

Are PTSD symptoms associated with engagement and response to alcohol care
management for Veteran Affairs patients with high risk drinking?

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Abstract

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Introduction: Posttraumatic stress disorder (PTSD) may create important barriers to engagement in alcohol use disorder (AUD) care management. Among a sample of Veteran Affairs (VA) patients randomized to receive nurse care management for AUD, this study tested whether PTSD interfered with engagement in AUD care management and predicted more heavy drinking days at 12-month follow up than not having PTSD.

Methods: VA patients from three primary care sites were enrolled in the Choosing Healthier Drinking Options In Primary Care (CHOICE) trial if they reported high-risk drinking (≥ 4 drinks/day for women; ≥ 5 for men, two times per week or once per week if any prior AUD treatment) and met eligibility criteria. This observational substudy was interested only in patients randomized to receive AUD care management and who

completed baseline screening for PTSD (n=147). Adjusted generalized linear regression models with Poisson and binomial distributions were used to assess the relationship between baseline PTSD and the number of nurse care visits at 12 month follow up as well as the number of heavy drinking days in past 28 days at 12 month follow up, respectively.

Results: Participants with and without PTSD did not differ significantly on baseline sociodemographic characteristics or baseline percent heavy drinking days. After adjusting for potential confounders, PTSD was not significantly associated with the number of visits with the CHOICE nurse. Participants with PTSD had significantly lower odds of having a heavy drinking day than patients without PTSD (OR=.77; 95% CI: .65, .92; $p<.01$).

Conclusions: Findings suggest future interventions for AUD should not exclude patients with PTSD or dissuade providers from treating patients with high-risk drinking on the basis of having PTSD.

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INTRODUCTION

Alcohol is one of the leading causes of death¹ and disability.^{2,3} Nine to 17% of primary care patients screen positive for alcohol use disorder (AUD),^{4,5} and the prevalence of AUD is even higher (32%) among Veteran Affairs (VA) primary care patients.⁶ Although AUD is treatable, most patients do not accept referral to specialty alcohol treatment when offered.⁷

Care management for AUD is a promising approach that engages primary care patients with AUD in care even when they are not ready for treatment. Participants with alcohol dependence who received a primary care-based alcohol care management intervention were more likely to engage in treatment and experience fewer heavier drinking days than patients who were assigned to receive specialty care.⁷ However, it is unknown whether AUD care management can engage and reduce drinking among VA patients, who often have substantial mental health symptoms.⁸ In 2007, 31% of veterans returning from Iraq and Afghanistan were diagnosed with a mental health disorder in the past year, and 56% of these veterans received two or more diagnoses.⁹ Posttraumatic Stress Disorder (PTSD) was the most common diagnosis (52%).⁹

Mental health disorders, and especially PTSD, may create barriers to engagement in AUD care management for veterans with AUDs who receive care in the VA. PTSD can develop after experiencing a traumatic event such as combat, rape, injury or natural disaster.¹⁰ The Diagnostic and Statistical Manual of Mental Disorders, 5th edition (DSM-5) identifies four symptom clusters: re-experiencing, hyperarousal, avoidance, negative cognitions and mood (2013). These symptoms of PTSD are often disabling and may cause patients with PTSD to consume alcohol because it dulls the effect of unpleasant

PTSD symptoms (e.g. flashbacks, an exaggerated startle response, nightmares, etc.).¹¹⁻¹⁴ Despite using more health care services generally than patients without PTSD,^{15,16} patients with high risk drinking and comorbid PTSD may be more difficult to engage in AUD care management than patients without PTSD.¹⁷⁻²⁰ Among VA patients who initiate mental health treatment, only 30% stay engaged.²⁰ However, no studies have examined whether PTSD is associated with poor engagement in AUD care management.

Patients with high risk drinking and comorbid PTSD typically exhibit poorer response to alcohol treatment and faster relapse than patients with high risk drinking only.²¹⁻²⁶ Poorer drinking outcomes may be a consequence of poor engagement,^{27,28} or they may be a consequence of the additive effects of alcohol withdrawal and PTSD symptomology.²⁶ Only one other study has examined the impact of PTSD in the context of alcohol care management. In a subgroup analysis of the AHEAD trial, primary care patients with a mental health disorder (major depressive disorder and PTSD) who received chronic care management for alcohol use did not have significantly greater reductions in heavy drinking days compared to primary care patients without a mental health disorder.²⁹ However, the majority of primary care patients were recruited from a residential detoxification unit, and these results may not generalize to patients who have not experienced detoxification. Further, this trial conducted baseline psychiatric assessments while patients were in detoxification, potentially overestimating symptoms of anxiety and misclassifying PTSD status.²⁹ More research is needed to understand how VA patients with PTSD might respond to AUD care management.

Objectives

In this subgroup analysis of the Choosing Healthier Drinking Options In Primary Care (CHOICE) trial, a randomized effectiveness trial of care management for primary care patients at high risk of AUD, we tested whether PTSD symptoms (“PTSD”) interfered with engagement and predicted poorer drinking outcomes (i.e., less reduction in heavy drinking days) in the intervention group who were offered AUD care management. Consistent with our conceptual model (Figure 1.), we hypothesized that VA patients with PTSD would be less likely to engage with the CHOICE nurses (Aim 1a) and less likely to reduce their drinking (Aim 1b). Because PTSD is highly comorbid with other mental health disorders, it is possible that PTSD is merely a partial proxy for overall poor mental health. Severity of mental health may be the driver of any association between engagement and alcohol use. Therefore, as a secondary objective, we tested whether the number of mental health disorders interfered with engagement in nurse care management and predicted reduction in heavy drinking days. We hypothesized that the number of mental health disorders would be inversely associated with both engagement (2a) and reduction in heavy drinking days (2b).

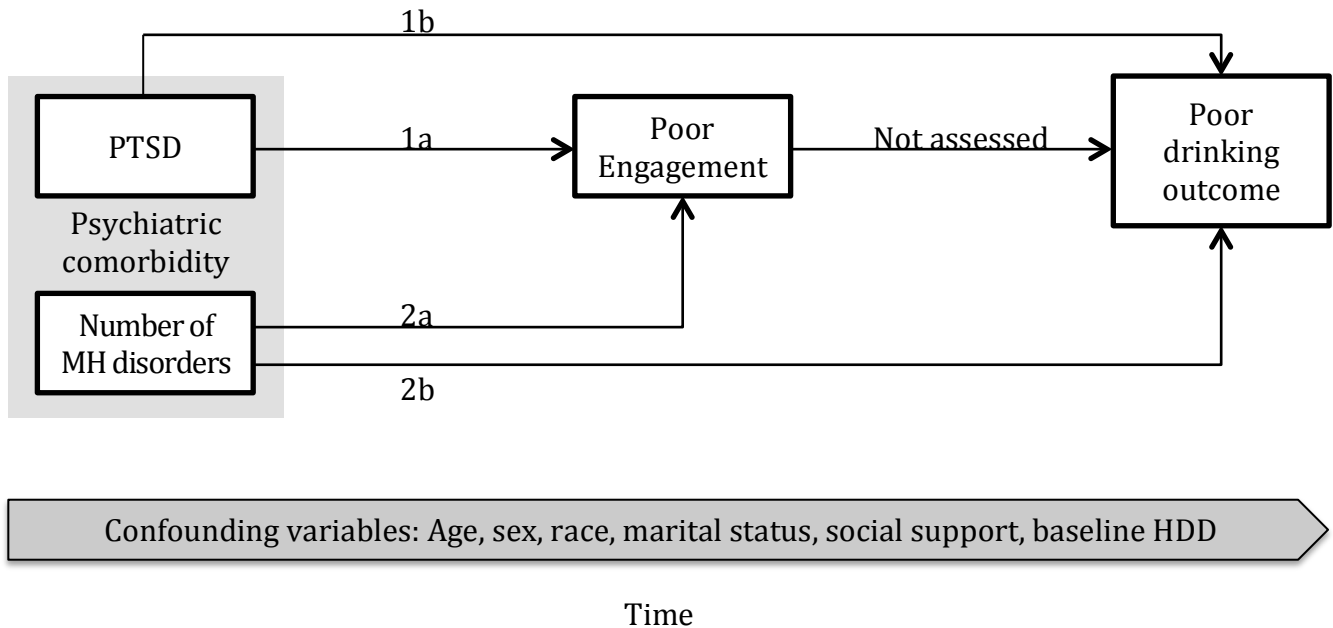


Figure 1. Hypothesized pathways through which mental health disorders could adversely impact VA patient engagement and response to AUD care management

METHOD

Participants and Study Design

This analysis uses data from the CHOICE trial. Details of the CHOICE trial have been described elsewhere.³⁰ Briefly, the trial took place at three primary care sites within the VA Puget Sound Health Care System from 2011-2015. The VA screens all patients for unhealthy alcohol use³¹ with the AUDIT-C. Women who scored four or more points on the AUDIT-C and men who scored five or more points on the AUDIT-C were identified from the VA electronic health record or were directly referred to the study by a primary care provider or the patient, him or herself. Study coordinators telephoned patients to screen for heavy drinking, and eligibility was confirmed in-person. Patients

were eligible if they were 21 to 75 years of age and at high risk for AUD (≥ 4 drinks/day for women, ≥ 5 drinks/day for men, two times per week or once per week if any prior AUD treatment). Patients were excluded if they had received alcohol treatment in the past 90 days or were already involved in another VA trial, if they had any cognitive impairment that would undermine the validity of self-reported outcomes, if there were concerns for safety (pregnancy, behavioral warning flag in the EHR, medically or psychiatrically unstable, or less than a year of life expectancy), or if there were concerns about follow-up (no valid phone or address, plans to leave the VA within the next year). Eligibility was confirmed, and informed consent obtained at the in-person baseline visit. A computer program was used to randomize 304 patients (1:1) to the CHOICE intervention or Usual Care. Randomization was stratified on sex, DSM-IV alcohol dependence (yes/no), and primary care site ($n=3$) in permuted blocks of varying size. Treatment group allocation was concealed.

In the present study, because we were interested in whether engagement in care management was associated with PTSD, patients were eligible if 1) they were randomized to the intervention arm ($n=150$) and 2) completed the screening questionnaire for PTSD, the PTSD Checklist (PCL).

The use of de-identified data from the CHOICE trial was approved by the Institutional Review Boards that approved the original study (Research & Development Committee of VA Puget Sound Health Care System and Kaiser Permanente Washington IRB) as well as the University of Washington Human Subjects Committee.

CHOICE Intervention

The 12-month CHOICE intervention targeted primary care veterans at high risk for AUD. Care management was provided by two registered nurses who were supervised by an interdisciplinary team consisting of two psychologists, two addiction psychiatrists and two primary care internists. A nurse practitioner who was a VA primary care provider was also available to prescribe and manage medication for AUD. Care management included proactive outreach to participants, an initial engagement visit with the nurse care manager, subsequent brief interventions delivered in-person or over the phone, progress monitoring, and continuous follow-up. With every participant interaction, nurse care managers employed motivational interviewing skills aiming to increase readiness to change. The initial engagement session focused on getting to know each participant. Brief interventions introduced educational materials about the risks of heavy alcohol consumption to health and the range of possible treatment options. Possible treatment options included continued visits with the nurse care manager, AUD medication and referral to specialty treatment or self-help groups. Nurse care managers used shared decision-making to support participants in their treatment decision. Participant progress was monitored with laboratory biomarkers (if abnormal at baseline) and/or the AUDIT (per patient preference). Nurse care managers supported participants in setting goals and problem-solved barriers to goal-attainment during brief interventions.

Independent Variables

The primary predictor variable in this study was PTSD symptoms and a secondary predictor was the number of mental health disorders, as defined below. These variables,

as well as demographic information and baseline alcohol consumption were assessed at baseline at the time of in-person enrollment.

PTSD symptoms (“PTSD”). The main independent variable was a binary measure of screening positive for PTSD on the PTSD Checklist (PCL) at a score of 50 or more. The PCL was used to measure self-reported past month PTSD symptoms corresponding to DSM-IV criteria for the disorder.³² The assessment contains 17 items rated from one (not at all bothersome) to five (extremely bothersome), and responses can be summed into a composite score ranging from 17-85. The PCL is not meant to be used to clinically diagnose PTSD, however it has demonstrated good reliability and validity as a screening instrument among veterans^{33,34} and trauma survivors.³⁵ Although PCL cut scores can range from 30-60, depending on the study population, a cut score of 50 has been recommended to indicate a positive screen among veterans.³²⁻³⁴ A cut score of 50 was used in this study for its high specificity to increase the likelihood that veterans who screen positive for PTSD have the disorder.

Number of mental health disorders. A scaled measure of the number of positive screens for mental health conditions (0-5), including PTSD, depression, general anxiety disorder (GAD), panic disorder or drug use disorder (DUD), was evaluated as a secondary independent measure of psychiatric comorbidity more generally. The total number of mental health disorders for each person was categorically coded as 0, 1 or 2+. Mental health disorders were assessed using the following screening questionnaires or instruments:

Patient Health Questionnaire (PHQ-9). The PHQ-9 is a self-reported measure of past two-week depression symptoms corresponding to DSM-IV criteria for the disorder.³⁶

The assessment contains nine items rated on a frequency scale from 0 (not at all) to 3 (nearly every day), and responses can be summed into a composite score ranging from 0-27. The PHQ-9 demonstrates good criterion and construct validity for adult primary care patients when compared to structured mental health interviews and the Short Form-20, respectively³⁷. A cut score of 10 can detect moderate severe depression, is recommended to maximize positive predictive value³⁷ and was considered indicative of depression in our measure of comorbidity.

Generalized Anxiety Disorder (GAD-7). The GAD-7 is a self-reported measure of general anxiety symptoms corresponding to DSM-IV criteria for the disorder³⁷. The assessment contains seven items rated on a frequency scale from 0 (not at all) to 3 (nearly every day), and responses can be summed into a composite score ranging from 0-21. The GAD-7 demonstrates good criterion and convergent validity for adult primary care patients when compared to structured mental health interviews and the Beck Anxiety Inventory, respectively.³⁷ A cut score of 10 is recommended to optimize sensitivity and specificity for GAD³⁷ and was considered indicative of GAD in our measure of comorbidity.

Mini International Neuropsychiatric Interview (M.I.N.I). The M.I.N.I. is a short, structured interview guide developed by the World Health Organization for preliminary psychiatric assessment by lay interviewers.³⁸ Although the M.I.N.I should not be used in place of a full medical or psychiatric evaluation by a licensed professional, the 15 minute assessment has demonstrated good validity and internal consistency as a screening tool in the clinical setting.³⁸ Items on the M.I.N.I correspond to DSM-IV or ICD-10 criteria. Although the M.I.N.I can be used to screen for 16 disorders, the

CHOICE trial only used the M.I.N.I to screen for panic disorder and drug use disorder. A positive screen for panic disorder is defined by having experienced a panic attack and at least four panic symptoms (e.g. trembling or shaking, skipping or racing heart, etc.) and was our indicator of panic disorder in the measure of mental health used in this study. A positive screen for drug use disorder is defined by three or more questions receiving a positive response and was used as an indicator of drug use disorder in our measure of mental health.

Outcomes

Engagement. One of two primary outcomes (1a) was a count variable of engagement with the CHOICE nurse care manager, defined as the number of nurse care visits during the trial. Engagement was documented in the EHR and in study databases throughout the trial and enumerated after the trial had concluded. Both telephone and in-person visits are included in the count of visits. Attempts to contact and schedule were not included. The CHOICE intervention did not require a pre-specified number of visits with the nurse but the COMBINE trial was used as a template (nine visits over four months).³⁹ Other care management interventions related to depression or AUD have found four visits to be a good indicator for engagement.^{7,40}

Heavy drinking days. The other primary outcome for this study was a count variable of heavy drinking days in the past 28 days at 12 months follow-up (ranging from 0-28 days). Heavy drinking days were defined as consuming four or more drinks per day for women, five or more drinks per day for men. The CHOICE study measured the total number of heavy drinking days in the past 28 days using the 28-Day Timeline Follow Back (TLFB) assessment, in person at baseline and by phone at 3 and 12-months follow

up. This assessment was administered over the phone by an independent survey research program³⁰ with interviewers blinded to treatment assignment. The TLFB is a calendar-based diary used to retrospectively assess estimates of daily drinking.⁴¹ The TLFB has demonstrated good validity and reliability across adult drinkers of varying abuse severity.⁴² A strength of the TLFB is its ability to account for related factors such as volume and percent alcohol of a drink. Some participants had fewer than 28 potential drinking days at 12 month follow up due to hospitalization, and this was accounted for in the analyses.

Analysis

TLFB responses were missing or incomplete for 27 participants. However, missing data was not significantly different from complete data,⁴³ so outcome analyses used complete cases only.

To test for differences in baseline characteristics between participants in the intervention group with PTSD and without PTSD, we conducted two-sample t-tests for continuous variables and chi-squared tests or Fisher's Exact test for categorical variables.

Multivariate regression models were used to estimate each outcome and control for potential confounders. Sex, age, race and marital status at baseline were considered a priori to be potential confounders for both outcomes: engagement with nurse care managers and heavy drinking days in the past 30 days at 12 months. Sex was not included in either model due to the low variability in our sample (91.8% male). Age, race and marital status were included as covariates in analyses of both outcomes. Age was entered as a continuous variable while race was entered as categorical (Black, Hispanic, White, other) and marital status was entered as a binary variable (married or not). Percent

heavy drinking days at baseline was added to both models as a continuous variable since higher baseline drinking is often associated with more severe PTSD^{14,44} and a greater reduction in heavy drinking days at follow-up (more room for improvement).^{7,39}

Because number of CHOICE nurse visits was a negatively skewed, overly-dispersed count variable, we used a generalized linear regression model (GLM) with a Poisson distribution and scaled standard errors to assess the relationship between PTSD and engagement. Wald's tests were used to compare participants with PTSD to participants without PTSD regarding engagement in the CHOICE intervention at a statistically significant alpha level of 0.05. Unadjusted and adjusted incidence rate ratios (IRR) were reported for number of visits with the CHOICE nurse along with corresponding 95% confidence intervals.

We used a GLM with a binomial distribution and a logit link function to assess the relationship between PTSD and number of heavy drinking days. The binomial distribution was appropriate for this analysis because the outcome was assessed using the TLFB interview, which has a cap at 28 days. Wald's tests were used to compare participants with PTSD to participants without PTSD regarding the number of heavy drinking days in a 28-day period at a statistically significant alpha level of 0.05. Unadjusted and adjusted odds ratios were reported for heavy drinking days along with corresponding 95% confidence intervals.

As a secondary research question, we estimated an association between number of mental health disorders and engagement using a GLM with Poisson distribution and scaled standard errors. Wald's test was used to assess whether there was a statistically significant trend among comorbidity categories. We hypothesized that the greater the

number of mental health disorders, the lower the number of visits with the CHOICE nurse. Unadjusted and adjusted IRRs were reported for each mental health category (1, 2+), with the referent as 0. We also estimated an association between number of mental health disorders and heavy drinking days using a binomial distribution. As before, Wald's test was used to assess whether there was a statistically significant trend among comorbidity categories. We hypothesized that the greater the number of mental health disorders, the higher the number of heavy drinking days. Unadjusted and adjusted ORs were reported for each mental health category (1, 2+), with the referent as 0.

RESULTS

Sample Characteristics

One hundred and fifty participants were enrolled to the intervention arm of the CHOICE trial. Of these, 147 completed baseline PCL assessments and were included in the main analyses, and 43 (29%) screened positive for PTSD. Demographic and baseline characteristics are displayed in Table 1. There were no significant differences between the 43 participants with PTSD and the 104 without PTSD on sociodemographic factors or baseline percent heavy drinking days. The average age of the sample was 52 years. The majority of patients were male (91.8%). Sixty-seven percent of the sample was White, 8.8% were Black, 6.8% were Hispanic and 17.7% identified as another race. Forty-seven percent of participants were married. The average percent heavy drinking days at baseline was 61%. There was a significant association between number of mental health disorders and PTSD. Participants who screened positive for PTSD were significantly more likely to

screen positive for additional mental health disorders as compared to people who screened negative ($X^2=53.96$, $p<0.001$). Eighty-three percent of participants with PTSD screened positive for two or more mental health disorders.

Engagement Outcome

There was no significant difference in engagement between participants with and without PTSD. The adjusted mean number of visits with the CHOICE nurse was 6.92 among participants without PTSD and 8.96 among participants with PTSD. In the unadjusted analysis, the IRR was 1.16 (95% CI: 0.86, 1.57, $p=0.337$). After adjusting for confounders, the IRR was 1.29 (95% CI: 0.98, 1.72, $p=0.07$).

Drinking Outcome

Participants with PTSD had significantly fewer heavy drinking days at 12 months follow-up compared to those without PTSD. The adjusted mean number of heavy drinking days at 12 months was 11.47 among participants without PTSD and 9.87 among participants with PTSD. The unadjusted OR (comparing the odds that a day is a heavy drinking day among PTSD participants as compared to the odds that a day is a heavy drinking day among non-PTSD participants) was 0.71 (95% CI 0.60-0.84, $p<0.001$). The adjusted OR was 0.77 (95% CI 0.65-0.92, $p<0.01$).

Mental Health Disorders

Table 3 displays the proportion of the sample with 0, 1 and 2 or more mental health disorders by disorder type. A total of 63.2% of the sample screened positive for at least one mental health disorder and 39.4% screened positive for two or more mental health disorders.

As a secondary analysis, the number of mental health disorders (including PTSD) was used to predict engagement and heavy drinking days. There was no evidence that the number of visits with the CHOICE nurse increased or decreased for participants as the number of mental health disorders increased (trend test $p=0.94$). The adjusted mean number of visits with the CHOICE nurse was 7.33 among participants without any mental health disorder, 7.77 among participants with one mental health disorder, and 7.43 among participants with two or more mental health disorders. The unadjusted OR comparing number of visits with the CHOICE nurse among participants with one disorder to participants with no disorders was 0.97 (95% CI: 0.67, 1.39), and the unadjusted OR comparing number of visits with the CHOICE nurse among participants with two or more disorders to participants with no disorders was 0.91 (95% CI: 0.66, 1.26). The adjusted OR comparing individuals with one disorder to individuals with no disorders was 1.06 (95% CI: 0.75, 1.50), and the adjusted OR comparing individuals with two or more disorders to individuals with no disorders was 1.01 (95% CI: 0.74, 1.38).

The number of heavy drinking days at 12 months was progressively lower as the number of mental health disorders increased (trend test $p<0.001$). The adjusted number of heavy drinking days in the past 28 days at 12 months was 12.86 among participants without any mental health disorders, 10.27 among participants with one mental health disorder, and 9.72 among individuals with two or more mental health disorders. The unadjusted OR comparing individuals with one mental health disorder to individuals with no disorders was 0.71 (95% CI: 0.60, 0.85), and the unadjusted OR comparing individuals with two or more disorders to individuals with no disorders was 0.62 (95% CI: 0.54, 0.74). The adjusted OR comparing individuals with one disorder to individuals

with no disorders was 0.66 (95% CI: 0.55, 0.80), and the adjusted OR comparing individuals with two or more disorders to individuals with no disorders was 0.60 (95% CI: 0.51, 0.72).

DISCUSSION

The present study sought to test whether PTSD predicted poor engagement and poor drinking outcomes relative to individuals without PTSD among a sample of VA patients at risk for heavy drinking and randomized to an intervention for AUD care management. Because individuals with PTSD frequently have other co-occurring mental health disorders, we also tested whether severity of number of mental health disorders was also associated with poor engagement and poor drinking outcomes. Contrary to our hypothesis, neither PTSD, specifically, nor the number of comorbid mental health disorders based on brief validated measures predicted poor engagement with the CHOICE nurse. Moreover, findings regarding drinking at follow-up were contrary to our hypotheses: patients with PTSD or comorbidity were more likely to decrease heavy drinking at 12 months follow-up. The number of mental health disorders was significantly associated with fewer heavy drinking days. Having two or more mental health disorders had a stronger association with the number of heavy drinking days at 12-month follow up than having PTSD. Despite the lower number of heavy drinking days, patients with two or more mental health disorders still had an average of nine heavy drinking days in one month. It is unclear whether a difference of three heavy drinking days between PTSD and no PTSD patients in a period of 28 days is clinically significant.

The finding regarding engagement—no significant difference in engagement in participants with and without PTSD, but, if anything, a trend towards higher engagement in patients with PTSD—runs contrary to prior studies which have found that individuals with PTSD are difficult to engage in treatment for substance use^{27,45} and contrary to theory that individuals with PTSD are less likely to engage in AUD treatment due to avoidant coping behavior.^{18,46} Overall, participants randomized to the CHOICE intervention were highly engaged—the average number of care management visits for patients without PTSD was 6.92 and the average number of care management visits for patients with PTSD was 8.96 (NSD). One potential interpretation for this finding of good engagement is that the CHOICE intervention was successfully able to engage PTSD patients whose tendency is to avoid mental health and substance use treatment, perhaps because much of the intervention was delivered over the phone. Another potential interpretation is that avoidance symptoms characteristic of PTSD were less strong or were outweighed among PTSD patients with other mental health disorders like depression. Only seven participants had PTSD-only. The remaining 36 patients with PTSD had at least one other mental health disorder. For patients who have comorbid PTSD and depression, for example, negative mood may be a more prominent symptom, and negative mood has been associated with greater receptivity to mental health treatment.⁴⁷ This interpretation is supported by our finding that participants with two or more mental health disorders were also equally engaged in care as participants without any mental health disorders.

Our results that PTSD was strongly associated with a decrease in heavy drinking days at 12-month follow-up, the opposite direction from what we expected, was contrary

to prior studies that predicted increased drinking or no difference in drinking,^{21,29} PTSD predicted fewer heavy drinking days at 12-month follow up compared to no PTSD. This association remained significant after controlling for demographic characteristics and baseline heavy drinking. To our knowledge, only one other study of outpatients enrolled in a contingency management trial found a similar association between high baseline PTSD symptoms and greater odds of abstinence from cocaine or heroin at nine month follow up.⁴⁵ Ours is the first study to find an association between PTSD and reduced drinking. It may be that participants with PTSD are more motivated to change their drinking than participants without PTSD. Although engagement with the CHOICE nurse did not differ between patients with and without PTSD, it is possible that care management was more effective for participants with PTSD. Stappenbeck et al.⁴⁶ found that interventions targeting coping skills among participants with alcohol dependence and PTSD resulted in significant decreased drinking as compared to a control condition. Although AUD care management in the CHOICE trial did not specifically target PTSD coping skills, the highly tailored nature of care management, which emphasized motivational interviewing, may have increased participants' ability to cope.

The findings of this study are limited to the intervention group of the CHOICE effectiveness trial, and our findings may be limited by a small sample size. Although we adjusted for age, race, marital status and baseline drinking, it is possible there was residual confounding by these factors (e.g. due to dichotomizing marital status) as well as other unmeasured confounders. For instance, we did not include outside treatment in specialty mental health care in our model. Successful treatment for PTSD by the nurse care managers or other services in the VA may have had an effect on heavy drinking

days. Many studies have demonstrated that a reduction in PTSD symptoms is associated with a reduction in alcohol use.^{11,23,48-50} Because our measures of symptoms of PTSD and the number of mental health disorders were assessed at baseline, and only heavy drinking days was measured at follow-up to decrease participant burden, we do not know whether there were any changes in symptoms at follow up. Generalizability of these results may be limited to patients with PTSD who were willing to engage in an AUD care management trial and were successfully recruited by the CHOICE trial. Patients with more severe PTSD symptoms of avoidance, for instance, may not be represented in our sample. Finally, we studied VA patients whose mental health needs may differ from those of general primary care patients, and our findings may not generalizable to these patients.

Despite these limitations, our findings suggest that among patients with heavy drinking willing to enroll in a trial of alcohol care management with a nurse care manager, those with PTSD decrease their drinking more than those without PTSD. Future studies should examine whether there is an association between engagement in AUD care management and number of heavy drinking days and whether this association depends on the number of mental health disorders. Our findings suggest future interventions for AUD should not exclude patients with mental health disorders or dissuade providers from treating patients with high-risk drinking on the basis of having a comorbid mental health disorder. Our results suggest that these participants are no less likely to engage in care, and may, in fact, respond better to care management for AUD.

CONCLUSION

In a secondary analysis of the CHOICE trial, despite no difference between participants with and without PTSD in engagement with the nurse care manager, participants with PTSD or two or more mental health disorders, had fewer heavy drinking days at 12 month follow up than those without any mental health disorders.

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Table 1. Baseline characteristics of CHOICE intervention group by PTSD status

Characteristic	Total* (N=147)	No PTSD (n=104)	PTSD (n=43)	p-value
Age, mean (SD)	51.93 (13.71)	53.49 (13.71)	49.09 (12.43)	0.07
Male sex (%)	135 (91.8)	95 (91.4)	40 (93.0)	0.51
Race (%)				
Black	13 (8.8)	9 (8.7)	4 (9.3)	0.81
Hispanic	10 (6.8)	6 (5.8)	4 (9.3)	
White	98 (66.7)	71 (68.3)	27 (62.79)	
Other	26 (17.7)	18 (17.31)	8 (18.6)	
Married (%)	69 (46.9)	47 (45.2)	22 (51.2)	0.51
Mental health disorders (%)				
0	54 (36.7)	54 (36.7)	-	< 0.001
1	35 (23.8)	28 (26.9)	7 (16.28)	
2+	58 (39.5)	22 (21.15)	36 (83.72)	
Baseline percent heavy drinking days, mean (SD)	0.61 (0.33)	0.63 (0.33)	0.57 (0.33)	0.38

Table 2. Adjusted association between PTSD and main outcomes

Outcome	Mean(SE)	Parameter	95% CI	P
Number of visits with the CHOICE nurse				
No PTSD	6.92 (0.56)	1.29 ^a	0.98, 1.72	0.07
PTSD	8.96 (1.05)			
Number of heavy drinking days				
No PTSD	11.47 (0.26)	0.77 ^b	0.65, 0.92	<0.001
PTSD	9.87 (0.47)			

^a IRR^b OR**Table 3.** Prevalence of mental health disorders in sample

Number of mental health disorders (%)	PTSD	Depression	GAD	Panic	DUD	TOTAL
0	-	-	-	-	-	54
1	7 (16.3)	13 (20.0)	6 (12.2)	1 (6.3)	8 (28.6)	35
2+	36 (83.7)	52 (80.0)	43 (87.8)	15 (93.8)	20 (71.4)	58
TOTAL	43 (100.0)	65 (100.0)	49 (100.0)	16 (100.0)	28 (100.0)	147

Table 4. Adjusted association between number of mental health disorders and main outcomes

Outcome	Mean(SE)	Parameter	95% CI	P
Number of visits with the CHOICE nurse				
0	7.33 (0.81)	--	--	--
1	7.77 (1.06)	1.06 ^a	0.75, 1.50	0.74
2	7.43 (0.82)	1.01 ^a	0.74, 1.38	0.93
Trend test		1.01 ^a	0.86, 1.17	0.94
Number of heavy drinking days				
0	12.86 (0.38)	--	--	--
1	10.27 (0.46)	0.66 ^b	0.55, 0.80	<0.001
2	9.72 (0.37)	0.60 ^b	0.51, 0.72	<0.001
Trend test		0.78 ^b	0.71, 0.85	<0.001

^a IRR^b OR