



REVIEW ARTICLE

State of the Science: Treatment of comorbid posttraumatic stress disorder and substance use disorders

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Abstract

Posttraumatic stress disorder (PTSD) and substance use disorders (SUDs) co-occur at high rates, with research showing that up to nearly 60% of individuals with PTSD also suffer from an alcohol and/or drug use disorder. PTSD/SUD is complex; associated with adverse health, social, and economic outcomes; and can be challenging to treat. Over the past decade, the landscape of treatment research addressing PTSD/SUD has significantly expanded. Ongoing efforts aimed at developing and evaluating novel treatments for PTSD/SUD, encompassing both psychotherapy and pharmacotherapy approaches, are steadily advancing. As such, this State of the Science paper reviews the literature on the latest scientific advances in treating PTSD/SUD. Clinical practice guidelines for the treatment of PTSD/SUD are discussed, along with evidence-based psychotherapies and emerging interventions. Rigorously conducted clinical trials demonstrate that individual, manualized, trauma-focused treatments are the most efficacious psychotherapies to use among individuals with PTSD/SUD. Moreover, patients do not need to be abstinent to initiate or benefit from evidence-based PTSD treatment. To date, no medications have been established for this comorbidity. We highlight ongoing research on novel treatments for PTSD/SUD, such as new forms of integrated trauma-focused psychotherapies, pharmacological augmentation strategies, and technology-based enhancements. Finally, promising future directions for the field are discussed.

Individuals with posttraumatic stress disorder (PTSD) frequently experience co-occurring substance use disorders (SUDs). Indeed, data estimate that approximately 30%–60% of individuals with PTSD also have a comorbid alcohol or drug use disorder (Petrakis et al., 2011; Prior et al., 2017; Simpson et al., 2019). Although several potential mechanisms have been identified to help explain the com-

mon co-occurrence of PTSD and SUD (i.e., PTSD/SUD) and inform the development of effective treatments, the self-medication hypothesis has received the most attention and empirical support to date (Luciano et al., 2022). According to the self-medication hypothesis, individuals with PTSD/SUD use substances to try to alleviate distressing trauma-related symptoms; the substance use is

negatively reinforced by providing temporary relief of distress (Khantzian, 1997).

Regardless of the pathway to the development of PTSD/SUD, once established, PTSD/SUD can be challenging to treat. PTSD/SUD is associated with worse treatment outcomes as compared to either condition alone, as well as a host of adverse sequelae, such as increased suicide risk, physical health problems, and morbidity and mortality (Vujanovic & Back, 2019). Though PTSD/SUD is complex, a growing number of interventions targeting this comorbidity demonstrate positive findings. It is encouraging that several evidence-based, efficacious treatments for PTSD/SUD exist and that new approaches are being explored. In this narrative review, we focus on the state of the science of PTSD/SUD treatment research by reviewing current clinical practice guidelines and empirically supported treatments, discussing emerging treatments, and providing suggestions for future directions for the field.

Overview of the treatment literature for PTSD/SUD

Research conducted over the past 20 years has led to major advances in our understanding of PTSD/SUD and opened the door for new treatment approaches. Overall, the findings indicate that individual, trauma-focused therapies are most effective in treating patients with PTSD/SUD. Trauma-focused therapies are treatments that use cognitive, emotional, and/or behavioral techniques to facilitate processing a traumatic event and in which the trauma focus is a central component of the treatment (Watkins et al., 2018). New research also shows that combining trauma-focused psychotherapy with medications targeting SUDs may be especially helpful (Hien et al., 2023). This is discussed later in more detail.

Current clinical practice guidelines recommend the use of individual, trauma-focused psychotherapies alongside concurrent SUD treatment for PTSD/SUD (U.S. Department of Veterans Affairs [VA]/U.S. Department of Defense [DoD], 2023). The 2023 VA/DoD Clinical Practice Guideline (CPG) for Management of PTSD states that the presence of a co-occurring SUD should not prevent treatment with evidence-based, trauma-focused therapy for PTSD. Moreover, the 2021 VA/DoD Clinical Practice Guideline for the Management of SUD indicates that it is best to provide integrated care for patients with SUD and co-occurring conditions, such as PTSD, whenever possible (VA/DoD, 2021). Thus, patients who present for mental health care who have both PTSD and a co-occurring alcohol or drug use disorder should be offered treatment to address both conditions (see Table 1 for a summary of recommended practices). In the following sections, we briefly discuss the treatment literature, focusing first on psychothera-

pies for PTSD/SUD, followed by pharmacotherapeutic treatments.

Psychotherapy for PTSD/SUD

Based on rigorous clinical studies and clinical practice, the targets and implementation of psychotherapy for PTSD/SUD have changed in recent years from single disorder-focused and abstinence-focused to a more integrated approach that includes harm reduction. Previously, it was believed that patients with PTSD/SUD first needed to achieve abstinence from alcohol and drugs before starting treatment for PTSD. This approach, known as the sequential treatment model, has several notable shortcomings. Namely, it requires patients to be abstinent in the face of untreated PTSD symptoms—potent triggers for craving and substance use. Indeed, one of the most common reasons patients with PTSD/SUD report using alcohol or drugs is to cope with their PTSD symptoms (e.g., to sleep at night, reduce nightmares, quell intrusive thoughts and memories, or dampen distressing hyperarousal symptoms; María-Ríos & Morrow, 2020; Vujanovic & Back, 2019). Current practice guidelines specify that abstinence is not necessary to start or benefit from PTSD treatment (VA/DoD, 2023). Moreover, research shows that a reduction in substance use (i.e., harm reduction) can lead to clinically meaningful improvements in physical health, overall functioning, and quality of life and is a valuable treatment goal (Hagman et al., 2022).

Additional factors have contributed to the historical predominance of the sequential treatment model in managing PTSD/SUD. For instance, patients who seek treatment for SUDs are rarely assessed for trauma exposure or PTSD and, therefore, do not receive referrals for PTSD treatment (Dutra & Marx, 2019). For individuals who do complete SUD treatment and receive an assessment and referral for PTSD treatment, it is unclear how many patients follow up on the referral, which usually involves going to a different provider in a separate clinic or agency. In addition, concerns among some providers that PTSD treatment could potentially exacerbate trauma-related symptoms and lead to increased substance use have contributed to the use of this treatment approach (Cook et al., 2014). However, extensive research spanning two decades contradicts these concerns. Instead, evidence supports that PTSD treatments offered concurrently with SUD treatment significantly reduce both PTSD and SUD symptoms (Hien et al., 2023; Roberts et al., 2015). Furthermore, a recent study showed that only 15.8% of patients with PTSD/SUD experienced an increase in their PTSD symptoms at the beginning of treatment (i.e., Sessions 3–5) before symptoms improved, and there was no difference in this temporary symptom increase between

TABLE 1 Summary of current recommended treatment approaches for comorbid posttraumatic stress disorder (PTSD) and substance use disorder (SUD)

Treatment	Brief description	Key references
COPE	Integrated trauma-focused therapy using PE for PTSD combined with cognitive behavioral therapy for SUD; largest evidence base for integrated trauma-focused treatments for PTSD/SUD; recommended by VA/DoD Clinical Practice Guidelines	Back et al., 2019 Mills et al., 2012 Norman et al., 2019 Persson et al., 2017 Ruglass et al., 2017
Trauma-focused therapy + evidence-based psychotherapy for SUD	Trauma-focused therapy (e.g., PE, CPT) while the patient also engages in evidence-based psychotherapy for SUD (e.g., cognitive behavioral therapy, MI); recommended by VA/DoD Clinical Practice Guidelines	Coffey et al., 2016 Kehle-Forbes et al., 2019
Trauma-focused therapy + FDA-approved medication for SUD	Trauma-focused therapy (e.g., PE, CPT, COPE) while the patient also receives FDA-approved medication for SUD; recommended by VA/DoD Clinical Practice Guidelines	Foa et al., 2013 Hien et al., 2023 Hien et al., 2024 Peck et al., 2023

Note: COPE = concurrent treatment For PTSD and substance use disorders using prolonged exposure; PE = prolonged exposure; CPT = cognitive processing therapy; MI = motivational interviewing; VA/DoD = U.S. Department of Veterans Affairs/U.S. Department of Defense.

trauma-focused or non-trauma-focused psychotherapies (Tripp et al., 2021). In fact, one study found that patients with PTSD/SUD experience more PTSD symptom exacerbations during SUD-only treatment—that is, when their PTSD is not treated—compared to integrated (i.e., a therapy that addresses both PTSD and SUD symptoms simultaneously), trauma-focused treatment (Lancaster et al., 2020). This suggests that attending to trauma during treatment is critical for individuals with PTSD/SUD and is associated with reduced substance use.

The trauma-focused therapies with the most research and supporting evidence include prolonged exposure (PE; Foa et al., 2019) and cognitive processing therapy (CPT; Resick et al., 2017). PE uses imaginal exposure to help patients gradually approach and process memories, feelings, and thoughts related to a traumatic experience. In PE, patients also learn to gradually approach and habituate to situations and activities they have been avoiding through in vivo exposure exercises. CPT is a cognitive therapy that helps patients identify and change unhelpful beliefs and thoughts, called “stuck points.” CPT addresses core beliefs related to themes of safety, trust, power and control, esteem, and intimacy. An integrated, trauma-focused therapy that combines PE (Foa et al., 2019) with cognitive behavioral therapy (CBT) for SUD is concurrent treatment of PTSD and substance use disorders using prolonged exposure (COPE; Back et al., 2015). Current research is underway to evaluate a new integrated therapy that combines CPT (Resick et al., 2017) with relapse prevention for alcohol use disorder (AUD; Vujanovic & Back, 2024; ClinicalTrials.gov: NCT05959434), thereby broadening trauma-focused treatment options for patients with PTSD/SUD. [Correction added on 13 June 2024, after first online publication: 2nd line of this paragraph has been modified.

Research on psychotherapies for PTSD/SUD has examined interventions that are trauma-focused and integrated (e.g., COPE; Back et al., 2015) and directly address both PTSD and SUD together, interventions that are trauma-focused but not integrated (e.g., PE, CPT; Foa et al., 2019; Resick et al., 2017) and focus on directly addressing PTSD, and interventions that are non-trauma-focused and integrated (e.g., Seeking Safety; Najavits, 2002) that use coping skills for patients with PTSD/SUD but do not directly address trauma. Overall, the findings indicate that trauma-focused therapies are superior to non-trauma-focused therapies in reducing PTSD symptoms and, in some cases, reducing substance use among patients with PTSD/SUD (Hien et al., 2024; Norman et al., 2019; Roberts et al., 2015). Non-trauma-focused treatments have been found to be no more effective than treatment as usual for PTSD or SUD (Roberts et al., 2015; Schäfer et al., 2019). Thus, trauma-focused therapies are recommended for PTSD/SUD.

In line with these findings, the most recent VA/DoD CPG for PTSD (2023) identifies COPE as the integrated, trauma-focused treatment that has been the most extensively studied and shown to consistently improve PTSD outcomes among patients with PTSD/SUD. COPE has been implemented in person and via telehealth, and the evidence base for COPE includes well-controlled, rigorously conducted clinical research with complex patients with PTSD/SUD in the United States and internationally. COPE trials have included individuals who have experienced combat trauma, childhood trauma (on average, experiencing their first trauma at 8–10 years of age), exposure to multiple traumatic events (on average, experiencing six to eight different trauma types), alcohol and drug use disorders, using drugs intravenously (i.e., heroin), and suicidal ideation and prior suicide attempts

(i.e., 27%–52% of participants endorsed at least one lifetime suicide attempt; Back et al., 2019; Mills et al., 2012; Norman et al., 2019; Persson et al., 2017; Ruglass et al., 2017). Overall, the findings demonstrate that COPE leads to significant reductions in PTSD symptoms and substance use, remission from PTSD and SUD diagnoses, and improvements in associated problems (e.g., depression, physical health, quality of life, trauma-related guilt; Back et al., 2019; Mills et al., 2012; Norman et al., 2019; Persson et al., 2017). The first edition of the COPE manual was published in 2015, and the second edition is currently underway. The development of COPE*Web*, an online provider training program for COPE, has also begun. Thus, COPE is currently the only trauma-focused, integrated therapy for PTSD/SUD with a strong evidence base.

New trauma-focused, integrated treatments that are in development include COPE for adolescents (Schollar-Root et al., 2021) and the integrated CPT-based intervention (Resick et al., 2017) for PTSD/SUD mentioned earlier. In addition, an ongoing study is developing and testing an integrated brief intervention that combines written exposure therapy (WET; Sloan & Marx, 2019) for PTSD and cognitive behavioral therapy (CBT) for SUD among recent sexual assault survivors (Hahn et al., 2023). A recent pilot study of WET in an SUD residential treatment setting demonstrated positive results (Schacht et al., 2023), and another study is currently examining the integration of WET into substance use treatment in a VA setting (Meshberg-Cohen et al., 2024). The addition of new integrated treatments for PTSD/SUD based on CPT and WET may help enhance access to treatment and expand reach to more diverse clinical settings (Kehle-Forbes et al., 2023). Finally, a large comparative effectiveness study is underway to examine the effects of trauma-focused therapy (PE or CPT) versus a non-trauma-focused therapy (i.e., present-centered therapy, which includes psychoeducation, problem-solving, and emotional support) among veterans with PTSD/SUD who are already enrolled in SUD treatment (Kehle-Forbes et al., 2022). The findings from this important study will inform treatment decisions for patients enrolled in VA SUD treatment programs. Patient preferences for treatment are important to consider and have informed the development of treatments for PTSD/SUD. As such, it is important that novel therapies, such as these, be developed and evaluated among patients with PTSD/SUD to enhance options for evidenced-based care.

In settings where trauma-focused treatments are unavailable, research shows that patients with PTSD/SUD who receive evidence-based, individual, manualized treatments for either PTSD or SUD may also see reductions in both conditions. For example, one study found that CPT and SUD-only treatment both led to within-subject

reductions in PTSD symptoms and alcohol consumption (Simpson et al., 2022). In a previous trial comparing COPE to an SUD-only psychotherapy, both groups evidenced significant reductions in PTSD and SUD severity; however, the outcomes for PTSD were significantly better among participants randomized to COPE, and the outcomes for SUD were comparable or significantly better for those in COPE (Back et al., 2019). Taken together, the findings suggest that patients with PTSD/SUD can experience reductions in PTSD and SUD symptoms through various types of evidence-based, manualized interventions, although trauma-focused and integrated interventions may be more efficacious and responsive to patient preferences than other types of treatments

Pharmacotherapy for PTSD/SUD

Interest is growing in identifying medications that can alleviate PTSD/SUD symptoms. U.S. Food and Drug Administration (FDA)-approved medications for AUD include naltrexone, acamprosate, and disulfiram. For opioid use disorder (OUD), FDA-approved medications include buprenorphine, methadone, and injectable naltrexone. Two selective serotonin reuptake inhibitor (SSRI) medications, paroxetine and sertraline, have FDA approval for the treatment of PTSD. There are currently no approved pharmacotherapies for the treatment of PTSD/SUD.

In the pursuit of effective pharmacotherapies for PTSD/SUD comorbidity, research has examined medications that target neurobiological mechanisms implicated in PTSD/SUD. For instance, anticonvulsant medications (e.g., topiramate, zonisamide) target glutamate and gamma-aminobutyric acid (GABA) receptors, which may reduce substance use and PTSD symptoms (Batki et al., 2014; Petrakis et al., 2020). Medications that target adrenergic receptors (e.g., prazosin, doxazosin) may reduce stress responses, nightmares, craving, and the effects of withdrawal (Back, Flanagan, Mintz, et al., 2023; Petrakis et al., 2016). Medications that modulate neuroendocrine pathways (e.g., oxytocin) are currently being examined for PTSD/SUD (Back, Flanagan, Killeen, et al., 2023), as these agents may have anxiolytic and prosocial effects and reduce craving, use, and withdrawal symptoms. To date, most studies investigating medications for PTSD/SUD have failed to observe significant and clinically meaningful differences among treatment groups. For example, randomized, double-blind, placebo-controlled trials investigating prazosin and doxazosin among veterans with PTSD and co-occurring AUD have generally found that both medications, as well as those used in placebo conditions, are associated with improvements in PTSD and AUD (Back, Flanagan, Mintz, et al., 2023; Petrakis et al., 2016).

Future investigations related to prazosin or doxazosin may benefit from examining subgroups of patients with higher pretreatment blood pressure, withdrawal symptoms, or a family history of AUD to refine potential treatment efficacy (Sinha et al., 2021). In summary, ongoing research is critically needed to identify effective medications for the treatment of PTSD/SUD.

Other research has shown that medications for SUDs combined with psychotherapy for PTSD can be effective (Hien et al., 2023). For instance, Foa et al. (2013) found that patients with PTSD/AUD ($N = 165$) treated with PE plus naltrexone had the best long-term alcohol-related outcomes as compared to those who received PE plus placebo, supportive counseling and naltrexone, or supportive counseling and placebo. New research findings from Project Harmony (Hien et al., 2024; Saavedra et al., 2021)—the largest and most comprehensive examination of treatments for patients ($N = 4046$) with PTSD/SUD—highlight the potential benefits of combining pharmacotherapy for SUD with trauma-focused psychotherapy for optimal outcomes. Specifically, Hien et al. (2024) conducted a systematic review and network meta-analysis using individual patient data to examine the effectiveness of interventions targeting PTSD and SUDs. A total of 39 studies were included in the systematic review, and 24 randomized clinical studies were included in the network analyses. Interventions were grouped by the treatment target (i.e., PTSD plus SUD, PTSD only, SUD only) and treatment type (e.g., psychotherapy or pharmacotherapy). Overall, the findings showed that integrated, trauma-focused therapy for PTSD/SUD was superior to the other types of therapies examined (i.e., integrated, non-trauma-focused therapy; SUD-only therapy; treatment as usual) in reducing PTSD symptom severity. Moreover, medications for AUD (e.g., naltrexone), both with and without trauma-focused therapy, were superior to placebo in reducing alcohol use severity. Thus, the existing research emphasizes the potential benefits of utilizing trauma-focused treatment for PTSD in combination with medications for AUD.

Other recent areas of investigation have focused on the use of PE (Foa et al., 2019) among patients with PTSD and co-occurring OUD who are maintained on medications for OUD (e.g., buprenorphine), and early findings are promising (Peck et al., 2023). Among patients with PTSD/SUD, individuals with OUD have some of the highest rates of trauma exposure. A retroactive chart review by Meshberg-Cohen et al. (2019) found that patients with comorbid PTSD/OUD who were maintained on medication for OUD and received concurrent treatment for PTSD had significantly better retention as compared to those who did not receive treatment for PTSD. Ongoing efforts on comorbid PTSD/OUD are underway to adapt existing integrated,

trauma-focused psychotherapy for the unique needs of patients with OUD (e.g., chronic pain, the importance of medications for OUD, reducing overdose risk; Saraiya et al., 2024). It is critical that all patients with co-occurring PTSD/OUD be evaluated for potential OUD medications, as these medications are lifesaving yet underutilized.

Additional pharmacotherapies are being investigated for their therapeutic benefit when used to augment psychotherapy for PTSD/SUD. One trial is currently underway to examine the combination of COPE with intranasal oxytocin versus placebo prior to each therapy session in reducing PTSD and AUD symptoms (Back, Flanagan, Killeen, et al., 2023). Another trial is examining whether adding topiramate to PE leads to greater PTSD symptom reduction, alcohol use reduction, and PE treatment completion than PE plus placebo (Norman, 2023). Finally, a recently funded study in Australia is examining the use of COPE combined with 3,4-methyl enedioxy methamphetamine (MDMA) versus niacin for PTSD and AUD (Morley, 2024). Some research suggests that psychedelic-integrative therapy for PTSD/SUD may hold promise, although more research in this area is needed to replicate findings (Gully et al., 2023). In summary, further research is needed to identify medications for PTSD/SUD as well as to investigate potential advantageous combinations of medications added to psychotherapy.

Future directions

Although there have been important advances in the treatment of PTSD/SUD, there is no “magic bullet,” emphasizing the critical need for continued research in this area. Given the heterogeneity of pathways between and clinical presentations of PTSD/SUD and the diversity of patients in need of healing from trauma/PTSD and SUD, much work remains to enhance outcomes and improve the accessibility of treatments. In this section, we briefly discuss potential areas for future directions.

Adapt and augment current treatments

Existing treatments for PTSD/SUD can be adapted to enhance the feasibility of delivery, address the diverse needs of patient populations, and broaden the use of treatments across diverse clinical settings. One such consideration is delivering evidence-based treatments in alternative formats and settings rather than the conventional weekly individual outpatient therapy visits. For example, research to explore the acceptability and benefits of massed delivery of treatments (e.g., daily therapy sessions delivered over 2 weeks) in intensive outpatient programs or

residential settings (Watkins et al., 2024) will provide valuable information. One study is currently underway to examine the effectiveness of massed PE in an intensive outpatient substance use treatment setting among veterans (Norman, 2024; ClinicalTrials NCT06296186). Brief versions of treatments for use in mainstream health care settings (e.g., primary care) could enhance the feasibility of delivery, reduce barriers to care, and allow patients to initiate treatment earlier in the progression of disease. One example is an intervention called primary care treatment integrating motivation and exposure treatment (PC-TIME; Possemato et al., 2023), which includes five 30-min sessions that combine motivational interviewing (MI) and exposure therapy to reduce alcohol use and PTSD symptoms among patients in primary care settings. Early findings among 63 patients demonstrate high patient satisfaction, larger reductions in PTSD severity and heavy drinking compared to treatment as usual, and a 70% completion rate. Innovations such as these that utilize alternative formats and novel settings for the provision of PTSD/SUD treatment will contribute to the advancement of the field.

Advances in technology can also be leveraged to augment existing evidence-based treatments. For example, mental health (mHealth) applications (i.e., “apps”), such as PE Coach and THRIVE, and web-based self-management programs, such as VetChange, are feasible and acceptable and may help users reduce drinking behaviors and symptoms of PTSD (Brief et al., 2013; Dworkin et al., 2023; Enggasser et al., 2021; Kuhn et al., 2014; Reger et al., 2023). Recent pilot work with a newly developed VetChange mobile app is investigating a blended application to examine whether use of the mobile app in the context of group interventions in clinical settings can help patients learn about the association between PTSD and alcohol use, navigate and engage with the app, and benefit from additional support. A recently completed study used wearable physiological monitors paired with an audio/visual feed for clinicians to guide patients remotely during *in vivo* exposures during PE and found positive outcomes (Saraiya et al., 2022). This work was expanded to test the feasibility and acceptability of this technology in patients with comorbid PTSD/AUD, and analyses are currently underway. More research is needed on mobile and web-based interventions, with or without therapist facilitation, and other novel technology-based strategies to enhance treatment reach, scalability, engagement, and retention.

There is much work to be done to address the needs of diverse individuals and consider how intersectional identities (e.g., sex/gender, race/ethnicity, sexuality, socioeconomic status) and race-based trauma coincide with PTSD/SUD (Bauer & Saraiya, 2021; Saraiya et al., 2023).

Emerging research in this area has identified factors that may be related to early therapeutic alliance among Black women with PTSD/SUD (Bauer et al., 2022). In addition, Brown et al. (2022) identified that African American veterans with PTSD/SUD had larger decreases in substance use during treatment, but larger increases during follow-up, compared to White veterans. Cultural adaptations may be helpful to enhance treatment engagement and outcomes (e.g., Banks et al., 2023). Examining protective (e.g., positive cultural identity, receipt of affirming care) and risk factors (e.g., discrimination, historical trauma) in the context of PTSD/SUD among diverse individuals will not only point to community strengths and needs but also provide valuable insights for developing inclusive and effective treatments tailored to diverse patients with PTSD/SUD.

Develop novel treatments

The neurobiological mechanisms underlying PTSD/SUD are still poorly understood, and this significantly limits researchers' ability to identify novel treatment targets and develop new interventions. Although the neuroscience literature has contributed much to the understanding of PTSD and SUD individually, more neurobiological research examining the comorbidity is needed. A translational framework drawing upon the Alcohol and Addiction Research Domain Criteria (AARDOC; Litten et al., 2015) has been proposed to conceptualize neurobiological risk factors and outcomes for PTSD/SUD to enhance treatment matching and innovations in intervention research, including a review of research findings on executive functioning, negative emotionality, reward, and social cognition (Hien et al., 2021). Although work from animal models has identified that reward and stress circuits are dysregulated in PTSD/SUD, few studies have examined neural mechanisms underlying PTSD/SUD in humans and their associations with treatment outcomes. Additional research in this area is critical to enhance understanding of the foundational neurobiology of PTSD/SUD and open doors to new treatments.

Additionally, new treatments are needed to address cannabis use disorder, which is strongly associated with PTSD (Hasin et al., 2016; Hill et al., 2022) and for which there is currently no FDA-approved medication. In a national sample of over 42,000 veterans of recent conflicts, Bryan et al. (2021) found that 72.3% of veterans with cannabis use disorder also had co-occurring PTSD—one of the highest rates of PTSD/SUD comorbidity observed in the literature. Given the strong connection between PTSD and cannabis use and the limited amount of treatment research in this area, additional research will be important going forward.

Conclusions

PTSD and SUD frequently co-occur and can be challenging to treat. The aim of this paper was to review the current state of the science regarding treatment for PTSD/SUD. Trauma-focused psychotherapy used alongside SUD treatment has some of the strongest empirical support and is recommended for patients presenting with PTSD/SUD. Even though there is strong empirical support for these recommendations, there remains significant room for improving treatment outcomes for patients with PTSD/SUD and for increasing treatment uptake and retention.

Novel treatment options for trauma-focused psychotherapies for PTSD/SUD are being developed and evaluated, with an emphasis on increasing patient and provider options for evidence-based care, enhancing feasibility, and broadening reach. These new lines of investigation include, for example, the development of integrated CPT-based treatments; applying trauma-focused treatments in primary care settings and residential or inpatient SUD treatment settings; and evaluating briefer treatments, such as WET (Sloan & Marx, 2019). Research on pharmacological interventions for PTSD/SUD also remains an area of active investigation. To date, no effective medications for this comorbidity have been identified, which represents a major clinical gap as well as an opportunity for the field. Research focused on combination treatments that use medications synergistically paired with psychotherapies may prove beneficial.

An important need that spans across the treatment literature is the need to increase retention during treatment. Many patients discontinue treatment prior to receiving the minimum required therapeutic dose. Research focused specifically on increasing treatment retention and completion among patients with PTSD/SUD would be highly valuable. Technology-based applications are one avenue that may be helpful in this regard. There is much to be explored with regard to developing and utilizing creative technology-based strategies to enhance both uptake and retention in PTSD/SUD treatments and further improve outcomes. Internet-based interventions, text-messaging protocols, web-based tools, and other mobile technology-based applications have been largely unexplored in the field of PTSD/SUD and represent areas of opportunity.

To date, most of the research on treating PTSD/SUD has focused on adults. Given that most adult patients with PTSD/SUD endorse childhood trauma and early life initiation of substance use, effective strategies for addressing co-occurring symptoms of PTSD and SUD in adolescents and young adults are greatly needed. In addition, research focused on attending to cultural and identity-related fac-

tors in the assessment and treatment of PTSD/SUD has been largely absent, and more research in this area is needed. To that end, enhancing diversity among investigators in the field of PTSD/SUD research will help generate new ideas and effective treatment approaches. The National Institute of Mental Health (NIMH), National Institute on Alcohol Abuse and Alcoholism (NIAAA), National Institute on Drug Abuse (NIDA), and the VA play critical roles in supporting various training programs and grant funding mechanisms aimed at enhancing diversity among trainees and investigators. Sustained support of these programs will be vital to ensure their continued success and promote progress in the field of PTSD/SUD.

In conclusion, the evolving landscape of PTSD/SUD treatment research, coupled with innovative methods, such as technology-based enhancements and the utilization of trauma-focused treatments in diverse clinical settings, offer promise. Effective dissemination and implementation of evidence-based treatments for PTSD/SUD requires continued work to ensure that effective interventions reach individuals in need. As the field progresses, continued research, adaptation, and a deeper understanding of the multifaceted nature of PTSD/SUD will drive innovation in treatment and improved outcomes for patients living with PTSD/SUD.

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