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Rates and predictors of psychotherapy receipt among U.S. veterans with comorbid posttraumatic stress disorder and substance use disorders

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ABSTRACT

Introduction: Veterans with comorbid posttraumatic stress disorder (PTSD) and substance use disorder (SUD) have complex needs and often do not receive adequate mental health treatment. The purpose of this study was to examine rates and predictors of PTSD-only, SUD-only, or PTSD and SUD psychotherapy receipt among newly diagnosed Veterans with PTSD and SUD.

Design and setting: An administrative dataset including Veterans Health Administration (VHA) users.

Participants: The sample comprised 32,779 United States Veterans with a new PTSD and a new SUD diagnosis in fiscal year 2015.

Measurement: Multinomial logistic regression was used to identify predictors of receipt of any and adequate psychotherapy for PTSD, SUD, or PTSD and SUD across settings. Binomial logistic regression was used to identify predictors of PTSD psychotherapy among those who received any psychotherapy.

Findings: A total of 13,824 (42.17%) Veterans in this sample received any PTSD- or SUD-related therapy in the year following diagnosis. Low rates of veterans received an adequate dose of PTSD-related psychotherapy (6.58%), SUD-related psychotherapy (7.72%), or both PTSD and SUD-related psychotherapy (<1%) In adjusted models, older age, service-connected disability, and psychiatric comorbidities were associated with decreased odds of treatment. Specific types of SUDs, including alcohol, cocaine, and opioid use disorders, along with receipt of diagnosis in a PTSD or SUD clinic, were associated with increased odds of treatment.

Conclusions: Low rates of PTSD and SUD related psychotherapy highlight a need to better engage and retain Veterans with these disorders in care. Predictors of decreased treatment utilization, such as older age, service connection, and bipolar and major depressive disorders, may inform efforts by the VHA to further target and engage Veterans with indicated treatments.

Posttraumatic stress disorder (PTSD) and substance use disorders (SUDs) are highly comorbid among veterans in the United States (US). Approximately 20–30% of veterans with PTSD have a comorbid SUD, and up to 75% of veterans with a SUD also have PTSD (E.J. Hawkins et al., 2012; Fuehrlein et al., 2016; Norman et al., 2018; Petrakis et al., 2011; Seal et al., 2011; Trivedi et al., 2015; Wisco et al., 2014). Veterans with comorbid PTSD and SUD have higher levels of substance use and other psychiatric symptoms, chronic health problems, and other negative health outcomes, as compared with veterans who have PTSD or SUD alone (Bohnert et al., 2013; Bowe and Rosenheck, 2015; Fuehrlein et al., 2014; Norman et al., 2018). Additionally, studies suggest that substance use may mediate the relationship between PTSD and poorer mental health functioning (Angkaw et al., 2015; McDevitt et al., 2010). Given the psychiatric complexity and severity among those with PTSD-SUD comorbidity, delivering PTSD and SUD treatments to veterans with both conditions is important to reduce the burden of illness associated with both disorders. Indeed, both SUD- and PTSD-focused behavioral interventions have been shown to be effective for comorbid patients (Simpson et al., 2017).

Unfortunately, evidence suggests that rates of adequate treatment are low for both conditions. A recent study found that only 24% of veterans with PTSD-SUD comorbidity received an adequate course of PTSD

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psychotherapy (i.e., 8 sessions within 14 weeks) within a year of diagnosis (Mansfield et al., 2017); SUD-focused psychotherapy was not examined. Other studies of veterans have found similarly low rates of trauma-focused treatment receipt (Hoge et al., 2014; Lu et al., 2011), and note that comorbid SUD may be a barrier to receiving trauma-focused treatment (Back et al., 2009; Barnett et al., 2014; Cook et al., 2014, 2017; Osei-Bonsu et al., 2017). Much less is known about the receipt of SUD-focused treatment among patients with PTSD-SUD comorbidity. In a nationally representative US sample, only 10% of veterans with a SUD reported receiving SUD treatment in the prior year (Golub et al., 2013). A Department of Veterans Affairs (VA)-specific study found that only 13% of veterans with alcohol use disorder (AUD) and 24% of veterans with a drug use disorder received any SUD-specific treatment within a year following an elevated alcohol use screening (Glass et al., 2010).

Consistent findings of low rates of treatment utilization by patients with PTSD and SUD point to a need to understand factors associated with treatment receipt in this population. Prior research suggests that factors such as additional mental health comorbidities, physical health problems, recent mental health utilization, and being middle aged are associated with increased PTSD-focused and SUD-focused treatment utilization by patients with either or both disorders (Glass et al., 2010; Hundt et al., 2014). Nonetheless, very few studies have examined receipt of both PTSD and SUD-focused treatment in veterans with this prevalent comorbidity, and instead, prior work has generally focused on receipt of trauma-focused treatments or trauma-focused treatments augmented by behavioral SUD approaches (Simpson et al., 2017) Importantly, an integrated approach to treatment, one that includes SUD and PTSD therapy, is effective and preferred by veterans (Back et al., 2014) and might be able to help address potential barriers to care such as homelessness and chronic substance use (Simpson et al., 2020).

Based on the identified limitations of existing research, including the lack of focus on predictive factors of treatment receipt across available treatments for PTSD and SUD, the current study aimed to examine rates and predictors of PTSD-only, SUD-only, and both PTSD and SUD psychotherapy among a national sample of veterans newly diagnosed with both PTSD and SUD. Beyond receipt of these treatments, we also examined predictors of receiving adequate doses of each treatment (see Measures section). Additionally, because providers may be hesitant to consider or refer to trauma-focused treatment to veterans with comorbid PTSD and SUD (Back et al., 2014), we also examined predictors of receipt of any PTSD psychotherapy among veterans who received psychotherapy for PTSD or SUD.

1. Methods

1.1. Participants

The VA Corporate Data Warehouse (CDW) provided patient data on demographics, psychiatric diagnoses, and utilization of psychiatric services. Using the CDW allows for extraction of data from the electronic medical record for large samples of veterans. The current study was approved and granted a waiver of informed consent for access to protected health information by the local Institutional Review Board. The population of interest included all VA patients who received a new PTSD diagnosis and at least one new SUD diagnosis in a mental health setting during fiscal year 2015, with the two diagnoses being within 3 months of one another and the patient not having a previous PTSD or SUD diagnosis within the prior year (N = 32,779). All SUD diagnoses, except tobacco use disorder, were included. Psychiatric diagnoses were defined using the International Classification of Diseases, 10th Edition, Clinical Modification (ICD-10-CM) data.

1.2. Measures

The primary outcomes of interest were receipt of PTSD, SUD, or both PTSD-SUD psychotherapy within a year of the initial SUD or PTSD diagnosis. Psychotherapy (identified by CPT stop codes 90,834, 90,836, 90,837, 90,838, or 90,853) within PTSD or SUD specialty clinics was identified by the current procedural terminology codes in a PTSD stop code with PTSD listed as a primary diagnosis or a SUD stop code with SUD listed as the primary diagnosis. To be categorized as having received both PTSD and SUD psychotherapy, participants were required to have received treatment within both PTSD and SUD specialty clinics during the period of interest. The use of these procedural terminology codes allowed us to restrict analysis to encounters focused on psychotherapy, as opposed to supportive case management or medication management. The secondary outcome of interest was the receipt of an adequate dose of psychotherapy for PTSD or SUD. An adequate dose of psychotherapy for PTSD was defined as five psychotherapy visits within ten weeks in the year following the index PTSD diagnosis (Department of Veterans Affairs, 2018). An adequate dose of SUD psychotherapy was defined as at least four psychotherapy visits within any eight-week period during the year following the index SUD diagnosis (Department of Veterans Affairs, 2018).

Demographic characteristics of interest included age, service connection for PTSD and other mental health diagnoses (SCD; indicating VA-recognized disability from injuries or conditions that occurred or were exacerbated during military service), gender, race, and ethnicity. Additional independent variables included psychiatric diagnoses (Simpson et al., 2020) such as major depressive disorder, psychosis or bipolar disorder, and other anxiety disorders, receipt of a higher level of mental health treatment in the previous year (SUD-Intensive outpatient program, psychiatric hospitalization, residential treatment), type of SUD diagnosis (alcohol use disorder [AUD], opioid use disorder [OUD], cannabis use disorder [CUD], cocaine use disorder, and other drug use disorder [stimulants, hallucinogens, sedatives, other psychoactive substance]), receipt of homelessness services (Simpson et al., 2020), clinic location in which SUD and PTSD were diagnosed (PTSD clinical team, Mental Health Clinic [MHC], SUD-Clinic, Primary Care Mental Health [PCMH], or Other), Elixhauser score (Elixhauser et al., 1998), and driving distance to VA.

1.3. Data analysis

Descriptive statistics were used to examine characteristics of veterans with PTSD-SUD comorbidity and receipt of psychotherapy within SUD or PTSD specialty clinics. Multinomial logistic regression analyses were used to identify significant predictors of receipt of any and adequate psychotherapy within a SUD specialty clinic only, PTSD specialty clinic only, or both SUD and PTSD specialty clinics, with no psychotherapy in either clinic being the reference. Given that comorbid SUD may be a barrier to receiving PTSD treatment (Back et al., 2009; Barnett et al., 2014; Cook et al., 2014, 2017; Osei-Bonsu et al., 2017), we also conducted binomial logistic regression analyses to identify predictors of receipt of PTSD-focused treatment among veterans who received any of the above types of psychotherapy (N = 13,824).

Generalized estimating equations were used to account for clustering of observations within facilities. SAS Enterprise Guide 7.1 was used for all study analyses.

2. Results

A total of 32,779 veterans were diagnosed with PTSD and SUD in a VA mental health setting in 2015. On average, veterans were 46 years of age at the time of their initial PTSD or SUD diagnosis. A majority were white and male, and less than half were service-connected for PTSD or other mental health disorders (Table 1). All SUD types were represented among this cohort with alcohol and cannabis being the most common, followed by cocaine, and OUD (Table 2). In addition to diagnoses of comorbid PTSD and SUD, 54.81% of veterans had a diagnosis of a unipolar depressive disorder, 25.83% had other anxiety disorders, and 8.77% had bipolar disorder or psychosis (Table 2).

Table 1
Demographic characteristics of veteran cohort.

Variable	Frequency	Percentage
Age		
Less than 35 years	11,333	34.57
35–55 years	11,319	34.53
55+ years	10,127	30.89
Race		
White	21,431	65.38
Black	8037	24.52
Asian American/Pacific Islander/Native Hawaiian	603	1.84
American Indian/Alaskan Native	481	1.47
Multi-racial	360	1.10
Unknown	1867	5.70
Gender		
Male	30,186	92.09
Female	2593	7.91
Service-Connected for PTSD		
Yes	12,497	38.13
No	20,282	61.87

Note. N = 32,779.

Table 2
Frequencies of psychiatric diagnoses.

Psychiatric Diagnosis	Frequency	Percentage
Substance Use Disorders		
Alcohol Use Disorder	24,408	74.46
Cannabis Use Disorder	5923	18.07
Cocaine Use Disorder	2360	7.20
Opioid Use Disorder	2078	6.34
Other Psychoactive Substance	4240	12.94
Other Psychiatric Diagnoses		
Depressive Disorder	17,966	54.81
Other Anxiety Disorder	8467	25.83
Bipolar/Psychosis	2874	8.77
Higher Level Care	1656	5.05

Note. Other Psychoactive Substance: Stimulant, Hallucinogen, and other substance use disorders.

Within a year of diagnosis, 7111 (21.69%) veterans received at least one psychotherapy visit in a PTSD clinic and 8960 veterans (27.33%) had at least one psychotherapy visit in a SUD clinic. With respect to clinic location, 4864 (14.84%) veterans received a psychotherapy visit in a PTSD clinic only, 6713 (20.48%) veterans received a psychotherapy visit in a SUD clinic only, and 2247 (6.85%) veterans received a psychotherapy visit in both a PTSD and SUD clinic. Frequencies of adequate psychotherapy treatment (i.e., four sessions within eight weeks for SUD clinics and five sessions within ten weeks for PTSD clinics) were calculated. With respect to adequate treatment, 2156 veterans (6.58%) received an adequate dose of PTSD-related psychotherapy, 2530 veterans (7.72%) received an adequate dose of SUD-related psychotherapy, and 289 (<1%) veterans received an adequate dose of both PTSD and SUD-related psychotherapy.

2.1. Multinomial models

2.1.1. Receipt of PTSD-only, SUD-only, or both PTSD andSUD psychotherapy

Several factors were significantly associated with the odds of psychotherapy receipt across both PTSD and SUD specialty clinics (Table 3). Older age (55+) was associated with decreased odds of receipt of the three psychotherapy outcomes (Table 3). Additionally, Black race was associated with increased odds of receipt of both PTSD and SUD psychotherapy as well as receipt of SUD-only psychotherapy, and Latino ethnicity was associated with greater odds of receipt of PTSD-only psychotherapy. Finally, SCD, for both PTSD and other mental health diagnoses, was associated with decreased odds of receipt of psychotherapy.

Other mental health diagnoses were associated with decreased odds of receipt of all three treatment groups. Diagnoses of depression, bipolar or psychotic disorder, and other anxiety disorder were all associated with decreased odds of receipt of both PTSD andSUD psychotherapy. Additionally, diagnoses of depression and other anxiety disorders were both associated with decreased odds of SUD-only psychotherapy receipt, while bipolar or psychosis disorder was associated with decreased odds of PTSD-only psychotherapy receipt.

Specific types of SUD were more variably associated with treatment receipt. AUD was consistently associated with increased odds of psychotherapy receipt. Cocaine and other drug use disorders were associated with increased odds of receipt of both PTSD andSUD psychotherapy as well as SUD-only psychotherapy, but not receipt of PTSD-only psychotherapy. Notably, veterans with OUD were more likely to receive both PTSD andSUD psychotherapy and SUD-only psychotherapy, but less likely to receive PTSD-only psychotherapy. Finally, veterans with CUD were less likely to receive both PTSD andSUD psychotherapy and SUD-only psychotherapy.

Clinic location where veterans received their PTSD and SUD diagnoses was important. Veterans who received a PTSD or SUD diagnosis in a matching specialty clinic (i.e., received a PTSD diagnosis in a PTSD clinic or a SUD diagnosis in a SUD clinic) had increased odds of receiving both PTSD and SUD psychotherapy, PTSD psychotherapy only, or SUD psychotherapy, but only in the clinic in which they were diagnosed. Additionally, those diagnosed with PTSD in a PCMH clinic were more likely to get PTSD-only treatment.

2.1.2. Adequate receipt of PTSD and SUD psychotherapy

Similar patterns were observed across most predictors of adequate psychotherapy receipt among SUD and PTSD clinics; however, some differences were noted. Older age was associated with decreased odds of receipt of adequate PTSD-only psychotherapy but was not associated with the two other psychotherapy outcomes, and race and ethnicity were not predictive of adequate treatment receipt (Table 4).

As with the analysis of any psychotherapy, bipolar or psychosis disorder was associated with decreased odds of adequate treatment receipt. However, depression was associated with decreased odds of receipt of adequate SUD-only psychotherapy, but not with receipt of both PTSD and SUD psychotherapy. Other anxiety disorders were predictive of decreased odds of SUD-only psychotherapy but also increased odds of PTSD-only psychotherapy receipt, and not predictive of both PTSD and SUD psychotherapy receipt. Across SUD types, as well as clinic location, similar results to PTSD-only, SUD-only, or both PTSD and SUD psychotherapy were found for the model predicting adequate psychotherapy.

2.1.3. Receipt of any PTSD psychotherapy

A binomial logistic regression model was used to examine predictors of receipt of PTSD psychotherapy among veterans who received either PTSD or SUD psychotherapy during the year following diagnosis (N = 13,824; Table 5). Veterans in both the 35–55 and 55+ age groups and female veterans had lower odds of any PTSD psychotherapy, as compared with veterans younger than 35 and male veterans, respectively. Additionally, although SCD for PTSD was associated with increased odds of receiving any PTSD psychotherapy, SCD for other mental health disorders was associated with decreased odds of receipt of any PTSD psychotherapy.

Bipolar disorder and psychosis diagnoses were associated with decreased odds, whereas other anxiety disorder was associated with increased odds of PTSD psychotherapy receipt. Notably, while CUD was associated with increased odds of receipt of PTSD psychotherapy, the other SUD types, including OUD, cocaine use disorder, and other drug use disorder were associated with decreased odds of receipt of any PTSD psychotherapy. Finally, veterans who were diagnosed with PTSD or SUD in PTSD clinics, were diagnosed with PTSD in PCMH, or were diagnosed

Table 3
Predictors of PTSD-only, SUD-only, or PTSD andSUD Psychotherapy Receipt (N = 32,779).

Variable	Both PTSD & SUD Psychotherapy (n = 2247)		PTSD-Only Psychotherapy (n = 4864)		SUD-Only Psychotherapy (n = 6713)	
	O.R.	**95% CI**	**O.R.**	**95% CI**	**O.R.**	**95% CI**
Intercept	0.13	0.10–0.17	0.21	0.16–0.26	0.34	0.28–0.42
Age (Reference: <35 years)						
35–55 years	0.94	0.86–1.04	**0.89**	**0.81–0.97**	**1.11**	**1.03–1.19**
55+ years	**0.46**	**0.39–0.55**	**0.51**	**0.45–0.58**	**0.76**	**0.69–0.85**
Sex (Reference: Male)						
Female	0.98	0.82–1.17	0.88	0.74–1.04	1.07	0.94–1.21
Race (Reference: White)						
American Indian/Alaska Native	0.73	0.43–1.23	1.13	0.76–1.69	0.91	0.65–1.28
Asian/Pacific Islander/Native Hawaiian	1.03	0.56–1.90	1.24	0.89–1.73	0.80	0.55–1.18
Black	**1.21**	**1.03–1.43**	1.11	0.96–1.28	**1.20**	**1.05–1.37**
Multi-racial	0.84	0.51–1.39	0.93	0.65–1.34	1.04	0.75–1.44
Unknown	0.83	0.66–1.05	0.92	0.76–1.10	0.87	0.74–1.03
Ethnicity (Reference: Not Hispanic/Latino)						
Hispanic/Latino	1.04	0.85–1.28	**1.18**	**1.03–1.35**	1.03	0.89–1.20
PTSD-Service Connection	**0.67**	**0.60–0.76**	0.93	0.86–1.01	**0.70**	**0.64–0.76**
Other Mental Health Service Connection	**0.55**	**0.44–0.69**	**0.50**	**0.40–0.63**	**0.78**	**0.69–0.88**
Depression	**0.85**	**0.76–0.96**	0.93	0.85–1.01	**0.81**	**0.75–0.88**
Bipolar/Psychosis	**0.59**	**0.49–0.71**	**0.60**	**0.51–0.71**	0.90	0.80–1.01
Other Anxiety disorder	**0.81**	**0.72–0.92**	1.00	0.91–1.09	**0.81**	**0.75–0.88**
Alcohol Use Disorder	**1.33**	**1.16–1.52**	**1.14**	**1.00–1.30**	**1.28**	**1.18–1.39**
Opioid Use Disorder	**2.65**	**2.17–3.23**	**0.70**	**0.56–0.87**	**2.69**	**2.39–3.04**
Cannabis Use Disorder	**0.75**	**0.66–0.86**	1.01	0.90–1.15	**0.74**	**0.67–0.82**
Cocaine use Disorder	**1.81**	**1.48–2.21**	1.09	0.91–1.30	**1.78**	**1.55–2.03**
Other Drug Use Disorder	**1.55**	**1.31–1.85**	0.97	0.83–1.13	**1.59**	**1.40–1.80**
Higher Level Mental Health Treatment	**2.29**	**1.83–2.86**	**1.35**	**1.08–1.67**	**2.11**	**1.76–2.53**
Homelessness Services	0.60	0.30–1.20	0.50	0.25–1.01	0.87	0.62–1.22
Clinic of PTSD Diagnosis (Reference: Other Clinic)						
Mental Health Clinic	**0.67**	**0.55–0.81**	0.97	0.84–1.11	**0.75**	**0.66–0.84**
Primary Care Mental Health	0.93	0.75–1.15	**1.42**	**1.20–1.68**	**0.66**	**0.55–0.80**
PTSD Clinical team	**38.35**	**26.12–56.30**	**54.13**	**36.75–79.72**	0.63	0.40–1.00
Substance Use Disorder Clinic	**4.66**	**3.03–7.17**	1.31	0.99–1.74	**6.49**	**4.32–9.76**
Clinic of SUD Diagnosis (Reference: Other Clinic)						
Mental Health Clinic	**0.62**	**0.50–0.76**	0.93	0.80–1.08	**0.62**	**0.53–0.71**
Primary Care Mental Health	**0.60**	**0.46–0.78**	0.92	0.76–1.11	0.83	0.68–1.01
PTSD Clinical team	**7.29**	**5.12–10.39**	**24.00**	**18.22–31.62**	0.99	0.72–1.35
Substance Use Disorder Clinic	**18.01**	**12.45–26.03**	0.90	0.56–1.43	**19.16**	**13.59–27.00**
Non PTSD/SUD Mental Health Visits	**0.88**	**0.79–0.98**	0.93	0.84–1.03	1.01	0.94–1.09
Elixhauser	**0.98**	**0.97–0.99**	1.00	0.99–1.01	**0.99**	**0.98–0.99**
Driving Distance (Reference: <30 miles)						
30–59 miles	0.97	0.82–1.15	0.91	0.80–1.04	1.03	0.91–1.16
60+ Miles	1.09	0.88–1.35	**0.78**	**0.63–0.96**	1.13	0.96–1.33
Unknown	1.04	0.87–1.25	**0.79**	**0.68–0.93**	1.02	0.90–1.15

Note. Total N = 32,779; No treatment receipt n = 18,955; PTSD: Posttraumatic Stress Disorder; SUD: Substance use disorder; O.R.: Odds Ratio; CI: Confidence Interval; Higher Level of Mental Health Treatment: Episode of treatment in SUD-Intensive outpatient program, psychiatric hospitalization, or residential treatment in the year prior to index PTSD or SUD diagnosis; Bolded items are significant at p<.05.

with SUD in a MHC were more likely to receive any PTSD psychotherapy. Additionally, veterans diagnosed with PTSD or SUD in a SUD clinic were less likely to receive any PTSD psychotherapy.

3. Discussion

The current study examined characteristics of veterans newly diagnosed with PTSD and SUD, as well as rates and predictors of receipt of SUD and PTSD -focused psychotherapy within a year following the diagnosis. To our knowledge, this is the first study to examine both PTSD and SUD psychotherapy treatment receipt among a national sample of veterans who received new comorbid diagnoses of PTSD and SUD. Unfortunately, our findings show that less than half of the sample received PTSD or SUD psychotherapy and few (i.e., 6.58% for PTSD only care, 7.72% for SUD-only care, and <1% for PTSD and SUD care) received an adequate dose of psychotherapy. These results highlight the need for improved efforts to provide veterans who have PTSD-SUD comorbidity with adequate mental health care. With respect to overall treatment engagement, our results are also consistent with existing literature documenting rates of both PTSD and/or SUD treatment receipt that range from 10 to 25% (Glass et al., 2010; Golub et al., 2013; J.M. Mott et al., 2014). Notably, existing studies include psychosocial *and* pharmacological interventions; therefore, these percentages are likely larger than estimates based on receipt of psychotherapy alone, such as in the current study.

Although medication may be a frontline treatment for patients with some SUDs (e.g., OUD), the focus of this investigation was on psychotherapy outcomes alone. Our choice was guided by the fact that the VA/DoD clinical practice guidelines recommend using psychosocial interventions for veterans with SUDs regardless of pharmacotherapy status, especially for veterans with comorbid PTSD and SUD (US Department of Veterans Affairs, 2017). Additionally, not all SUDs are treatable with pharmacotherapy (e.g., CUD; Chan et al., 2019), and therefore, receipt of targeted psychotherapy for this cohort is crucial. With respect to

Table 4
Predictors of adequate treatment receipt (N = 32,779).

Variable	Both PTSD & SUD Treatment(n = 289)		PTSD Treatment Only(n = 1867)		SUD Treatment Only(n = 2241)	
	O.R.	95% CI	O.R.	95% CI	O.R.	95% CI
Intercept	0.01	0.01–0.02	0.06	0.04–0.08	0.10	0.08–0.13
Age (Reference: <35 years)						
35–55 years	1.39	1.08–1.77	1.05	0.93–1.17	1.23	1.10–1.37
55+ years	0.99	0.72–1.37	0.84	0.73–0.98	1.03	0.90–1.19
Sex (Reference: Male)						
Female Sex	1.13	0.77–1.64	0.95	0.80–1.12	1.06	0.90–1.25
Race (Reference: White)						
American Indian/Alaska Native	1.01	0.26–3.90	0.89	0.52–1.52	0.75	0.49–1.16
Asian/Pacific Islander/Native Hawaiian	0.55	0.16–1.84	1.04	0.76–1.42	0.72	0.48–1.06
Black	0.93	0.68–1.27	0.91	0.78–1.06	1.05	0.92–1.22
Multi-racial	0.52	0.14–1.87	0.66	0.40–1.08	0.78	0.48–1.26
Unknown	0.62	0.29–1.33	0.83	0.66–1.06	0.85	0.66–1.08
Ethnicity (Reference: Not Hispanic/Latino)						
Hispanic/Latino	0.70	0.43–1.16	1.12	0.92–1.35	0.89	0.72–1.10
PTSD-Service Connection	0.50	0.37–0.68	0.74	0.66–0.83	0.56	0.49–0.64
Other Mental Health Service Connection	0.82	0.48–1.39	0.53	0.41–0.70	0.74	0.58–0.95
Depression	0.91	0.73–1.15	0.91	0.82–1.00	0.82	0.75–0.91
Bipolar/Psychosis	0.58	0.35–0.96	0.69	0.55–0.87	0.77	0.64–0.93
Other Anxiety disorder	0.92	0.69–1.23	1.19	1.04–1.37	0.76	0.66–0.87
Alcohol Use Disorder	1.25	0.88–1.79	1.24	1.04–1.49	1.09	0.94–1.26
Opioid Use Disorder	1.17	0.76–1.81	0.77	0.59–1.00	1.91	1.56–2.35
Cannabis Use Disorder	0.86	0.61–1.22	0.93	0.77–1.12	0.76	0.66–0.88
Cocaine use Disorder	1.48	1.00–2.19	1.03	0.83–1.28	1.50	1.25–1.79
Other Drug Use Disorder	0.97	0.58–1.64	0.98	0.79–1.21	1.40	1.21–1.62
Higher Level Mental Health Treatment	1.74	1.08–2.81	1.06	0.81–1.38	1.37	1.11–1.69
Homelessness Services	1.33	0.39–4.48	0.81	0.43–1.53	0.75	0.44–1.30
Clinic of PTSD Diagnosis (Reference: Other Clinic)						
Mental Health Clinic	0.72	0.46–1.13	0.88	0.70–1.10	0.65	0.55–0.78
Primary Care Mental Health	0.65	0.40–1.07	1.22	0.95–1.58	0.62	0.48–0.82
PTSD Clinical team	5.46	3.29–9.05	3.19	2.30–4.43	0.92	0.66–1.27
Substance Use Disorder Clinic	2.21	1.40–3.49	0.81	0.58–1.12	2.78	2.21–3.49
Clinic of SUD Diagnosis (Reference: Other Clinic)						
Mental Health Clinic	0.46	0.28–0.75	0.94	0.76–1.15	0.70	0.56–0.88
Primary Care Mental Health	0.78	0.47–1.30	0.91	0.68–1.21	0.82	0.65–1.03
PTSD Clinical team	0.38	0.18–0.79	3.33	2.43–4.55	0.41	0.28–0.62
Substance Use Disorder Clinic	2.04	1.33–3.11	1.03	0.74–1.44	1.87	1.46–2.39
Non PTSD/SUD Mental Health Visits	1.11	0.88–1.40	0.99	0.88–1.11	1.13	1.03–1.23
Elixhauser	0.98	0.96–1.00	0.99	0.98–1.01	0.99	0.98–1.00
Driving Distance (Reference: <30 miles)						
30–59 miles	0.97	0.68–1.38	0.80	0.66–0.97	0.89	0.76–1.03
60+ Miles	1.04	0.61–1.78	0.75	0.54–1.03	1.31	1.02–1.68
Unknown	1.29	0.91–1.84	0.91	0.73–1.13	0.99	0.84–1.16

Note. Total N = 32,779; No adequate treatment receipt: n = 28,382; PTSD: Posttraumatic Stress Disorder; SUD: Substance use disorder; O.R.: Odds Ratio; CI: Confidence Interval; Higher Level of Mental Health Treatment: Episode of treatment in SUD-Intensive outpatient program, psychiatric hospitalization, or residential treatment in the year prior to index PTSD or SUD diagnosis. Bolded items are significant at p<.05.

PTSD, while pharmacotherapy has been found to be effective, VA/DoD clinical practice guidelines (2017) also recommend psychotherapy, with or without pharmacotherapy, as a first-line intervention. Future studies could expand this work by examining predictors of pharmacotherapy and psychotherapy receipt in this population.

In the present study, we studied predictors of service use to better inform strategies to engage patients less likely to use these services. Several demographic variables were inconsistently related to odds of receiving SUD, PTSD, or any PTSD psychotherapy, including race, gender, and ethnicity, though none of these variables affected odds of adequate treatment receipt. Based on these results, future research is warranted to further examine the circumstances in which these demographics impact PTSD and/or SUD treatment engagement. Age, on the other hand, was a more consistent predictor in our models. Our results indicate that, relative to younger veterans, older veterans have lower odds of receiving any SUD or PTSD psychotherapy, or adequate PTSD psychotherapy. Previous research has pointed to younger veterans as difficult to engage in mental health treatment (Garcia et al., 2014); however, studies have

Table 5
Predictors of any PTSD psychotherapy receipt among veterans receiving any SUD or PTSD treatment (N = 13,824).

Variable	O.R.	95% C.I.
Intercept	0.98	0.78–1.24
Age (Reference: <35 years)		
35–55 years	0.80	0.72–0.89
55+ years	0.62	0.54–0.72
Sex (Reference: Male)		
Female Sex	0.84	0.72–0.99
Race (Reference: White)		
American Indian/Alaska Native	1.01	0.61–1.66
Asian/Pacific Islander/Native Hawaiian	1.35	0.96–1.89
Black	0.97	0.81–1.16
Multi-racial	0.87	0.60–1.26
Unknown	0.99	0.84–1.16
Ethnicity (Reference: Not Hispanic/Latino)		
Hispanic/Latino	1.05	0.91–1.22
PTSD-Service Connection	1.16	1.06–1.27
Other Mental Health Service Connection	0.67	0.55–0.83
Depression	1.06	0.98–1.16
Bipolar/Psychosis	0.62	0.53–0.74
Other Anxiety disorder	1.13	1.02–1.24
Alcohol Use Disorder	0.96	0.85–1.08
Opioid Use Disorder	0.56	0.46–0.68
Cannabis Use Disorder	1.22	1.07–1.39
Cocaine use Disorder	0.78	0.66–0.92
Other Drug Use Disorder	0.76	0.65–0.88
Higher Level Mental Health Treatment	0.80	0.65–0.98
Homelessness Services	0.69	0.38–1.26
Clinic of PTSD Diagnosis (Reference: Other Clinic)		
Mental Health Clinic	1.12	0.97–1.29
Primary Care Mental Health	1.75	1.39–2.19
PTSD Clinical team	71.96	43.88–118.00
Substance Use Disorder Clinic	0.52	0.43–0.64
Clinic of SUD Diagnosis (Reference: Other Clinic)		
Mental Health Clinic	1.39	1.21–1.59
Primary Care Mental Health	1.05	0.84–1.32
PTSD Clinical team	20.11	14.02–28.85
Substance Use Disorder Clinic	0.44	0.35–0.54
Non PTSD/SUD Mental Health Visits	0.90	0.82–0.99
Elixhauser	1.00	0.99–1.01
Driving Distance (Reference: <30 miles)		
30–59 miles	0.93	0.80–1.08
60+ Miles	0.80	0.64–0.98
Unknown	0.87	0.73–1.04

Note. Total: N = 13,824; Any receipt of PTSD treatment: n = 7111; PTSD: Post-traumatic Stress Disorder; SUD: Substance use disorder; O.R.: Odds Ratio; CI: Confidence Interval; Higher Level of Mental Health Treatment: Episode of treatment in SUD-Intensive outpatient program, psychiatric hospitalization, or residential treatment in the year prior to index PTSD or SUD diagnosis. Bolded items are significant at p<.05.

found that older veterans with PTSD may be harder to initiate into and retain in psychotherapy (Doran et al., 2017; Lu et al., 2012; Smith et al., 2016). Similar findings have been noted for elderly veterans seeking mental health services related to SUDs (Kerfoot et al., 2011). Moreover, substantial efforts have been aimed at engaging returning veterans from the recent conflicts in VA care (Spelman et al., 2012), and it is possible that other programming is warranted for aging veterans, especially with specific mental health diagnoses. Importantly, while it is unlikely that veterans with newly diagnosed PTSD and SUD received previous treatment for these conditions in PTSD and/or SUD specialty clinics, it is possible that older veterans received some other type of psychotherapy in the past. However, as a new diagnosis suggests current need for treatment, our results suggest age-related differences in veteran treatment engagement are an area deserving of continued exploration.

Like older age, SCD for PTSD and other mental health disorders was also associated with decreased odds of receipt of any and adequate psychotherapy. Existing research consistently finds that SCD is either associated with increased mental health service use (J.M. Mott et al., 2014; Spoont et al., 2007) or is not significantly associated with service use (Sripada et al., 2018). However, one study found that SCD for PTSD was associated with decreased odds of receiving evidence-based psychotherapy for PTSD (Sripada et al., 2018). While SCD is not given for SUD diagnoses, it is possible that this group of veterans evidences a more complex relationship between mental health service utilization and SCD. Notably, among veterans who received some type of psychotherapy, PTSD SCD was associated with increased odds of PTSD psychotherapy receipt. PTSD SCD may indicate greater PTSD treatment need, and other mental health SCD may indicate treatment need for other disorders.

In addition to SCD, greater psychiatric comorbidity has often been linked with increased psychotherapy utilization (Austin et al., 2011; Barrera et al., 2014; E.J. Hawkins et al., 2012; Possemato et al., 2010). In the current analyses, depression and psychosis or bipolar disorder were associated with decreased odds of psychotherapy receipt. It may be that these other diagnoses are primary and are being addressed by psychotherapy not within the PTSD or SUD clinic. Historically, clinicians have expressed concern about treating patients with co-occurring PTSD and psychosis or bipolar disorder in PTSD specialty care (Frueh et al., 2006); however, recent research suggests that using evidence-based trauma-focused treatment in these populations is feasible (Grubaugh et al., 2017). It is somewhat surprising that depression was associated with decreased odds of PTSD or SUD-focused psychotherapy. Major depression comorbid with both PTSD (Barrera et al., 2014) and SUD (Edlund et al., 2012) has consistently been shown to be associated with increased utilization of related psychotherapy. However, depression may be viewed by both veterans and providers as the predominant concern despite other comorbidities (Strachan et al., 2012), so it possible these veterans engaged in depression-related psychotherapy. Given our inability to assess the reasons behind this finding in the current paper, this hypothesis could be explored in future studies. Other research indicates that greater psychiatric severity, which is reflected by additional psychiatric comorbidities, is associated with decreased psychotherapy receipt (Sripada et al., 2018). Additionally, timing and duration of the depression diagnosis may impact willingness to seek treatment for PTSD or SUD. Future research may clarify whether additional efforts to engage this multimorbid population are necessary.

With respect to SUD type, veterans with illicit SUD types were more likely to receive either both PTSD and SUD psychotherapy or SUD-only psychotherapy and less likely to get PTSD-only psychotherapy than those without these specific SUDs. Existing literature suggests that providers may be hesitant to conduct trauma-focused treatment with veterans with comorbid SUD (Back et al., 2009; Barnett et al., 2014; Cook et al., 2014, 2017; Osei-Bonsu et al., 2017); however, a recent study found that substance related problems co-occurring with PTSD did not affect PTSD-focused treatment outcomes (Fontana et al., 2012). In previous work, rates of abstinence, which may explain differences in treatment receipt across SUD-types (Manhapra et al., 2015; Wilkinson et al., 2015), varied across substance groups, with higher rates of veterans with illicit drug-related SUD reporting abstinence than those using alcohol or cannabis. Therefore, it is possible that severity of SUD and the ability to abstain may be more related to PTSD treatment outcomes than specific SUD. Further research is needed to determine the cause of these differences. Cannabis use, in particular, is a fruitful area for further exploration. Our finding that a diagnosis of cannabis use disorder is associated with increased odds of receiving any PTSD treatment is consistent with other research that has shown that veterans often attempt to self-treat PTSD through cannabis use and view it to be an acceptable, rather than illicit treatment (O'Neil et al., 2017). It should be noted that excessive cannabis use, while seen as acceptable by many veterans, has not been consistently linked to improvement in PTSD symptoms, which might help to explain why CUD was associated

with receipt of any PTSD treatment, but not an adequate dose of PTSD treatment. Exploring the impact of veterans' beliefs about the effectiveness of cannabis use as a standalone treatment for PTSD might help to better explain these patterns. Taken together, efforts to improve equity of PTSD treatment among patients with different SUDs and severity of substance use may be indicated.

Finally, clinic location of PTSD and SUD diagnoses was the strongest predictor of PTSD and SUD-related psychotherapy receipt. Overall, when the diagnosis matched the clinic in which the diagnosis was made, there was increased odds of receipt of therapy in that clinic. These results are consistent with a study suggesting that veterans were more likely to receive counseling and PTSD-related care if they were diagnosed with PTSD in a PTSD clinic (Spoont et al., 2010). This suggests that systems issues may need to be addressed in order to facilitate transitions between clinics and, ideally, an integrated treatment approach. However, these results are not entirely surprising, potentially reflecting veterans' initial reason for seeking treatment. If veterans are diagnosed with PTSD or SUD in a MHC or PCMH, it is possible that they are seeking and receiving care for other disorders. Another possibility is that it is more difficult for veterans who are diagnosed with PTSD and SUD in non-PTSD and SUD clinics to transition into these clinics and receive specialty care for these disorders. Identifying ways to improve transitions between clinics so that veterans are easily able to move between more generalized mental health clinics to specialty care is imperative for patients to receive appropriate treatment.

The current study has several limitations. First, using administrative diagnoses has drawbacks, especially when considering receipt of SUD-related treatment. A primary problem is that these diagnoses do not give information regarding severity and are not necessarily an indicator of need for treatment. Existing studies suggest that veterans with PTSD and a SUD comorbidity are more likely to seek treatment for PTSD or other mental health disorders (Hundt et al., 2014; Mansfeld et al., 2017); however, these studies do not examine how severity, duration, and type of SUD may be related to treatment seeking and receipt. This is an important area of future research which we were unable to assess using administrative diagnostic information alone. Second, while this study does specify psychotherapy receipt within specialty clinics, we are not able to describe content or quality of the treatment delivered, or comment on treatment outcomes. As such, we cannot guarantee that treatment received within the specialty clinics met the requirements for condition-specific evidence-based treatments. Third, whereas patients were excluded if they had received SUD or PTSD diagnoses in the year prior to the index diagnosis, it is possible that patients received SUD or PTSD treatment before the index diagnosis. These veterans may not have been in acute need of treatment at the time of the study. On the other hand, we were focusing on those with newly identified comorbidity rather than existing histories who may have variable treatment patterns. Nevertheless, research has shown that veterans see gains even after a repeated course of evidenced-based treatment for PTSD (Schumm et al., 2017).

In sum, findings regarding predictors of treatment utilization among a sample of veterans newly diagnosed with PTSD and SUD point to characteristics that may hinder veterans from receiving treatment and may inform efforts to engage newly diagnosed veterans in care. Results highlight complex and multimorbid psychiatric presentations among these veterans, as well as low rates of psychotherapy in both PTSD and SUD specialty clinics. Consideration of the study findings and further investigation of mental health treatment utilization and outcomes among this comorbid veteran population may help improve their course of care.

4. Contributors

The first, second, and fifth author designed the study. The first and third author conducted literature searches and drafted the contents of the manuscript. The fourth author conducted the analyses for the manuscript. All authors contributed to the editing and final drafting process. All authors approved of the submission of this manuscript.

Declaration of Competing Interest

The authors declare no relevant competing interests.

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Supplementary materials

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