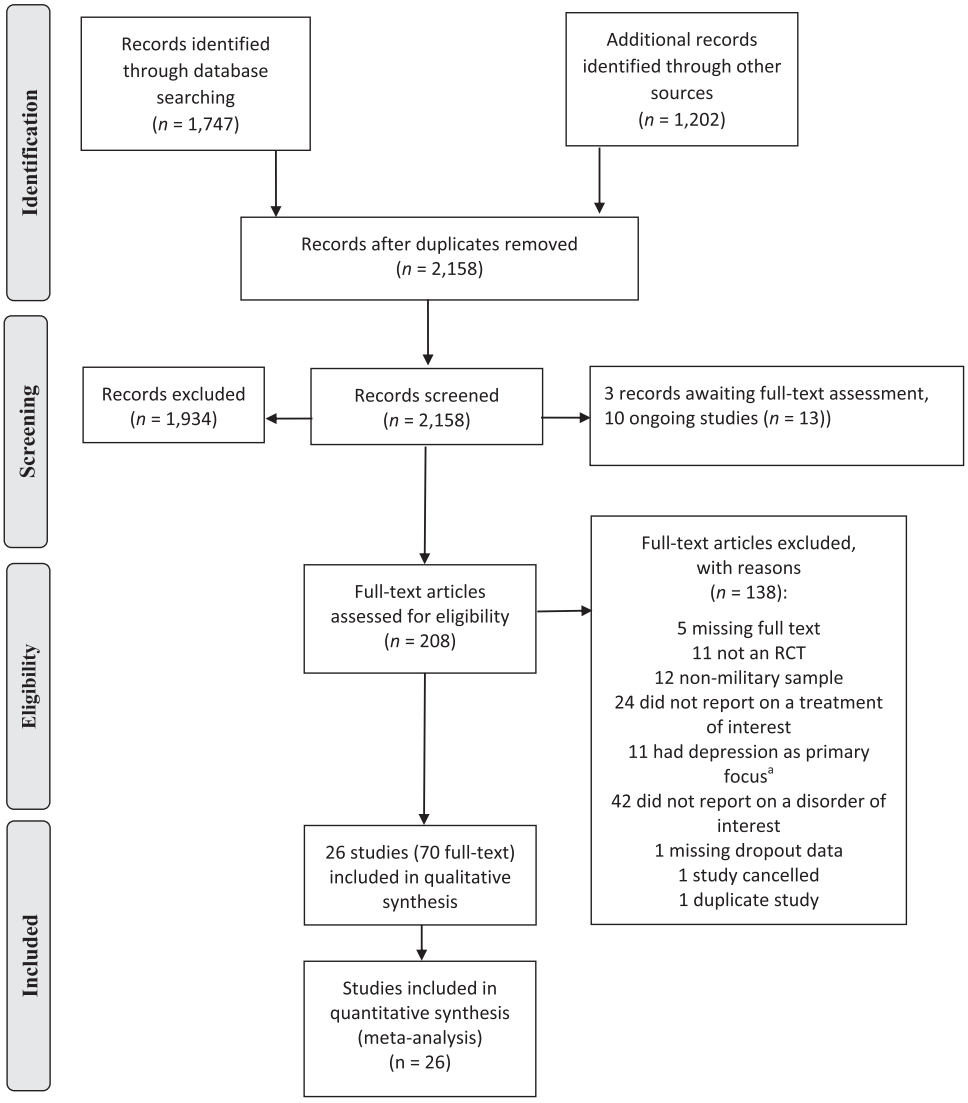
We searched for relevant studies in MEDLINE (via Ovid), EMBASE (via Elsevier), PsycINFO (via Ovid), and the Cochrane Central Register of Controlled Trials. We also examined the "gray" literature, which includes nonpublished trials and dissertations (i.e., ClinicalTrials.gov, the World Health Organization International Clinical Trials Registry Platform, ProQuest Dissertations & Theses OPEN, and Open Access Theses & Dissertations). Searches were conducted from June 18th, 2018, to June 19th, 2018, with no restriction regarding publication date. Searches included a combination of keywords and medical subject heading (MeSH) terms (see the Supplementary Materials for an example search strategy).

To meet the inclusion criteria, studies had to be RCTs that examined PTSD as the primary outcome of interest and included at least one treatment condition that was given a "strong for" recommendation in the VA/DoD clinical practice guideline (CPG; VA/DoD, 2017). We also restricted the population to adult active duty military or veterans. Studies that utilized an intervention modified from those strongly recommended by the VA/DoD CPG were included only if the original treatment approach was used as a comparator (e.g., conventional imaginal PE vs. virtual reality PE).

Study Selection

The search identified 1,747 potentially relevant records from the academic literature and an additional 1,202 records from the grey literature and hand-searching of citations within articles. After the removal of duplicates, two reviewers independently screened 2,158 records. Disagreements were resolved through consultation with a third reviewer. All reviewers were psychologists. Of these initial articles, 1,934 records did not meet the inclusion criteria and were excluded. Three full-text records were unavailable, and 13 records within 10 studies were from ongo-

Figure 1
Flow Diagram of the Study Selection Process



Note. *PTSD = posttraumatic stress disorder; RCT = randomized controlled trial.*
[a] *Studies removed when studies refocused on PTSD.*

ing projects that had, at the time, insufficient data for inclusion in the current analyses. The remaining 208 records went through a full-text review for eligibility. In total, 138 of these records were excluded, leaving 70 eligible articles representing 26 studies that were ultimately included in the present qualitative and quantitative synthesis (see Figure 1).

Data Collection and Screening Process

The two screeners independently extracted all relevant data from the included studies. Disagreements were resolved through discussion or in consultation with a third reviewer. We used a standardized, pilot-tested abstraction form for the data extraction. If data reported in an article were incomplete, the authors of the relevant study were contacted up to two times to request additional data.

Data Items

For the current study, we defined primary and secondary treatment dropout as the total number of participants who stopped attending treatment sessions. Waitlist dropout was defined as participants who withdrew from the study during the treatment phase (i.e., after condition randomization and before posttreatment assessment). Secondary variables collected included participant and study information. Participant information included comorbid disorders, veteran era (for veteran participants only), age, ethnicity, rank (for active duty participants only), educational attainment, and marital status. Study information included country of origin, primary assessment, clinical setting and condition (outpatient, inpatient, residential, individual, group, telehealth, in-home telehealth, mobile health), session length, incentive type, number of assessments,

number of sites, therapist education and experience, total participants randomized, number of participants randomized per group, dropout by study phase, and results.

Risk of Bias

Two independent reviewers evaluated the methodological quality of each study via a risk of bias (ROB) assessment. We resolved discrepancies through discussion. The ROB was measured at the study level and assessed using the Cochrane Collaboration ROB assessment tool (Higgins & Green, 2011; see the Supplementary Materials and Supplementary Figure S1).

Synthesis of Results

The analysis of summary dropout proportions used the double arcsine transformation of study-specific dropout proportions (Barendregt et al., 2013). We examined total dropout in each study using a univariate random-effects meta-analysis. We also estimated dropout proportions stratified by type of assigned treatment (i.e., TFTs, non–TFTs, and control conditions). We used a multivariate random-effects meta-analysis with an assumed zero within-study correlation between proportions given the randomized design of the included studies for the formal estimate of the summary dropout proportions (White, 2009, 2011). Between-study correlations were estimated as an unstructured matrix. We compared dropout between the treatment types using orthogonal contrasts of the summary effect size measures. Statistical heterogeneity was assessed using the I^2 values. Study-level covariates included study population (e.g., military or veteran), country of origin, total sample size, number of active treatment sessions, session frequency, use of telehealth, use of incentives, and whether the originator of the active treatment was part of the study team. Covariates were considered individually to measure the effect on statistical heterogeneity. We used the characteristics of the primary treatment group when treatment groups with a common active treatment type (e.g., two TFTs or two non-TFTs) were combined for analysis.

In a second analysis, we examined relative dropout in the subset of studies with data for two or more treatment types. We estimated the summary risk ratio for studies that compared TFTs to non-TFTs and for studies that compared TFTs to control conditions. Summary risk ratios were estimated using univariate random-effects meta-analysis. Study-specific risk ratios were natural-logarithm transformed prior to analysis. For studies with a zero-cell value in the contingency table, 0.5 was added to each cell.

Results

Systematic Review

We identified a total of 26 studies with 2,984 participants and 51 treatment groups in this systematic review (Table 1). Publication dates of the included studies were between 1994 and 2019. There were 20 studies with veteran-only samples, four with active duty–only samples, and two with mixed veteran and active duty samples. Most studies (84.6%) used current or former members of the United States military as the primary source population. The remainder were drawn from Israel ($n = 2$), Iran ($n = 1$), and Australia ($n = 1$). All studies had one or more treatment groups that underwent TFTs (PE = 46.2%; CPT = 42.3%; EMDR = 11.5%). Approximately 50% of the included studies had a non-TFT comparison treatment group (i.e., biofeedback-assisted relaxation, PCT, transcendental meditation, health education, or relaxation), and 30.8% had a waitlist, minimal attention, or a non-TFT treatment-as-usual condition (see Table 1). The definition of treatment as usual (TAU) differed across studies. Two studies included trials with a TAU comparator wherein participants could receive a TFT (Forbes et al., 2012; Fortney et al., 2015), and two trials specified that the TAU comparator excluded a TFT (Franklin et al., 2017; Nacasch et al., 2011). For this review, we included the studies with TFT TAU groups in the TFT group, whereas studies that specified TAUs did not include TFTs were categorized as having non-TFT comparator groups. Most treatments were delivered in an outpatient setting (96.2%) and through individual therapy (92.3%). The total number of treatment sessions participants attended in each trial ranged from three to 30, with an average of nine sessions for the primary treatment and seven sessions for the comparator treatment. Most sessions were conducted biweekly or weekly, with session duration ranging from 50 to 135 min.

Quality Assessment

The methodological characteristics of the 27 included studies are described in Supplemental Figure S1. Most studies had a low risk of bias regarding their blinding of outcome assessment (i.e., 21 of the 26 studies). Over half of the included studies had a low risk of bias on their randomization procedure (61.5%), incomplete outcome data (57.7%), and selective reporting (53.8%). However, only 42.3% of the included studies had a low risk of bias for allocation concealment, which could indicate a selection bias. Due to the type of interventions, avoidance of detection bias through the blinding of participants and personnel was not possible. All but one of the included studies reported active treatment dropout numbers for each treatment group. For the article that did not, the primary authors were contacted and able to provide this information. Few studies reported specific reasons for dropout.

Synthesis of Results

Table 2 shows the distribution of treatment protocols across study groups. For the present analysis, TFT and non-TFT protocols each constituted a single treatment type. In studies with more than one treatment group within a treatment type, the data for the groups were pooled.

Table 1
Overview of Participants, Interventions, Comparisons, and Study Design (PICOS) for Included Studies

First author, year	Study design	Primary disorder	Total randomized (*N*)	Service designation	Intervention and contrast groups (*n*)	Dropout (*n*)
Acierno, 2017	RCT	PTSD	150	Veterans	PE ($n = 76$) PE via iPhone ($n = 40$)	PE ($n = 29$) PE via iPhone ($n = 40$)
Agha, 2017	RCT	PTSD	207	Veterans	In -person CPT ($n = 104$) Telehealth CPT ($n = 103$)	In -person CPT ($n = 39$) Telehealth CPT ($n = 43$)
Ahmadi, 2015	RCT	PTSD	48	AD	EMDR ($n = 16$) REM Desensitization ($n = 16$) Waitlist control ($n = 16$)	EMDR ($n = 5$) REM Desensitization ($n = 6$) Waitlist control ($n = 4$)
Campbell, 2016	RCT	PTSD	15	Veterans	CPT ($n = 10$) CPT + art therapy ($n = 5$)	CPT ($n = 4$) CPT + art therapy ($n = 0$)
Carlson, 1998	RCT	PTSD	35	Veterans	EMDR ($n = 10$) Biofeedback-assisted relaxation ($n = 13$) Waitlist ($n = 12$)	EMDR ($n = 0$) Biofeedback-assisted relaxation ($n = 1$) Waitlist ($n = 0$)
Chard, 2018	RCT	PTSD	79	Veterans	CPT ($n = 43$) PCT ($n = 36$)	CPT ($n = 23$) PCT ($n = 11$)
Foa, 2018	RCT	PTSD	370	AD/veterans	Spaced PE ($n = 110$) Massed PE ($n = 110$) PCT ($n = 110$) Minimal contact ($n = 40$)	Spaced PE ($n = 24$) Massed PE ($n = 15$) PCT ($n = 13$) Minimal contact ($n = 0$)
Forbes, 2012	RCT	PTSD	59	Veterans	CPT ($n = 30$) TAU ($n = 29$)	CPT ($n = 9$) TAU ($n = 9$)
Ford, 2018	RCT	PTSD	31	Veterans	PE ($n = 14$) TARGET ($n = 17$)	PE ($n = 9$) TARGET ($n = 5$)
Fortney, 2015	RCT	PTSD	265	Veterans	CPT + TAU ($n = 133$) TAU ($n = 132$)	CPT + TAU ($n = 21$) TAU ($n = 14$)
Franklin, 2017	RCT	PTSD	27	Veterans	PE ($n = 7$) PE via iPhone ($n = 12$) Non-TFT TAU ($n = 8$)	PE ($n = 3$) PE via iPhone ($n = 3$) Non-TFT TAU ($n = 0$)
Jensen, 1994	RCT	PTSD	29	Veterans	EMDR ($n = 13$) Waitlist ($n = 12$)	EMDR ($n = 4$) Waitlist ($n = 0$)
Maireritsch, 2016	RCT	PTSD	90	Veterans	In-person CPT ($n = 45$) Telehealth CPT ($n = 45$)	In-person CPT ($n = 17$) Telehealth CPT ($n = 20$)
Monson, 2006	RCT	PTSD	60	Veterans	CPT ($n = 30$) Waitlist ($n = 30$)	CPT ($n = 6$) Waitlist ($n = 4$)

(*Continued*)

Table 1
Continued

First author, year	Study design	Primary disorder	Total randomized (*N*)	Service designation	Intervention and contrast groups (*n*)	Dropout (*n*)
Morland, 2014	RCT	PTSD	144	Veterans	Group CPT ($n = 64$) Group telehealth CPT ($n = 61$)	Group CPT ($n = 8$) Group telehealth CPT ($n = 10$)
Nacasch, 2011	RCT	PTSD	30	Veterans	PE ($n = 15$) Non-TFT TAU ($n = 15$)	PE ($n = 2$) Non-TFT TAU ($n = 2$)
Nacasch, 2015	RCT	PTSD	40	Veterans	PE ($n = 19$) 60-min PE ($n = 20$)	PE ($n = 2$) 60-min PE ($n = 0$)
Nidich, 2018	RCT	PTSD	203	Veterans	PE ($n = 68$) Transcendental meditation ($n = 68$) Health education ($n = 67$)	PE ($n = 0$) Transcendental meditation ($n = 6$) Health education ($n = 4$)
Thorp, 2019	RCT	PTSD	87	Veterans	PE ($n = 41$) Relaxation ($n = 46$)	PE ($n = 8$) Relaxation ($n = 8$)
Rauch, 2015	RCT	PTSD	36	Veterans	PE ($n = 18$) PCT ($n = 18$)	PE ($n = 7$) PCT ($n = 3$)
Reger, 2016	RCT	PTSD	162	AD	PE ($n = 54$) VRE ($n = 54$) Waitlist ($n = 54$)	PE ($n = 22$) VRE ($n = 24$) Waitlist ($n = 7$)
Resick, 2015	RCT	PTSD	108	AD	CPT ($n = 56$) PCT ($n = 52$)	CPT ($n = 15$) PCT ($n = 7$)
Resick, 2017	RCT	PTSD	268	AD	In- person CPT ($n = 135$) Group CPT ($n = 133$)	In- person CPT ($n = 53$) Group CPT ($n = 60$)
Schurr, 2007	RCT	PTSD	284	AD/Veterans	PE ($n = 141$) PCT ($n = 143$)	PE ($n = 53$) PCT ($n = 30$)
Suris, 2013	RCT	PTSD	129	Veterans	CPT ($n = 72$) PCT ($n = 57$)	CPT ($n = 28$) PCT ($n = 13$)
Yehuda, 2014	RCT	PTSD	52	Veterans	PE ($n = 35$) Weekly minimal attention ($n = 17$)	PE ($n = 12$) Weekly minimal attention ($n = 3$)

Note. RCT = randomized controlled trial; PTSD = posttraumatic stress disorder; MDD = major depressive disorder; AD = Active duty; PE = prolonged exposure; CPT = cognitive processing therapy; EMDR = eye movement desensitization and reprocessing; PCT = present-centered therapy; TARGET = Trauma Affect Regulation: Guide for Education and Therapy; VRE = virtual reality exposure therapy; TAU = treatment as usual.

Table 2
Description of Included Studies

Variable	Trauma-focused therapy ($n = 26$)		Non–trauma-focused therapy ($n = 12$)		Waitlist ($n = 8$)	
	n	%	*n*	%	*n*	%
Veteran-only population	20	76.9	8	66.7	5	62.5
Study outside the United States	4	15.4	2	16.7	1	12.5
Total sample size (*N*)						
< 50	9	34.6	5	41.7	3	37.5
50–99	6	23.1	2	16.7	2	25.0
≥ 100	11	42.3	5	41.7	3	37.5
≥ 12 sessions of treatment	14	53.8	7	58.3	–	–
Session duration ≥ 90 min	14	53.8	5	41.7	–	–
More often than weekly	10	38.5	4	38.5	–	–
Telehealth	2	7.7	1	7.7	–	–
Incentive provided	9	34.6	6	34.6	4	50.0
Manual developer on study team	14	53.8	6	53.8	4	50.0

Absolute Dropout

Total dropout was moderate across the studies (Table 3). Absolute dropout varied by treatment protocol in univariate meta-analyses (see Supplementary Table S1). In the multivariate meta-analysis, TFTs had a higher dropout proportion than non-TFTs (i.e., .27, 95% CI [.21, .34] vs. .16, 95% CI [.12, .21], respectively. Together, these two treatment types had a higher proportion of participants who dropped out than the waitlist treatment group (i.e., .07, 95% CI [.02, .14]; Supplementary Table S2).

Statistical heterogeneity was moderate to high for all three treatment groups. None of the covariates listed in Table 2 substantially reduced this heterogeneity for the TFT and non-TFT groups. The use of an incentive explained a portion of the heterogeneity for the waitlist group whereby studies with an incentive had lower proportions of participant dropout (i.e., .00, 95% CI [.00, .04] vs. .16, 95% CI [.09, .24]; see Supplementary Table S3).

Relative Dropout

Summary risk ratios for studies that compared two or more of the treatment types are presented in Table 4. As suggested by the comparison of absolute dropout proportions, TFTs conferred a higher risk of participant dropout than either the non-TFT or waitlist/TAU treatment types. Participation in non-TFTs also conferred a higher risk of dropout than participation in waitlist/TAU treatments. The statistical heterogeneity was substantially reduced in this analysis according to both the I^2 estimate and the associated Galbraith plots shown in Supplementary Figure S2.

Discussion

We found an average between-study PTSD treatment dropout rate of 24.3%, 95% CI [18.8%, 30.0%], among military and veteran study participants. This dropout rate was considerably lower than what was reported in the only other systematic review of PTSD treatment dropout in military samples, which was 36.0%, 95% CI [26.2%, 43.9%] (Goetter et al., 2015). The difference between these findings may be attributable to Goetter and colleagues' inclusion of studies that (a) reported on routine clinical care and (b) limited their samples to veterans who had been deployed in support of recent military operations in Iraq and Afghanistan. The current review included a broad range of military personnel (i.e., active duty military and veteran populations of all eras), which is a strength of the present meta-analysis as it may provide a more accurate assessment of the dropout rate from PTSD RCTs among military populations. The current method was similar to that used by Imel and colleagues (2013), as we also performed within-study comparisons of dropout rates in RCTs. However, the studies Imel et al. investigated included primarily civilian samples. Despite this difference, the overall dropout rate found in the current study was only slightly higher than that found by Imel et al. (2013), who reported a rate of 18.3%, 95% CI [14.8%, 21.8%]). This indicates that despite the previously identified additional perceived barriers specific to military populations, PTSD treatment dropout rates among military samples are only slightly higher than dropout rates found in comparative systematic reviews of primarily civilian samples.

We found considerable heterogeneity between studies that was not explained by the inclusion of study-level covariates. Unlike other meta-analyses and studies on this topic, we did

Table 3
Overall Dropout, by Study

First author (year)	Proportion	95% CI	Weight (%)
Acierno (2017)	.46	[.38, .54]	4.19
Agha (2018)	.40	[.33, .46]	4.27
Ahmadi (2015)	.31	[.20, .45]	3.69
Campbell (2016)	.27	[.11, .52]	2.68
Carlson (1998)	.03	[.01, .15]	3.46
Chard (2018)	.43	[.33, .54]	3.96
Foa (2018)	.14	[.11, .18]	4.36
Forbes (2012)	.31	[.20, .43]	3.81
Ford (2018)	.45	[.29, .62]	3.37
Fortney (2015)	.13	[.10, .18]	4.31
Franklin (2017)	.22	[.11, .41]	3.25
Jensen (1994)	.16	[.06, .35]	3.18
Maieritsch (2016)	.41	[.32, .51]	4.02
Monson (2006)	.17	[.09, .28]	3.82
Morland (2014)	.14	[.09, .22]	4.14
Nacasch (2011)	.13	[.05, .30]	3.34
Nacasch (2015)	.05	[.01, .17]	3.54
Nidich (2018)	.05	[.03, .09]	4.27
Rauch (2015)	.28	[.16, .44]	3.49
Reger (2016)	.33	[.26, .40]	4.21
Resick (2015)	.20	[.14, .29]	4.09
Resick (2017)	.42	[.36, .48]	4.32
Schnurr (2007)	.29	[.24, .35]	4.33
Suris (2013)	.32	[.24, .40]	4.15
Thorp (2019)	.18	[.12, .28]	4.01
Yehuda (2014)	.29	[.18, .42]	3.74
Overall	.24	[.19, .30]	–

not find that the number of sessions (Imel et al., 2012), treatment modality (telehealth vs. in-person; Goetter et al., 2015), or age (Kehle-Forbes et al., 2016) impacted dropout among military samples. Heterogeneity was reduced when we analyzed relative dropout rates among individual studies. It is possible that this reduction was due to the subset of studies retained in the within-group subanalyses, which were more homogeneous than those that were not included. Another explanation is that a dropout propensity within a single study would be common to all of its treatment groups.

The propensity for dropout was not uniformly distributed by treatment protocol. The risk of treatment dropout was higher for individuals in an active treatment condition than for those in waitlist groups. An increased propensity to drop out of treatment would be expected for active treatment groups compared to waitlist groups due to the relative burden placed on participants: Waitlist participants are required to do little during the "treatment phase," whereas those receiving an active treatment must attend sessions and complete between-session homework. Such differences in the participation burden, however, do not explain the higher risk of dropout from TFTs compared to non-TFTs.

The current review offers support for the notion that TFTs increase the risk of treatment dropout compared to other forms

Table 4
Summary Risk Ratios

Variable	No. of studies	*RR*	95% CI	I^2 (%)
Trauma-focused vs. non–trauma-focused	12	1.60	[1.29, 1.99]	0.0
Trauma-focused vs. waitlist	8	1.68	[1.11, 3.76]	26.6
Non–trauma-focused vs. waitlist	4	1.73	[0.83, 3.59]	0.0

of treatment. Although a 27.1% dropout rate for TFTs is within the expected range of dropouts reported for disorders other than PTSD and their various treatments (Swift & Greenberg, 2017), this rate is still considerably higher than the 16.1% we found among participants randomized to non-TFTs. This finding supports growing concerns about the exclusive use of short-term, trauma-based manualized treatments (Steenkamp et al., 2020), as trauma-avoidant treatments such as PCT also appear to be efficacious in the treatment of PTSD and carry a lower risk of treatment dropout (Belsher et al., 2019; Imel et al., 2012). Possible explanations for this difference include the inherent rigidity of receiving a manualized treatment for the TFT protocols as compared to the non-TFT protocols, the difficulty of disclosing trauma content in treatment, and participant treatment preferences. Such factors should be investigated in future research.

The risk of treatment dropout was not explained by military status (active duty vs. veteran) in the current study. Given this, it is possible that despite the unique barriers identified for and by military participants, such barriers are not what impact treatment dropout. The current study suggests that dropout might be a function of treatment type rather than population or other therapy variables (i.e., common factors, patient and provider characteristics). However, further research is needed to confirm this finding.

Most studies included in the current review were conducted among veteran-only samples. We found few studies conducted with exclusively active duty populations or those that provided comparisons of dropout between active duty and veteran subsamples. Future research should continue to evaluate treatment dropout rates among active duty military and veterans but in direct comparison to civilian rates. This review was also limited by our exclusion of non–evidence-based treatments identified as first-line treatments in the VA/DoD CPG. Future research should include more disorders and treatment types and allow for comorbid conditions when investigating PTSD treatment dropout among military populations.

In the present study, we defined dropout by the number of participants to leave a study during the active-treatment phase. Our definition of treatment dropout is limited by RCT reporting standards, wherein researchers primarily rely upon a CONSORT diagram to report treatment attrition. There is an inherent limitation to reporting dropout in this way; consumers of PTSD RCT outcome research cannot investigate if dropout was a function of symptom severity, which is likely more valuable in the analysis of treatment dropout than a comparison of dropout numbers. It is possible that some of the participants who prematurely terminated treatment did so because of symptom improvement or increased symptomatology and a lack of skills, such as distress tolerance, which would have enabled participates to wait for symptom improvement. We are hopeful that future research will be more flexible in its definition of treatment completion (Foa et al., 2019; Galovski et al., 2012) or rely on patient–therapist agreement (Nacasch et al., 2015). Such research would offer more nuanced explanations of treatment dropout.

Open Practices Statement

The study protocol was registered with PROSPERO (CRD42018097052) and is available from http://www.crd.york.ac.uk/PROSPERO/display_record.php?ID=CRD42018097052. Further requests for the data or materials should be sent via email to the lead author at amanda.e.stewart7.civ@mail.mil.

References

*Indicates a primary article included in the systematic review

*Acierno, R., Knapp, R., Tuerk, P., Gilmore, A. K., Lejuez, C., Ruggiero, K., Muzzy, W., Egede, L., Hernandez-Tejada, M. A., & Foa, E. B. (2017). A non-inferiority trial of prolonged exposure for posttraumatic stress disorder: In-person versus home-based telehealth. *Behaviour Research & Therapy*, *89*, 57–65. https://doi.org/10.1016/j.brat.2016.11.009

*Agha, Z. (2017). Veterans telemedicine outreach for PTSD services (VTOPS). *Clinicaltrials.gov*. https://clinicaltrials.gov/show/nct00645047

*Ahmadi, K., Hazrati, M., Ahmadizadeh, M., & Noohi, S. (2015). REM desensitization as a new therapeutic method for post-traumatic stress disorder: A randomized controlled trial. *Acta Medica Indonesiana*, *47*(2), 111–119.

Barendregt, J. J., Doi, S. A., Lee, Y. Y., Norman, R. E., & Vos, T. (2013). Meta-analysis of prevalence. *Journal of Epidemiology and Community Health*, *67*(11), 974–978. https://doi.org/10.1136/jech-2013-203104

Belsher, B. E., Beech, E., Evatt, D., Smolenski, D. J., Shea, M. T., Otto, J. L., Rosen, C. S., & Schnurr, P. P. (2019). Present-centered therapy (PCT) for post-traumatic stress disorder (PTSD) in adults. *Cochrane Database of Systematic Reviews*, *11*, CD012898. https://doi.org/10.1002/14651858.CD012898.pub2

Berke, D. S., Kline, N. K., Wachen, J. S., McLean, C. P., Yarvis, J. S., Mintz, J., Young-McCaughan, S., Peterson, A. L., Foa, E., Resick, P. A., & Litz, B. T. (2019). Predictors of attendance and dropout in three randomized controlled trials of PTSD treatment for active duty service members. *Behaviour Research and Therapy*, *118*, 7–17. https://doi.org/10.1016/j.brat.2019.03.003

*Campbell, M., Decker, K. P., Kruk, K., & Deaver, S. P. (2016). Art therapy and cognitive processing therapy for combat-related PTSD: A randomized controlled trial. *Art Therapy*, *33*(4), 169–177. https://doi.org/10.1080/07421656.2019.1226643

*Carlson, J. G., Chemtob, C. M., Rusnak, K., Hedlund, N. L., & Muraoka, M. Y. (1998). Eye movement desensitization and reprocessing (EDMR) treatment for combat-related posttraumatic stress disorder. *Journal of Traumatic Stress*, *11*(1), 3–24. https://doi.org/10.1023/A:1024448814268

*Chard, K. M. (2018). A comparison of cognitive processing therapy (CPT) versus present centered therapy (PCT) for veterans. *Clinicaltrials.gov*. https://clinicaltrials.gov/show/nct00607815

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*. Department of Veterans Affairs and Department of Defense. https://www.healthquality.va.gov/guidelines/MH/ptsd/VADoDPTSDCPGFinal012418.pdf

*Foa, E. B., McLean, C. P., Zang, Y., Rosenfield, D., Yadin, E., Yarvis, J. S., Mintz, J., Young-McCaughan, S., Borah, E. V., Dondanville, K. A., Fina, B. A., Hall-Clark, B. N., Lichner, T., Litz, B. T., Roache, J., Wright, E. C., & Peterson, A. L. (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. *JAMA*, *319*(4), 354–364. https://doi.org/10.1001/jama.2017.21242

Foa, E. B., Zandberg, L. J., McLean, C. P., Rosenfield, D., Fitzgerald, H., Tuerk, P. W., Wangelin, B. C., Young-McCaughan, S., & Peterson, A. L. (2019). The efficacy of 90-minute versus 60-minute sessions of prolonged exposure for posttraumatic stress disorder: Design of a randomized controlled trial in active duty military personnel. *Psychological Trauma*, *11*(3), 307–313. https://doi.org/10.1037/tra0000351

*Forbes, D., Lloyd, D., Nixon, R., Elliott, P., Varker, T., Perry, D., Bryant, R. A., & Creamer, M. (2012). A multisite randomized controlled effectiveness trial of cognitive processing therapy for military-related posttraumatic stress disorder. *Journal of Anxiety Disorders*, *26*(3), 442–452. https://doi.org/10.1016/janxdis.2012.01.006

*Ford, J. D., Grasso, D. J., Greene, C. A., Slivinsky, M., & DeViva, J. C. (2018). Randomized clinical trial pilot study of prolonged exposure versus present-centred affect regulation therapy for PTSD and anger problems with male military combat veterans. *Clinical Psychology & Psychotherapy*, *25*(5), 641–649. https://doi.org/10.1002/cpp.2194

*Fortney, J. C., Pyne, J. M., Kimbrell, T. A., Hudson, T. J., Robinson, D. E., Schneider, R., Moore, W. M., Custer, P. J., Grubbs, K. M., & Schnurr, P. P. (2015). Telemedicine-based collaborative care for posttraumatic stress disorder: A randomized clinical trial. *JAMA Psychiatry*, *72*(1), 58–67. https://doi.org/10.1001/jamapsychiatry.2014.1575

*Franklin, C., Cuccurullo, L., Walton, J. L., Arseneau, J. R., & Petersen, N. J. (2017). Face to face but not in the same place: A pilot study of prolonged exposure therapy. *Journal of Trauma & Dissociation*, *18*(1), 116–130. https://doi.org/10.1080/15299732.2016.1205704

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*(6), 968–981. https://doi.org/10.1037/a0030600

Goetter, E. M., Bui, E., Ojserkis, R. A., Zakarian, R. J., Brendel, R. W., & Simon, N. M. (2015). A systematic review of dropout from psychotherapy for posttraumatic stress disorder among Iraq and Afghanistan combat veterans. *Journal of Traumatic Stress*, *28*(5), 401–409. https://doi.org/10.1002/jts.22038

Higgins, J. P. T., & Green, S. (2011). *Cochrane handbook for systematic reviews of interventions: The Cochrane collaboration* (Version 5.1.0). https://handbook-5-1.cochrane.org/front_page.htm

Hoge, C. W., Grossman, S. H., Auchterlonie, J. L., Riviere, L. A., Milliken, C. S., & Wilk, J. E. (2014). PTSD treatment for soldiers after combat deployment: Low utilization of mental health care and reasons for dropout. *Psychiatric Services*, *65*(8), 997–1004. https://doi.org/10.1176/appi.ps.201300307

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*(3), 394–404. https://doi.org/10.1037/a0031474

*Jensen, J. A. (1994). An investigation of eye movement desensitization and reprocessing (EMD/R) as a treatment for posttraumatic stress disorder (PTSD) symptoms of Vietnam combat veterans. *Behavior Therapy*, *25*(2), 311–325. https://doi.org/10.1016/S0005-7894(05)80290-4

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*(1), 107–114. https://doi.org/10.1037/tra0000065

Kitchiner, N. J., Lewis, C., Roberts, N. P., & Bisson, J. I. (2019). Active duty and ex-serving military personnel with post-traumatic stress disorder treated with psychological therapies: Systematic review and meta-analysis. *European Journal of Psychotraumatology*, *10*(1), 1684226. https://doi.org/10.1080/20008198.2019.1684226

*Maieritsch, K. P., Smith, T. L., Hessinger, J. D., Ahearn, E. P., Eickhoff, J. C., & Zhao, Q. (2016). Randomized controlled equivalence trial comparing videoconference and in person delivery of cognitive processing therapy for PTSD. *Journal of Telemedicine & Telecare*, *22*(4), 238–243. https://doi.org/10.1177/1357633X15596109

Masi, M. V., Miller, R. B., & Olson, M. M. (2003). Differences in dropout rates among individual, couple, and family therapy clients. *Contemporary Family Therapy*, *25*(1), 63–75. https://doi.org/10.1023/A:1022558021512

*Monson, C. M., Schnurr, P. P., Resick, P. A., Friedman, M. J., Young-Xu, Y., & Stevens, S. P. (2006). Cognitive processing therapy for veterans with military-related posttraumatic stress disorder. *Journal of Consulting & Clinical Psychology*, *74*(5), 898–907. https://doi.org/10.1037/0022-006X.74.5.898

*Morland, L. A., Mackintosh, M. A., Greene, C. J., Rosen, C. S., Chard, K. M., Resick, P., & Frueh, B. C. (2014). Cognitive processing therapy for posttraumatic stress disorder delivered to rural veterans via telemental health: A randomized noninferiority clinical trial. *Journal of Clinical Psychiatry*, *75*(5), 470–476. https://doi.org/10.4088/JCP.13m08842

*Nacasch, N., Foa, E. B., Huppert, J. D., Tzur, D., Fostick, L., Dinstein, Y., Polliack, M., & Zohar, J. (2011). Prolonged exposure therapy for combat- and terror-related posttraumatic stress disorder: A randomized control comparison with treatment as usual. *Journal of Clinical Psychiatry*, *72*(9), 1174–1180. https://doi.org/10.4088/JCP.09m05682blu

*Nacasch, N., Huppert, J. D., Su, Y. J., Kivity, Y., Dinshtein, Y., Yeh, R., & Foa, E. B. (2015). Are 60-minute prolonged exposure sessions with 20-minute imaginal exposure to traumatic memories sufficient to successfully treat PTSD? A randomized noninferiority clinical trial. *Behavior Therapy*, *46*(3), 328–341. https://doi.org/10.1016/j.beth.2014.12.002

*Nidich, S., Mills, P. J., Rainforth, M., Heppner, P., Schneider, R. H., Rosenthal, N. E., Salerno, J., Gaylord-King, C., & Rutledge, T. (2018). Non-trauma-focused meditation versus exposure therapy in veterans with posttraumatic stress disorder: A randomized controlled trial. *Lancet Psychiatry*, *5*(12), 975–986. https://doi.org/10.1016/52215-0366(18)30384:5

Pekarik, G. (1985). Coping with dropouts. *Professional Psychology: Research and Practice*, *16*(1), 114–123. https://doi.org/10.1037/0735-7028.16.1.114

*Rauch, S. A., King, A. P., Abelson, J., Tuerk, P. W., Smith, E., Rothbaum, B. O., Clifton, E., Defever, A., & Liberzon, I. (2015). Biological and symptom changes in posttraumatic stress disorder treatment: A randomized clinical trial. *Depression & Anxiety*, *32*(3), 204–212. https://doi.org/10.1002/da.22331

*Resick, P. A., Wachen, J. S., Dondanville, K. A., Prulksma, K. E., Yarvis, J. S., Peterson, A. L., Mintz, J., and the STRONG STAR consortium, Borah, E. V., Brundige, A., Hembree, E. A., Litz, B. T., Roache, J. D., & Young-McCaughan, S. (2016). 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*(1), 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., Borah, E. V., Dondanville, K. A., Hembree, E. A., Litz, B. T., & Peterson, A. L. (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*(6), 1058–1068. https://doi.org/10.1037/ccp0000016

*Reger, G. M., Koenen-Woods, P., Zetocha, K., Smolenski, D. J., Holloway, K. M., Rothbaum, B. O., Difede, J., Rizzo, A. A., Edwards-Stewart, A., Skopp, N. A., Mishkind, M., Reger, M. A., & Gahm, G. A. (2016). Randomized controlled trial of prolonged exposure using imaginal exposure vs. virtual reality exposure in active duty soldiers with deployment-related posttraumatic stress disorder (PTSD). *Journal of Consulting & Clinical Psychology*, *84*(11), 946–959. https://doi.org/10.1037/ccp0000134

Sayer, N. A., Friedemann-Sanchez, G., Spoont, M., Murdoch, M., Parker, L. E., & Chiros, S. (2009). A qualitative study of determinants of PTSD treatment initiation in veterans. *Psychiatry: Interpersonal and Biological Processes*, *72*(3), 238–255. https://doi.org/10.1521/psyc.2009.72.3.238

*Schnurr, P. P., Friedman, M. J., Engel, C. C., Foa, E. B., Shea, M., Chow, B. K., Resick, P. A., Thurston, V., Orsillo, S. M., Haug, R., Turner, C., & Bernardy, N. (2007). Cognitive behavioral therapy for posttraumatic stress disorder in women: A randomized controlled trial. *JAMA*, *297*(8), 820–830. https://doi.org/10.1001/jama.297.8.820

Steenkamp, M. M., Litz, B. T., & Marmar, C. R. (2020). First-line psychotherapies for military-related PTSD. *JAMA*, *323*(7), 656–657. https://doi.org/10.1001/jama.2019.20825

Straud, C. L., Siev, J., Messer, S., & Zalta, A. K. (2019). Examining military population and trauma type as moderators of treatment outcome for first-line psychotherapies for PTSD: A meta-analysis, *Journal of Anxiety Disorders*, *67*, 102133. https://doi.org/10.1016/j.janxdis.2019.102133

*Suris, A., Link-Malcolm, J., Chard, K., Ahn, C., & North, C. (2013). A randomized clinical trial of cognitive processing therapy for veterans with PTSD related to military sexual trauma. *Journal of Traumatic Stress*, *26*(1), 28–27. https://doi.org/10.1002/jts/21765

Swift, J. K., & Greenberg, R. P. (2014). A treatment by disorder meta-analysis of dropout from psychotherapy. *Journal of Psychotherapy Integration*, *24*(3), 193–207. https://doi.org/10.1037/a0037512

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.rog/10.1016/j/janxdis.2017.01.002

*Thorp, S. R., Glassman, L. H., Wells, S. Y., Walter, K. H., Gebhardt, H., Twamley, E., Golshan, S., Pittman, J., Penski, K., Allard, C., Morland, L. A., & Wetherell, J. (2019). A randomized controlled trial of prolonged exposure therapy versus relaxation training for older veterans with military-related PTSD. *Journal of Anxiety Disorders*, *64*, 45–44. https://doi.org/10.1016/j.janxdis.2019.02.003

White, I. R. (2009). Multivariate random-effects meta-analysis. *Stata Journal*, *9*(1), 40–56. https://www.stata-journal.com/article.html?article=st0156

White, I. R. (2011). Multivariate random-effects meta-regression: Updates to mvmeta. *Stata Journal*, *11*(2), 255–270. https://www.stata-journal.com/article.html?article=st0156_1

*Yehuda, R., Pratchett, L. C., Elmes, M. W., Lehrner, A., Daskalakis, N. P., Koch, E., Makotkine, I., Flory, J. D., & Bierer, L. M. (2014). Glucocorticoid-related predictors and correlates of post-traumatic stress disorder treatment response in combat veterans. *Interface Focus*, *4*(5), 1–0. https://doi.org/10.1098/rsfs.2014.0048

Zieve, G. G., Persons, J. B., & Yu, L. A. D. (2019). The relationship between dropout and outcome in naturalistic cognitive behavior therapy. *Behavior Therapy*, *50*(1), 189–199.https://doi.org/10.1016j.beth.2018.05.004