Title

Substance use predictors of attendance among veterans in integrated PTSD and alcohol use disorder treatment

Authors

Kline, Alexander C
Straus, Elizabeth
Lyons, Robert C
et al.

Publication Date

2021-05-01

DOI

10.1016/j.jsat.2021.108278

Peer reviewed

HHS Public Access

Author manuscript

J Subst Abuse Treat. Author manuscript; available in PMC 2023 May 19.

Published in final edited form as:

J Subst Abuse Treat. 2021 May ; 124: 108278. doi:10.1016/j.jsat.2021.108278.

Substance use predictors of attendance among veterans in integrated PTSD and alcohol use disorder treatment

Alexander C. Kline[a,b], **Elizabeth Straus**[a,b], **Robert C. Lyons**[c], **Abigail C. Angkaw**[a,b,c,d], **Brittany C. Davis**[e,f], **Moira Haller**[a,b], **Denise Hien**[g], **Sonya B. Norman**[a,b,d]

[a]VA San Diego Healthcare System, 3350 La Jolla Village Drive, San Diego, CA, 92161, USA

[b]University of California San Diego, School of Medicine, 9500 Gilman Drive, La Jolla, CA, 92037, USA

[c]San Diego State University/University of California, San Diego Joint Doctoral Program in Clinical Psychology, 6363 Alvarado Court, Suite 103, San Diego, CA, 92120, USA

[d]National Center for PTSD, 163 Veterans Drive, White River Junction, VT, 05009, USA

[e]James A. Haley Veterans Hospital, 13000 Bruce B. Downs Boulevard, Tampa, FL, 33612, USA

[f]Department of Psychiatry and Behavioral Neurosciences, University of South Florida, 3515 E. Fletcher Avenue, Tampa, FL, 33613, USA

[g]Center of Alcohol & Substance Use Studies, Rutgers University, 607 Allison Road, New Brunswick, NJ, 08854, USA

Abstract

Comorbid post-traumatic stress disorder (PTSD) and alcohol use disorder (AUD) is common, defined by greater severity and impairment than either disorder alone, and associated with poor treatment attendance. Exposure therapies are effective in treating PTSD+AUD, yet substance use is still cited as a potential contraindication for exposure. This study examined substance use–related predictors of session attendance among veterans (N = 119) randomized to receive integrated exposure therapy (Concurrent Treatment of PTSD and Substance Use Disorders using Prolonged Exposure [COPE]; Back et al., 2015) or integrated coping skills therapy (Seeking Safety [SS]; Najavits, 2002) in a clinical trial for comorbid PTSD+AUD (Norman et al., 2019). At baseline, greater percentage of heavy drinking days (β = –.23, p = .011) and greater AUD severity

Corresponding Author: Alexander Kline, Ph.D. alexander.kline@va.gov.

Author Statement

Alexander Kline: Conceptualization, Methodology, Formal Analysis, Writing – Original Draft, Writing – Review & Editing
Elizabeth Straus: Writing – Original Draft, Writing – Review & Editing
Robert Lyons: Methodology, Formal Analysis, Writing – Review & Editing
Abigail Angkaw: Investigation, Writing – Review & Editing, Supervision
Brittany Davis: Investigation, Writing – Review & Editing, Supervision
Moira Haller: Investigation, Data Curation, Writing – Review & Editing, Supervision
Denise Hien: Writing – Review & Editing, Supervision
Sonya Norman: Conceptualization, Methodology, Investigation, Resources, Data Curation, Writing – Review & Editing, Supervision, Funding Acquisition

per structured clinical interview for DSM-IV-TR (β = –.21, p = .019) predicted fewer sessions across both treatments. Treatment type did not moderate the relationship between predictors and attendance, except for a trend for craving (p = .057), where greater craving predicted fewer sessions in SS (β = −.31, p = .02) but not COPE (β = .14, p = .28). Percentage of abstinence days, AUD duration, and living in a controlled environment (e.g., recovery home) at the start of therapy were not associated with attendance in either treatment condition. Only a subset of substance use characteristics predicted attendance. Findings did not support the notion that alcohol use leads to lower attendance in exposure therapy compared to nonexposure therapy.

Keywords

PTSD; Alcohol use; Substance use; Integrated treatment; Treatment attendance; Treatment dropout

1. Introduction

Post-traumatic stress disorder (PTSD) frequently co-occurs with alcohol use disorder (AUD; e.g., Seal et al., 2011) and is associated with greater symptom severity, worse social and functional impairment, higher likelihood of other psychiatric comorbidities, greater risk of suicide and homelessness, and increased service utilization compared to either disorder alone (Blanco et al., 2013; Bowe & Rosenheck, 2015; Drapkin et al., 2011; Norman, Haller, Hamblen, Southwick, & Pietrzak, 2018). Concurrent or integrated treatments, particularly those that are trauma-focused, are effective in reducing PTSD symptoms and alcohol use among comorbid patients (Mills et al., 2012; Norman et al., 2019; Roberts, Roberts, Jones, & Bisson, 2015; Simpson, Lehavot, & Petrakis, 2017). Yet even with improvements in the efficacy of treatments targeting comorbid PTSD+AUD, this comorbidity remains difficult to treat, with challenges in treatment retention particularly salient (e.g., Back & Jones, 2018; Roberts et al., 2015).

Understanding the relationship between attendance and treatment outcomes is complex, in part due to varying definitions of treatment dropout and completion across clinical research. In clinical trials, for example, treatment dropout often refers to termination prior to fully completing a treatment protocol or, in less stringent cases, termination prior to completing a specified subset of sessions (e.g., attendance of fewer than 9 sessions of a 12-session protocol). Yet even when accounting for differences in ways to assess retention, greater session attendance and completion of treatment are generally associated with stronger response across both clinical trials (e.g., Berke et al., 2019; Straus et al., 2019) and effectiveness research (e.g., Holmes et al., 2019; Myers, Haller, Angkaw, Harik, & Norman, 2019). A small subset of patients likely terminates PTSD treatment due to early response (e.g., Szafranski, Smith, Gros, & Resick, 2017; Zandberg, Rosenfield, Alpert, McLean, & Foa, 2016), and comorbid PTSD+substance use disorder (SUD) literature indicates that the ideal level of session attendance for optimal outcomes is nuanced (e.g., Hien et al., 2012). Overall, however, poor session attendance in most cases limits the effectiveness of existing evidence-based PTSD treatments, as a sufficient level of attendance is needed to maximally benefit from therapies (e.g., Holmes et al., 2019).

Across different psychotherapies, patient retention remains an ongoing challenge in the treatment of PTSD (Imel, Laska, Jakupcack, & Simpson, 2013), SUD (Brorson, Arnevik, Rand-Hendriksen, & Duckert, 2013), and their co-occurrence (Roberts et al., 2015). A recent meta-analysis of randomized trials and cohort studies examining in-person psychosocial SUD treatments estimated an average dropout rate of 30.4% across studies and 26.1% for alcohol use treatment specifically (Lappan, Brown, & Hendricks, 2020). In clinical trials for PTSD alone, overall dropout rates have been estimated around 18%, up to 36% (Imel et al., 2013). However, these figures are typically higher in clinical trials for comorbid PTSD+AUD (e.g., Foa et al., 2013; Hien et al., 2015; Sannibale et al., 2013) or PTSD+SUD (e.g., Back et al., 2019; Coffey et al., 2016; Hien et al., 2009; Mills et al., 2012; Ruglass et al., 2017). Estimates of dropout rates in a recent review of comorbid PTSD and SUD ranged, for example, from 30 to 50% (Roberts et al., 2015). Substance use–related characteristics in trials for PTSD alone have also been predictive of higher dropout. In one recent study of a PTSD clinical trial examining prolonged exposure and sertraline, for example, dropout rates were highest among patients with recent substance use or lifetime diagnoses of alcohol use and SUDs (e.g., Bedard-Gilligan, Garcia, Zoellner, & Feeny, 2018). It is not demonstrably clear as to why attendance is particularly poor in treatment for PTSD+SUD relative to PTSD alone. Each disorder may contribute individual, additive risk factors for poor attendance, or may amplify the effects of shared risk factors. Patients with co-occurring PTSD and SUD are also likely to be affected by factors such as increased life stressors, decreased social support, and increased functional impairment that may also inhibit their ability to attend treatment (e.g., Gros et al., 2016; Norman et al., 2018). Taken together, high dropout rates and poor treatment attendance represent critical barriers to effectively treating individuals with PTSD+SUD, given that poor attendance is frequently associated with worse treatment response.

Prevailing concerns that exposure-based interventions are not suitable for PTSD patients with co-occurring SUD have negatively impacted the dissemination and reach of first-line treatments for PTSD among these patients (Becker, Zayfert, & Anderson, 2004; Ronconi, Shiner, & Watts, 2014; van Minnen, Harned, Zoellner, & Mills, 2012). Providers have shared concerns that patients should be abstinent before beginning PTSD treatment because otherwise they may be at increased risk of symptom exacerbation or dropout, or that patients using substances cannot engage in or benefit from exposure-based therapies (Becker et al., 2004; Gielen, Krumeich, Havermans, & Jansen, 2014; Najavits, 2006; Osei-Bonsu et al., 2017; van Minnen et al., 2012). Compared to non-trauma-focused or present-focused therapies, concerns regarding poor attendance when PTSD and SUD co-occur have centered on trauma-focused therapies (Becker et al., 2004; Najavits, 2006; Osei-Bonsu et al., 2017; van Minnen et al., 2012). These beliefs may decrease the likelihood that providers will implement these interventions despite evidence that these therapies are effective in treating comorbid PTSD+SUD (e.g., Norman et al., 2019; Roberts et al., 2015). Accordingly, it is important to empirically determine whether features of alcohol use inhibit attendance and engagement in exposure-based therapies more so than non-exposure-based interventions.

Several studies have examined baseline predictors of treatment dropout among patients with PTSD+SUD, linking—albeit inconsistently—trauma type, education, anxiety sensitivity, and higher baseline PTSD severity to dropout (Belleau et al., 2017; Szafranski et al., 2017;

Zandberg et al., 2016). For SUD treatment studies, a recent review identified that studies with higher percentages of African Americans and lower income individuals were associated with higher dropout; greater cocaine use was also associated with higher dropout (Lappan et al., 2020). Overall, reliable predictors of attendance in PTSD+SUD trials specifically have proven difficult to identify, likely in part due to the exclusion of patients with comorbid SUD from many PTSD clinical trials (Leeman et al., 2017; Ronconi et al., 2014). Additionally, understanding if specific facets of substance use (e.g., alcohol use frequency, severity, abstinence, duration, or its co-occurrence with other substance use) are associated with attendance is critical to improving attendance and treatment outcomes among PTSD+SUD patients. If found to be related to attendance, these facets of substance use could be targets for intervention to improve treatment retention and ultimately outcomes.

Thus, the current study aimed to examine baseline substance use–related predictors of session attendance among veterans with comorbid PTSD+AUD receiving two integrated treatments for PTSD and substance use. We selected substance use–related predictors based on precedence in SUD research and clinical utility (i.e., information that is relatively easily gathered and is often assessed as part of routine intakes with this population). We elected to examine continuous session attendance rather than a dichotomous dropout or completer variable because of (a) inconsistent definitions of treatment completion and dropout in the literature and (b) evidence that patients often respond flexibly to treatment and that the optimal time to end treatment varies among patients (e.g., Galovski, Blain, Mott, Elwood, & Houle, 2012; Robinson, Kellett, & Delgadillo, 2020). The current study used data from a recent randomized clinical trial comparing an integrated trauma-focused exposure therapy (Concurrent Treatment of PTSD and Substance Use Disorders Using Prolonged Exposure [COPE]; Back et al., 2015) to an integrated present-focused coping skills therapy (Seeking Safety [SS]; Najavits, 2002). Providers delivered both COPE and SS in a 12-session format, with an option to extend up to an additional four sessions if patients and respective providers agreed that patient-reported treatment goals had not yet been met. Given the disparate approaches of these two interventions—one is exposure-based and the other present-focused—we also investigated whether predictors were associated with attendance differentially between these two treatments. We hypothesized that greater baseline alcohol use and drug use severity—indexed as the percentage of heavy drinking days and drug use days in the interval prior to treatment—and greater AUD severity—assessed via the Structured Clinical Interview for DSM-IV-TR (SCID-IV; First et al., 2002)—would be associated with lower session attendance. We hypothesized that we would observe these effects in both treatments to a similar degree.

2. Method

2.1 Participants and procedures

This study included 119 veterans (M_{age} = 41.61, 89.9% male) who sought treatment for comorbid PTSD+AUD at a large urban VA hospital. Recruitment occurred between February 2013 and May 2017 and consisted of referrals from VA mental health providers and participant self-referral through flyers posted at the facility. Male and female veterans from all service eras with all trauma types were eligible to participate in the study who:

(a) met current *Diagnostic and Statistical Manual of Mental Disorders, 5th Edition* (DSM-5; American Psychiatric Association, 2013) full or subthreshold PTSD (up to one missing symptom; Franklin et al., 2018), (b) met current *Diagnostic and Statistical Manual of Mental Disorders, 4th Edition* (DSM-IV-TR; American Psychiatric Association, 2000) alcohol use or dependence with at least 20 days of heavy alcohol use in the last 90 days while not living in a restricted environment, and (c) reported a desire to reduce or abstain from alcohol use. Exclusion criteria were: (a) moderate or severe cognitive impairment, (b) acute suicidality, (c) unmanaged psychosis or mania, and (d) intravenous substance use. The local Institutional Review Board approved this study. For a more detailed description of study methods and primary outcomes see Norman et al. (2015) and Norman et al. (2019).

2.2 Measures

Sociodemographic characteristics.—This study collected sociodemographic characteristics at pretreatment, and they included age, race/ethnicity, level of education, and living arrangements (i.e., house or apartment; controlled environment, such as a sober living or recovery facility; no stable arrangements). For a full list of sociodemographic characteristics, see Table 1.

PTSD symptoms.—The study used the sum of the 20 symptom items from the Clinician Administered PTSD Scale for DSM-5 (CAPS-5; Weathers et al., 2013) to assess for past-month PTSD symptom severity at pretreatment. The CAPS-5 is a structured clinical interview that has displayed strong internal consistency, interrater reliability, and convergent validity in veterans (Weathers et al., 2018).

Alcohol and drug use.—The study assessed lifetime alcohol use disorders at pretreatment with the SCID-IV (First et al., 2002) Module E, a semi-structured interview which has demonstrated strong reliability (Martin, Pollock, Bukstein, & Lynch, 2000). The study measured *AUD severity* at baseline as the sum of symptoms of alcohol dependence and alcohol use that patients met over the past 12 months. The SCID-IV evaluated DSM-IV alcohol use and alcohol dependence criteria. Studies have summed these items and used them as an AUD outcome measure (e.g., Mills et al., 2012; Lyons, Haller, Curry, & Norman, 2019), which mirrors closely the dimensional nature of AUD as part of DSM-5 (American Psychiatric Association, 2013; legal problems removed, craving added).

To assess *AUD duration*, we calculated a patient's age divided by the date they first met criteria for AUD. Higher values reflected greater duration. For example, a 50-year-old patient who first met criteria for AUD at age 40 would receive a value of 20% or .20.

The Substance Use Inventory (SUI; Weiss, Hufford, Najavits, & Shaw, 1995) measured whether participants used alcohol or other substances in the past week prior to session 1 and we used it to assess abstinence at the start of treatment.

The Timeline Follow-Back (TLFB; Sobell & Sobell, 1992) assessed alcohol use in the interval prior to beginning treatment (M_{days} = 99.49, *SD* = 17.28), indexed as (a) *percentage of heavy drinking days* (PHDD; dividing the number of days in which 5 or more drinks were consumed for men or 4 or more drinks were consumed for women, by the total

number of days in the time interval) and (b) *percentage of days abstinent* (PDA). The TLFB also assessed *percentage of drug use days* (PDUD). The TLFB is a psychometrically sound instrument for assessing daily alcohol and drug use and has shown strong temporal reliability and superior concurrent validity compared to collateral informants' reports of alcohol use (Fals-Stewart et al., 2000).

Craving.—The Penn Alcohol Craving Scale (PACS; Flannery, Volpicelli, & Pettinati, 1999) is a five-item self-report measure that assessed for pretreatment *alcohol craving*. Items assess for the frequency, intensity, and duration of thoughts with respect to drinking, the ability to refrain from consuming alcohol, and the average rating of past-week cravings. The PACS has demonstrated strong psychometric properties, including excellent internal consistency and adequate convergent and discriminant validity, in individuals with AUDs (Flannery et al., 1999).

Attendance.—Attendance, defined as the number of on-protocol treatment sessions attended, was the primary dependent variable. Attendance ranged from zero to 16 sessions; however, session attendance for treatment extenders (i.e., patients attending 13–16 sessions) was recoded to 12 attended sessions to reflect attendance until typical treatment completion (i.e., attendance of 12 on-protocol sessions, or a full treatment protocol).

2.3 Treatments

Practitioners delivered both COPE and SS protocols in a 90-minute individual format and practitioners encouraged participants to attend one to two sessions per week. Virtually all patients in the current trial elected to attend sessions once per week and adhered to that weekly schedule throughout therapy. Providers were flexible in an effort to accommodate patients' schedules and competing demands, though sessions more than once per week were very infrequent. The average number of days between sessions in the current sample was 9.98; the median and mode of each between-session interval was 7. The study structured both treatments to be 12 sessions in length, although all participants were provided with the option of extending up to four additional sessions if participants had not yet met their treatment goals. The decision to extend was based on a collaborative discussion initiated by session 10 between patients and their providers and determined on a week-by-week basis.

COPE (Back et al., 2015) is an integrated trauma-focused intervention that includes the prolonged exposure therapy protocol (Foa, Hembree, & Rothbaum, 2007) and relapse prevention skills for SUD (Carroll, 1998). COPE includes three primary interventions: in vivo exposure (sessions 3–12); imaginal exposure (sessions 4–12); and relapse prevention for SUD (sessions 1–12). When patients extended treatment beyond 12 sessions, in vivo and imaginal exposures continued and relapse prevention skills were repeated.

SS (Najavits, 2002) is an integrated present-focused therapy that enhances skills to better manage PTSD and SUD symptoms. The impact of trauma exposure with regard to the patient's current functioning is also discussed throughout treatment. General themes addressed in SS include interpersonal, cognitive, and behavioral topics. Although typically delivered in 50-minute sessions when offered in individual (rather than group) format, SS was implemented in 90-minute sessions to match for dose with COPE.

2.4 Data analytic plan

The study conducted analyses using SPSS 26. All analyses used available data for patients randomized to treatment; missing data were very minimal, with almost all measures missing no data. The study performed power analyses using G*Power 3 (Faul, Erdfelder, Lang, & Buchner, 2007). Using the f^2 statistic and defining 0.15 as a medium effect, (Cohen, 1988), analyses were well powered (.91 and above) to detect effects of at least 0.15 in analyses given the sample size (N=119) and the number of predictors used in models.

Initial analyses examined whether patient characteristics previously linked to attendance in PTSD+AUD clinical trials showed similar relations in our sample; thus, we decided a priori to examine variables with empirical precedent identified in prior studies: baseline PTSD severity, age, trauma type, and education. We also examined patients' living arrangements (e.g., controlled environment such as a recovery home) at baseline and whether patients being abstinent at the start of therapy (measured via SUI in the interval prior to beginning treatment) were connected with attendance. None of these variables correlated with session attendance or improved model fit in our sample and were thus not included in the main analyses. However, given that session attendance varied significantly between treatment conditions, we included treatment in all regression models in main analyses. Primary analyses utilized multiple regression models, with continuous variables standardized to ease interpretation. Moderator analyses were run for treatment type to determine whether the relationship of alcohol-related predictor variables differed by treatment. In all models, the primary dependent variable was session attendance, with session attendance for treatment extenders recoded to 12 attended sessions, rather than 13–16. We elected to recode this variable because (a) our primary interest was attendance until typical treatment completion (i.e., attendance of 12 sessions, or a full treatment protocol) and (b) to confirm that results were not a function of differences in rates of treatment extension between COPE and SS. Specifically, veterans in SS (n = 25; 44.6%) were more likely to extend past 12 sessions compared to COPE (n = 13; 20.6%), $\chi^2(1, N=119) = 6.80$, p = .009.

To confirm the stability of results, we also decided a priori to run two sets of sensitivity analyses, examining links between baseline substance use–related patient characteristics and attendance (1) when not re-coding treatment extenders and (2) when taking overall treatment response into account, thus accounting for "early completers" identified during the trial. In the first, we recoded number of attended sessions for treatment extenders back to their original, true value (i.e., 13–16). Second, we ran parallel analyses excluding two patients who were early treatment completers; these patients and their respective provider mutually agreed to terminate treatment early in light of sustained response prior to the completion of 12 sessions. We ran these analyses to confirm stability of our results, as it is possible that a subset of patients did not complete a full dose of treatment (12 sessions), but still optimally benefited from therapy and thus elected to terminate early.

3. Results

Table 1 presents demographic, PTSD, and AUD information about the total sample and within each treatment condition. Veterans attended an average of 9.13 sessions (SD = 4.76) in the trial, with greater attendance in SS (M = 11.00, SD = 4.61) compared to COPE (M =

7.48, *SD* = 4.28), *t*(117) = 4.32, $p < .001$, $d = 0.79$, a feature likely due to significantly more patients in SS electing to extend beyond 12 sessions compared to COPE. Defining treatment completion as attendance of 12 sessions or early treatment response per discussions between patients and their respective provider, a greater number of patients in SS ($n = 35$, 62.5%) completed treatment compared to COPE ($n = 19$, 30.2%), $\chi^2(1, N=119) = 11.24$, $p = .001$. Veterans in COPE demonstrated greater PTSD symptom reduction relative to SS ($d = 0.41$). Veterans reported substantial reductions in percentage of heavy drinking days in the trial, with no differences between treatment conditions ($d = 0.04$). Additional information regarding treatment outcomes can be found in Norman et al. (2019).

Correlations among variables indexing PTSD severity and substance use are presented in Table 2. The study observed small positive correlations between PTSD symptom severity and both craving and AUD symptoms. Craving was also positively associated with percentage of heavy drinking days. As would be expected, percentage of days abstinent was negatively associated with percentage of heavy drinking days, percentage of drug use days, and craving. Baseline SUD characteristics were similar between conditions, except for higher craving at the start of treatment in SS compared to COPE ($d = 0.45$).

The first set of analyses examined substance use–related predictor variables (percentage of heavy drinking days per TLFB; percentage days abstinent per TLFB; percentage of days with drug use per TLFB; craving per PACS; number of AUD symptoms per the SCID-IV; AUD duration per the SCID-IV) in individual models, with step 1 of each model including treatment condition and the respective substance use–related predictor.[1] As depicted in Table 3, percentage of heavy drinking days (PHDD) at baseline assessed by the TLFB predicted attendance, where greater PHDD was associated with fewer attended sessions in the trial, $\beta = -.23$, $p = .011$. AUD severity per the SCID-IV also predicted attendance, where endorsement of more AUD SCID-IV items was associated with fewer attended sessions in the trial, $\beta = -.21$, $p = .019$. No other predictor variables were associated with attendance.

For each model, we also entered a treatment x predictor variable interaction term at step 2 to evaluate whether treatment type moderated the relationship between substance use predictors and treatment attendance. As presented in Table 3, we observed a treatment x craving interaction at a trend level ($\beta = .17$, $p = .057$). In light of reduced power in interaction tests (Aiken & West, 1991), we elected to probe this interaction, finding that greater craving at baseline was predictive of fewer attended sessions in SS ($\beta = -.31$, $p = .02$), but not COPE ($\beta = .14$, $p = .28$). The study observed no additional significant predictor x treatment interaction terms.[2]

[1]Given the number of ways to examine chronicity, we also examined number of years with AUD as predictor attendance. This variable did not predict attendance ($p = .83$), and the predictor * interaction term was also nonsignificant ($p = .66$).

[2]To strengthen confidence in overall results, we also used a binary dropout variable (defined as completion of all 12 sessions per treatment protocol) as the primary outcome. When running logistic regression models with dropout as the binary outcome variable, a similar pattern of findings emerged. Both heavy drinking days (OR: 0.69, $p = .07$) and number of SCID items met (OR: 0.68, $p = .06$) predicted increased dropout risk at a trend level. The craving * treatment interaction term was again significant ($p = .007$); probing this interaction, craving predicted increased dropout risk in SS (OR = 0.44, $p = .019$), but not COPE (OR = 1.48, $p = .17$), in line with study findings. All other predictors and their treatment interaction terms were nonsignificant.

In sensitivity analyses, when coding extenders as having attended their actual number of sessions (i.e., 13–16), results stayed virtually identical. TLFB percentage of heavy drinking days (β = −.23, p = .006) and number of SCID-IV items endorsed (β = −.17, p = .045) again predicted attendance, while the craving (PACS) x treatment interaction moved to a level of statistical significance (β = .21, p = .013). When removing the two early treatment completers from analyses, results again were parallel. TLFB percentage of heavy drinking days (β = −.24, p = .005) and number of SCID-IV items met (β = −.18, p = .036) again predicted attendance; the study also observed an interaction of craving (PACS) x treatment (β = .20, p = .018).[3]

4. Discussion

Among patients with PTSD+SUD, session attendance in exposure therapies is often low (Roberts et al., 2015), which limits their effectiveness and may negatively impact providers' willingness to implement these interventions (e.g., Becker et al., 2004; Osei-Bonsu et al., 2017). While certain facets of substance use were modestly related to treatment attendance in the current study, these relationships were not specific to exposure therapy and predicted attendance in both conditions. Additionally, abstinence from use at the start of therapy—indexed in several ways—was not linked to attendance in either exposure-based or coping skills-based PTSD+SUD treatment. A robust literature shows that PTSD+SUD patients benefit from exposure-based therapies in that they demonstrate reductions in PTSD symptoms and substance use and do not typically decompensate or endorse symptom exacerbations (e.g., Hien et al., 2010; Norman et al., 2019; Tripp et al., 2020a; Tripp et al., 2020b). In line with this literature and clinical practice guidelines (Hamblen et al., 2019), current findings reinforce recommendations that SUD should not impede patients from getting exposure therapy for PTSD.

The study observed significant differences in attendance between COPE and SS, where a greater number of patients in the latter completed treatment and elected to extend therapy beyond 12 sessions. These differences in retention do not appear to be explained by baseline indices of substance use, however. Indicators of more severe alcohol use—measured by frequency of heavy drinking days in the interval prior to the start of treatment per TLFB, and alcohol dependence and use items from the SCID-IV—predicted poorer session attendance in both treatment conditions. Findings suggest that among patients with more frequent and impairing alcohol use, early discussions in therapy surrounding substance use may be particularly important for ensuring optimal attendance. Current manuals afford the flexibility to tailor treatment and allot additional time for personalized problem-solving as indicated. Across both exposure and coping skills therapies, discussions regarding how alcohol use may inhibit patients' ability or motivation to attend therapy may be warranted among those with more severe and impairing use.

Links between baseline substance use indicators and attendance were generally not moderated by treatment condition. The only substance use–related predictor associated

[3]For all analyses, we also ran parallel models using total sessions attended as the primary outcome variable, operationalized as the sum of both on-protocol and off-protocol (i.e., deviated sessions). Results were identical.

differentially with attendance between treatments was baseline craving at a trend level statistically, where greater craving at the start of treatment was associated with fewer sessions in SS, but not COPE. It is important to note, however, that craving at baseline was higher in SS than COPE despite randomization, which may have affected this pattern of findings. Yet it is also possible that between-treatment effects may have been linked to the content of SS and COPE, where the latter directly targets the identification, understanding, and management of cravings early in treatment. Evidence from daily monitoring research suggests a positive relationship between PTSD symptoms and distress and alcohol craving (Simpson, Stappenbeck, Varra, Moore, & Kaysen, 2012). It is possible that reductions in PTSD symptoms—greater in COPE in the current trial compared to SS—were associated with concurrent decreases in craving, which in turn attenuated the potentially negative impact of craving on attendance. Results related to craving should be interpreted cautiously given baseline differences between treatments as well as this trend-level finding, but results warrant further investigation into whether directly targeting craving may improve attendance in integrated therapies. Overall, the current study suggests the possible need for providers to assess cravings with patients at the start of therapy in addition to alcohol use.

Taken together, evidence from the current study further suggests that baseline substance use should not be considered a contraindication for exposure-based therapies among PTSD patients with comorbid AUD. Findings also help to illuminate the specific facets of substance use that may be associated with attendance across different types of PTSD+SUD treatments. Additional, targeted research in this area will further improve our understanding of the relationship between substance use and treatment retention beyond broad, generalized beliefs regarding their putative link. In addition to investigating baseline patient substance use characteristics, it may also be informative to examine alcohol use, symptoms, and cravings during therapy. For example, future work from a more process-oriented or mechanistic framework (Cooper, Kline, Baier, & Feeny, 2018) could investigate changes in these indicators over the course of treatment to help explain how and why these factors may negatively impact attendance. This research may also help complement studies investigating strategies to improve attendance in PTSD+SUD treatments and identify patients who may be ideal for such strategies and modifications. A recent trial, for example, found that financially incentivizing patients with PTSD and opioid use disorder to attend PE was effective in boosting attendance and rates of treatment completion, which in turn improved PTSD outcomes and SUD treatment retention (Schacht, Brooner, King, Kidorf, & Peirce, 2017). Other strategies include offering treatment within residential settings and modifying models of treatment delivery to allow for treatment completion within these safer, structured settings. For example, in a pilot study of massed PE (three times per week) in a residential substance use treatment setting, a group of nine veterans showed strong response to PE and all completed the treatment while on the unit (e.g., Norman et al., 2016). Another avenue of future research with PTSD+AUD patients is to ascertain optimal treatment dose and response rates for these patients, and whether these may differ relative to PTSD-only or AUD-only patients.

4.1 Limitations

Findings of the current study should be interpreted in the context of several limitations. First, this sample was predominantly male combat veterans with PTSD+AUD, which may affect study generalizability. Second, the relationship between attendance and treatment outcomes is not always linear, as some patients benefit from therapy more quickly. To account for potential attrition due to early treatment response, we ran sensitivity analyses without patients who were early treatment responders. These yielded identical findings, which add confidence in the results. Third, despite randomization, patients in SS reported greater baseline craving than patients in COPE ($d = 0.45$), which should be considered when interpreting these results. Fourth, other factors may be related to attendance in the trial that were not controlled for in analyses. Such factors include, for example, traumatic brain injury (TBI), which has been associated with dropout in PTSD treatment (e.g., Berke et al., 2019). Unfortunately, data related to TBI were not systematically collected on veterans in the current trial. Last, SS is typically administered in 60-minute sessions and often in group format, but the current trial provided it in 90-minute individual sessions to match dose with COPE. This adjustment may impact generalizability of findings related to SS.

4.2 Conclusions

Given that SUD is often an exclusion criterion in trials of PTSD (Leeman et al., 2017), this sample provided an ideal opportunity to investigate the relationships between substance use and attendance. Despite that the study observed higher rates of attrition in COPE, links between patients' baseline substance use and attendance were not specific to exposure therapy. Additionally, several patient characteristics at the start of therapy that were not associated with attendance are notable; these characteristics included patients' reported days of abstinence and drug use in the interval prior to starting therapy, patients' duration of AUD, and whether patients entered treatment from a restricted environment. In sum, links between substance use and attendance among AUD patients did not differ between exposure-based and coping skills–based therapy and should not be regarded as a contraindication for these interventions. The current study's findings thus add to broader literature indicating these patients can benefit from exposure-based PTSD treatment and do not need a period of abstinence prior to beginning therapy.

Acknowledgments

Funding for this work was made possible by a Veteran Affairs Clinical Science Research and Development Merit Grant, 1I01CX000756 (PI: Sonya Norman). Dr. Kline is supported by the Veterans Affairs Office of Academic Affiliations through the VA's Interprofessional Advanced Fellowship in Addictions Treatment. Mr. Lyons was supported by an institutional T32 fellowship (T32AA013525).

References

Aiken LS, & West SG (1991). Multiple regression: Testing and interpreting interactions. Newbury Park, CA: Sage.

American Psychiatric Association. (2000). Diagnostic and statistical manual of mental disorders (4th ed., Text Revision). Washington, DC: Author. doi: 10.1176/appi.books.9780890423349

American Psychiatric Association. (2013). Diagnostic and statistical manual of mental disorders (5th Ed.). Washington, DC: Author. doi: 10.1176/appi.books.9780890425596

Back SE, Foa EB, Killeen TK, Mills KL, Teesson M, Cotton BD, … & Brady KT (2015). Concurrent Treatment of PTSD and Substance Use Disorders Using Prolonged Exposure (COPE): Therapist Guide. Oxford, England: Oxford University Press. doi: 10.1093/med:psych/9780199334513.001.0001

Back SE, & Jones JL(2018). Alcohol use disorder and PTSD: An introduction. Alcoholism: Clinical and Experimental Research, 42, 836–840. doi: 10.1111/acer.13619 [PubMed: 29489019]

Back SE, Killeen T, Badour CL, Flanagan JC, Allan NP, Ana ES, … & Brady KT, (2019). Concurrent treatment of substance use disorders and PTSD using prolonged exposure: A randomized clinical trial in military veterans. Addictive Behaviors, 90, 369–377. doi: 10.1016/j.addbeh.2018.11.032 [PubMed: 30529244]

Becker CB, Zayfert C, & Anderson E. (2004). A survey of psychologists' attitudes towards and utilization of exposure therapy for PTSD. Behaviour Research and Therapy, 42, 277–292. doi: 10.1016/S0005-7967(03)00138-4 [PubMed: 14975770]

Bedard-Gilligan M, Garcia N, Zoellner LA, & Feeny NC (2018). Alcohol, cannabis, and other drug use: Engagement and outcome in PTSD treatment. Psychology of Addictive Behaviors, 32, 277–288. doi: 10.1037/adb0000355 [PubMed: 29595297]

Belleau EL, Chin EG, Wankyn SG, Zambrano-Vazquez L, Schumacher JA, & Coffey SF (2017). Pre-treatment predictors of dropout from prolonged exposure therapy in patients with chronic posttraumatic stress disorder and comorbid substance use disorders. Behaviour Therapy and Research, 91, 43–50. doi: 10.1016/j.brat.2017.01.011

Berke DS, Kline NK, Wachen JS, McLean CP, Yarvis JS, Mintz J, … & STRONG STAR Consortium. (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. doi: 10.1016/j.brat.2019.03.003 [PubMed: 30933748]

Blanco C, Xu Y, Brady K, Pérez-Fuentes G, Okuda M, & Wang S. (2013). Comorbidity of posttraumatic stress disorder with alcohol dependence among US adults: Results from National Epidemiological Survey on alcohol and related conditions. Drug and Alcohol Dependence, 132, 630–638. doi: 10.1016/j.drugalcdep.2013.04.016 [PubMed: 23702490]

Bowe A, & Rosenheck R. (2015). PTSD and substance use disorder among veterans: Characteristics, service utilization, and pharmacotherapy. Psychopharmacology & Neurobiology, 11, 22–32. doi: 10.1080/15504263.2014.989653

Brorson HH, Arnevik EA, Rand-Hendrisken K, & Duckert F. (2013). Drop-out from addiction treatment: A systematic review of risk factors. Clinical Psychology Review, 33, 1010–1024. doi: 10.1016/j.cpr.2013.07.007 [PubMed: 24029221]

Carroll KM (1998). A Cognitive-behavioral approach: Treating cocaine addiction. NIDA Therapy Manuals for Drug Addiction. NIH Publication No. 98–4308. Rockville, MD. doi: 10.1037/e722512007-001

Cohen JW (1988). Statistical power analysis for the behavioral sciences (2nd edn.). Hillsdale, NJ: Lawrence Erlbaum Associates.

Coffey SF, Schumacher JA, Nosen E, Littlefield AK, Henslee AM, Lappen A, & Stasiewicz PR (2016). Trauma-focused exposure therapy for chronic posttramatic stress disorder in alcohol and drug dependent patients: A randomized controlled trial. Psychology of Addictive Behaviors, 30, 778–790. doi: 10.1037/adb0000201 [PubMed: 27786516]

Cooper AA, Kline AC, Baier AL, & Feeny NC (2018). Rethinking research on prediction and prevention of psychotherapy dropout: A mechanism-oriented approach. Behavior Modification. Advance online publication. doi: 10.1177/0145445518792251

Drapkin ML, Yusko D, Yasinski C, Oslin D, Hembree EA, & Foa EB (2011). Baseline functioning among individuals with posttraumatic stress disorder and alcohol dependence. Journal of Substance Abuse Treatment, 41, 186–192. doi: 10.1016/j.jsat.2011.02.012 [PubMed: 21546205]

Faul F, Erdfelder E, Lang AG, & Buchner A. (2007). G*Power 3: A flexible statistical power analysis program for the social, behavioral, and biomedical sciences. Behavior Research Methods, 39, 175–191. doi: 10.3758/BF03193146 [PubMed: 17695343]

Fals-Stewart W, O'Farrell TJ, Freitas TT, McFarlin SK, & Rutigliano P. (2000). The Timeline Followback reports of psychoactive substance use by drug-abusing patients:

Psychometric properties. Journal of Consulting and Clinical Psychology, 68, 134–144. doi: 10.1037/0022-006X.68.1.134 [PubMed: 10710848]

First MB, Spitzer RL, Gibbon M, & Wiliams JB (2002). Structured Clinical Interview for DSM-IV-TR Axis I Disorders, Research Version, Patient Edition. Washington, DC: American Psychiatric Publishing.

Foa EB, Hembree E, & Rothbaum BO (2007). Prolonged exposure therapy for PTSD. New York: Oxford University. doi: 10.1093/med.psych/9780195308501.001.0001

Foa EB, Yusko DA, McLean CP, Suvak MK, Bux DA, Oslin D, … & Volpicelli J. (2013). Concurrent naltrexone and prolonged exposure therapy for patients with comorbid alcohol dependence and PTSD. JAMA, 310, 488–495. doi: 10.1001/jama.2013.8268 [PubMed: 23925619]

Flannery BA, Volpicelli JR, & Pettinati HM (1999). Psychometric properties of the Penn Alcohol Craving Scale. Alcoholism: Clinical and Experimental Research, 23, 1289–1295. doi: 10.1111/j.1530-0277.1999.tb04349.x [PubMed: 10470970]

Franklin CL, Raines AM, Chambliss JL, Walton JL, & Maeritsch KP (2018). Examining various subthreshold definitions of PTSD using the Clinician Administered PTSD Scale for DSM-5. Journal of Affective Disorders, 234, 256–260. doi: 10.1016/j.jad.2018.03.001 [PubMed: 29550742]

Galovski TE, Blain LM, Mott JM, Elwood L, Houle T. (2012). Manualized therapy for PTSD: Flexing the structure of cognitive processing therapy. Journal of Consulting and Clinical Psychology, 80, 968–981. doi: 10.1037/a0030600 [PubMed: 23106761]

Gielen N, Krumeich A, Havermans RC, Smeets F, & Jansen A. (2014). Why clinicians do not implement integrated treatment for comorbid substance use disorder and posttraumatic stress disorder: A qualitative study. European Journal of Psychotraumatology, 5, 22821. doi: 10.3402/ejpt.v5.22821

Gros DF, Flanagan JC, Korte KJ, Mills AC, Brady KT, & Back SE (2016). Relations among social support, PTSD symptoms, and substance use in veterans. Psychology of Addictive Behaviors, 30, 764–770. doi: 10.1037/adb0000205 [PubMed: 27786511]

Hamblen JL, Norman SB, Sonis JH, Phelps AJ, Bisson JI, Nunes VD, … & Schnurr, P. P. (2019). A guide to the guidelines for the treatment of posttraumatic stress disorder in adults: An update. Psychotherapy, 56, 359–373. doi: 10.1037/pst0000231 [PubMed: 31282712]

Hien DA, Jiang H, Campbell ANC, Hu M, Miele GM, Cohen LR, … & Nunes EV (2010). Do treatment improvements in PTSD severity affect substance use outcomes? A secondary analysis from a randomized clinical trial in NIDA's clinical trial network. American Journal of Psychiatry, 167, 95–101. doi: 10.1176/appi.ajp.2009.09091261 [PubMed: 19917596]

Hien DA, Levin FR, Ruglass LM, López-Castro T, Papini S, Hu M-C, Cohen LR, & Herron A. (2015). Combining seeking safety with sertraline for PTSD and alcohol use disorders: A randomized controlled trial. Journal of Consulting and Clinical Psychology, 83(2), 359–369. doi: 10.1037/a0038719 [PubMed: 25622199]

Hien DA, Morgan-Lopez AA, Campbell ANC, Saavedra LM, Wu E, Cohen L, … & Nunes EV (2012). Attendance and substance use outcomes for the Seeking Safety program: Sometimes less is more. Journal of Consulting and Clinical Psychology, 80, 29–42. doi: 10.1037/a0026361 [PubMed: 22182262]

Hien DA, Wells EA, Jiang H, Suarez-Morales L, Campbell ANC, Cohen LR, … & Nunes EV (2009). Multisite randomized trial of behavioral interventions for women with co-occurring PTSD and substance use disorders. Journal of Consulting and Clinical Psychology, 77, 607–619. doi: 10.1037/a0016227 [PubMed: 19634955]

Holmes SC, Johnson CM, Suvak MK, Sijercic I, Monson CM, & Stirman SW (2019). Examining patterns of dose response for clients who do and do not complete cognitive processing therapy. Journal of Anxiety Disorders, 68, 102120. doi: 10.1016/j.janxdis.2019.102120 [PubMed: 31585686]

Imel ZE, Laska K, Jakupcak M, & Simpson TL (2013). Meta-analysis of dropout in treatments for posttraumatic stress disorder. Journal of Consulting and Clinical Psychology, 81, 394–404. doi: 10.1037/a0031474 [PubMed: 23339535]

Lappan SN, Brown AW, & Hendricks PS (2020). Dropout rates of in-person psychosocial substance use disorder treatments: A systematic review and meta-analysis. Addiction, 115, 201–217. doi: 10.1111/add.14793 [PubMed: 31454123]

Leeman RF, Hefner K, Frohe T, Murray A, Rosenheck RA, Watts BV, & Sofuoglu M. (2017). Exclusion of participants based on substance use status: Findings from randomized controlled trials of treatments for PTSD. Behaviour Research and Therapy, 89, 33–40. doi: 10.1016/j.brat.2016.10.006 [PubMed: 27846419]

Lyons R, Haller M, Curry I, & Norman SB (2019). The relationship between negative trauma-related cognitions and psychosocial functioning in veterans with posttraumatic stress disorder and alcohol use disorder. Substance Abuse, 41, 132–138. doi: 10.1080/08897077.2019.1635957 [PubMed: 31314701]

Martin CS, Pollock NK, Bukstein OG, & Lynch KG (2000). Inter-rater reliability of the SCID alcohol and substance use disorders section among adolescents. Drug and Alcohol Dependence, 59, 173–176. doi: 10.1016/S0376-8716(99)00119-2 [PubMed: 10891630]

Mills KL, Teesson M, Back SE, Brady KT, Baker AL, Hopwood S, … & Ewer PI (2012). Integrated exposure-based therapy for co-occurring posttraumatic stress disorder and substance dependence: A randomized controlled trial. JAMA, 308, 690–699. doi: 10.1001/jama.2012.9071 [PubMed: 22893166]

Myers US, Haller M, Angkaw AC, Harik JM, & Norman SB (2019). Evidence-based psychotherapy completion and symptom improvement among returning combat veterans with PTSD. Psychological Trauma: Theory, Research, Practice, and Policy, 11, 216–223. doi: 10.1037/tra0000360 [PubMed: 30035552]

Najavits LM (2002). Seeking Safety: A Treatment Manual for PTSD and Substance Abuse. New York, NY: Guilford Press.

Najavits LM (2006). Present- versus past-focused therapy for posttraumatic stress disorder/substance abuse: A study of clinician preferences. Brief Treatment and Crisis Interventions, 6, 248–254. doi: 10.1093/brief-treatment/mhl005

Norman SB, Davis BC, Colvonen PJ, Haller M, Myers US, Trim RS, … & Robinson SK (2016). Prolonged exposure with veterans in a residential substance use treatment program. Cognitive and Behavioral Practice, 23, 162–172. doi: 10.1016/j.cbpra.2015.08.002

Norman SB, Haller M, Hamblen JL, Southwick SM, & Pietrzak RH (2018). The burden of co-occurring alcohol use disorder and PTSD in U.S. Military veterans: Comorbidities, functioning, and suicidality. Psychology of Addictive Behaviors, 32, 224–229. doi: 10.1037/adb0000348 [PubMed: 29553778]

Norman SB, Haller M, Spadoni AD, Drummond SPA, Risbrough V, Hamblen JL, Trim RS, & Blanes EX (2015). Maximizing the utility of a single site randomized controlled psychotherapy trial. Contemporary Clinical Trials, 42, 244–251. doi: 10.1016/j.cct.2015.04.011 [PubMed: 25933919]

Norman SB, Trim R, Haller M, Davis BC, Myers US, Colvonen PJ, … & 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, 791–799. doi: 10.1001/jamapsychiatry.2019.0638 [PubMed: 31017639]

Osei-Bonsu PE, Bolton RE, Stirman SW, Eisen SV, Herz L, & Pellowe ME (2017). Mental health providers' decision-making around the implementation of evidence-based treatment for PTSD. The Journal of Behavioral Health Services & Research, 44, 213–223. doi: 10.1007/s11414-015-9489-0 [PubMed: 26743770]

Roberts NP, Roberts PA, Jones N, & Bisson JI (2015). Psychological interventions for post-traumatic stress disorder and comorbid substance use disorder: A systematic review and meta-analysis. Clinical Psychology Review, 38, 25–38. doi: 10.1016/j.cpr.2015.02.007 [PubMed: 25792193]

Robinson L, Kellett S, & Delgadillo J. (2020). Dose-response patterns in low and high intensity cognitive behavioral therapy for common mental health problems. Depression and Anxiety, 37, 285–294. doi: 10.1002/da.22999 [PubMed: 32027435]

Ronconi JM, Shiner B, & Watts BV (2014). Inclusion and exclusion criteria in randomized controlled trials of psychotherapy for PTSD. Journal of Psychiatric Practice, 20, 25–37. doi: 10.1097/01.pra.0000442936.23457.5b [PubMed: 24419308]

Ruglass LM, Lopez-Castro T, Papini S, Killeen T, Back SE, & Hien DA (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, 150–161. doi: 10.1159/000462977 [PubMed: 28490022]

Sannibale C, Teesson M, Creamer M, Sitharthan T, Bryant RA, Sutherland K, … & Peek-O'Leary M. (2013). Randomized controlled trial of cognitive behavior therapy for comorbid post-traumatic stress disorder and alcohol use disorders. Addiction, 108, 1397–1410. doi: 10.1111/add.12157 [PubMed: 25328957]

Schacht RL, Brooner RK, King VL, Kidorf MS, & Peirce JM (2017). Incentivizing attendance to prolonged exposure for PTSD with opioid use disorder patients: A randomized controlled trial. Journal of Consulting and Clinical Psychology, 85, 689–701. doi: 10.1037/ccp0000208 [PubMed: 28414485]

Seal KH, Cohen G, Waldrop A, Cohen BE, Maguen S, & Ren L. (2011). Substance use disorders in Iraq and Afghanistan veterans in VA healthcare, 2001–2010: Implications for screening, diagnosis, and treatment. Drug and Alcohol Dependence, 116, 93–101. doi: 10.1016/j.drugalcdep.2010.11.027 [PubMed: 21277712]

Simpson TL, Lehavot K, & Petrakis IL (2017). No wrong doors: Findings from a critical review of behavioral randomized clinical trials for individuals with co-occurring alcohol/drug problems and posttraumatic stress disorder. Alcoholism: Clinical and Experimental Research, 41, 681–702. doi: 10.1111/acer.13325 [PubMed: 28055143]

Simpson TL, Stappenbeck CA, Varra AA, Moore SA, & Kaysen D. (2012). Symptoms of posttraumatic stress predict craving among alcohol treatment seekers: Results of a daily monitoring study. Psychology of Addictive Behaviors, 26, 724–733. doi: 10.1037/aa0027169 [PubMed: 22369221]

Sobell LC, & Sobell MB (1992). Timeline follow-back: A technique for assessing self-reported alcohol consumption. In: Litten R., Allen JP eds. Measuring Alcohol Consumption: Psychological and Biochemical Methods. (pp. 41–72). Clifton, NJ: Humana Press. doi: 10.1007/978-1-4612-0357-5_3

Straus E. Worley MJ, Tripp JC, Davis BC, Haller M…, & Norman SB (2019, November). Examining attendance patterns across integrated therapies for posttraumatic stress disorder (PTSD) and alcohol use disorder (AUD). Paper presented at the annual meeting for the International Society for Traumatic Stress Studies, Boston, MA.

Szafranski DD, Smith BN, Gros DF, & Resick PA (2017). High rates of PTSD treatment dropout: A possible red herring? Journal of Anxiety Disorders, 47, 91–98. doi: 10.1016/j.janxdis.2017.01.002 [PubMed: 28117192]

Szafranski DD, Snead A, Allan NP, Gros DF, Killeen T, Flanagan J, … & Back SE (2017). Integrated, exposure-based treatment for PTSD and comorbid substance use disorders: Predictors of treatment dropout. Addictive Behaviors, 73, 30–35. doi: 10.1016/j.addbeh.2017.04.005 [PubMed: 28460246]

Tripp JC, Haller M, Trim RS, Straus E, Bryan CJ, Davis BC, … & Norman SB (2020a). Does exposure exacerbate symptoms for veterans with PTSD and alcohol use disorder? Psychological Trauma: Theory, Research, Practice, and Policy. Advance online publication. doi: 10.1037/tra0000634

Tripp JC, Worley MJ, Straus E, Angkaw AC, Trim RS, & Norman SB (2020b). Bidirectional relationship of posttraumatic stress disorder (PTSD) symptom severity and alcohol use over the course of integrated treatment. Psychology of Addictive Behaviors. Advance online publication. doi: 10.1037/adb0000564

van Minnen A, Harned MS, Zoellner L, & Mills K. (2012). Examining potential contraindications for prolonged exposure therapy for PTSD. European Journal of Psychotraumatology, 3, 18805. doi: 10.3402/ejpt.v3i0.18805

Weathers FW, Blake DD, Schnurr PP, Kaloupek DG, Marx BP, & Keane TM (2013). Clinician-Administered PTSD Scale for DSM-5 (CAPS-5). Boston, MA: National Center for PTSD. Retrieved from www.ptsd.va.gov

Weathers FW, Bovin MJ, Lee DJ, Sloan DM, Schnurr PP, Kaloupek DG, … &Marx BP (2018). The Clinician-Administered PTSD Scale for DSM-5 (CAPS-5): Development and initial psychometric

evaluation in military veterans. Psychological Assessment, 30, 383–395. doi: 10.1037/pas0000486 [PubMed: 28493729]

Weiss RD, Hufford C, Najavits LM, & Shaw SR (1995). Weekly Substance Use Inventory. Unpublished measure. Harvard University Medical School, Boston, MA.

Zandberg LJ, Rosenfield D, Alpert E, McLean CP, & Foa EB (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. doi: 10.1016/j.brat.2016.02.005 [PubMed: 26972745]

Table 1.

Sample characteristics (N = 119).

	Total sample (*N* = 119)	COPE (*n* = 63)	SS (*n* = 56)
Age, *M* (SD)	41.61 (12.59)	43.20 (13.46)	39.78 (11.37)
Female, *n* (%)	12 (10.1)	7 (11.1)	5 (8.9)
Race			
White, *n* (%)	78 (65.5)	41 (65.1)	37 (66.1)
Black, *n* (%)	16 (13.4)	8 (12.7)	8 (14.3)
Other or unknown, *n* (%)	24 (20.1)	14 (22.3)	10 (17.9)
Hispanic ethnicity, *n* (%)	35 (29.4)	18 (28.6)	17 (30.4)
College graduate or higher, *n* (%)	36 (30.3)	21 (33.3)	15 (26.8)
Married, *n* (%)	32 (26.9)	18 (28.6)	14 (25.0)
Index trauma, *n* (%)			
Physical assault	11 (9.2)	7 (11.1)	4 (7.1)
Sexual assault	14 (11.8)	8 (12.7)	6 (10.7)
Combat	71 (59.7)	35 (55.6)	36 (64.3)
Other	23 (19.3)	13 (20.6)	10 (17.9)
Living arrangements, *n* (%)			
House/apartment	85 (71.4)	37 (58.7)	48 (85.7)
Controlled environment	26 (21.8)	21 (33.3)	5 (8.9)
No stable arrangements	8 (6.7)	5 (7.9)	3 (5.4)
Baseline assessment scores, *M* (SD)			
PTSD severity (CAPS)	42.68 (9.48)	43.18 (8.77)	42.13 (10.28)
AUD symptoms	7.84 (1.98)	7.97 (1.81)	7.70 (2.17)
% heavy drinking days (TLFB)	51.53 (26.14)	52.54 (25.60)	50.41 (26.92)
% days abstinent (TLFB)	30.66 (23.32)	32.16 (24.33)	29.00 (22.26)
% days drug use (TLFB)	16.59 (30.93)	16.40 (31.19)	16.80 (30.92)
Craving (PACS), *M* (SD)	15.03 (7.42)	16.75 (7.12)	13.51 (7.39)
AUD duration	32.07 (21.74)	34.31 (22.83)	29.54 (20.29)

Note. AUD duration = % lifetime SCID-IV AUD diagnosis; AUD symptoms = number of alcohol dependence and alcohol abuse symptoms met on SCID-IV; CAPS = Clinician Administered PTSD Scale for *DSM-5*; COPE = Concurrent Treatment of PTSD and Substance Use Disorders Using Prolonged Exposure; PACS = Penn Alcohol Craving Scale; SS = Seeking Safety; TLFB = Timeline Follow-Back.

Table 2.

Correlations among baseline assessments (N = 119).

	1.	2.	3.	4.	5.	6.	7.
1. CAPS	-						
2. PDA	.02	-					
3. PHDD	.00	−.49***	-				
4. PDUD	.03	−.36***	.14	-			
5. PACS	.22*	−.33***	.31**	.00	-		
6. AUD symptoms	.25**	.07	.15	.25**	.11	-	
7. AUD duration	.11	.08	−.02	.06	−.12	−.11	-

Note. AUD duration = % lifetime SCID-IV AUD diagnosis; AUD symptoms = number of alcohol dependence and alcohol abuse symptoms met on SCID-IV; CAPS = Clinician Administered PTSD Scale for *DSM-5*; PACS = Penn Alcohol Craving Scale; PDA = % days abstinent per Timeline Follow-Back; PDUD = % days drug use per Timeline Follow-Back; PHDD = % heavy drinking days per Timeline Follow-Back.

* $p < .05$

** $p < .01$

*** $p < .001$

Table 3.

Regression models predicting session attendance (N = 119).

Predictors	Model 1			Model 2		
	β	R^2	*p*	β	R^2 Δ	*p*
Treatment	−.29	.14	.001	−.29		.001
PHDD (TLFB)	−.23		.011	−.23	.00	.011
PHDD X Treatment				.01		.93
Treatment	−.30	.09	.001	−.24		.001
PDA (TLFB)	.05		.57	.05	.00	.63
PDA X Treatment				.05		.55
Treatment	−.30	.09	.001	−.30		.001
PDUD	.02		.83	.02	.00	.83
PDUD X Treatment				.01		.93
Treatment	−.32	.10	.001	−.32		<.001
Craving (PACS)	−.05		.60	−.07	.03	.47
PACS X Treatment				.17		.057
Treatment	−.29	.14	.001	−.29		.001
AUD Symptoms (SCID-IV)	−.21		.019	−.21	.00	.017
AUD Symptoms X Treatment				−.05		.57
Treatment	−.30	.09	.001	−.30		.001
AUD duration	.05		.56	.06	.00	.53
AUD duration X Treatment				−.04		.71

Note. Step 1 of each model included the specified predictor variable and treatment. Step 2 of each model added the predictor X treatment interaction term.

AUD duration = % lifetime SCID-IV AUD diagnosis; AUD symptoms = number of alcohol dependence and alcohol abuse symptoms met on SCID-IV; PDA = % days abstinent per Timeline Follow-Back; PDUD = % days drug use per Timeline Follow-Back; PHDD = % heavy drinking days per Timeline Follow-Back; PACS = Penn Alcohol Craving Scale.