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STATE OF THE SCIENCE

State of the Science: Prolonged exposure therapy for the treatment of posttraumatic stress disorder

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Abstract

Prolonged exposure therapy (PE) is a well-established first-line treatment for posttraumatic stress disorder (PTSD) that is based on emotional processing theory. PE has been rigorously evaluated and tested in a large number of clinical trials in many countries covering a wide range of trauma populations. In this review, we summarize the evidence base supporting the efficacy of PE across populations, including adults with sexual assault–related PTSD and mixed trauma–related PTSD, military populations, and adolescents. We highlight important strengths and gaps in the research on PE with individuals from marginalized communities. We discuss the efficacy of PE on associated psychopathology and in the presence of the most commonly comorbid conditions, either alone or integrated with other treatments. In addition, we provide an overview of research examining strategies to augment PE. Much of this work remains preliminary, but numerous trials have tested PE in combination with other psychological or pharmacological approaches, interventions to facilitate extinction learning, and behavioral approaches, in the hopes of further increasing the efficiency and efficacy of PE. There are now several trials testing PE in novel formats that may have advantages over standard in-person PE, such as lower dropout and increased scalability. We examine this recent work on new models of delivering PE, including massed treatment, telehealth, and brief adaptations for primary care, all of which have the potential to increase access to PE. Finally, we highlight several promising areas for future research.

Prolonged exposure therapy (PE) was developed by Dr. Edna Foa and colleagues in the 1980s, shortly after posttraumatic stress disorder (PTSD) was first introduced to the *Diagnostic and Statistical Manual of Mental Disorders* (*DSM-III*; APA, 1980). At that time, the application of exposure therapy to treat patients who were struggling with memories of traumatic events was relatively new. Other researchers were reporting good results with a variant of imaginal exposure they called "implosive" or "flooding" therapy in which patients were guided through graduated imaginal exposure to trauma-related scenes. Controlled trials with veterans showed this approach was effective relative to waitlist conditions (N. A. Cooper & Clum, 1989; Keane et al., 1989) and counseling (Boudewyns et al., 1990). This work informed the development of PE, a manualized exposure therapy program designed to help people with PTSD emotionally process traumatic experiences. As described later, the first studies of PE were led by Dr. Foa and focused on the treatment of sexual assault survivors with PTSD. Since then, numerous independent research groups have studied PE in a wide range of patient populations around the world, and the PE manual (Foa

et al., 2007, 2019) has been translated into 10 languages (i.e., Japanese, Korean, Swedish, Polish, Spanish, German, Chinese, Norwegian, Russian, and Italian). It is one of the most well-supported protocols for treating PTSD (Department of Veterans Affairs [VA]/Department of Defense [DoD], 2023).

Theoretical underpinnings

PE is based on emotional processing theory (EPT), which was first proposed by Foa and Kozak (1986) to explain the development and maintenance of and recovery from anxiety-related disorders. The application of EPT to PTSD specifically was articulated by Foa and Cahill (2001) and has been described in subsequent work incorporating new experimental and clinical research findings (e.g., Foa & McLean, 2016). According to EPT, which was heavily influenced by Lang's (1979) bioinformational theory of fear, a traumatic event is represented in memory as a cognitive structure. This cognitive structure includes information about the distressing stimuli, the emotional responses, and their meaning. The information in this structure is interrelated such that information matching any part of the structure will activate its entirety. In a nonpathological structure, the associations match reality (e.g., gunshots mean danger), and activation of the structure elicits adaptive behavior (e.g., seeking cover). In contrast, a pathological structure involves inaccurate associations (e.g., a crowd of people means danger) and elicits maladaptive behavior (e.g., running from a store) that does not promote safety. Whereas a nonpathological structure is only activated in threatening situations, a pathological structure is characterized by overgeneralization and excessive response to safe stimuli. In PTSD, the cognitive structure is also characterized by representations of one's responses during and after the traumatic event with the meaning of self-incompetence (e.g., "I'm a weak person because I did not stop the assault"). These perceptions promote the avoidance of trauma-related thoughts, images, and situations, which, in turn, prevents emotional processing and, thereby, maintains PTSD symptoms.

EPT proposes that the same mechanisms underlie both natural recovery from trauma and therapeutic recovery from PTSD. Natural recovery is thought to occur when trauma-related perceptions are disconfirmed through repeated activation of the cognitive structure in the absence of feared consequences. According to EPT, the emotional structure is repeatedly activated by thinking and talking about the traumatic event and approaching trauma reminders by resuming usual daily activities. In contrast, avoiding trauma-related thoughts, memories, and situations can increase the risk of developing PTSD by preventing activation of the structure and the opportunity for corrective learning.

PE was designed to mirror the processes hypothesized to promote recovery following a traumatic event. Specifically, therapeutic recovery through PE involves helping individuals to repeatedly approach safe trauma-related thoughts, memories, and situations to activate the trauma-related structure and disconfirm inaccurate or unhelpful perceptions. PE is thought to alter inaccurate perceptions by providing opportunities to obtain corrective information experientially through repeated in vivo exposure and imaginal exposure followed by processing.

In vivo exposure involves approaching safe situations that remind the patient of the trauma and cause emotional distress (e.g., anxiety, shame, guilt) or that have felt unsafe since the traumatic event. The rationale for in vivo exposure is that entering distress-evoking situations provides opportunities for extinction learning as patients realize that their distress decreases over time and that they can tolerate distress. According to EPT, in vivo exposure promotes therapeutic recovery by activating the emotional structure and correcting unrealistic or exaggerated probability estimates of harm via extinction learning. It also provides the opportunity to test and disconfirm the anticipated negative consequences and incorporate more realistic information through experiential learning (e.g., realizing that shopping in a crowded store is safe). Moreover, staying in distress-evoking situations is thought to block the negative reinforcement of avoidance, which helps the patient break the habit of managing distress through avoidance or escape.

Imaginal exposure involves revisiting and recounting aloud the memory of the trauma followed by the processing of the experience. According to EPT, imaginal exposure promotes therapeutic recovery in several ways. Similar to in vivo exposure, repeatedly revisiting the trauma memory is thought to promote extinction learning when emotional distress associated with the trauma memory does not increase to an intolerable level or persist indefinitely. Systematically revisiting and recounting the traumatic event in one's imagination may also prevent the negative reinforcement that occurs when patients avoid or distract themselves from the trauma memory. In addition, repeated revisiting and recounting of the traumatic memory may help patients distinguish between remembering the trauma and being traumatized again. Finally, imaginal exposure is also thought to help patients organize the memory and gain a new perspective about what happened (e.g., "I did what I needed to survive the situation" instead of "I could have stopped it if I tried harder"). Imaginal exposure is followed by processing,

which involves a discussion of the experience of imaginal exposure and their thoughts about the self and world related to that experience. The goal of processing is to help patients attend to and articulate the correcting learning that occurs during imaginal exposure. Evidence has supported many—though not all—of the proposed indicators of emotional processing (see Foa & McLean, 2016, for a review).

Overview of PE

The original PE manual (Foa et al., 2007) was updated in 2019 (Foa et al., 2019) and describes three key components of PE: (a) psychoeducation, (b) in vivo exposure, and (c) imaginal exposure followed by processing. PE typically consists of eight to 15 individual 90-min sessions. The recommended number of sessions is based on clinical observations of the rate of recovery during PE. Traditionally, sessions are delivered once or twice weekly by mental health clinicians. However, as described later, several studies have tested variations of this standard format and found that PE is efficacious when delivered in different lengths, tempos, modalities, and settings, as well as when it is delivered by counselors or nonspecialist health workers. Provider training in PE involves a 4-day didactic and interactive workshop followed by case consultation on two cases with a PE expert.

The first session of PE includes an overview of treatment and a rationale for PE. The therapist explains in vivo and imaginal exposure and how they work to address factors that maintain PTSD symptoms. The first session also involves collecting information about the *index trauma* (i.e., the patient's most distressing traumatic experience) and the rationale for focusing on this event, which is that corrective learning related to the index trauma can generalize to other traumatic memories. The first session concludes with teaching patients slow, diaphragmic breathing as a general stress reduction technique (not to be used during exposure) that they are encouraged to practice daily as homework in addition to listening to an audio recording of the session.

The second session of PE involves psychoeducation about common reactions to trauma and the role of avoidance in maintaining PTSD symptoms; the rationale for in vivo exposure is also presented. The therapist and patient work collaboratively to develop a list of avoided or distress-evoking situations related to the traumatic event. The list is organized into a hierarchy based on anticipated distress. In vivo exposure involves approaching safe trauma-related situations that the patient avoids because these situations are trauma reminders. In vivo exposure is typically done as homework for 1–3 hr daily for optimal benefit. Patients track their progress with in vivo exposure as homework for the remainder of treatment.

Beginning in Session 3, imaginal exposure involves revisiting and recounting aloud the memory of the index trauma for an extended period (i.e., 30–45 min) and including rich details about all five senses as well as thoughts and feelings. Patients are asked to recount the event aloud, in detail, with their eyes closed, using the present tense. They are asked to repeat the narrative of the event as needed for the full time. Imaginal exposure is immediately followed by 15–20 min of processing, which involves discussing the experience of the imaginal exposure. Processing aims to help patients elaborate new learning related to the experience of imaginal exposure (e.g., "I can tolerate thinking about the trauma") and their reactions during and after the trauma (e.g., "freezing was a normal reaction to an extreme situation"). Imaginal exposure and processing continue at each subsequent session. In addition to the breathing practice, in vivo exposure, and listening to audio recordings of the session, patients are instructed to listen to the recording of the imaginal exposure, which is recorded separately, daily. Later in treatment, patients are asked to focus on the most distressing parts of the memory (i.e., "hot spots") during imaginal exposure. In the final session, patients recount the full trauma memory once (15–25 min), and processing focuses on new learning that has occurred over the course of treatment.

Evidence supporting PE

PE has been evaluated in a large number of randomized controlled trials (RCTs) and in a wide range of trauma populations. Results from meta-analyses indicate that PE is associated with large between-group effect sizes compared to waitlist control conditions, medium effects compared to nonspecific active control conditions, small or no difference among active treatments, and large within-group effects (McLean et al., 2022; Powers et al., 2010). As a result of the number and quality of these trials (i.e., over 40 RCTs to date), PE has been recognized as a first-line treatment for PTSD in major clinical practice guidelines (APA, 2017; International Society for Traumatic Stress Studies, 2018; National Institute for Health and Care Excellence, 2018; VA/DoD, 2023).

Early Studies of PE

The first RCTs of PE were led by the developer, Dr. Edna Foa. These trials were conducted with civilian women in the United States with sexual assault–related PTSD and examined PE compared to waitlist as well as

established interventions, such as stress inoculation training (SIT) and cognitive restructuring (CR), either alone or in combination. In the first small trial of PE (N = 45), Foa and colleagues (1991) found that participants who received PE, SIT, supportive counseling (SC), and waitlist all improved, and only SIT was superior to SC and waitlist at posttreatment. However, at the 3-month follow-up, only participants who received PE showed further improvements in PTSD. In the second trial (N = 96), Foa and colleagues (1999) found that contrary to expectations, PE plus SIT was not superior to PE or SIT alone, and all interventions were superior to waitlist; however, the effect size for PE was the largest. A third trial led by Foa and colleagues (2005) also found that adding CR to PE (PE+CR) was not superior to PE alone, and both CR+PE and PE alone were superior to waitlist. Around this time, Resick and colleagues (2002) published findings from a large trial showing that PE and cognitive processing therapy (CPT; Resick et al., 2017) were both superior to waitlist among women with sexual assault–related PTSD (N = 171) but not different from one another with regard to PTSD symptom reduction. Together, these early RCTs established the preliminary efficacy of PE as a treatment for sexual assault–related PTSD in women relative to waitlist conditions. These trials also provided some of the first evidence that combining PE with other treatment approaches does not seem to improve clinical outcomes of PE.

PE in civilian mixed-trauma populations

Most of the trials testing PE in civilians have enrolled mixed-trauma samples. In this population, PE has been found superior to waitlist (N = 66 U.S. civilians; Fonzo et al., 2017) and treatment as usual (N = 23 Japanese civilians; Asukai et al., 2010). PE was also found to be superior to present-centered therapy (PCT) in a diverse sample of U.S. residents with PTSD who had been exposed to multiple interpersonal traumatic events (N = 71) when delivered by community mental health providers (Ghafoori et al., 2017). Contrary to the authors' hypotheses, a study with Norwegian civilians (N = 65) found that imagery rescripting was not superior to PE when delivered in an inpatient setting (Langkaas et al., 2017). Similarly, a small trial in England found that PE was not different from metacognitive therapy, and both were superior to waitlist (N = 32; Wells et al., 2015). Finally, interpersonal psychotherapy was found to be noninferior to PE in an RCT with a sample of civilians in the United States (N = 110; Markowitz et al., 2015). In this trial, PE was superior to relaxation therapy, whereas interpersonal therapy was not. Together, the findings from these studies provide further support for the efficacy of PE compared to control conditions.

PE in civilian sexual assault and childhood trauma populations

As previously noted, early trials of PE showed that PE was superior to waitlist among women with sexual assault–related PTSD. A later U.S. trial with women sexual assault survivors (N = 74) found that PE and eye movement desensitization and reprocessing (EMDR; Shapiro, 2001) were both superior to waitlist but not different from each other (Rothbaum et al., 2005). This trial, and the early trials of PE, included women with PTSD related to childhood sexual abuse.

Two European studies tested PE in adults with child abuse-related PTSD. Contrary to hypotheses, a Dutch trial (N = 159; Oprel et al., 2021) demonstrated no differences between two variants of PE—standard and intensive—and a non–trauma-focused therapy called Skills Training in Affective and Interpersonal Regulation (STAIR; Cloitre et al., 2002) followed by PE. Also contrary to hypotheses, a Norwegian trial (N = 92; Sele et al., 2023) demonstrated that PE was superior to STAIR followed by narrative therapy, which includes exposure, and not different from STAIR alone in adults with childhood trauma–related PTSD and a diagnosis of complex PTSD (CPTSD) per the *International Statistical Classification of Diseases and Related Health Problems* (11th rev.; World Health Organization, 2019). Findings from these two studies contradict the perspective that PE alone is not indicated for childhood trauma–related PTSD. The findings show that PE was well tolerated and as efficacious as skills-based interventions.

PE in military populations

The first trial in a military population compared PE to PCT, an active non–trauma-focused therapy, in a large sample (N = 277) of women veterans (n = 7 active duty) receiving care at VA facilities and found PE superior to PCT for all PTSD outcomes (Schnurr et al., 2007). In smaller trials, PE was found to be superior to PCT (N = 30 U. S. veterans; Rauch et al., 2015) and treatment as usual (N = 30 Israeli veterans; Nacasch et al., 2011) but not superior to weekly 30-min therapist phone calls (N = 52 U.S. veterans; Yehuda et al., 2014). In addition, participants who received PE showed a similar reduction in PTSD symptoms as compared to relaxation training in a sample of older U.S. veterans (N = 87; Thorp et al., 2019), and PE was found to be noninferior to transcendental meditation in a sample of U.S. veterans with military-related PTSD (both were superior to health education; N = 203; Nidich et al., 2018).

Two recent trials compared PE to other trauma-focused treatments among U.S. veterans. PE was found to be nonin-

ferior to five to seven sessions of written exposure therapy (WET; Sloan & Marx, 2019) but had a higher dropout rate ($N = 178$; Sloan et al., 2023). In the largest trial of PE to date ($N = 916$), Schnurr et al. (2022) found that participants who received PE showed a higher likelihood of experiencing a response to treatment, loss of diagnosis, and remission than those who received CPT, but PE also demonstrated a slightly higher dropout rate.

In the first RCT of PE in U.S. active duty military personnel with PTSD ($N = 366$), PE delivered in daily sessions over 2–3 weeks was found to be more efficacious than minimal attention, comprised of weekly 15 min phone calls, and noninferior to standard weekly PE (Foa et al., 2018). However, contrary to hypotheses, weekly PE was not superior to weekly PCT. PE has not demonstrated consistent superiority to PCT, and studies of PE and other evidence-based psychotherapies (EBPs) for PTSD in military samples generally report smaller effect sizes than civilian studies. However, massed PE seems to be an acceptable and effective treatment that has now been used in several studies, primarily with veterans (see Ragsdale et al., 2020, and Wright et al., 2023). A recent trial found that a modified version of the previously studied massed PE protocol and a more intensive outpatient PE program were both efficacious in reducing PTSD severity, with 61% of participants achieving clinically significant reductions in interviewer-assessed PTSD ($N = 319$; U.S. service members; Peterson et al., 2023).

PE in adolescents

The adolescent version of the PE manual (Foa et al., 2008), designed for individuals aged 12–18 years, includes the same treatment components as the adult version but is broken down into modules and includes developmentally appropriate language, examples, and exercises. The first study of PE with adolescents found that PE was more effective than time-limited dynamic therapy among Israeli adolescents ($N = 38$) with mixed trauma–related PTSD (Gilboa-Schechtman et al., 2010). Building on these promising findings, Foa, McLean, et al. (2013) conducted an RCT in the United States comparing PE with supportive counseling among adolescent girls with sexual abuse–related PTSD ($N = 61$). The results showed that PE was superior to counseling for improvement in PTSD symptoms, depression, and functioning, with gains maintained up to 12 months posttreatment. Importantly, the study therapists were trained counselors at a community mental health clinic with no previous cognitive behavioral therapy (CBT) experience, thus demonstrating the efficacy of PE even when delivered by providers who were more accustomed to delivering counseling. PE was also found to be more effective than supportive counseling among South African adolescents ($N = 63$) with mixed trauma–related PTSD when delivered by trained nonspecialist health workers (i.e., nurses) in a low-resource community setting (Rossouw et al., 2018); the superiority of PE over counseling persisted at 12- and 24-month follow-up assessments (Rossouw et al., 2022). Finally, two uncontrolled trials with Dutch adolescents with mixed trauma–related PTSD support the safety, tolerability, and effectiveness of PE delivered three times per week ($N = 10$; Hendriks et al., 2017) and delivered daily when integrated with EMDR (van Pelt et al., 2021). Together, this research provides good support for the efficacy of PE for adolescents relative to active control conditions.

PE in marginalized populations

The efficacy of PE in many ethnoracial minority and sexual and gender minority communities is not well established. However, a few trials to date have tested the effects of PE exclusively within ethnoracial minority communities. The first pilot trial found that PE was well-tolerated (i.e., 80% of participants completed treatment) and superior to treatment as usual among predominately low-income African American women ($N = 21$; Feske, 2008). Vera and colleagues (2011) developed a culturally adapted version of PE for Spanish-speaking Latino individuals that demonstrated feasibility, acceptability, and preliminary helpfulness in a pilot open trial study with Latinos in Puerto Rico ($N = 14$). In a larger trial ($N = 98$), Vera et al. (2022) found that the adapted version of PE and applied relaxation were both effective, with a small effect favoring PE, among Spanish-speaking Latinos with PTSD in Puerto Rico.

Several other studies have examined the effects of PE on individuals from marginalized communities by comparing subgroups within larger clinical trials. Zoellner et al. (1999) compared responses to treatment (i.e., PE, SIT, or PE+SIT) and dropout and found no differences between Black participants ($N = 35$) and White participants ($N = 60$). Similarly, Black participants ($N = 94$) showed similar PTSD symptom reductions as White participants ($N = 214$) in a trial comparing PE and CPT (Lester et al., 2010); however, Black participants were more likely to drop out of treatment. This was replicated in a trial showing that although Black ($N = 43$) and White ($N = 130$) participants who received PE or sertraline benefitted similarly from treatment, Black participants attended fewer sessions than White participants (Kline et al., 2020). Together, these findings suggest that although Black participants benefit from PE to a similar degree as White participants, retention in PE among Black individuals may be lower. Understanding the individual or community that PE is intended to help and using culturally appropriate language and

content reflecting the norms and values of the community may help promote engagement in care.

In a systematic review of minority inclusion in 38 RCTs of PE (N = 3,734), Benuto and colleagues (2020) found that ethnoracial minority inclusion was low except for Black participants, who were overrepresented in 21 studies (inclusion rate: 13.5%–73.9%). Across the included trials, 58.9% of participants were White, 31.1% were Black, 4.9% were Latinx, 0.6% were Asian American or Pacific Islander, and 4.7% reported their race as "other." One of the challenges in examining the inclusion of marginalized participants is that the reporting of detailed demographic characteristics, including enthoracial information, was not common in published studies until fairly recently. Moreover, the reporting of this information is still not standardized, making it difficult to compare or combine data to examine the effects of treatment across ethnoracial groups (McLean, Levy, et al., 2022). It is still not common practice in the field to assess sexual orientation at all or to assess gender identity comprehensively in the context of PTSD treatment trials. Thus, little is known about the effects of PE, or other treatments for PTSD, among sexual and gender minority individuals. The low levels of inclusion and dearth of studies specifically targeting marginalized communities limit understanding of the effects of PE across diverse populations and leave questions about whether or how clinicians should adapt PE for these groups. However, guidance on clinical considerations for delivering PE to individuals from marginalized communities is available. For example, Williams and colleagues (2014) discuss possible adaptations to PE for Black individuals (e.g., discussing the impact of racism and discrimination). Guidance is also available from Livingston and colleagues (2020) regarding cultural considerations when working with lesbian, gay, bisexual, transgender, and queer (LGBTQ) individuals with PTSD, including possible adaptations to PE and other EBPs. Such adaptations may improve retention in treatment or even outcomes; additional research is needed.

PE in comorbid populations

Depression

Depression is highly comorbid with PTSD (Rytwinski et al., 2013), and several studies have examined the effect of depression on PE outcomes as well as the effect of PE on depressive symptoms. PE has been found to be effective in reducing self-reported depressive symptoms in numerous trials (e.g., Foa et al., 2005; Resick et al., 2002; Rothbaum et al., 2005). Findings on whether depression hinders therapeutic recovery during PE are somewhat mixed. Two studies with samples of Dutch civilians with mixed trauma–related PTSD found that PE completion and PTSD improvement were unrelated to pretreatment depressive symptoms (Sample 1: N = 59, Sample 2: N = 63 [van Minnen et al., 2002]; N = 71 [Hagenaars et al., 2010]). Other studies have found associations between higher pretreatment depressive symptom severity and larger reductions in PTSD symptoms following PE (Rizvi et al., 2009; Zang et al., 2019). However, among participants who received PE in an intensive outpatient program, Burton and colleagues (2022) found that those with higher depressive symptom severity at baseline were more likely to be among the subgroup of participants who did not maintain PTSD gains over the follow-up period. Taken together, the presence of comorbid depression or high levels of depressive symptom severity should generally not be considered a contraindication for using PE. However, in some cases, it may be helpful to address depression, perhaps by including behavioral activation items on the in vivo hierarchy, to promote engagement in PE and maintenance of gains.

Substance use disorders

Substance use is also common in the context of PTSD (see Brady et al., 2021). Clinically, it has often been assumed that trauma-focused treatment should be withheld from individuals with high levels of substance use to prevent anticipated clinical worsening. However, recent practice guidelines recommend that comorbid substance use disorder (SUD) should not preclude the receipt of EBPs for PTSD psychotherapies such as PE (VA/DoD, 2023). In a trial with U.S. civilians with mixed trauma–related PTSD (N = 200), alcohol use did not predict dropout, adherence, or clinical outcomes from PE or sertraline, but drug use did negatively predict clinical outcomes (Bedard-Gilligan et al., 2018). Moreover, the same trial found that a lifetime diagnosis of both an alcohol and SUD (odds ratio [OR] = 3.42) and recent cannabis use (OR = 3.38) predicted higher dropout. Thus, the impact of alcohol and substance use on PE engagement and outcomes may depend on the type of use, and alcohol use alone may be more likely to impact engagement than outcomes. Indeed, other studies have also found an association between alcohol use and higher rates of dropout from PE (e.g., Zandberg et al., 2016).

In recognition of the interrelationships between PTSD and alcohol use, several trials have tested concurrent and integrated treatment programs. Among U.S. civilians with PTSD and comorbid alcohol dependence, naltrexone and medication counseling with and without PE were found to be equally effective in reducing PTSD severity (N = 165; Foa, Yusko, et al., 2013); however, participants who received PE and naltrexone showed more maintenance of

gains on alcohol use at a 6-month follow-up. Among U.S. civilians with PTSD and comorbid substance dependence ($N = 126$), Coffey and colleagues (2016) found that PE, with or without motivational enhancement therapy for PTSD, was superior to a health information control condition in reducing PTSD severity. All groups showed reductions in substance use, and there were no differences in dropout across groups.

An integrated treatment program called Concurrent Treatment of PTSD and Substance Use Disorders Using Prolonged Exposure (COPE; Back et al., 2014) has also been examined in several trials, demonstrating superiority to treatment as usual ($N = 103$; Mills et al., 2012), active monitoring ($N = 110$; Ruglass et al., 2017), and substance use interventions ($N = 81$ [Back et al., 2019]; $N = 119$ [Norman et al., 2019]) in reducing PTSD severity with similar effects to the comparison condition on substance use.

Importantly, none of the trials using PE have reported an association between exposure and a worsening of alcohol or substance use. Thus, in the context of mild-to-moderate substance use, PE alone may be considered safe and effective, though particular attention to treatment engagement is warranted. For individuals with moderate-to-high levels of alcohol or substance use, an integrated treatment approach may be indicated. In either case, patients should not use substances near the time of their exposure exercises, as this could hinder therapeutic learning.

Borderline personality disorder

Patients with comorbid borderline personality disorder (BPD) have been underrepresented in PTSD trials, as many studies have excluded those with high suicide risk or other problems that frequently co-occur with severe BPD. In addition, therapists are often concerned about the safety of delivering trauma-focused treatment to patients with BPD features. However, research suggests that many BPD features should not contraindicate PE. For example, Feeny and colleagues (2002) found that pretreatment trait/state dissociation, depersonalization, and numbing were not associated with PE outcomes or dropout. Similarly, Hagenaars and colleagues (2010) found that in contrast to hypotheses, trait dissociation, depersonalization, numbing, and depressive symptoms did not predict PTSD improvement or dropout from PE ($N = 74$). As discussed in the PE manual, exposures can be modified for patients with a tendency to dissociate under distress.

For patients with comorbid BPD, treatment that integrates PE with dialectic behavior therapy (DBT) may be indicated (i.e., DBT-PE). The DBT-PE protocol, which involves providing DBT alone followed by DBT+PE once BPD-related stability criteria are met, was found to reduce PTSD severity and self-injurious behavior in a small open trial ($N = 13$; Harned et al., 2012) and when compared to DBT alone in a small RCT with women with suicidal ideation and self-injuring behavior in the United States ($N = 26$; Harned et al., 2014). In a recent open trial, DBT-PE also demonstrated effectiveness in a diverse sample of U.S. adolescents and adults ($N = 35$) receiving care in a community clinic context (Harned et al., 2021).

Other co-occurring problems

PE has been shown to improve symptoms of many of the problems that most commonly co-occur with PTSD. In addition to depressive symptoms, PE has been found to reduce general anxiety (e.g., Foa et al., 2005; Schnurr et al., 2007), trauma-related guilt (e.g., Resick et al., 2002; McLean et al., 2019), anger (e.g., Cahill et al., 2003), and physical health difficulties (e.g., Asukai et al., 2010; Rauch et al., 2009) and to improve functioning and quality of life (e.g., Foa et al., 2013; Schnurr et al., 2022). In contrast, symptoms of insomnia and nightmares may not improve to a clinically meaningful degree following PE (Walters et al., 2020), which has prompted research testing PE integrated with treatments for sleep problems, such as CBT for insomnia (e.g., Colvonen et al., 2019). Mild-to-moderate traumatic brain injury (TBI), which is particularly common in military samples and survivors of interpersonal violence, does not appear to limit the effect of PE on PTSD severity (e.g., Ragsdale & Voss Horrell, 2016). Moreover, in U.S. veterans and active duty service members with mild-to-severe TBI ($N = 44$), PE was found to improve post-concussive symptoms, many of which overlap with PTSD (Wolf et al., 2018). One RCT found that individuals with psychosis can also benefit from PE. This trial found that PE and EMDR were both superior to waitlist and not different from each other among Dutch civilians with PTSD and comorbid psychosis ($N = 155$) who were receiving antipsychotic medication under psychiatric care (van den Berg et al., 2015). Taken together, this research highlights that adaptations to PE are not always required, and the need to modify PE or integrated treatments for comorbid disorders may depend on the interrelationships between PTSD and the comorbid condition.

Augmentation of PE

Despite the strong evidence base supporting PE, not all patients achieve a good clinical outcome. For example, in an RCT with civilians in the United States, 31% of participants retained a PTSD diagnosis at posttreatment, and 28% did not meet the criteria for responder status

(Zoellner et al., 2019). In addition, across 22 RCTs of PE, the average dropout rate was found to be 22% (range: 16%–28%; Lewis et al., 2020). Although these metrics are similar to those for other trauma-focused treatments, they clearly highlight room for improvement. Beginning with the earliest trials of PE, researchers have sought to identify ways to further improve outcomes. Studies have approached this challenge in different ways, including testing combinations of psychotherapy, pharmacotherapy, and using medications or other strategies hypothesized to improve or hasten symptom reduction.

As noted, studies testing the therapeutic value of augmenting PE with additional psychotherapy procedures have not yielded positive results (e.g., Foa et al., 1999, 2005; McDonagh et al., 2005). Although Bryant and colleagues (2008) found that adding CR to exposure therapy improved outcomes, the exposure protocol did not include processing; thus, the relevance of this finding to PE is unclear, as processing likely overlaps with CR in terms of therapeutic mechanisms.

Regarding the combination of PE and pharmacotherapy, two large RCTs did not demonstrate a clear benefit to combining PE with selective serotonin reuptake inhibitors (SSRIs) relative to PE alone among civilians in the United States with motor vehicle accident–related PTSD (N = 171; Popiel et al., 2015) or to PE plus placebo among U.S. veterans with PTSD (N = 223; Rauch et al., 2019). However, a large RCT with U.S. civilians (N = 200) found that PE alone was superior to PE plus sertraline on all PTSD-related outcomes (loss of diagnosis, responder status, and self-reported PTSD) except for interviewer-assessed PTSD (Zoellner et al., 2019). In contrast, one RCT with survivors of the September 11, 2001, World Trade Center attacks (N = 37) found that PE plus paroxetine was superior to PE plus placebo (N = 37; Schneier et al., 2012). This small trial is the exception; most trials have not found that SSRIs augment PE.

Rather than combining independently effective interventions, some research has tested medications thought to facilitate extinction learning. Despite initial promise from research testing the effects of D-cycloserine (DCS), a so-called "cognitive enhancer," DCS has generally not been found to augment PE (e.g., de Kleine et al., 2012). Hydrocortisone, which is hypothesized to promote extinction learning and improve distress tolerance, was also not found to augment PE compared to PE alone among U.S. veterans with PTSD (N = 60; Lehrner et al., 2021). However, exploratory analyses suggested hydrocortisone may augment PE among a subgroup of veterans with mild TBI and those with higher baseline glucocorticoid sensitivity. Methylene blue, which is hypothesized to improve memory consolidation, also was not found to augment an abbreviated version of PE (i.e., five sessions of daily imaginal exposure) in U.S. civilians with PTSD (N = 42), although the pattern suggested it may be more beneficial if dosed during the later PE sessions only (Zoellner et al., 2017). Some alternate cognitive enhancers have shown promise as PE augmentation strategies in pilot work (e.g., oxytocin [Flanagan et al., 2018], yohimbine [Tuerk et al., 2018]), but replication with larger samples is needed.

Virtual reality (VR) technology has been used to deliver imaginal exposure using head-mounted computer simulations of sights, sounds, vibrations, and smells related to an individual's traumatic experience. A purported advantage of VR is helping patients who struggle to engage with their trauma memory with sufficient detail and affective magnitude (Beidel et al., 2014). Although VR may be superior to standard imaginal exposure for some patients, among 162 active duty soldiers with PTSD, Reger and colleagues (2016) found no evidence that VR exposure therapy increased emotional activation over standard PE.

New models of PE delivery

Given the breadth and strength of the evidence base supporting PE, a logical next step is to evaluate whether PE retains its efficacy when adapted for delivery for different lengths, tempos, modalities, and settings to better meet the needs of various populations. One of the barriers to implementing PE is the 90-min session format, which is longer than the standard 60-min session length used in mental health systems for scheduling and reimbursement. Building on promising findings from a small trial showing similar benefits for PE delivered in 60-min sessions as for 90-min sessions (N = 39; Nacasch et al., 2015), a large trial in active duty military personnel (N = 160) demonstrated noninferiority of 60-min PE compared to 90-min PE in terms of PTSD reduction and rate of change (Foa et al., 2022). Thus, shorter PE sessions seem to be as efficacious and efficient as standard PE sessions.

To minimize dropout and hasten PTSD recovery, several studies have tested massed or intensive PE formats. As noted, in active duty military personnel, Foa and colleagues (2018) found that weekly PE was noninferior to massed PE delivered in daily sessions over 2–3 weeks, and a subsequent study in the same population found that both massed PE and an intensive outpatient PE program were efficacious (Peterson et al., 2023). Studies of other intensive outpatient PE programs have also demonstrated good effects (e.g., Rauch et al., 2021). Notably, these studies have reported low dropout among participants (i.e., 4%–14%), highlighting an advantage of intensive treatment delivery schedules. Indeed, a recent meta-analysis of 35 trials found that dropout from PE is lower when sessions are delivered

twice weekly or more frequently as compared to weekly (Levinson et al., 2022).

An abbreviated version of PE was developed for primary care settings, where most individuals with PTSD seek care. PE for primary care (PE-PC; Rauch et al., 2017) involves four to six 30-min sessions of PE delivered weekly by behavioral health consultants working in integrated primary care settings. Among U.S. service members (N = 67), PE-PC was found to be efficacious in reducing self-reported PTSD, but not interviewer-assessed PTSD, relative to a minimal contact control (Cigrang et al., 2017). Among 120 U.S. veterans, PE-PC and treatment as usual, consisting of primary care mental health integration best practices, were both similarly effective in reducing PTSD symptom severity, with no differences between conditions (Rauch, Kim, et al., 2023). A recent effectiveness trial (N = 737) reported medium effects for PE-PC in VA clinics (Rauch, Venners, et al., 2023). PE-PC may be helpful to many patients with PTSD presenting to primary care settings, but additional research is needed.

The delivery of PTSD treatment through telehealth can address some barriers to accessing in-person PE, such as long distances from clinics and fear of stigmatization associated with seeking treatment for mental health problems. Fortunately, research has shown that PE delivered through telehealth is as efficacious as in-person PE. Building on positive preliminary findings on telehealth-delivered PE (e.g., Tuerk et al., 2010), Acierno and colleagues (2017) found that home-based telehealth was noninferior to standard in-person PE among U.S. veterans (N = 132). Another trial found that home-based telehealth was not different from in-person PE among women with military sexual assault–related PTSD (N = 136; Acierno et al., 2021). Given these findings and the growing demand for telehealth services, the use of telehealth-PE will likely continue to increase in clinical practice. Morland and colleagues (2020) have described clinical considerations for delivering PE via telehealth.

One small study (N = 40) with predominately active duty personnel tested the effects of "Web-PE," a self-guided online program with asynchronous therapist support (McLean et al., 2021) and demonstrated that Web-PE was similarly efficacious as in-person PCT. Participants appreciated being able to access the program when it was convenient for them but also noted that high levels of motivation were required to complete the self-guided sessions (McLean et al., 2024).

Summary and future directions

PE is a very well-established treatment for PTSD that has been studied in a large number of clinical trials. The pattern of findings across these trials is summarized by meta-analyses showing that PE is associated with large effect sizes compared to waitlist control conditions, medium effect sizes compared to nonspecific active controls, and small or no differences among active treatments (McLean et al., 2022; Powers et al., 2010). The lower effects seen for PE and other EBPs in active duty and veteran samples relative to civilians are not well understood but highlight room for improvement (e.g., Steenkamp et al., 2020). Research is underway to evaluate augmentation strategies hoped to improve outcomes, and many of these studies target military populations.

Most RCTs evaluating PE were conducted in the United States, although a large minority were conducted internationally. Most ethnoracial minority communities are underrepresented in trials of PE, except for Black and African American participants, and no trials have specifically targeted sexual and gender minority communities. More research on PTSD treatment engagement, retention, and outcomes for PE among marginalized communities is needed along with the development and evaluation of cultural adaptations that could promote engagement and retention in care and/or improve outcomes within specific communities. Partnering with members of marginalized communities with lived experience of PTSD may help ensure that any identified adaptations or guidelines for using PE with diverse populations are culturally responsive.

PE has been evaluated in the context of many of the most common comorbid conditions, either alone or integrated with other treatments, and has been found to be efficacious. Given the large number of trials and the variety of study samples included in PE trials, much is known about the breadth and depth of PE's efficacy across patient populations and problem areas relative to other PTSD treatments. However, many important questions remain regarding the effects of PE in comorbid populations. For example, DBT-PE is a promising intervention, but it has not been evaluated in any large RCTs. In addition, few PE trials have reported changes in quality of life, and fewer examined quality of life at longer-term follow-up (Kaur et al., 2024).

The efficacy ceiling for PE is high, and, overall, studies combining PE with other approaches have not identified strategies to improve outcomes. For example, combining PE and cognitive approaches does not improve outcomes, possibly because the mechanisms underlying exposure and cognitive therapy are the same. According to EPT, associative processes, like extinction learning, may not be consciously accessible to the patient but can promote changes in beliefs, which are consciously accessible. Thus, associative learning and cognitive change may not be fully separate processes but rather potentially

different levels of measurement, distinct in the degree to which they are accessible to awareness (see A. A. Cooper et al., 2017).

Most research testing PE augmentation strategies can be considered preliminary; few lines of research have advanced to clinical trials, and replication is needed for those that have. Research that focuses on minimizing dropout or selective augmentation targeting patients identified early as probable nonresponders may prove more promising than approaches that aim to boost overall efficacy. For example, current research is testing whether receiving social support from veterans who have successfully completed PE during in vivo exposure is an effective strategy to reverse dropout and improve PTSD outcomes (Hernandez-Tejada et al., 2020).

Although delivering PE in once-weekly sessions is consistent with standard practice, providers in some mental health systems may be unable to see patients weekly (e.g., due to large patient caseloads), and weekly sessions delivered over 2–4 months are not feasible for all patients and all settings. Long, drawn-out, or fragmented courses of care may negatively impact therapeutic momentum and/or make it difficult to complete a full course of treatment. Indeed, longer courses of treatment are associated with higher dropout (Gutner et al., 2016; Imel et al., 2013) and worse clinical outcomes (Berke et al., 2019) relative to shorter treatments. New models of delivering PE, such as PE-PC and telehealth PE, have the potential to improve access to treatment by addressing critical challenges in the capacity (e.g., too few providers are trained in PE) and equity (e.g., unequal geographical distribution of services) of available PTSD care. The more treatment options that are available for individuals seeking PE, the more likely they will access an approach that is suited to their needs and preferences, which could improve treatment reach and clinical outcomes.

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REFERENCES

Acierno, R., Jaffe, A. E., Gilmore, A. K., Birks, A., Denier, C., Muzzy, W., Lopez, C. M., Tuerk, P., & Grubaugh, A. L. (2021). A randomized clinical trial of in-person vs. Home-based telemedicine delivery of prolonged exposure for PTSD in military sexual trauma survivors. *Journal of Anxiety Disorders*, *83*, Article 102461. https://doi.org/10.1016/j.janxdis.2021.102461

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 and Therapy*, *89*, 57–65. https://doi.org/10.1016/j.brat.2016.11.009

American Psychological Association. (2017). Clinical practice guideline for the treatment of PTSD. https://www.apa.org/ptsd-guideline/ptsd.pdf

American Psychiatric Association. (1980). *Diagnostic and statistical manual of mental disorders*. (3rd ed). Washington, DC: Author.

Asukai, N., Saito, A., Tsuruta, N., Kishimoto, J., & Nishikawa, T. (2010). Efficacy of exposure therapy for Japanese patients with posttraumatic stress disorder due to mixed traumatic events: A randomized controlled study. *Journal of Traumatic Stress*, *23*(6), 744–750. https://doi.org/10.1002/jts.20589

Back, S. E., Killeen, T., Badour, C. L., Flanagan, J. C., Allan, N. P., Ana, E. S., Lozano, B., Korte, K. J., Foa, E. B., & Brady, K. T. (2019). Concurrent treatment of substance use disorders and PTSD using prolonged exposure: A randomized clinical trial in military veterans. *Addictive Behaviors*, *90*, 369–377. https://doi.org/10.1016/j.addbeh.2018.11.032

Back, S. E., Killeen, T. K., Mills, K. L., & Cotton, B. D. (2014). *Concurrent treatment of PTSD and substance use disorders using prolonged exposure (COPE): Therapist guide*. Oxford University Press.

Bedard-Gilligan, M., Garcia, N., Zoellner, L. A., & Feeny, N. C. (2018). Alcohol, cannabis, and other drug use: Engagement and outcome in PTSD treatment. *Psychology of Addictive Behaviors*, *32*(3), 277–288. https://doi.org/10.1037/adb0000355

Beidel, D. C., Frueh, B. C., Neer, S. M., Bowers, C., & Rizzo, A. (2014, December 1–4). *Using virtual reality as part of an intensive treatment program for PTSD* [Conference presentation]. Interservice/Industry Training, Simulation, and Education Conference, Orlando, FL, United States.

Benuto, L. T., Bennett, N. M., & Casas, J. B. (2020). Minority participation in randomized controlled trials for prolonged exposure therapy: A systematic review of the literature. *Journal of Traumatic Stress*, *33*(4), 420–431. https://doi.org/10.1002/jts.22539

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

Boudewyns, P. A., Hyer, L., Woods, M. G., Harrison, W. R., & McCranie, E. (1990). PTSD among Vietnam veterans: An early look at treatment outcome using direct therapeutic exposure. *Journal of Traumatic Stress*, *3*(3), 359–368. https://doi.org/10.1002/jts.2490030305

Brady, K. T., McCauley, J. L., & Back, S. E. (2021). The comorbidity of post-traumatic stress disorder (PTSD) and substance use

disorders. In N. el-Guebaly, G. Carrà, M. Galanter, & A. M. Baldacchino (Eds.), *Textbook of addiction treatment* (pp. 1985–2004). Springer, Cham. https://doi.org/10.1007/978-3-030-36391-8_93

Bryant, R. A., Moulds, M. L., Guthrie, R. M., Dang, S. T., Mastrodomenico, J., Nixon, R. D. V., Felmingham, K. L., Hopwood, S., & Creamer, M. (2008). A randomized controlled trial of exposure therapy and cognitive restructuring for posttraumatic stress disorder. *Journal of Consulting and Clinical Psychology*, *76*(4), 695–703. https://doi.org/10.1037/a0012616

Burton, M. S., Rothbaum, B. O., & Rauch, S. A. M. (2022). The role of depression in the maintenance of gains after a prolonged exposure intensive outpatient program for posttraumatic stress disorder. *Depression and Anxiety*, *39*(4), 315–322. https://doi.org/10.1002/da.23240

Cahill, S. P., Rauch, S. A., Hembree, E. A., & Foa, E. B. (2003). Effect of cognitive-behavioral treatments for PTSD on anger. *Journal of Cognitive Psychotherapy*, *17*(2), 113–131. https://doi.org/10.1891/jcop.17.2.113.57434

Cigrang, J. A., Rauch, S. A., Mintz, J., Brundige, A. R., Mitchell, J. A., Najera, E., Litz, B. T., Young-McCaughan, S., Roache, J. D., Hembree, E. A., Goodie, J. L., Sonnek, S. M., & Peterson, A. L. (2017). Moving effective treatment for posttraumatic stress disorder to primary care: A randomized controlled trial with active duty military. *Families, Systems, & Health*, *35*(4), 450–462. https://doi.org/10.1037/fsh0000315

Cloitre, M., Koenen, K. C., Cohen, L. R., & Han, H. (2002). Skills training in affective and interpersonal regulation followed by exposure: A phase-based treatment for PTSD related to childhood abuse. *Journal of Consulting and Clinical Psychology*, *70*(5), 1067–1074. https://doi.org/10.1037/0022-006X.70.5.1067

Coffey, S. F., Schumacher, J. A., Nosen, E., Littlefield, A. K., Henslee, A. M., Lappen, A., & Stasiewicz, P. R. (2016). Trauma-focused exposure therapy for chronic posttraumatic stress disorder in alcohol and drug dependent patients: A randomized controlled trial. *Psychology of Addictive Behaviors*, *30*(7), 778–790. https://doi.org/10.1037/adb0000201

Colvonen, P. J., Drummond, S. P. A., Angkaw, A. C., & Norman, S. B. (2019). Piloting cognitive–behavioral therapy for insomnia integrated with prolonged exposure. *Psychological Trauma: Theory, Research, Practice, and Policy*, *11*(1), 107–113. https://doi.org/10.1037/tra0000402

Cooper, A. A., Clifton, E. G., & Feeny, N. C. (2017). An empirical review of potential mediators and mechanisms of prolonged exposure therapy. *Clinical Psychology Review*, *56*, 106–121. https://doi.org/10.1016/j.cpr.2017.07.003

Cooper, N. A., & Clum, G. A. (1989). Imaginal flooding as a supplementary treatment for PTSD in combat veterans: A controlled study. *Behavior Therapy*, *20*(3), 381–391. https://doi.org/10.1016/S0005-7894(89)80057-7

de Kleine, R. A., Hendriks, G.-J., Kusters, W. J. C., Broekman, T. G., & van Minnen, A. (2012). A randomized placebo-controlled trial of d-cycloserine to enhance exposure therapy for posttraumatic stress disorder. *Biological Psychiatry*, *71*(11), 962–968. https://doi.org/10.1016/j.biopsych.2012.02.033

Department of Veterans Affairs/Department of Defense. (2023). VA/DoD clinical practice guideline for management of posttraumatic stress disorder and acute stress disorder. https://www.healthquality.va.gov/guidelines/MH/ptsd/VA-DoD-CPG-PTSD-Full-CPGAug242023.pdf

Feeny, N. C., Zoellner, L. A., & Foa, E. B. (2002). Treatment outcome for chronic PTSD among female assault victims with borderline personality characteristics: A preliminary examination. *Journal of Personality Disorders*, *16*(1), 30–40. https://doi.org/10.1521/pedi.16.1.30.22555

Feske, U. (2008). Treating low-income and minority women with posttraumatic stress disorder: A pilot study comparing prolonged exposure and treatment as usual conducted by community therapists. *Journal of Interpersonal Violence*, *23*(8), 1027–1040. https://doi.org/10.1177/0886260507313967

Flanagan, J. C., Sippel, L. M., Wahlquist, A., Moran-Santa Maria, M. M., & Back, S. E. (2018). Augmenting prolonged exposure therapy for PTSD with intranasal oxytocin: A randomized, placebo-controlled pilot trial. *Journal of Psychiatric Research*, *98*, 64–69. https://doi.org/10.1016/j.jpsychires.2017.12.014

Foa, E. B., Bredemeier, K., Acierno, R., Rosenfield, D., Muzzy, W., Tuerk, P. W., Zandberg, L. J., Hart, S., Young-McCaughan, S., Peterson, A. L., & McLean, C. P. (2022). The efficacy of 90-min versus 60-min sessions of prolonged exposure for PTSD: A randomized controlled trial in active-duty military personnel. *Journal of Consulting and Clinical Psychology*, *90*(6), 503–512. https://doi.org/10.1037/ccp0000739

Foa, E. B., & Cahill, S. P. (2001.) Emotional processing in psychological therapies. In N. J. Smelser & B. Baltes (Eds.), *International encyclopedia of the social and behavioral sciences* (pp. 12363–12369). Elsevier.

Foa, E. B., Chrestman, K. R., & Gilboa-Schechtman, E. (2008). *Prolonged exposure therapy for adolescents with PTSD emotional processing of traumatic experiences: Therapist guide*. USA: Oxford University Press.

Foa, E. B., Dancu, C. V., Hembree, E. A., Jaycox, L. H., Meadows, E. A., & Street, G. P. (1999). A comparison of exposure therapy, stress inoculation training, and their combination for reducing posttraumatic stress disorder in female assault victims. *Journal of Consulting and Clinical Psychology*, *67*(2), 194–200. https://doi.org/10.1037/0022-006X.67.2.194

Foa, E. B., Hembree, E. A., Cahill, S. P., Rauch, S. A. M., Riggs, D. S., Feeny, N. C., & Yadin, E. (2005). Randomized trial of prolonged exposure for posttraumatic stress disorder with and without cognitive restructuring: Outcome at academic and community clinics. *Journal of Consulting and Clinical Psychology*, *73*(5), 953–964. https://doi.org/10.1037/0022-006X.73.5.953

Foa, E. B., Hembree, E. A., & Rothbaum, B. O. (2007). *Prolonged exposure therapy for PTSD: Emotional processing of traumatic experiences: Therapist guide* (pp. viii, 146). Oxford University Press. https://doi.org/10.1093/med:psych/9780195308501.001.0001

Foa, E. B., Hembree, E. A., Rothbaum, B. O., & Rauch, S. A. M. (2019). *Prolonged exposure therapy for PTSD: Emotional processing of traumatic experiences: Therapist guide* (2nd ed; pp. xi, 181). Oxford University Press. https://doi.org/10.1093/med-psych/9780190926939.001.0001

Foa, E. B., & Kozak, M. J. (1986). Emotional processing of fear: Exposure to corrective information. *Psychological Bulletin*, *99*(1), 20–35. https://doi.org/10.1037/0033-2909.99.1.20

Foa, E. B., & McLean, C. P. (2016). The efficacy of exposure therapy for anxiety-related disorders and its underlying mechanisms: The Case of OCD and PTSD. *Annual Review of Clinical Psychology*, *12*(1), 1–28. https://doi.org/10.1146/annurev-clinpsy-021815-093533

Foa, E. B., McLean, C. P., Capaldi, S., & Rosenfield, D. (2013). Prolonged exposure vs supportive counseling for sexual abuse–related PTSD in adolescent girls: A randomized clinical trial. *JAMA*, *310*(24), 2650–2657. https://doi.org/10.1001/jama.2013.282829

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., & for the STRONG STAR Consortium. (2018). Effect of prolonged exposure therapy delivered over 2 weeks vs 8 weeks vs present-centered therapy on PTSD symptom severity in military personnel: A randomized clinical trial. *JAMA*, *319*(4), 354–364. https://doi.org/10.1001/jama.2017.21242

Foa, E. B., Rothbaum, B. O., Riggs, D. S., & Murdock, T. B. (1991). Treatment of posttraumatic stress disorder in rape victims: A comparison between cognitive-behavioral procedures and counseling. *Journal of Consulting and Clinical Psychology*, *59*(5), 715–723. https://doi.org/10.1037/0022-006X.59.5.715

Foa, E. B., Yusko, D. A., McLean, C. P., Suvak, M. K., Bux, D. A., Jr, Oslin, D., O'Brien, C. P., Imms, P., Riggs, D. S., & Volpicelli, J. (2013). Concurrent naltrexone and prolonged exposure therapy for patients with comorbid alcohol dependence and PTSD: A randomized clinical trial. *JAMA*, *310*(5), 488–495. https://doi.org/10.1001/jama.2013.8268

Fonzo, G. A., Goodkind, M. S., Oathes, D. J., Zaiko, Y. V., Harvey, M., Peng, K. K., Weiss, M. E., Thompson, A. L., Zack, S. E., Mills-Finnerty, C. E., Rosenberg, B. M., Edelstein, R., Wright, R. N., Kole, C. A., Lindley, S. E., Arnow, B. A., Jo, B., Gross, J. J., Rothbaum, B. O., & Etkin, A. (2017). Selective effects of psychotherapy on frontopolar cortical function in PTSD. *American Journal of Psychiatry*, *174*(12), 1175–1184. https://doi.org/10.1176/appi.ajp.2017.16091073

Ghafoori, B., Hansen, M. C., Garibay, E., & Korosteleva, O. (2017). Feasibility of training frontline therapists in prolonged exposure: A randomized controlled pilot study of treatment of complex trauma in diverse victims of crime and violence. *Journal of Nervous and Mental Disease*, *205*(4), 283. https://doi.org/10.1097/NMD.0000000000000659

Gilboa-Schechtman, E., Foa, E. B., Shafran, N., Aderka, I. M., Powers, M. B., Rachamim, L., Rosenbach, L., Yadin, E., & Apter, A. (2010). Prolonged exposure versus dynamic therapy for adolescent PTSD: A pilot randomized controlled trial. *Journal of the American Academy of Child & Adolescent Psychiatry*, *49*(10), 1034–1042. https://doi.org/10.1016/j.jaac.2010.07.014

Gutner, C. A., Suvak, M. K., Sloan, D. M., & Resick, P. A. (2016). Does timing matter? Examining the impact of session timing on outcome. *Journal of Consulting and Clinical Psychology*, *84*(12), 1108–1115. https://doi.org/10.1037/ccp0000120

Hagenaars, M. A., van Minnen, A., & Hoogduin, K. A. L. (2010). The impact of dissociation and depression on the efficacy of prolonged exposure treatment for PTSD. *Behaviour Research and Therapy*, *48*(1), 19–27. https://doi.org/10.1016/j.brat.2009.09.001

Harned, M. S., Korslund, K. E., Foa, E. B., & Linehan, M. M. (2012). Treating PTSD in suicidal and self-injuring women with borderline personality disorder: Development and preliminary evaluation of a dialectical behavior therapy prolonged exposure protocol. *Behaviour Research and Therapy*, *50*(6), 381–386. https://doi.org/10.1016/j.brat.2012.02.011

Harned, M. S., Korslund, K. E., & Linehan, M. M. (2014). A pilot randomized controlled trial of dialectical behavior therapy with and without the dialectical behavior therapy prolonged exposure protocol for suicidal and self-injuring women with borderline personality disorder and PTSD. *Behaviour Research and Therapy*, *55*, 7–17. https://doi.org/10.1016/j.brat.2014.01.008

Harned, M. S., Schmidt, S. C., Korslund, K. E., & Gallop, R. J. (2021). Does adding the dialectical behavior therapy prolonged exposure (DBT PE) protocol for PTSD to DBT improve outcomes in public mental health settings? A pilot nonrandomized effectiveness trial with benchmarking. *Behavior Therapy*, *52*(3), 639–655. https://doi.org/10.1016/j.beth.2020.08.003

Hendriks, L., de Kleine, R. A., Heyvaert, M., Becker, E. S., Hendriks, G.-J., & van Minnen, A. (2017). Intensive prolonged exposure treatment for adolescent complex posttraumatic stress disorder: A single-trial design. *Journal of Child Psychology and Psychiatry*, *58*(11), 1229–1238. https://doi.org/10.1111/jcpp.12756

Hernandez-Tejada, M. A., Muzzy, W., Price, M., Hamski, S., Hart, S., Foa, E., & Acierno, R. (2020). Peer support during in vivo exposure homework to reverse attrition from prolonged exposure therapy for posttraumatic stress disorder (PTSD): Description of a randomized controlled trial. *Trials*, *21*(1), Article 366. https://doi.org/10.1186/s13063-020-04302-5

Imel, Z. E., Laska, K., Jakcupcak, M., & Simpson, T. L. (2013). Meta-analysis of dropout in treatments for post-traumatic stress disorder. *Journal of Consulting and Clinical Psychology*, *81*(3), 394–404. https://doi.org/10.1037/a0031474

International Society for Traumatic Stress Studies. (2018). ISTSS prevention and treatment guidelines. https://www.istss.org/treating-trauma/new-istss-prevention-and-treatment-guidelines.aspx

Kaur, K., Asnaani, A., Levy, H., Miller, M., Tolin, D., & McLean, C. (2024). Moving beyond symptom reduction: A meta-analysis on the effect of exposure therapy for PTSD on quality of life. Manuscript submitted for publication.

Keane, T. M., Fairbank, J. A., Caddell, J. M., & Zimering, R. T. (1989). Implosive (flooding) therapy reduces symptoms of PTSD in Vietnam combat veterans. *Behavior Therapy*, *20*(2), 245–260. https://doi.org/10.1016/S0005-7894(89)80072-3

Kline, A. C., Feeny, N. C., & Zoellner, L. A. (2020). Race and cultural factors in an RCT of prolonged exposure and sertraline for PTSD. *Behaviour Research and Therapy*, *132*, Article 103690. https://doi.org/10.1016/j.brat.2020.103690

Lang, P. J. (1979). *A bio-informational theory of emotional imagery*. John Wiley & Sons Inc. https://onlinelibrary.wiley.com/doi/abs/10.1111/j.1469-8986.1979.tb01511.x

Langkaas, T. F., Hoffart, A., Øktedalen, T., Ulvenes, P. G., Hembree, E. A., & Smucker, M. (2017). Exposure and non-fear emotions: A randomized controlled study of exposure-based and rescripting-based imagery in PTSD treatment. *Behaviour Research and Therapy*, *97*, 33–42. https://doi.org/10.1016/j.brat.2017.06.007

Lehrner, A., Hildebrandt, T., Bierer, L. M., Flory, J. D., Bader, H. N., Makotkine, I., & Yehuda, R. (2021). A randomized, double-blind, placebo-controlled trial of hydrocortisone augmentation of prolonged exposure for PTSD in U.S. combat veterans. *Behaviour Research and Therapy*, *144*, Article 103924. https://doi.org/10.1016/j.brat.2021.103924

Lester, K., Artz, C., Resick, P. A., & Young-Xu, Y. (2010). Impact of race on early treatment termination and outcomes in posttraumatic stress disorder treatment. *Journal of Consulting and Clinical Psychology*, *78*(4), 480–489. https://doi.org/10.1037/a0019551

Levinson, D. B., Halverson, T. F., Wilson, S. M., & Fu, R. (2022). Less dropout from prolonged exposure sessions prescribed at least

twice weekly: A meta-analysis and systematic review of randomized controlled trials. *Journal of Traumatic Stress*, *35*(4), 1047–1059. https://doi.org/10.1002/jts.22822

Lewis, C., Roberts, N. P., Gibson, S., & Bisson, J. I. (2020). Dropout from psychological therapies for post-traumatic stress disorder (PTSD) in adults: Systematic review and meta-analysis. *European Journal of Psychotraumatology*, *11*(1), Article 1709709. https://doi.org/10.1080/20008198.2019.1709709

Livingston, N. A., Berke, D., Scholl, J., Ruben, M., & Shipherd, J. C. (2020). Addressing diversity in PTSD treatment: Clinical considerations and guidance for the treatment of PTSD in LGBTQ populations. *Current Treatment Options in Psychiatry*, *7*(2), 53–69. https://doi.org/10.1007/s40501-020-00204-0

Markowitz, J. C., Petkova, E., Neria, Y., Van Meter, P. E., Zhao, Y., Hembree, E., Lovell, K., Biyanova, T., & Marshall, R. D. (2015). Is exposure necessary? A randomized clinical trial of interpersonal psychotherapy for PTSD. *American Journal of Psychiatry*, *172*(5), 430–440. https://doi.org/10.1176/appi.ajp.2014.14070908

McDonagh, A., Friedman, M., Mchugo, G., Ford, J., Sengupta, A., Mueser, K., Demment, C., Fournier, D., Schnurr, P., & Descamps, M. (2005). Randomized trial of cognitive behavioral therapy for chronic PTSD in adult female childhood sexual abuse survivors. *Journal of Consulting and Clinical Psychology*, *73*(3), 515–524. https://doi.org/10.1037/0022-006X.73.3.515

McLean, C. P., Foa, E. B., Dondanville, K. A., Haddock, C. K., Miller, M. L., Rauch, S. A. M., Yarvis, J. S., Wright, E. C., Hall-Clark, B. N., Fina, B. A., Litz, B. T., Mintz, J., Young-McCaughan, S., & Peterson, A. L. (2021). The effects of web-prolonged exposure among military personnel and veterans with posttraumatic stress disorder. *Psychological Trauma: Theory, Research, Practice, and Policy*, *13*(6), 621–631. https://doi.org/10.1037/tra0000978

McLean, C. P., Levy, H. C., Miller, M. L., & Tolin, D. F. (2022). Exposure therapy for PTSD: A meta-analysis. *Clinical Psychology Review*, 91, Article 102115. https://doi.org/10.1016/j.cpr.2021.102115

McLean, C. P., Miller, M. L., Dondanville, K. A., Rauch, S. A. M., Yarvis, J. S., Wright, E. C., Hall-Clark, B. N., Fina, B. A., Litz, B. T., Mintz, J., Young-McCaughan, S., Peterson, A. L., & Foa, E. B. (2024). Perceptions and experiences of web-prolonged exposure for posttraumatic stress disorder: A mixed-methods study. *Psychological Trauma: Theory, Research, Practice, and Policy*, *16*(1), 143–148. https://doi.org/10.1037/tra0001124

McLean, C. P., Zandberg, L., Brown, L., Zang, Y., Benhamou, K., Dondanville, K. A., Yarvis, J. S., Litz, B. T., Mintz, J., Young-McCaughan, S., Peterson, A. L., Foa, E. B., & the STRONG STAR Consortium. (2019). Guilt in the treatment of posttraumatic stress disorder among active duty Military Personnel. *Journal of Traumatic Stress*, *32*(4), 616–624. https://doi.org/10.1002/jts.22416

Mills, K. L., Teesson, M., Back, S. E., Brady, K. T., Baker, A. L., Hopwood, S., Sannibale, C., Barrett, E. L., Merz, S., Rosenfeld, J., & Ewer, P. L. (2012). Integrated exposure-based therapy for co-occurring posttraumatic stress disorder and substance dependence: A randomized controlled trial. *JAMA*, *308*(7), 690–699. https://doi.org/10.1001/jama.2012.9071

Morland, L. A., Wells, S. Y., Glassman, L. H., Greene, C. J., Hoffman, J. E., & Rosen, C. S. (2020). Advances in PTSD treatment delivery: Review of findings and clinical considerations for the use of telehealth interventions for PTSD. *Current Treatment Options in Psychiatry*, *7*(3), 221–241. https://doi.org/10.1007/s40501-020-00215-x

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

National Institute for Health and Care Excellence. (2018). Guidelinefor post-traumatic stress disorder. London, United Kingdom: NationalInstitute for Health and Clinical Practice. https://www.nice.org.uk/guidance/ng116

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 post-traumatic stress disorder: A randomised controlled trial. *The Lancet Psychiatry*, *5*(12), 975–986. https://doi.org/10.1016/S2215-0366(18)30384-5

Norman, S. B., Trim, R., Haller, M., Davis, B. C., Myers, U. S., Colvonen, P. J., Blanes, E., Lyons, R., Siegel, E. Y., Angkaw, A. C., Norman, G. J., & Mayes, T. (2019). Efficacy of integrated exposure therapy vs integrated coping skills therapy for comorbid posttraumatic stress disorder and alcohol use disorder: A randomized clinical trial. *JAMA Psychiatry*, *76*(8), 791–799. https://doi.org/10.1001/jamapsychiatry.2019.0638

Oprel, D. A. C., Hoeboer, C. M., Schoorl, M., Kleine, R. A. de, Cloitre, M., Wigard, I. G., van Minnen, A., & van der Does, W. (2021). Effect of prolonged exposure, intensified prolonged exposure and STAIR+prolonged exposure in patients with PTSD related to childhood abuse: A randomized controlled trial. *European Journal of Psychotraumatology*, *12*(1), Article 1851511. https://doi.org/10.1080/20008198.2020.1851511

Peterson, A. L., Blount, T. H., Foa, E. B., Brown, L. A., McLean, C. P., Mintz, J., Schobitz, R. P., DeBeer, B. R., Mignogna, J., Fina, B. A., Evans, W. R., Synett, S., Hall-Clark, B. N., Rentz, T. O., Schrader, C., Yarvis, J. S., Dondanville, K. A., Hansen, H., Jacoby, V. M., … Consortium to Alleviate PTSD. (2023). Massed vs intensive outpatient prolonged exposure for combat-related posttraumatic stress disorder: A randomized clinical trial. *JAMA Network Open*, *6*(1), Article e2249422. https://doi.org/10.1001/jamanetworkopen.2022.49422

Popiel, A., Zawadzki, B., Pragłowska, E., & Teichman, Y. (2015). Prolonged exposure, paroxetine and the combination in the treatment of PTSD following a motor vehicle accident. A randomized clinical trial–the "TRAKT" study. *Journal of Behavior Therapy and Experimental Psychiatry*, *48*, 17–26. https://doi.org/10.1016/j.jbtep.2015.01.002

Powers, M. B., Halpern, J. M., Ferenschak, M. P., Gillihan, S. J., & Foa, E. B. (2010). A meta-analytic review of prolonged exposure for posttraumatic stress disorder. *Clinical Psychology Review*, *30*(6), 635–641. https://doi.org/10.1016/j.cpr.2010.04.007

Ragsdale, K. A., & Voss Horrell, S. C. (2016). Effectiveness of prolonged exposure and cognitive processing therapy for U.S. veterans with a history of traumatic brain injury. *Journal of Traumatic Stress*, *29*(5), 474–477. https://doi.org/10.1002/jts.22130

Ragsdale, K. A., Watkins, L. E., Sherrill, A. M., Zwiebach, L., & Rothbaum, B. O. (2020). Advances in PTSD treatment delivery: Evidence base and future directions for intensive outpatient programs. *Current Treatment Options in Psychiatry*, *7*(3), 291–300. https://doi.org/10.1007/s40501-020-00219-7

Rauch, S. A. M., Cigrang, J., Austern, D., & Evans, A. (2017). Expanding the reach of effective PTSD treatment into primary care: Prolonged exposure for primary care. *FOCUS*, *15*(4), 406–410. https://doi.org/10.1176/appi.focus.20170021

Rauch, S. A. M., Defever, E., Favorite, T., Duroe, A., Garrity, C., Martis, B., & Liberzon, I. (2009). Prolonged exposure for PTSD in a Veterans Health Administration PTSD clinic. *Journal of Traumatic Stress*, *22*(1), 60–64. https://doi.org/10.1002/jts.20380

Rauch, S. A. M., Kim, H. M., Acierno, R., Ragin, C., Wangelin, B., Blitch, K., Muzzy, W., Hart, S., & Zivin, K. (2023). Improving function through primary care treatment of posttraumatic stress disorder study outcomes: A randomized controlled trial of prolonged exposure for primary care in veterans. *Families, Systems, & Health*, *41*(4), 502–513. https://doi.org/10.1037/fsh0000823

Rauch, S. A. M., Kim, H. M., Powell, C., Tuerk, P. W., Simon, N. M., Acierno, R., Allard, C. B., Norman, S. B., Venners, M. R., Rothbaum, B. O., Stein, M. B., Porter, K., Martis, B., King, A. P., Liberzon, I., Phan, K. L., & Hoge, C. W. (2019). Efficacy of prolonged exposure therapy, sertraline hydrochloride, and their combination among combat veterans with posttraumatic stress disorder. *JAMA Psychiatry*, *76*(2), 117–126. https://doi.org/10.1001/jamapsychiatry.2018.3412

Rauch, S. A. M., 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 and Anxiety*, *32*(3), 204–212. https://doi.org/10.1002/da.22331

Rauch, S. A. M., Yasinski, C. W., Post, L. M., Jovanovic, T., Norrholm, S., Sherrill, A. M., Michopoulos, V., Maples-Keller, J. L., Black, K., Zwiebach, L., Dunlop, B. W., Loucks, L., Lannert, B., Stojek, M., Watkins, L., Burton, M., Sprang, K., McSweeney, L., Ragsdale, K., & Rothbaum, B. O. (2021). An intensive outpatient program with prolonged exposure for veterans with posttraumatic stress disorder: Retention, predictors, and patterns of change. *Psychological Services*, *18*(4), 606–618. https://doi.org/10.1037/ser0000422

Rauch, S. A. M., Venners, M. R., Ragin, C., Ruhe, G., Lamp, K. E., Burton, M., Pomerantz, A., Bernardy, N., Schnurr, P. P., Hamblen, J. L., Possemato, K., Sripada, R., Wray, L. O., Dollar, K., Wade, M., Astin, M. C., & Cigrang, J. A. (2023). Treatment of posttraumatic stress disorder with prolonged exposure for primary care (PE-PC): Effectiveness and patient and therapist factors related to symptom change and retention. *Psychological Services*, *20*(4), 745–755. https://doi.org/10.1037/ser0000783

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 and Clinical Psychology*, *84*(11), 946–959. https://doi.org/10.1037/ccp0000134

Resick, P. A., Monson, C. M., & Chard, K. M. (2017). *Cognitive processing therapy for PTSD: A comprehensive manual* (pp. xv, 312). Guilford Press.

Resick, P. A., Nishith, P., Weaver, T. L., Astin, M. C., & Feuer, C. A. (2002). A comparison of cognitive-processing therapy with prolonged exposure and a waiting condition for the treatment of chronic posttraumatic stress disorder in female rape victims. *Journal of Consulting and Clinical Psychology*, *70*(4), 867–879. https://doi.org/10.1037/0022-006X.70.4.867

Rizvi, S. L., Vogt, D. S., & Resick, P. A. (2009). Cognitive and affective predictors of treatment outcome in cognitive processing therapy and prolonged exposure for posttraumatic stress disorder. *Behaviour Research and Therapy*, *47*(9), 737–743. https://doi.org/10.1016/j.brat.2009.06.003

Rossouw, J., Yadin, E., Alexander, D., & Seedat, S. (2018). Prolonged exposure therapy and supportive counselling for post-traumatic stress disorder in adolescents: Task-shifting randomised controlled trial. *The British Journal of Psychiatry*, *213*(4), 587–594. https://doi.org/10.1192/bjp.2018.130

Rossouw, J., Yadin, E., Alexander, D., & Seedat, S. (2022). Long-term follow-up of a randomised controlled trial of prolonged exposure therapy and supportive counselling for post-traumatic stress disorder in adolescents: A task-shifted intervention. *Psychological Medicine*, *52*(6), 1022–1030. https://doi.org/10.1017/S0033291720002731

Rothbaum, B. O., Astin, M. C., & Marsteller, F. (2005). Prolonged exposure versus eye movement desensitization and reprocessing (EMDR) for PTSD rape victims. *Journal of Traumatic Stress*, *18*(6), 607–616. https://doi.org/10.1002/jts.20069

Ruglass, L. M., Lopez-Castro, T., Papini, S., Killeen, T., Back, S. E., & Hien, D. A. (2017). Concurrent treatment with prolonged exposure for co-occurring full or subthreshold posttraumatic stress disorder and substance use disorders: A randomized clinical trial. *Psychotherapy and Psychosomatics*, *86*(3), 150–161. https://doi.org/10.1159/000462977

Rytwinski, N. K., Scur, M. D., Feeny, N. C., & Youngstrom, E. A. (2013). The co-occurrence of major depressive disorder among individuals with posttraumatic stress disorder: A meta-analysis. *Journal of Traumatic Stress*, *26*(3), 299–309. https://doi.org/10.1002/jts.21814

Schneier, F. R., Neria, Y., Pavlicova, M., Hembree, E., Suh, E. J., Amsel, L., & Marshall, R. D. (2012). Combined prolonged exposure therapy and paroxetine for PTSD related to the World Trade Center attack: A randomized controlled trial. *American Journal of Psychiatry*, *169*(1), 80–88. https://doi.org/10.1176/appi.ajp.2011.11020321

Schnurr, P. P., Chard, K. M., Ruzek, J. I., Chow, B. K., Resick, P. A., Foa, E. B., Marx, B. P., Friedman, M. J., Bovin, M. J., Caudle, K. L., Castillo, D., Curry, K. T., Hollifield, M., Huang, G. D., Chee, C. L., Astin, M. C., Dickstein, B., Renner, K., Clancy, C. P., … Shih, M.-C. (2022). Comparison of prolonged exposure vs cognitive processing therapy for treatment of posttraumatic stress disorder among US veterans: A randomized clinical trial. *JAMA Network Open*, *5*(1), Article e2136921. https://doi.org/10.1001/jamanetworkopen.2021.36921

Schnurr, P. P., Friedman, M. J., Engel, C. C., Foa, E. B., Shea, M. T., 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

Sele, P., Hoffart, A., Cloitre, M., Hembree, E., & Øktedalen, T. (2023). Comparing phase-based treatment, prolonged exposure,

and skills-training for complex posttraumatic stress disorder: A randomized controlled trial. *Journal of Anxiety Disorders*, *100*, Article 102786. https://doi.org/10.1016/j.janxdis.2023.102786

Shapiro, F. (2001). *Eye movement desensitization and reprocessing (EMDR): Basic principles, protocols, and procedures* (2nd ed.). Guilford Press.

Sloan, D. M., & Marx, B. P. (2019). *Written exposure therapy for PTSD: A brief treatment approach for mental health professionals*. American Psychological Association. https://doi.org/10.1037/0000139-000

Sloan, D. M., Marx, B. P., Acierno, R., Messina, M., Muzzy, W., Gallagher, M. W., Litwack, S., & Sloan, C. (2023). Written exposure therapy vs prolonged exposure therapy in the treatment of posttraumatic stress disorder: A randomized clinical trial. *JAMA Psychiatry*, *80*(11), 1093–1100. https://doi.org/10.1001/jamapsychiatry.2023.2810

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

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*, 45–54. https://doi.org/10.1016/j.janxdis.2019.02.003

Tuerk, P. W., Wangelin, B. C., Powers, M. B., Smits, J. A. J., Acierno, R., Myers, U. S., Orr, S. P., Foa, E. B., & Hamner, M. B. (2018). Augmenting treatment efficiency in exposure therapy for PTSD: A randomized double-blind placebo-controlled trial of yohimbine HCl. *Cognitive Behaviour Therapy*, *47*(5), 351–371. https://doi.org/10.1080/16506073.2018.1432679

Tuerk, P. W., Yoder, M., Ruggiero, K. J., Gros, D. F., & Acierno, R. (2010). A pilot study of prolonged exposure therapy for posttraumatic stress disorder delivered via telehealth technology. *Journal of Traumatic Stress*, *23*(1), 116–123. https://doi.org/10.1002/jts.20494

van den Berg, D. P. G., de Bont, P. A. J. M., van der Vleugel, B. M., de Roos, C., de Jongh, A., Van Minnen, A., & van der Gaag, M. (2015). Prolonged exposure vs eye movement desensitization and reprocessing vs waiting list for posttraumatic stress disorder in patients with a psychotic disorder: A randomized clinical trial. *JAMA Psychiatry*, *72*(3), 259–267. https://doi.org/10.1001/jamapsychiatry.2014.2637

van Minnen, A., Arntz, A., & Keijsers, G. P. J. (2002). Prolonged exposure in patients with chronic PTSD: predictors of treatment outcome and dropout. *Behaviour Research and Therapy*, *40*(4), 439–457. https://doi.org/10.1016/s0005-7967(01)00024-9

van Pelt, Y., Fokkema, P., de Roos, C., & de Jongh, A. (2021). Effectiveness of an intensive treatment programme combining prolonged exposure and EMDR therapy for adolescents suffering from severe post-traumatic stress disorder. *European Journal of Psychotraumatology*, *12*(1), Article 1917876. https://doi.org/10.1080/20008198.2021.1917876

Vera, M., Obén, A., Juarbe, D., Hernández, N., Kichic, R., & Hembree, E. A. (2022). A randomized clinical trial of prolonged exposure and applied relaxation for the treatment of Latinos with posttraumatic stress disorder. *Journal of Traumatic Stress*, *35*(2), 593–604. https://doi.org/10.1002/jts.22773

Vera, M., Reyes-Rabanillo, M., Juarbe, D., Pérez-Pedrogo, C., Olmo, A., Kichic, R., & Chaplin, W. (2011). Prolonged exposure for the treatment of Spanish-speaking Puerto Ricans with posttraumatic stress disorder: A feasibility study. *BMC Research Notes*, *4*, Article 415. https://doi.org/10.1186/1756-0500-4-415

Walters, E. M., Jenkins, M. M., Nappi, C. M., Clark, J., Lies, J., Norman, S. B., & Drummond, S. P. A. (2020). The impact of prolonged exposure on sleep and enhancing treatment outcomes with evidence-based sleep interventions: A pilot study. *Psychological Trauma: Theory, Research, Practice, and Policy*, *12*(2), 175–185. https://doi.org/10.1037/tra0000478

Wells, A., Walton, D., Lovell, K., & Proctor, D. (2015). Metacognitive therapy versus prolonged exposure in adults with chronic posttraumatic stress disorder: A parallel randomized controlled trial. *Cognitive Therapy and Research*, *39*(1), 70–80. https://doi.org/10.1007/s10608-014-9636-6

Williams, M. T., Malcoun, E., Sawyer, B. A., Davis, D. M., Nouri, L. B., & Bruce, S. L. (2014). Cultural adaptations of prolonged exposure therapy for treatment and prevention of posttraumatic stress disorder in African Americans. *Behavioral Sciences*, *4*(2), Article 2. https://doi.org/10.3390/bs4020102

Wolf, G. K., Mauntel, G. J., Kretzmer, T., Crawford, E., Thors, C., Strom, T. Q., & Vanderploeg, R. D. (2018). Comorbid posttraumatic stress disorder and traumatic brain injury: Generalization of prolonged-exposure PTSD treatment outcomes to postconcussive symptoms, cognition, and self-efficacy in veterans and active duty service members. *Journal of Head Trauma Rehabilitation*, *33*(2), E53–E63. https://doi.org/10.1097/HTR.0000000000000344

World Health Organization. (2019). International statistical classification of diseases and related health problems (11th ed.). https://icd.who.int/

Wright, E. C., Wachen, J. S., Yamokoski, C., Galovski, T., Morris, K., Goetter, E. M., Klassen, B., Jacoby, V., Zwiebach, L., Sornborger, J., Dondanville, K. A., Fina, B. A., & Rauch, S. A. M. (2023). Clinical and administrative insights from delivering massed trauma-focused therapy to service members and veterans. *Cognitive and Behavioral Practice*, *30*(3), 397–416. https://doi.org/10.1016/j.cbpra.2022.06.005

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 posttraumatic stress disorder treatment response in combat veterans. *Interface Focus*, *4*(5), Article 20140048. https://doi.org/10.1098/rsfs.2014.0048

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

Zang, Y., Su, Y.-J., McLean, C. P., & Foa, E. B. (2019). Predictors for excellent versus partial response to prolonged exposure therapy: Who needs additional sessions? *Journal of Traumatic Stress*, *32*(4), 577–585. https://doi.org/10.1002/jts.22412

Zoellner, L. A., Feeny, N. C., Fitzgibbons, L. A., & Foa, E. B. (1999). Response of African American and Caucasian women to cognitive behavioral therapy for PTSD. *Behavior Therapy*, *30*(4), 581–595. https://doi.org/10.1016/S0005-7894(99)80026-4

Zoellner, L. A., Roy-Byrne, P. P., Mavissakalian, M., & Feeny, N. C. (2019). Doubly randomized preference trial of prolonged exposure versus sertraline for treatment of PTSD. *American Journal of Psychiatry*, *176*(4), 287–296. https://doi.org/10.1176/appi.ajp.2018.17090995

Zoellner, L. A., Telch, M., Foa, E. B., Farach, F. J., McLean, C. P., Gallop, R., Bluett, E. J., Cobb, A., & Gonzalez-Lima, F. (2017). Enhancing extinction learning in posttraumatic stress disorder with brief daily imaginal exposure and methylene blue: A randomized controlled trial. *The Journal of Clinical Psychiatry*, *78*(7), e782–e789. https://doi.org/10.4088/JCP.16m10936

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