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The Protocol Matters: A Meta-Analysis of Psychotherapy Dropout From Specific PTSD Treatment Approaches in U.S. Service Members and Veterans

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Objective: Service members and veterans (collectively, "military populations") are more likely to drop out of posttraumatic stress disorder (PTSD) psychotherapies than civilians, especially for trauma-focused treatments (Varker et al., 2021). Yet, it remains unclear whether specific protocols are linked with higher dropout risk, and no meta-analysis has investigated this for military populations. Therefore, this study aimed to conduct a secondary analysis of a large meta-analysis (Penix-Smith et al., 2025) to estimate dropout among specific PTSD treatments in United States military populations. ***Method:*** Overall, 181 articles provided PTSD dropout rates for 232 treatments ($N = 124{,}092$ clients) among military populations. ***Results:*** The weighted dropout rate for all PTSD interventions was 25.6%, 95% CI [22.9%, 28.5%] using a random effects model, where dropout significantly differed across treatments, $Q(21) = 96.86$, $p < .001$, $I^2 = 98.49$. Treatments linked with higher dropout included weekly formats of cognitive processing therapy (CPT; 40.1%), prolonged exposure therapy (PE; 34.7%), and virtual reality exposure therapy (37.2%). Lower dropout was linked with weekly formats of present-centered therapy (PCT; 16.1%), mindfulness-based stress reduction (17.4%), and group-based exposure therapy (6.9%). Intensive outpatient programs (IOPs) yielded the lowest dropout rates overall, even when IOPs included CPT (8.5%) and PE (5.5%). ***Conclusions:*** Together, this study provided dropout benchmarks for specific PTSD treatments and identified treatments with the highest risk for dropout, including weekly CPT and PE. Findings suggest that resources targeting dropout and increasing the reach of treatments with lower dropout risk (e.g., PCT, IOPs) may facilitate psychotherapy engagement among military populations.

Clinical Impact Statement
Results from this meta-analysis ($k = 181$) suggest 25.6% of military populations drop out of posttraumatic stress disorder treatments. Some treatments yielded higher (e.g., weekly cognitive processing therapy, prolonged exposure therapy, virtual reality exposure therapy) and lower dropout (e.g., present-centered therapy, mindfulness-based stress reduction, intensive outpatient programs).

Keywords: posttraumatic stress disorder, meta-analysis, psychotherapy, dropout, military

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Extensive resources have been allocated to disseminate evidence-based psychotherapies for posttraumatic stress disorder (PTSD) among service member and veterans (collectively, "military populations"; e.g., Karlin & Cross, 2014). However, challenges remain. After completing treatment, many report ongoing PTSD symptoms (e.g., Berke et al., 2019; Niles et al., 2018). Clients may also drop out of treatment prematurely (e.g., Edwards-Stewart et al., 2021; Goetter et al., 2015), where dropout refers to a client's decision to terminate

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This study used data that were previously published (Penix-Smith et al., 2025). Materials included in this meta-analysis are publicly available at https://figshare.com/articles/dataset/Meta-analysis_of_Psychotherapy_Dropout_for_Specific_Approaches_Targeting_PTSD_in_Service_Members_and_Veterans/26131396. Some findings from the present study were presented at the annual meeting of the International Society for Traumatic Stress Studies in November 2023.

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Elizabeth A. Penix-Smith played a lead role in conceptualization, data curation, formal analysis, funding acquisition, investigation, methodology, project administration, resources, writing–original draft, and writing–review and editing. Joshua K. Swift played a lead role in supervision, a supporting role in formal analysis, funding acquisition, investigation, and writing–original draft, and an equal role in conceptualization, methodology, and writing–review and editing.

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psychotherapy without achieving their treatment goals (Hatchett & Park, 2003). Meta-analytic findings (Varker et al., 2021) suggest that military populations are even more likely to drop out than their civilian counterparts after initiating trauma-focused treatments (TFTs), which require clients to engage with trauma memories or reminders (e.g., exposure therapies). Yet, findings are mixed regarding whether specific TFT protocols (e.g., cognitive processing therapy [CPT], prolonged exposure therapy [PE], eye movement desensitization and reprocessing therapy [EMDR]) yield higher dropout in military populations (e.g., Berke et al., 2019; Niles et al., 2018; Schnurr et al., 2022). Addressing such mixed findings is an important consideration given calls for revisiting the emphasis on implementing exposure-based TFTs, such as PE and EMDR, due to high dropout rates linked with these treatments (e.g., Najavits, 2024). In addition, dropout is linked with worse outcomes (e.g., Berke et al., 2019; Niles et al., 2018), higher wait times (Barrett et al., 2008), and therapist burnout (Piselli et al., 2011). To address such gaps, this study estimated dropout among specific PTSD treatments using data from a meta-analysis of dropout among military populations (Penix-Smith et al., 2025).

PTSD Treatment Among Military Populations

The most recent U.S. Department of Veterans Affairs (VA)/Department of Defense (DoD) clinical practice guidelines (CPGs; 2023) for PTSD highlights several TFTs, including strong recommendations for individual formats of CPT, PE, EMDR, and a weak recommendation for written exposure therapy (WET). These TFTs differ in their approach, such as challenging unhelpful trauma-related beliefs (CPT), verbally recounting trauma memories and listening to recordings of these (PE), utilizing bilateral stimulation while clients imagine their trauma memories (EMDR), and writing trauma narratives for index trauma memories (WET). Of the non-TFTs reviewed, present-centered therapy (PCT) and mindfulness-based stress reduction (MBSR) were weakly recommended for PTSD treatment and complementary and alternative treatment, respectively (U.S. Department of Veterans Affairs/Department of Defense, 2023). There was insufficient evidence to recommend for or against other treatments, including adaptations for group formats (e.g., group CPT; group-based exposure therapy [GBET]) and addressing comorbid symptoms like depression (e.g., behavioral activation and therapeutic exposure [BA-TE]) and substance use (e.g., seeking safety; U.S. Department of Veterans Affairs/Department of Defense, 2023).

Dropout Rates for Specific PTSD Treatments in Primary Articles

Primary articles have assessed and compared PTSD treatment dropout rates for specific treatments in military populations. Estimates from these studies vary greatly, ranging from 5% (Resick et al., 2015) to 88% (Maguen et al., 2023) for CPT, 8% (Morland et al., 2020) to 78% (Maguen et al., 2023) for PE, 0% (Jensen, 1994) to 45% (Pitman et al., 1996) for EMDR, 14% (Sloan et al., 2022) to 25% (LoSavio et al., 2023) for WET, 0% (Bremner et al., 2017) to 36% (Haynes et al., 2020) for PCT, and 0% (Bremner et al., 2017) to 22% (Polusny et al., 2015) for MBSR. Among TFTs, one study found that CPT and PE yield similar dropout rates (Miles & Thompson, 2016), whereas others have found higher dropout among CPT (Mott et al., 2014) or PE (Schnurr et al., 2022). Dropout was higher among TFTs versus non-TFTs in several studies (e.g., Amsalem et al., 2022; Berke et al., 2019). For non-TFTs, one study found higher dropout for MBSR versus PCT (Polusny et al., 2015), although this link was not significant in another study comparing MBSR and PCT (Bremner et al., 2017).

Additional treatment characteristics may be linked with dropout, such as massed or intensive outpatient program (IOP) delivery method, targeting comorbid presenting concerns, and therapy format. Regarding delivery method, massed PE yielded lower dropout than the standard, weekly outpatient format in one study (Foa et al., 2018). Treatments tailored to address comorbid symptoms may also yield different rates, as one study found higher dropout among a treatment developed for PTSD symptoms alone (CPT) compared to a treatment targeting both PTSD and substance use (seeking safety; Baig et al., 2021). Findings regarding dropout risk across individual and group formats are mixed, where individual formats for TFTs yielded better attendance in one study (Berke et al., 2019) but another study found that individual CPT yielded higher dropout than group CPT (Jeffreys et al., 2014).

Meta-Analyses of PTSD Treatment Dropout

To address mixed findings among primary articles, meta-analyses have examined PTSD treatment dropout among both civilian and military populations. For civilian populations, one meta-analysis ($k = 25$) found that dropout rates did not differ across treatments (exposure, cognitive therapy or stress inoculation training, exposure and other cognitive-behavioral treatment (CBT) strategies, and EMDR; Hembree et al., 2003). Subsequent meta-analyses that included a greater number of studies instead found higher dropout risk among TFTs than non-TFTs (Belsher et al., 2019; Imel et al., 2013; Lewis et al., 2020). Findings from Swift and Greenberg (2014) further suggest that dropout may differ across specific TFTs, as CBTs using both exposure and cognitive strategies yielded higher dropout (29%) than cognitive therapies alone (15%). There were no differences in dropout between CPT (24%), exposure (23%), and EMDR (17%) in that meta-analysis (Swift & Greenberg, 2014). Dropout may also differ across therapy formats, as group treatments yielded higher dropout in another meta-analysis ($k = 42$; Imel et al., 2013).

Further, other findings suggest that meta-analyses focusing on military populations may be warranted. Specifically, Varker et al. (2021) found higher dropout for military ($k = 21$; 28%) compared to civilian populations ($k = 63$; 16%). In addition, TFTs yielded higher dropout (34%) than non-TFTs (19%) in military populations, but this link did not persist in civilian populations. Dropout for specific treatments across both civilian and military populations included CPT (34%), EMDR (15%), PE (29%), and other CBTs (18%), although the authors did not provide specific dropout rates by treatment for military populations (Varker et al., 2021). Yet, two other meta-analyses did not find significant differences in dropout across military and civilian populations (Lewis et al., 2020; Straud et al., 2019).

Dropout meta-analyses focusing exclusively on military populations have also yielded mixed findings. One meta-analysis estimated an overall 36% PTSD treatment dropout rate among Operation Enduring Freedom and Operation Iraqi Freedom veterans engaged in psychotherapy in both randomized controlled trials and applied settings ($k = 20$; Goetter et al., 2015). Group formats were linked with higher dropout than individual formats; however, the authors found no link between dropout and exposure-based

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treatments or whether studies excluded comorbid substance use (Goetter et al., 2015). Another study found a 24% dropout rate among randomized controlled trials for PTSD ($k = 26$), where TFTs yielded higher dropout than non-TFTs (Edwards-Stewart et al., 2021). The largest meta-analysis of dropout among military populations to-date (Penix-Smith et al., 2025) included 283 articles ($N = 719{,}465$ clients) evaluating dropout for a range of presenting concerns. The overall dropout rate was 25.6% (95% CI [22.4%, 29.2%]), which was similar to the 25.3% dropout rate for manualized PTSD treatments in that study (95% CI [21.1%, 30.0%]). Among those treatments, dropout was higher among younger clients, VA compared to DoD settings, weekly outpatient versus IOPs, and individual versus group formats. There were no differences in dropout rates by study type (efficacy vs. effectiveness studies) or the dropout definition used (Penix-Smith et al., 2025).

Collectively, these meta-analyses provide insights into PTSD treatment dropout in military populations. However, limitations remain. First, no meta-analysis has evaluated dropout among specific PTSD treatments exclusively among military populations, which may be an important consideration given higher dropout among military populations overall and especially for TFTs (Varker et al., 2021). Primary research findings also suggest that there may be differences in dropout rates between various TFTs (Mott et al., 2014; Schnurr et al., 2022) and non-TFTs in military populations (Polusny et al., 2015). Estimating dropout for specific treatments can yield insights into which treatments may benefit from additional resources, provide more helpful benchmarks and practice implications for therapists and researchers who may specialize in only one or two treatments, and inform dissemination efforts that can then target treatments that are both effective and yield lower dropout rates.

The Present Study

Taken together, military populations may be at greater risk of dropping out of PTSD treatment compared to their civilian counterparts, especially from TFTs (Varker et al., 2021). However, meta-analytic dropout rates for specific PTSD treatments among military populations remain unknown. This study utilized articles providing dropout rates for PTSD treatments included in the Penix-Smith et al.'s (2025) meta-analysis to address these gaps in two ways. First, this study aimed to estimate dropout rates for specific PTSD protocols tested in both clinical trials and observational studies. Given that TFTs yielded higher dropout than non-TFTs overall in one meta-analysis with military populations (Varker et al., 2021), individual TFTs (e.g., CPT, PE) were expected to yield higher dropout than non-TFTs (e.g., PCT, MBSR). Hypotheses regarding comparisons within TFTs (e.g., CPT vs. PE) and within non-TFTs (e.g., PCT vs. MBSR) were not made due to mixed findings among primary research articles. Second, this study evaluated the link between dropout and treatment characteristics (targeting comorbid symptoms and therapy format). Based on preliminary findings, it was expected that higher dropout would be linked with treatments targeting PTSD symptoms alone rather than comorbid symptoms (Baig et al., 2021) as well as individual rather than group or combined formats across specific PTSD treatments (Jeffreys et al., 2014; Penix-Smith et al., 2025). Last, exploratory analyses tested whether study type and dropout definition moderated dropout, where no directional hypotheses were made for specific protocols.

Method

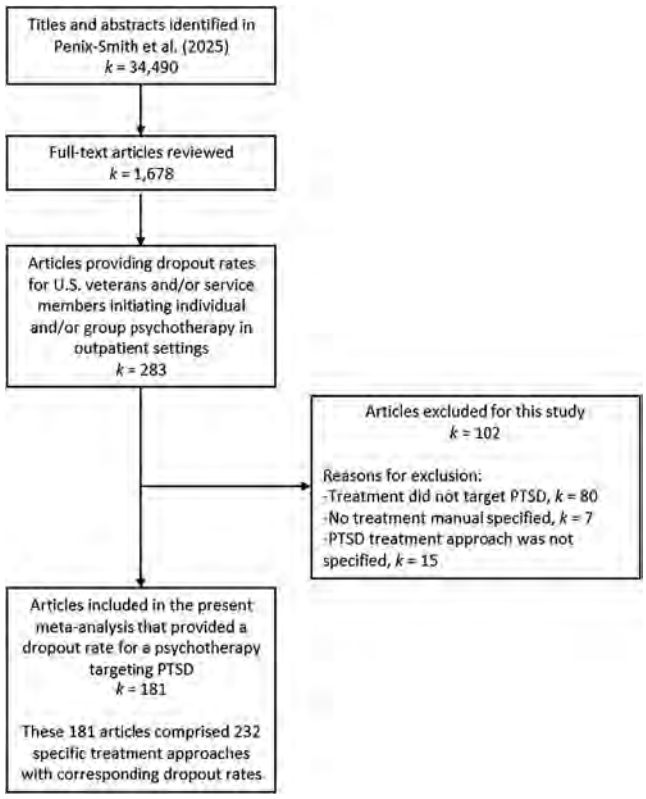
Inclusion Criteria

This study utilized articles that were identified in a dropout meta-analysis among U.S. military populations (Penix-Smith et al., 2025). See the Supplemental Materials for a more detailed review of the methods used in that study, including the search strategies used, keyword search terms, coding procedures (e.g., review phases, coders, resolution of discrepancies), agreement rates, and inclusion criteria. In that study, 283 articles were included that focused on U.S. adult military populations who initiated psychotherapy, included a dropout rate, used treatments that targeted mental health, leveraged individual and/or group formats, occurred in outpatient or IOP settings, entailed real-time client and therapist interactions, and were published in English (Penix-Smith et al., 2025). For articles to be included in the present study, articles had to specify (a) that PTSD was targeted, (b) the use of a treatment manual, and (c) the specific treatment used. See Figure 1 for the flow of articles through this review phase for study inclusion criteria. Overall, 181 articles met the inclusion criteria for the present study (Figure 1). References for all articles are provided in the Supplemental Materials.

Coding Procedure

Each article meeting inclusion criteria was coded by two raters, and agreement rates were high for coding study variables (91.8%).

Figure 1
Study Flowchart



Note. PTSD = posttraumatic stress disorder.

Additional information about the coding procedures used (Penix-Smith et al., 2025) is reviewed in the Supplemental Materials. In terms of study variables, dropout was coded as the percentage of clients that started an intervention and then prematurely dropped out (Penix-Smith et al., 2025; Swift & Greenberg, 2012). PTSD treatments tested in this study included CPT, PE, EMDR, WET, virtual reality exposure therapy (VRET), GBET, acceptance and commitment therapy (ACT), BA-TE, seeking safety, psychoeducation, MBSR, transcendental meditation (TM), Mantram Repetition Program (MRP), PCT, other exposure-focused protocol, CBTs with mixed cognitive and behavioral elements ("CBT-mixed"), CBTs with a specific focus on emotion regulation and interpersonal skills ("CBT-regulation"), other mindfulness protocol, or integrative treatment leveraging principles from multiple theoretical orientations. For IOPs, treatments were categorized as an IOP with a CPT focus, IOP with a PE focus, or as an IOP with another focus. Moderators included treatment focus (trauma symptoms alone, comorbid depression, and comorbid substance use), therapy format (group, individual, and combined group and individual formats), study type (effectiveness and efficacy studies), and dropout definition (failure to complete a protocol, therapist report, other definition such as stopped attending scheduled appointments, and not specified by study authors). More information about coding procedures for specific interventions and moderators are included in the Supplemental Materials.

Statistical Analyses

Random-effects models were used to estimate weighted, average dropout rates across specific interventions. Heterogeneity in dropout estimates was evaluated using the Q statistic, I^2 statistic, and prediction intervals. Higher Q and I^2 values indicate greater heterogeneity in dropout rates between studies. Mixed-effects models and the Q statistic were used to compare whether dropout differed across interventions, where higher Q values indicate greater between-group variability in dropout rates than would be expected by chance. Follow-up, pairwise subgroup analyses leveraging mixed-effects models were used to compare dropout across specific interventions. Next, mixed-effects models were used to test whether dropout rates varied across potential moderators. When those models were statistically significant, follow-up pairwise comparisons were leveraged to compare dropout rates across each level for those variables for specific treatments that yielded sufficient data to compare dropout rates (e.g., individual CPT vs. group CPT for therapy format). Additional information about the procedures used to account for Type I error is provided in the Supplemental Materials.

Transparency and Openness

This present study utilized articles identified in Penix-Smith et al. (2025). While that study included overall PTSD treatment dropout rates and moderators, it included articles that did not specify the protocol(s) used and did not test dropout rates or moderators for specific PTSD protocols (see the data transparency table in the Supplemental Materials). Instead, this study aimed to estimate weighted dropout rates and moderators for specific PTSD treatments among military populations. For both studies, journal article reporting standards for quantitative meta-analyses (American Psychological Association, 2020) were used, including reporting on search strategies, inclusion criteria, exclusion of articles, coding, and data analysis. References for articles that met study inclusion criteria are included in the Supplemental Materials. Comprehensive Meta-Analysis software, Version 4 (Borenstein et al., 2022) was used. For study materials, please see https://figshare.com/articles/dataset/Meta-analysis_of_Psychotherapy_Dropout_for_Specific_Approaches_Targeting_PTSD_in_Service_Members_and_Veterans/26131396. This study was not preregistered.

Results

Overall, 181 articles met study inclusion criteria. These articles comprised data from 124,092 U.S. service members and veterans published between 1994 and 2022. Specifically, client populations included veteran only samples ($k = 147$), service member only samples ($k = 16$), and mixed veteran and service members ($k = 18$). Interventions were primarily delivered in VA settings ($k = 139$; DoD $k = 14$; mixed DoD and VA $k = 5$; and civilian $k = 16$). Collectively, these 181 studies comprised dropout rates for 232 treatments targeting PTSD (Table 1).

Weighted dropout estimates across treatments are included in Table 1. Across all articles, the dropout rate was 25.6%, 95% CI [22.9%, 28.5%], prediction interval [5.6%, 66.7%), $Q(180) = 13439.25$, $p < .001$, $I^2 = 98.66$. Dropout rates from primary articles ranged from 0.0% ($k = 18$) to 87.6% ($k = 1$). Among weekly formats, dropout estimates ranged from 6.9% (GBET) to 40.1% (CPT). Dropout estimates among outpatient TFTs were as follows: 40.1% for CPT, 34.7% for PE, 13.6% for EMDR, and 19.8% for WET. For non-TFTs, dropout estimates were 16.1% for PCT and 20.0% for MBSR. The heterogeneity observed in dropout rates (Table 1) suggests that there are significant moderators that may explain variability in dropout estimates and that observed estimates may not apply to all populations.

See Table 2 for results from subgroup analyses comparing dropout rates across specific treatments. Overall, dropout rates significantly differed, $Q(21) = 96.86$, $p < .001$, $I^2 = 98.49$. Dropout rates for several TFTs—including weekly formats of CPT, PE, EMDR, and WET—were similar (Table 2). Dropout was higher among weekly CPT than: GBET, other exposure therapy protocols, MBSR, TM, MRP, other mindfulness protocols, integrative treatments, and PCT. Next, weekly PE had higher dropout rates than GBET and PCT. VRET yielded higher dropout rates than GBET, BA-TE, MBSR, TM, MRP, integrative treatments, and PCT. Dropout estimates for EMDR and WET did not significantly differ from other weekly protocols. However, GBET tended to yield lower dropout than other treatments.

Among non-TFTs, PCT yielded lower dropout rates than CPT, PE, VRET, ACT, CBT-mixed, CBT-regulation, and psychoeducation programs. Dropout was higher among weekly PCT than among GBET. MBSR yielded lower dropout than CPT and VRET, and this same pattern emerged for TM. Dropout rates were lower for MRP than those for CPT, PE, ACT, CBT-mixed, CBT-regulation, and psychoeducation interventions. Other mindfulness protocols yielded lower dropout than CPT; however, other mindfulness protocols yielded higher dropout rates than GBET.

Regarding delivery method, IOPs emphasizing CPT (8.5%) and PE (5.5%) tended to yield lower rates than other weekly protocols (Table 2). CPT-based IOPs and IOPs focusing on other treatments yielded higher dropout rates than IOPs utilizing PE. IOPs focused on other non-CPT and non-PE treatments yielded lower dropout than weekly CPT only.

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Table 1
Weighted Dropout Rates Among Specific PTSD Treatments

Population	*k*	Dropout estimate	95% CI	Prediction interval	*Q*	*df*	I^2
All articles with manualized PTSD treatments	181	25.6%	[22.9%, 28.5%]	[5.6%, 66.7%]	13439.25***	180	98.66
All weekly outpatient CBTs	199	30.6%	[27.9%, 33.4%]	[7.9%, 69.4%]	13765.26***	198	98.56
CPT	48	40.1%	[34.6%, 45.9%]	[11.9%, 76.9%]	6384.16***	47	99.26
PE	46	34.7%	[27.3%, 42.8%]	[4.9%, 84.4%]	5750.97***	45	99.28
EMDR	3	13.6%	[1.5%, 62.5%]	[0.0%, 100.0%]	7.30*	2	72.61
Written exposure therapy	3	19.8%	[12.0%, 30.8%]	[0.1%, 99.1%]	4.48	2	55.36
Virtual reality exposure therapy	11	37.2%	[28.9%, 46.3%]	[16.6%, 63.8%]	25.78**	10	61.21
GBET	5	6.9%	[3.4%, 13.5%]	[0.9%, 38.1%]	7.31	4	45.25
Other exposure protocol	9	14.2%	[7.0%, 26.7%]	[1.4%, 65.7%]	31.84***	8	74.88
ACT	4	39.9%	[19.4%, 64.7%]	[0.6%, 98.5%]	17.59***	3	82.94
BA-TE	4	20.9%	[16.4%, 26.3%]	[0.0%, 100.0%]	1.25	3	0.00
Seeking safety	3	23.6%	[10.5%, 44.9%]	[0.0%, 100.0%]	9.01*	2	77.81
Emotion regulation/interpersonal skills	9	28.8%	[21.3%, 37.6%]	[12.3%, 53.8%]	15.88*	8	49.63
Mixed cognitive-behavioral protocols	17	31.6%	[24.5%, 39.7%]	[10.7%, 64.0%]	121.82***	16	86.87
Psychoeducation	8	30.6%	[22.7%, 39.9%]	[10.5%, 62.4%]	33.48***	7	79.09
All mindfulness treatments	22	17.3%	[10.7%, 26.8%]	[5.8%, 45.8%]	67.15***	21	68.73
MBSR	4	20.0%	[12.9%, 29.6%]	[0.0%, 100.0%]	2.52	3	0.00
Transcendental meditation	3	16.8%	[10.2%, 26.5%]	[0.2%, 95.9%]	2.47	2	18.91
Mantram repetition program	5	10.3%	[4.9%, 20.4%]	[0.8%, 61.6%]	17.59**	4	77.27
Other mindfulness protocol	10	25.2%	[17.2%, 35.3%]	[7.4%, 58.6%]	26.08**	9	65.50
All weekly non-CBT treatments	22	16.6%	[13.0%, 21.0%]	[6.9%, 34.8%]	45.60***	21	53.95
Integrative	5	18.6%	[11.9%, 28.0%]	[6.5%, 43.0%]	4.92	4	18.51
Present-centered therapy	17	16.1%	[12.0%, 21.3%]	[5.9%, 37.1%]	40.69**	16	60.68
Intensive outpatient programs	16	7.9%	[4.5%, 13.6%]	[0.7%, 49.6%]	187.72***	15	92.01
CPT focus	4	8.5%	[7.0%, 10.4%]	[0.0%, 100.0%]	1.38	3	0.00
PE focus	8	5.5%	[2.8%, 10.8%]	[0.6%, 37.6%]	41.62***	7	83.18
Other treatment	4	16.9%	[4.0%, 50.0%]	[0.0%, 99.8%]	55.04***	3	94.55
Treatment focus							
PTSD only	213	26.3%	[23.8%, 28.9%]	[6.1%, 66.2%]	15061.51***	212	98.49
PTSD and comorbid depression	8	23.2%	[13.0%, 37.9%]	[4.6%, 65.5%]	6.76	7	0.00
PTSD and comorbid substance use	11	46.4%	[33.2%, 60.1%]	[12.7%, 83.8%]	49.13***	10	79.65
Study type							
Effectiveness (e.g., applied practice settings)	104	27.0%	[23.0%, 31.5%]	[6.1%, 66.3%]	2085.66***	103	95.06
Efficacy (e.g., randomized controlled trials)	127	25.6%	[22.0%, 29.5%]	[4.7%, 73.5%]	12785.07***	126	99.01
Dropout definition							
Failure to complete protocol	96	27.8%	[23.9%, 32.2%]	[5.7%, 71.1%]	11322.83***	95	99.16
Therapist report	7	27.5%	[14.7%, 45.6%]	[4.9%, 73.9%]	52.15***	6	88.50
Other definition	22	26.5%	[18.7%, 36.1%]	[5.1%, 70.6%]	538.46***	21	96.10
Not specified in primary article	98	25.6%	[21.8%, 29.8%]	[5.1%, 68.7%]	2972.81***	97	96.74

Note. The *Q* and I^2 statistics are measures of heterogeneity in effect sizes, where larger values indicate greater variability in dropout rates between primary studies. PTSD = posttraumatic stress disorder; CI = confidence interval; CBT = cognitive-behavioral therapy; CPT = cognitive processing therapy; PE = prolonged exposure; EMDR = eye movement desensitization and reprocessing; GBET = group-based exposure therapy protocol; ACT = acceptance and commitment therapy; BA-TE = behavioral activation and therapeutic exposure protocol; MBSR = mindfulness-based stress reduction.
* $p < .05$. ** $p < .01$. *** $p < .001$.

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Further, dropout differed depending on whether treatments targeted PTSD alone (26.3%), comorbid PTSD and depression (23.2%), or comorbid PTSD and substance use (46.4%; Table 1), $Q(2) = 9.68$, $p = .008$. Adaptations for comorbid depression included behavioral activation (i.e., BA-TE; $k = 3$), emotion regulation/interpersonal skills ($k = 2$), CBTs with mixed cognitive-behavioral elements ($k = 2$), and PCT ($k = 1$). Comorbid depression adaptations yielded similar dropout rates as those targeting PTSD alone, $Q(1) = 0.21$, $p = .65$. For comorbid substance use, treatments included ACT ($k = 2$), CBTs with cognitive-behavioral elements ($k = 2$), CPT ($k = 2$), other exposure treatments ($k = 2$), and seeking safety ($k = 3$). Rates were higher for treatments targeting comorbid substance use overall compared to those targeting PTSD alone, $Q(1) = 9.32$, $p = .002$, as well as comorbid depression, $Q(1) = 10.08$, $p < .001$.

Next, dropout differed for individual (31.0%), group (20.3%), and combined (19.4%) formats when tested across all PTSD treatments (Table 1). Individual therapies yielded higher dropout than group therapies, $Q(1) = 12.23$, $p < .001$, and combined therapy formats, $Q(1) = 2.94$, $p = .02$. Group and combined formats yielded similar dropout rates, $Q(1) = .07$, $p = .79$. For specific protocols, dropout did not differ between individual, group, and combined formats of all weekly CBTs, CPT, CBT-mixed, other mindfulness protocols, non-CBTs, and IOPs (Supplemental Table S2).

In terms of study variables, effectiveness (27.0%) and efficacy studies (25.6%) yielded similar dropout rates across all treatments, $Q(1) = .25$, $p = .62$ (Table 1). Similarly, there were no differences in dropout for specific protocols among articles that yielded sufficient articles to test this link, including weekly outpatient CBTs, CPT, PE, VRET, CBT-regulation, psychoeducation, weekly outpatient non-CBTs, and PCT (Supplemental Table S3).

Last, rates did not differ based on dropout definition across all PTSD treatments, including whether clients failed to complete a

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Table 2

Post Hoc Subgroup Analyses Comparing Dropout Among Specific PTSD Treatments

Protocol with meta-analytic dropout rate	CPT: 40.1% (*Q*)	PE: 34.7% (*Q*)	EMDR: 13.6% (*Q*)	WET: 19.8% (*Q*)	VRET: 37.2% (*Q*)	GBET: 6.9% (*Q*)	O-E: 14.2% (*Q*)	ACT: 39.9% (*Q*)	BA-TE: 20.9% (*Q*)	SS: 23.6% (*Q*)	ER-IS: 28.8% (*Q*)	CBT Mixed: 31.6% (*Q*)	PsyEd: 30.6% (*Q*)	MBSR: 20.0% (*Q*)	TM: 16.8% (*Q*)	MRP: 10.3% (*Q*)	O-M: 25.2% (*Q*)	Integ: 18.6% (*Q*)	PCT: 16.1% (*Q*)	IOP-CPT: 8.5% (*Q*)	IOP-PE: 5.5% (*Q*)
PE: 34.7%	1.09	—																			
EMDR: 13.6%	1.55	1.08	—																		
WET: 19.8%	3.90	1.37	0.17	—																	
VRET: 37.2%	0.62	0.08	0.56	5.46	—																
GBET: 6.9%	22.11[a]	11.24[a]	2.44	5.49	26.06[a]	—															
O-E: 14.2%	5.78[a]	2.86	0.13	0.10	1.70	4.76	—														
ACT: 39.9%	0.00	1.12	1.17	2.85	0.24	11.98[a]	1.83	—													
BA-TE: 20.9%	4.70	2.01	0.23	0.07	5.87[a]	6.61[a]	0.20	3.10	—												
SS: 23.6%	2.14	0.54	0.07	0.23	2.23	5.68[a]	0.04	1.09	0.36	—											
ER-IS: 28.8%	3.35	0.97	0.01	1.81	1.97	16.86[a]	0.16	1.82	2.31	0.31	—										
CBT Mixed: 31.6%	2.97	0.64	0.74	2.20	0.43	17.77[a]	0.85	0.92	2.56	0.74	0.42	—									
PsyEd: 30.6%	1.89	0.27	0.12	2.18	0.96	17.66[a]	0.56	1.16	2.45	0.63	0.15	0.05	—								
MBSR: 20.0%	5.02[a]	2.50	0.19	0.05	5.31[a]	4.18	0.37	3.21	0.04	0.45	3.71	2.69	2.45	—							
TM: 16.8%	5.57[a]	2.22	0.27	0.30	7.31[a]	3.27	0.34	3.57	0.70	0.67	3.30	3.52	3.54	0.27	—						
MRP: 20.0%	15.79[a]	7.97[a]	1.09	1.23	13.79[a]	0.80	2.63	8.01[a]	0.87	2.45	6.83[a]	10.23[a]	8.82[a]	0.63	0.50	—					
O-M: 25.2%	5.39[a]	1.97	0.00	0.67	2.78	11.04[a]	.01	2.35	0.92	0.02	0.13	1.12	0.60	0.98	1.50	4.71	—				
Integ: 18.6%	7.05[a]	3.44	0.39	0.08	7.35[a]	4.87[a]	0.54	4.32	0.16	0.00	2.83	3.75	3.39	0.01	0.11	0.79	1.36	—			
PCT: 16.1%	24.89[a]	10.25[a]	1.04	0.29	17.81[a]	5.38[a]	2.33	10.22[a]	0.13	1.29	6.58[a]	12.30[a]	9.36[a]	0.05	0.00	0.92	4.01	0.06	—		
IOP-CPT: 8.5%	20.13[a]	8.89[a]	9.50[a]	26.52[a]	42.56[a]	0.00	5.59	21.03[a]	29.83[a]	10.92[a]	33.13[a]	19.50[a]	24.28[a]	11.67[a]	8.21[a]	1.65	17.10[a]	13.38[a]	6.98[a]	—	
IOP-PE: 5.5%	44.04[a]	21.28[a]	2.69	4.51	32.38[a]	0.04	8.41	15.18[a]	3.63	6.37[a]	18.70[a]	31.45[a]	24.86[a]	2.81	2.89	1.08	14.22[a]	3.82	9.09[a]	12.14[a]	—
O-IOP: 16.9%	5.86[a]	2.16	0.02	0.00	2.53	1.57	0.04	1.36	0.01	0.15	0.65	2.24	1.56	0.07	0.03	0.84	0.26	0.76	0.16	3.79	7.74[a]

Note. The *Q* statistic is a between-group heterogeneity test, where higher values indicate greater between-group variability in dropout rates than would be expected by chance. PTSD = posttraumatic stress disorder; CPT = cognitive processing therapy; PE = prolonged exposure; EMDR = eye movement desensitization and reprocessing; WET = written exposure therapy; VRET = virtual reality exposure therapy; GBET = group-based exposure therapy; O-E = other exposure therapy protocol; ACT = acceptance and commitment therapy; BA-TE = behavioral activation and therapeutic exposure protocol; SS = seeking safety; ER-IS = CBT protocol with emotion regulation and interpersonal skills focus; CBT = cognitive-behavioral therapy; PsyEd = psychoeducation; MBSR = mindfulness-based stress reduction; TM = transcendental meditation; MRP = Mantram Repetition Program; O-M = other mindfulness protocol; Integ = integrative; PCT = present-centered therapy; IOP-CPT = intensive outpatient program with cognitive therapy focus; IOP-PE = intensive outpatient program with prolonged exposure therapy focus; O-IOP = other intensive outpatient program.

[a] Statistically significant after family-wise Benjamini–Hochberg corrections (Benjamini & Hochberg, 1995).

protocol (27.8%), therapist report (27.5%), another definition (26.5%), or did not specify their definition, 25.6%; $Q(1) = .07$, $p = .79$; Table 1. There were also no differences in dropout rates by definition for specific protocols, including weekly outpatient CBTs, CPT, PE, CBT-regulation, CBT-mixed, psychoeducation, other mindfulness protocol, weekly outpatient non-CBTs, PCT, and IOPs (Supplemental Table S4).

Discussion

This study conducted a secondary analysis of Penix-Smith et al. (2025) to obtain dropout rates for specific PTSD psychotherapies among military populations. These 181 articles encompassed data for 232 specific treatments and 124,092 veterans and service members. Across all articles, the average dropout rate was 25.6%, 95% CI [22.9%, 28.5%]. Dropout varied across specific treatments, ranging from 5.5% (IOPs focusing on PE) to 40.1% (weekly CPT). Specifically, dropout rates among TFTs recommended or suggested in the U.S. Department of Veterans Affairs/Department of Defense (2023) CPGs—CPT, PE, EMDR, and WET—did not differ. However, CPT, PE, and VRET yielded higher dropout than several other TFTs and non-TFTs. Other non-TFTs tended to yield lower dropout rates than other treatments, including 16.1% for PCT and 20.0% for MBSR. IOP formats—including those leveraging CPT and PE elements—had the lowest dropout rates overall. In addition, higher dropout was linked with treatments that targeted comorbid PTSD and substance use. Although individual formats yielded higher dropout when tested across all treatments together, dropout rates did not differ by therapy format when tested as a moderator for specific treatments (e.g., individual CPT vs. group CPT). Similarly, study type and dropout definition did not moderate dropout rates for specific treatments (e.g., CPT, PCT). Together, these findings underscore the importance of differentiating between specific protocols for both TFTs and non-TFTs when evaluating dropout.

Weighted Dropout Estimates for Specific Treatments

Dropout rates for first-line, weekly TFTs highlighted in the VA/DoD CPGs (2023) were 40.1% for CPT, 34.7% for PE, 13.6% for EMDR, and 19.8% for WET. Rates for specific PTSD treatments did not significantly differ even after controlling for study type (effectiveness vs. efficacy studies) and dropout definition. Further, a meta-analysis of mixed civilian and military populations (Varker et al., 2021) found slightly lower but comparable meta-analytic dropout rates: 34% for CPT, 29% for PE, and 15% for EMDR. In addition to TFTs, this study estimated dropout among non-TFTs, including CBTs targeting emotion regulation and interpersonal skills (28.8%), MBSR (20.0%), integrative treatments (18.6%), and PCT (16.1%). These estimates differed from meta-analytic rates in civilian populations, including 8.8% dropout for integrative treatments and 15.2% for supportive treatments (Swift & Greenberg, 2014). It is not clear why the dropout rate for integrative treatments was somewhat lower in that study. It could be that many of the integrative treatments in the present study included CBT elements, and CBTs generally yielded higher dropout rates in the present study.

Comparisons in Dropout Rates Between Specific Treatments

In this meta-analysis, dropout among TFTs commonly used in VA and DoD settings—CPT, PE, EMDR, and WET—did not statistically differ. These findings also paralleled those from Swift and Greenberg (2014), where dropout was similar among CPT, EMDR, and exposure therapies. While consistent with one primary research article that found no difference between CPT and PE (Miles & Thompson, 2016), findings from this study contrasted those that suggested CPT (Mott et al., 2014) or PE (Schnurr et al., 2022) yielded higher dropout.

Although dropout was similar across TFTs in this study, some of these treatments tended to yield higher dropout than other non-TFTs. Specifically, weekly TFTs yielding higher dropout included CPT, PE, and VRET. The overall pattern of some TFTs yielding higher dropout than some non-TFTs aligns with previous meta-analytic findings in military (Varker et al., 2021) and civilian populations (e.g., Belsher et al., 2019; Imel et al., 2013; Lewis et al., 2020). Yet, not all TFTs yielded higher dropout in this study, including GBET as well as IOP deliveries of CPT and PE. This overall pattern of findings suggests that, while several TFTs are linked with higher dropout rates, this is not always the case for all TFTs.

Nevertheless, is unclear why GBET, an adaptation of exposure therapy for group settings specifically for military populations, yielded lower dropout than other TFTs and non-TFTs. GBET includes activities for building cohesion with other group members (e.g., calling others as homework) prior to initiating exposure, which could bolster social support and protect against dropout. Indeed, one study found that strong support from loved ones for facing trauma-treatment-related distress was protective against dropout from CPT and PE (Meis et al., 2019). The group format could therefore make in-session imaginal exposure more tolerable than individual formats of other exposure-based treatments. GBET also specifically targeted feelings of grief, shame, and guilt, which are common features of moral injury that are thought to make TFT engagement difficult for military populations (Litz et al., 2009).

Attending IOPs was also protective against dropout, even when they leveraged CPT and PE. It could be that individuals who commit to postponing day-to-day responsibilities (e.g., work, childcare) to engage in IOPs may be more ready to change, and readiness to change is meta-analytically linked to enhanced retention (Krebs et al., 2018). IOPs may provide fewer opportunities to engage in avoidance behaviors than weekly formats, which could also promote engagement in IOPs. Several IOPs included additional elements beyond just TFTs (e.g., emotion regulation, interpersonal skills, identifying values), and it is possible that adding such elements could be protective against dropout. However, Foa et al. (2018) found that massed delivery of PE without these additional elements yielded less dropout than outpatient weekly formats, indicating that intensive deliveries of TFTs alone may be protective.

Regarding treatment focus, protocols targeting comorbid substance use yielded higher dropout than those targeting PTSD alone or comorbid depression. To our knowledge, this study is the first meta-analysis to document this link. This elevated dropout risk among treatments targeting comorbid substance use contradicts findings from one primary article (Baig et al., 2021), where the nontrauma-focused seeking safety protocol for comorbid substance use yielded

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lower dropout than CPT. This discrepancy in findings could be accounted for by the inclusion of protocols targeting comorbid substance use that leveraged trauma-focused elements (e.g., exposure) in this study. Such trauma-focused elements often explicitly target experiential avoidance, which could be difficult for these client populations to engage with given that substance use is associated with the use of avoidant coping strategies and avoidance can increase the severity of PTSD symptoms over time (Boden et al., 2014).

For therapy format, individual formats yielded higher dropout than group and combined formats when tested across all articles. However, this link did not persist when it was tested within specific treatments (e.g., CPT, mindfulness protocols, PCTs). In contrast, other meta-analyses with military populations who did not account for specific protocols used found higher dropout in group (Goetter et al., 2015) or individual formats (Penix-Smith et al., 2025) overall. Given that dropout was not linked to different formats when tested within the same treatment type (e.g., individual CPT vs. group CPT) in the present meta-analysis, it is possible that the higher overall dropout risk in individual formats is better accounted for by the inclusion of individual treatments with higher dropout risk (e.g., PE, VRET) than differences in dropout across individual and group formats of the same treatment. In line with this interpretation, primary articles found higher dropout rates among group (Berke et al., 2019) and individual formats (Jeffreys et al., 2014); however, these differences were no longer significant after controlling for covariates and the specific protocol used. Thus, individual formats of PTSD treatments may tend to yield higher overall dropout rates than group formats, but dropout rates may be similar for individual and group variations of the same protocol.

Limitations

There are several limitations associated with this study. First, this study aimed to obtain a representative estimate of PTSD dropout rates rather than comprehensively capture every published article; thus, it is possible that there are published articles with dropout rates in military populations that were not included. In line with the aim of capturing a representative estimate, however, five search strategies were utilized which yielded over 34,490 titles and abstracts that were reviewed. This approach yielded 181 articles associated with PTSD treatment, which is a larger number of primary articles included than previous PTSD meta-analyses in military populations (e.g., Edwards-Stewart et al., 2021; Goetter et al., 2015; Varker et al., 2021) and civilian populations (e.g., Belsher et al., 2019; Hembree et al., 2003; Swift & Greenberg, 2014). Second, this study evaluated dropout across specific treatments (e.g., PE). As such, it is not clear which common elements within those treatments (e.g., in vivo exposure, cognitive restructuring, homework) are particularly associated with dropout. Nevertheless, utilizing specific treatments rather than common elements as the unit of measurement in this study aligns with current VA and DoD practices where therapists and researchers may specialize in specific protocols (e.g., PE, CPT, WET) rather than specific common elements. Further, this study examined dropout by treatment across both efficacy and effectiveness studies. As a result, the degree of fidelity to specific treatments in the present study—particularly among effectiveness studies—remains unknown. For example, many protocols (e.g., CPT, PE) were designed to be delivered on a weekly basis, but session frequency may vary for efficacy (e.g., more frequent to accelerate the flow of participants) and effectiveness studies (e.g., less frequent due to clinician workload or access barriers). In addition, the present meta-analysis focused on dropout as a treatment outcome and did not focus on outcomes such as changes in PTSD symptoms or functioning. Thus, findings from this study may not generalize to such other treatment outcomes, and treatments that are high risk for dropout should not be excluded from practice given that they may still result in meaningful changes in symptoms and functioning for some clients. For some treatments (e.g., GBET), there were relatively few studies. However, these limited number of articles reflect the state of the existing literature, which to-date has largely focused on CPT and PE in military populations. In addition, most studies were conducted within VA settings; thus, findings from this study may be more generalizable to clients served in such settings.

Implications and Future Directions

Findings from this study can inform future practice, research, and policy efforts. Regarding practice implications, therapists using treatments associated with higher dropout (e.g., CPT, PE, VRET) may consider incorporating dropout prevention strategies. Such evidence-based strategies include accommodating client preferences, building strong therapeutic alliances, measurement-based care, increasing client hope, and providing psychoeducation about the therapy process (Swift et al., 2012). Although several weekly TFTs tended to yield higher dropout, it is also important to note that these treatments can still result in meaningful changes for clients and should not be excluded from practice. Instead, these high rates may underscore the importance of leveraging shared decision-making strategies, where clients have access to those treatments that meet their needs and preferences. In turn, accommodating client preferences is meta-analytically linked with better treatment outcomes and engagement (Swift et al., 2018). Last, given that IOPs yielded lower dropout than weekly formats, affording clients the opportunity to meet more frequently than once per week may mitigate dropout.

For research, findings suggest that dropout differs across specific treatments, where each treatment leveraged various treatment elements (e.g., bilateral stimulation in EMDR, focus on common factors in PCT). It is unknown whether specific elements are linked to dropout risk, and future research (e.g., dismantling studies) may address this gap. Researchers may also test whether those elements included in treatments with lower dropout risk can be utilized as possible dropout prevention strategies, such as the emphasis of common factors from PCT, mindfulness from MBSR or MRP, or addressing moral injury for GBET. Future work may also evaluate whether evidence-based dropout prevention strategies identified in civilian populations (e.g., Swift et al., 2012) mitigate dropout risk in military populations. For example, one therapist training targeting measurement-based care skills decreased dropout in Army settings (Nugent et al., 2022).

Regarding policy, dropout rates were equivalent across group and individual formats of specific treatments (e.g., CPT, PCT) that yielded sufficient articles to make meaningful comparisons. Thus, leveraging group formats may be one avenue for expanding treatment access to guideline-recommended treatments. In addition, weekly deliveries of CPT and PE yielded higher dropout than IOP deliveries. Increasing access to IOP delivery methods may optimize

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treatment engagement in TFTs. Yet, only weekly versions of TFTs (e.g., CPT, PE, EMDR) were found to have sufficient evidence to conclude they were effective in treating PTSD in the most recent VA/DoD CPGs (2023). Future efforts evaluating the effectiveness of group and IOP adaptions may support policymaker efforts to scale treatment access in VA or DoD settings, where policymakers may prioritize treatments that are effective, yield lower dropout rates, and are scalable. Policymakers may also consider how to address barriers to accessing care for effective treatments with low dropout rates, particularly for IOP formats that are not widely disseminated. Such guidance may include whether clients at risk for dropping out should be directed to engage in guideline-recommended formats with higher dropout risk, treatments with lower dropout risk that have less empirical support for treatment effectiveness (e.g., PCT), and/or IOP formats that may require additional resources if they are not available locally (e.g., travel expenses).

Collectively, such therapist, researcher, and policymaker efforts to promote treatment engagement can empower veterans and service members to choose how they heal from trauma, honor their treatment preferences, and increase the effectiveness of PTSD treatment treatments.

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