What Happens Next? Maintenance of Gains After Discharge From VA Residential PTSD Treatment

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Abstract: Residential posttraumatic stress disorder (PTSD) treatment in the Department of Veterans Affairs is helpful for many Veterans, yet the majority experience symptom rebound after discharge. This study examined a national cohort of Veterans (n = 1872) who completed VA residential PTSD treatment and identified factors associated with maintenance of gains from discharge to 4-month follow-up. We generated three logistic regression models based on response profiles during residential treatment. In the "marginal responders" group, 1–3 "booster" sessions of PTSD treatment were associated with decreased odds of maintenance of gains (odds ratio [OR], 0.42), whereas in the "clinically significant responders" group, these sessions were associated with increased odds of maintenance of gains (OR, 2.89). Greater pain severity was associated with decreased odds of maintenance of gains in the "clinically significant responder" group (OR, 0.90). Results demonstrate several avenues for intervention including targeting pain severity and matching aftercare psychotherapy to Veteran residential treatment response.

Key Words: Veterans, PTSD, residential treatment

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Residential rehabilitation treatment programs (RRTPs) serve a critical role in the treatment of posttraumatic stress disorder (PTSD) in the Department of Veterans Affairs (VA). These programs treat Veterans with chronic or severe cases of PTSD who have not benefited from traditional outpatient PTSD treatment (Cook et al., 2017). Many of these Veterans have experienced multiple traumatic events and have a wide range of mental and physical comorbidities linked to poorer PTSD treatment response (*e.g.*, substance use disorder, chronic pain; Cook et al., 2017; Sripada et al., 2020). These programs are also resource intensive; despite only providing approximately 3% of VA's PTSD treatment, the infrastructure necessary for RRTPs (*e.g.*, housing, staffing, programming) results in these programs accounting for nearly 30% of VA's spending on PTSD specialty care (Harpaz-Rotem and Hoff, 2020). As such, it is critical to maximize the potential effectiveness of care provided in these programs and, when areas of concern are identified, explore ways in which RRTP-based PTSD treatment can be improved.

Recent research has provided significant insights into the outcomes of patients who participate in VA PTSD RRTPs. In a large national sample of Veterans from the VA PTSD RRTPs (n = 10,832), Grau et al. (2022) used trajectory analysis to explore PTSD symptom reduction across three time points (admission, discharge, and 4-month follow-up). Results showed that, although the majority of Veterans experienced PTSD symptom reduction during residential treatment, many experienced significant symptom rebound in the 4 months after discharge. The specific reasons for these trends have yet to be explored. Previous research from the Veteran- and civilian-focused literature demonstrates several possible explanations. A small amount of symptom exacerbation after treatment discharge is to be expected, as has been shown by many studies of PTSD treatment across various settings and populations (*e.g.*, Magruder et al., 2016; Resick et al., 2012; Steenkamp et al., 2012) and, consistent with the literature from other populations, may at least partially reflect regression to the mean (Finney, 2008). However, these patterns of symptom rebound are smaller in magnitude compared with what was observed in the Grau et al. (2022) study, as well as in other examinations of VA residential PTSD treatment (*e.g.*, Gross et al., 2022; Holliday et al., 2020). Gross et al. (2023) examined PTSD and depression symptom change at 1-year follow-up and, in the full sample, demonstrated large effect size symptom reduction, as well as average symptom improvement from 4-month to 1-year follow-up. This study confirmed that, overall, VA residential PTSD treatment is effective, but that significantly more work is needed to understand the role of postdischarge care for Veterans who do and do not maintain or improve upon their residential treatment gains.

This pattern suggests that there are unique elements in VA residential PTSD treatment, possibly programmatic, demographic, or a combination of both, that may impact maintenance of treatment gains after discharge. First, sociodemographic (*e.g.*, race, age, employment) and psychiatric and medical variables (*e.g.*, substance use, pain severity) can strongly influence PTSD treatment response as well as overall symptom trajectories (Gross et al., 2022; Maguen et al., 2020; Sripada et al., 2019). Veterans enrolled in VA PTSD RRTPs typically have high levels of psychiatric and physical comorbidity (Grau et al., 2022; Sripada et al., 2019), as well as barriers to employment and housing (Holliday et al., 2021), all of which may increase the likelihood of postdischarge symptom exacerbation. Another consideration is the availability of evidence-based psychotherapies (EBPs) for PTSD in this setting. PTSD RRTPs in VA vary substantially in the availability, frequency, and format of their EBP programming (Cook et al., 2019).

Likely due in some part to this variability, treatment outcomes for Veterans who are coded as having received PTSD EBPs during residential treatment do not seem to differ from those who do not (Cook et al., 2019; Grau et al., 2022). Importantly, EBP receipt is not assessed in detail in the available data in the electronic medical record and collapses a wide range of potential EBP engagement (*i.e.*, one or two sessions *vs.* eight or more sessions) into a single, dichotomous indicator. It is possible that a dichotomous indicator does not fully capture the potential benefits of appropriate engagement in PTSD EBPs. In addition, these results are drawn from larger quantitative evaluation of PTSD RRTPs, but recent qualitative work has highlighted Veterans and clinician preference for PTSD EBP delivery. In a study of 24 patients and 12 providers across 3 PTSD RRTPs, Sripada and Walters (2022) found that most patients and all clinicians noted the importance of PTSD

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EBPs, particularly cognitive processing therapy (CPT). Veterans spoke about the importance of specific elements of CPT that they were able to use outside of treatment, most notably cognitive restructuring and challenging stuck points. Clinicians and Veterans also noted the importance of adequate time and resources to support PTSD EBPs, which adds needed context to the modest outcomes from larger RRTP effectiveness studies.

In addition to treatment received during the residential stay, a potentially important determinant of durable PTSD response is aftercare. There is generally very little attention paid to both residual symptoms and further care engagement after PTSD treatment completion (Larsen et al., 2019; Sripada et al., 2020). However, there is some evidence on the benefits of booster sessions after the completion of trauma-focused treatment (Hendriks et al., 2018; Ragsdale et al., 2020). Because these studies did not include comparative analyses for trauma-focused versus supportive booster sessions, the impact of different forms of mental healthcare engagement after trauma-focused treatment discharge remains unclear. Relatedly, Sripada and Walters (2022) found that RRTP clinicians noted the importance of aftercare programs but were often frustrated by a lack of adequate aftercare or, when available, a lack of aftercare integration into treatment. These results suggest that exploring the impact of both EBP booster sessions and general aftercare is important in understanding PTSD symptom maintenance after RRTP discharge.

PRESENT STUDY

Given the results from previous evaluations of long-term PTSD symptom course during and after VA PTSD RRTPs, it is crucial to evaluate factors related to PTSD symptom maintenance and rebound from discharge to long-term follow-up. The goals of this study were to predict maintenance of gains in the postdischarge period based on patient demographics, psychiatric comorbidities, and treatment-related variables (*e.g.*, treatment response during PTSD residential treatment, receipt of a PTSD EBP). In addition, because of the potential importance of aftercare, we examined engagement in various forms of mental and physical healthcare, including general mental healthcare, PTSD specialty care, and engagement in CPT or prolonged exposure (PE).

METHODS

Participants

Data were obtained from a national sample of 1872 Veterans who completed a PTSD RRTP and who had discharge and 4-month follow-up data during fiscal years 2014–2016. The sample was predominantly male (88.6%), White (63.4%), non-Hispanic (90.5%), and heterosexual (92.8%). The average age in this sample was 48.9 years (SD, 13.1; range, 21–78) and completed an average of 13.6 years of education (SD, 2.1; range, 8–25). Veterans reported an average of 2.73 cumulative traumas (SD, 1.28; range, 0–8). A total of 64.34% were documented as having received a PTSD EBP (*i.e.*, CPT or PE). Veterans stayed in the program for an average of 50.5 days (SD, 22.14; range, 4–254). Full demographics results are included in Table 1.

Procedure

Data were provided by The VA Northeast Program Evaluation Center, which routinely collects treatment outcome information from VA PTSD RRTPs for the purpose of program evaluation and research.

Measures

Dependent Variables

Our main outcome was PTSD symptom maintenance as measured by the PTSD Checklist for *DSM-5* (PCL-5), a 20-item self-report measure of PTSD symptom severity based on *DSM-5* criteria (Weathers et al., 2013). The PCL-5 uses a 5-point Likert scale (0 = not at all, 4 = extremely; range, 0–80) with higher scores indicating greater symptom severity. The PCL-5 has excellent convergent and discriminant validity, has high internal consistency, and has been used widely across PTSD treatment research (Blevins et al., 2015; Marx et al., 2022). In our sample, the discharge PCL-5 demonstrated adequate internal consistency ($\alpha = 0.96$)

Independent Variables

All variables are included in data packets collected in the PTSD RRTPs or available via the electronic medical record.

Demographic Characteristics

Demographic variables included age, race (dichotomized to White *vs*. Black, Asian, Native American, or Other and White *vs*. Unknown), sex (male *vs*. female), sexual orientation (dichotomized to heterosexual *vs*. nonheterosexual), ethnicity (Hispanic/Latino or non-Hispanic/Latino), relationship status (dichotomized to married/domestic partnered *vs*. other), homelessness (dichotomized to yes/no), years of education, and employment status (dichotomized to yes/no).

Clinical Characteristics

Descriptive psychiatric variables included discharge PCL-5 and total number of lifetime traumas. Alcohol and substance use was measured using the "use" subscale of the Brief Addiction Monitor (Cacciola et al., 2013). In this sample, internal consistency for the "use" subscale at discharge was marginal ($\alpha = 0.58$). Pain severity was indicated on a 0–10 scale. Psychological distress was assessed using the Kessler Psychological Distress Scale (Kessler et al., 2002). In our sample, internal consistency for the Kessler Psychological Distress Scale at discharge was acceptable ($\alpha = 0.86$).

Postdischarge Treatment-Related Variables

We assessed treatment engagement during residential treatment and in the 4 months after discharge using electronic medical record data. Relevant treatment-related variables during residential treatment included length of stay (*i.e.*, number of days spent in treatment) and receipt of a PTSD EBP (yes/no). With respect to the 4 months after discharge until follow-up, we generated multiple treatment engagement–related variables, including total mental health visits (*i.e.*, individual and group mental health visits across VA, including psychiatric and general mental health visits, but excluding telephone visits), total individual and group psychotherapy visits (both within and outside PTSD specialty care), engagement in a PTSD EBP (1–3 CPT or PE sessions *vs*. 0 and 4+ CPT or PE sessions *vs*. 0), and high intensity service utilization (*e.g.*, inpatient psychiatric admission). Categories for additional PTSD EBP sessions (*i.e.*, 1–3 and 4+ for both PE and CPT, separately) were selected to represent "booster" sessions (typically 1–3 additional sessions; Held et al., 2022) versus longer-term engagement. In addition, after VA-based work from Abrams et al. (2013) and Sripada et al. (2018), we included a measure of adequate medication continuation for Veterans prescribed citalopram, escitalopram, fluoxetine, fluvoxamine, paroxetine, sertraline, duloxetine, venlafaxine, and desvenlafaxine, defined as having a 72-day supply (over any 90-day period) with at least one refill during the 4-month period.

Data Analysis

Analyses were conducted using SAS Enterprise Guide 8.3 (SAS Institute Inc, Cary, NC). To capture the heterogeneity of Veteran symptom profiles during and after residential treatment, we generated three logistic regression models for three distinct groups based on symptom response during residential treatment: "nonresponders" ($n = 372$; residential PCL-5 change ≤ 0), "marginal responders" (residential PCL-5 change ≥ 1, <14; $n = 667$), and "clinically significant responders" (residential PCL-5 change ≥ 15; $n = 833$). For each model, "maintenance of gains" (defined as PCL-5 change between 4-month follow-up and discharge <1) was the binary dependent variable, and the clinical/

TABLE 1. Demographic and Clinical Characteristics of VHA PTSD RRTP Patient Who Did Not Respond to Treatment, Marginally Responded to Treatment, and Who Had a Clinically Significant Response to Treatment ($n = 1872$)

	No Response ($n = 372$; 19.9%)	Marginal Response ($n = 677$; 35.6%)	Clinically Significant Response ($n = 833$; 44.5%)	
	Mean (SD)/*n* (%)	Mean (SD)/*n* (%)	Mean (SD)/*n* (%)	χ^2
Demographic categories				
Age	49.80 (13.00)	48.94 (13.13)	48.54 (13.08)	2.45
Years of education	13.31 (1.98)	13.56 (2.12)	13.66 (2.10)	6.30*
Sex (male)	342 (91.94%)	593 (88.91%)	723 (86.79%)	6.83*
Sexual orientation (heterosexual)	321 (94.13%)	571 (92.54%)	708 (92.43%)	1.13
Partnered	184 (49.86%)	312 (47.13%)	368 (44.77%)	2.76
Race (Black, Asian, Native American, or other[a])	151 (40.59%)	231 (34.63%)	246 (29.53%)	18.07*
Race (unknown)	14 (3.76%)	14 (2.10%)	29 (3.48%)	
Hispanic/Latinx ethnicity	32 (8.67%)	65 (9.79%)	80 (9.65%)	0.38
Homelessness	108 (29.27%)	203 (30.80%)	250 (30.49%)	0.28
Employed	76 (20.65%)	122 (18.35%)	153 (18.61%)	0.91
Psychiatric variables				
Discharge PCL-5	60.97 (11.84)	50.79 (13.88)	32.13 (13.86)	776.57*
Total no. traumas	2.56 (1.19)	2.77 (1.32)	2.78 (1.29)	8.40*
BAM use scale	2.31 (2.92)	2.30 (2.96)	2.55 (3.30)	0.86
Pain severity	5.66 (2.59)	5.40 (2.51)	5.22 (2.67)	6.44*
Psychological distress	20.91 (4.96)	21.43 (4.79)	21.19 (4.58)	2.09
Residential length of stay	49.87 (19.97)	50.02 (24.19)	51.24 (21.32)	2.57
Discharge PCL-5 < 28	5 (1.34%)	35 (5.25%)	306 (36.73%)	334.25*
Residential evidence-based PTSD treatment	234 (63.59%)	410 (61.56%)	556 (66.91%)	4.72
Postdischarge treatment engagement				
Total mental health visits	10.50 (11.16)	11.00 (11.31)	10.02 (10.56)	5.02
Total individual psychotherapy visits	2.48 (4.51)	2.54 (5.59)	2.29 (4.76)	1.09
Total individual PTSD specialty visits	1.28 (3.39)	1.26 (3.61)	1.08 (2.70)	3.14
Total group psychotherapy visits	2.29 (3.23)	2.46 (3.43)	2.32 (3.27)	1.37
Total group PTSD specialty visits	0.86 (2.01)	0.82 (1.94)	0.91 (2.31)	0.19
1–3 CPT sessions	17 (4.57%)	42 (6.30%)	40 (4.80%)	3.61
4+ CPT sessions	5 (1.34%)	11 (1.65%)	8 (0.96%)	
1–3 PE sessions	8 (2.15%)	10 (1.50%)	3 (0.36%)	10.67*
4+ PE sessions	2 (0.54%)	6 (0.90%)	3 (0.36%)	
8 Psychotherapy visits within 14 weeks	55 (14.78%)	99 (14.84%)	109 (13.09%)	1.16
3 Psychotherapy visits within 6 weeks	79 (21.24%)	155 (23.24%)	157 (18.85%)	4.36
Adequate medication continuation	123 (33.06%)	213 (31.93%)	302 (36.25%)	3.29
IP psychiatric admission	53 (14.25%)	112 (16.79%)	176 (21.13%)	9.58*
ER/urgent care visit	15 (4.03%)	21 (3.15%)	24 (2.88%)	1.11

[a]Racial categories were collapsed due to small number of Veterans identifying as Asian or Native American.

*$p < 0.05$.

VHA, Veterans Health Administration; BAM, Brief Addiction Monitor; IP, inpatient; ER, emergency room.

demographic/treatment engagement variables were included as predictors. Odds ratios were generated for all model results. Cases were excluded if they did not include PCL-5 values at either discharge and/or 4-month follow-up.

RESULTS

With respect to the residential treatment period, 80% of Veterans in this cohort experienced PTSD symptom improvement from admission to discharge. In the full sample ($n = 1872$), at 4-month follow-up, 36.3% of Veterans maintained or improved their discharge PCL-5 score.

Nonresponder Model

In the group of Veterans who did not experience a reduction in PTSD symptoms during residential treatment ($n = 372$), the factors associated with increased odds of symptom maintenance or improvement were a higher discharge PCL-5 (odds ratio [OR], 1.07; 95% confidence interval [CI], 1.03–1.10), being employed (OR, 2.12; 95% CI, 1.01–4.43), and an inpatient psychiatric admission (OR, 2.68; 95% CI, 1.09–6.59). The only factor associated with decreased odds of symptom maintenance was receipt of a PTSD EBP during residential treatment (OR, 0.50; 95% CI, 0.27–0.93). Full results are presented in Table 2.

TABLE 2. Logistic Regression "Nonresponder" Model Predicting Maintenance of Gains in Veterans Who Did Not Improve During Residential Treatment (n = 298)

Effect	Estimate	SE	OR	95% CI	Significant (Yes/No)
Demographics characteristics					
Age	−0.02	0.01	0.98	0.96–1.00	No
Sex (female)	−0.02	0.53	0.98	0.35–2.75	No
Sexual orientation (nonheterosexual)	−0.02	0.63	0.98	0.28–3.41	No
Partnered	−0.10	0.32	0.91	0.48–1.71	No
Race (Black, Asian, Native American, or other[a] *vs*. White)	−0.20	0.32	0.82	0.43–1.55	No
Race (unknown *vs*. White)	−0.61	0.78	0.54	0.12–2.48	No
Hispanic/Latinx ethnicity	−0.47	0.53	0.62	0.22–1.77	No
Homelessness	0.02	0.35	1.02	0.51–2.03	No
Years of education	−0.11	0.08	0.89	0.77–1.04	No
Employed	0.75	0.38	2.12	1.01–4.43	Yes
Clinical characteristics					
Discharge PCL-5	0.06	0.02	1.07	1.03–1.10	Yes
Total no. traumas	0.15	0.12	1.16	0.92–1.47	No
BAM use scale	0.05	0.05	1.05	0.95–1.16	No
Pain severity	0.05	0.06	1.06	0.94–1.19	No
Psychological distress	−0.01	0.04	0.99	0.92–1.06	No
Residential length of stay	−0.01	0.01	0.99	0.98–1.01	No
Discharge PCL-5 < 28	2.70	1.28	14.86	1.21–182.36	No
Residential evidence-based PTSD treatment	−0.69	0.32	0.50	0.27–0.93	Yes
Postdischarge treatment engagement					
Total mental health visits	0.02	0.02	1.02	0.98–1.05	No
Total individual psychotherapy visits	0.17	0.09	1.19	1.00–1.41	No
Total individual PTSD specialty visits	−0.10	0.08	0.91	0.78–1.06	No
Total group psychotherapy visits	0.01	0.07	1.01	0.88–1.16	No
Total group PTSD specialty visits	−0.05	0.09	0.95	0.80–1.13	No
1–3 CPT sessions	0.41	0.63	1.51	0.44–5.20	No
4+ CPT sessions	0.19	1.13	1.21	0.13–11.03	No
1–3 PE sessions	−0.03	0.81	0.97	0.20–4.70	No
4+ PE sessions	−15.46	NA	NA	NA	No
8 Psychotherapy visits within 14 weeks	0.61	0.70	1.84	0.46–7.32	No
3 Psychotherapy visits within 6 weeks	−0.83	0.52	0.44	0.16–1.21	No
Adequate medication continuation	−0.16	0.31	0.86	0.47–1.56	No
IP psychiatric admission	0.99	0.46	2.68	1.09–6.59	Yes
ER/urgent care visit	−0.80	0.79	0.45	0.09–2.12	No

[a]Racial categories were collapsed due to small number of Veterans identifying as Asian or Native American.

BAM, Brief Addiction Monitor; IP, inpatient; ER, emergency room.

Marginal Responder Model

In the group of Veterans who improved, but did not experience reliable PTSD symptom change during residential treatment (n = 667), the factors associated with increased odds of symptom maintenance or improvement were a higher discharge PCL-5 (OR, 1.05; 95% CI, 1.03–1.07), identifying as female (OR, 1.96; 95% CI, 1.05–3.67), and having more mental health visits (OR, 1.03; 95% CI, 1.01–1.05). The only factor associated with decreased odds of symptom maintenance was engaging in 1–3 sessions of CPT (OR, 0.42; 95% CI, 0.18–0.98). Full results are presented in Table 3.

Clinically Significant Responder Model

In the group of Veterans who experienced reliable PTSD symptom change during residential treatment (n = 833), the factors associated with increased odds of symptom maintenance or improvement were a higher discharge PCL-5 (OR, 1.06; 95% CI, 1.03–1.09), having more years of education (OR, 1.17; 95% CI, 1.07–1.29), more individual psychotherapy visits in the 4 months after discharge (OR, 1.08; 95% CI, 1.00–1.17), and having 1–3 sessions of CPT (OR, 2.89; 95% CI, 1.32–6.35). Having at least 8 psychotherapy visits (outside of PTSD specialty care) within 14 weeks of discharge (OR, 0.33; 95% CI, 0.11–0.96) and greater pain severity (OR, 0.90; 95% CI, 0.83–0.97) were both associated with lower odds of maintaining treatment gains. Full results are presented in Table 4.

DISCUSSION

This study assessed factors associated with maintenance of treatment gains across a national sample of Veterans who completed VA residential PTSD treatment. The majority of Veterans in this study (80%) experienced PTSD symptom reduction during residential treatment. Of this group, 56% experienced reliable symptom change during treatment, which translates to 45% of the full cohort. These results are

TABLE 3. Logistic Regression Model Predicting Maintenance of Gains in Veterans Who Experienced Marginal Clinical Change During Residential Treatment (n = 562)

Effect	Estimate	SE	OR	95% CI	Significant Effect (Yes/No)
Demographics characteristics					
Age	0.00	0.01	1.00	0.99–1.02	No
Sex (female)	0.67	0.32	1.96	1.05–3.67	Yes
Sexual orientation (nonheterosexual)	−0.05	0.37	0.95	0.46–1.96	No
Partnered	0.31	0.22	1.37	0.89–2.11	No
Race (Black, Asian, Native American, or other[a] *vs*. White)	−0.17	0.22	0.85	0.55–1.29	No
Race (unknown *vs*. White)	−0.34	0.68	0.71	0.19–2.68	No
Hispanic/Latinx ethnicity	0.00	0.32	1.00	0.54–1.86	No
Homelessness	−0.01	0.24	0.99	0.63–1.58	No
Years of education	0.05	0.05	1.05	0.96–1.15	No
Employed	−0.16	0.25	0.85	0.52–1.38	No
Clinical characteristics					
Discharge PCL-5	0.05	0.01	1.05	1.03–1.07	Yes
Total no. traumas	0.12	0.07	1.13	0.98–1.30	No
BAM use scale	0.06	0.03	1.06	0.99–1.13	No
Pain severity	−0.06	0.04	0.94	0.87–1.01	No
Psychological distress	0.00	0.03	1.00	0.94–1.05	No
Residential length of stay	0.00	0.00	1.00	0.99–1.01	No
Discharge PCL-5 < 28	−0.08	0.59	0.92	0.29–2.94	No
Residential evidence-based PTSD treatment	0.00	0.20	1.00	0.67–1.48	No
Postdischarge treatment engagement					
Total mental health visits	0.03	0.01	1.03	1.01–1.05	Yes
Total individual psychotherapy visits	−0.02	0.03	0.98	0.92–1.04	No
Total individual PTSD specialty visits	0.01	0.04	1.01	0.93–1.09	No
Total group psychotherapy visits	−0.03	0.04	0.97	0.90–1.05	No
Total group PTSD specialty visits	0.01	0.06	1.01	0.90–1.13	No
1–3 CPT sessions	−0.86	0.43	0.42	0.18–0.98	Yes
4+ CPT sessions	−0.98	0.77	0.38	0.08–1.69	No
1–3 PE sessions	1.08	0.80	2.94	0.62–13.97	No
4+ PE sessions	−0.84	1.19	0.43	0.04–4.43	No
8 Psychotherapy visits within 14 weeks	−0.30	0.43	0.74	0.32–1.72	No
3 Psychotherapy visits within 6 weeks	0.05	0.32	1.05	0.56–1.97	No
Adequate medication continuation	−0.14	0.21	0.87	0.58–1.31	No
IP psychiatric admission	0.02	0.26	1.02	0.61–1.71	No
ER/urgent care visit	0.12	0.54	1.13	0.39–3.22	No

[a]Racial categories were collapsed due to small number of Veterans identifying as Asian or Native American.

BAM, Brief Addiction Monitor; IP, inpatient; ER, emergency room.

encouraging and suggest that many Veterans do receive benefit from engaging in VA PTSD RRTP treatment. However, our results concerning maintenance of treatment gains are less encouraging. Of the 80% who received any PTSD symptom reduction, only 30% maintained or improved upon their treatment gains. For Veterans who experienced clinically significant change during residential PTSD treatment, only 19% maintained their gains, whereas Veterans who experienced marginal change during residential PTSD treatment exhibited more stability, with 42% maintaining their gains.

These results provide important data confirming quantitative (*e.g.*, Grau et al., 2022; Gross et al., 2022; Holliday et al., 2020) and qualitative (*e.g.*, Sripada and Walters, 2022) results pointing to a gap in effective aftercare treatment after discharge from VA PTSD RRTPs. Although some regression to the mean is to be expected, especially in those Veterans with the largest symptom reductions over the course of treatment (Finney, 2008), we observed a high percentage of Veterans who did not maintain gains after even marginal improvement (58%). The symptom rebound shown in this study is particularly concerning because it comes directly after a period of, for many Veterans, hope, camaraderie, and symptom relief (Sripada and Walters, 2022). In outpatient studies of PTSD EBP completers and noncompleters, symptom exacerbation is one of the most frequently cited reasons for disengagement in care (Kehle-Forbes et al., 2022), so it is possible that symptom exacerbation immediately after RRTP discharge might lead Veterans to experience hopelessness and reduced motivation to continue to seek out effective PTSD treatment. As such, it is essential to explore the perspectives of Veterans who do not maintain their gains after VA PTSD RRTP discharge.

Our model results provide several important insights into predictors of symptom maintenance after RRTP discharge. For those who did not experience a reduction in PTSD symptoms during residential treatment, being employed and experiencing an inpatient psychiatric admission in the months after discharge were associated with increased odds of maintaining or improving upon discharge PTSD symptoms. Although experiencing an inpatient psychiatric admission implies additional

TABLE 4. Logistic Regression Model Predicting Maintenance of Gains in Veterans Who Experienced Clinically Significant Change During Residential Treatment (n = 688)

Effect	Estimate	SE	OR	95% CI	Significant Effect (Yes/No)
Demographics characteristics					
Age	−0.02	0.01	0.98	0.97–1.00	No
Sex (female)	−0.34	0.34	0.71	0.36–1.40	No
Sexual orientation (nonheterosexual)	0.38	0.40	1.47	0.66–3.24	No
Partnered	0.42	0.23	1.52	0.96–2.40	No
Race (Black, Asian, Native American, or other[a] *vs*. White)	0.04	0.26	1.04	0.63–1.73	No
Race (unknown *vs*. White)	−0.49	0.70	0.61	0.16–2.42	No
Hispanic/Latinx ethnicity	0.44	0.33	1.55	0.82–2.95	No
Homelessness	0.09	0.25	1.09	0.67–1.79	No
Years of education	0.16	0.05	1.17	1.07–1.29	Yes
Employed	−0.11	0.27	0.90	0.53–1.54	No
Clinical characteristics					
Discharge PCL-5	0.06	0.01	1.06	1.03–1.09	Yes
Total no. traumas	0.06	0.09	1.06	0.90–1.26	No
BAM use scale	−0.03	0.03	0.97	0.91–1.04	No
Pain severity	−0.11	0.04	0.90	0.83–0.97	Yes
Psychological distress	−0.03	0.03	0.98	0.92–1.03	No
Residential length of stay	0.00	0.00	1.00	0.99–1.01	No
Discharge PCL-5 < 28	0.37	0.39	1.44	0.67–3.09	No
Residential evidence-based PTSD treatment	0.13	0.23	1.14	0.72–1.81	No
Postdischarge treatment engagement					
Total mental health visits	−0.01	0.01	0.99	0.97–1.02	No
Total individual psychotherapy visits	0.08	0.04	1.08	1.00–1.17	Yes
Total individual PTSD specialty visits	−0.08	0.06	0.92	0.82–1.05	No
Total group psychotherapy visits	0.08	0.05	1.09	0.99–1.20	No
Total group PTSD specialty visits	−0.08	0.06	0.92	0.81–1.04	No
1–3 CPT sessions	1.06	0.40	2.89	1.32–6.35	Yes
4+ CPT sessions	−0.62	1.18	0.54	0.05–5.44	No
1–3 PE sessions	−14.20	NA	NA	NA	No
4+ PE sessions	−13.26	NA	NA	NA	No
8 Psychotherapy visits within 14 weeks	−1.12	0.55	0.33	0.11–0.96	Yes
3 Psychotherapy visits within 6 weeks	0.18	0.37	1.20	0.58–2.48	No
Adequate medication continuation	0.22	0.22	1.25	0.81–1.92	No
IP psychiatric admission	0.04	0.28	1.04	0.60–1.80	No
ER/urgent care visit	−0.48	0.80	0.62	0.13–2.99	No

[a]Racial categories were collapsed due to small number of Veterans identifying as Asian or Native American.

BAM, Brief Addiction Monitor; IP, inpatient; ER, emergency room.

treatment engagement and likely a period of stabilization after a period of symptom exacerbation, it is difficult to take away anything definitive from this result, given the lack of information concerning the precipitants of inpatient hospitalization in this sample. For example, it is possible that there is minimal treatment engagement before and after inpatient hospitalization, and without this treatment engagement information, we cannot say how inpatient (and related) services are related to maintenance of gains. Employment status as a protective factor against PTSD symptom exacerbation mirrors previous findings pointing to the importance of work-related social support in maintaining PTSD symptom severity levels that allow for effective functioning (Schnurr et al., 2005). It is also possible that, especially for Veterans who did not receive symptom reduction during residential treatment, the ability to focus on work provides some protection against PTSD symptom increase.

In the models examining Veterans who experienced marginal and clinically significant change, several results are important to discuss. First, in the "clinically significant responder" model, more years of education and being partnered were both associated with increased odds of maintaining or improving upon discharge PTSD symptoms. These findings are in line with previous research; more years of education is consistently linked with improved outcomes in trauma-focused interventions for Veterans (*e.g.*, Sripada et al., 2019). Importantly, the only clinical characteristic associated with decreased odds of maintaining treatment gains in the "clinically significant responder" group was greater pain severity, which is a common comorbidity in need of significantly more attention. Research has demonstrated that Veterans with PTSD experience high levels of chronic pain, which is also linked to slower treatment response and decreased quality of life in both outpatient and residential settings (Benedict et al., 2020; Sripada et al., 2019). Although some promising interventions exist, including integrating cognitive-behavioral therapy for chronic pain + PTSD treatment (Otis et al., 2009) and yoga + PTSD treatment (Chopin et al., 2020), there is a significant knowledge-to-practice gap (Lumley et al., 2022) that is necessary to bridge to improve care for these Veterans.

Several intriguing and conflicting patterns emerged between the "marginal responder" and "clinically significant responder" groups. Most notably, in the "marginal responder" group, receiving 1–3 CPT sessions was associated with decreased odds of symptom maintenance, whereas a strong effect in the opposite direction (OR, 2.89; 95% CI, 1.32–6.35) was observed for the "clinically significant responder" group. There are several important implications for this finding. First, in line with previous research highlighting the benefits of booster sessions upon completion of trauma-focused treatment (Hendriks et al., 2018; Ragsdale et al., 2020), Veterans who responded most strongly to VA PTSD RRTP treatment were significantly more likely to continue their positive trajectory if given a small number of trauma-focused treatment sessions in the 4 months after discharge. In addition, receiving 8 or more psychotherapy visits outside of PTSD specialty care within 14 weeks of discharge was associated with decreased odds of maintenance of gains, suggesting the specific utility of trauma-focused interventions in this subgroup. Given clinician and Veteran concerns surrounding adequate aftercare strategies in these programs (Sripada and Walters, 2022), these results point to the potential benefits of offering low-intensity trauma-focused interventions delivered in an outpatient format in the months after VA PTSD RRTP discharge. Alternatively, it is possible that postdischarge non-PTSD mental healthcare could have been provided in response to the presence of unresolved symptoms in patients and could be a marker of greater clinical severity during the immediate postdischarge period. However, if Veterans only experience a small or moderate amount of clinical change, these interventions do not seem to be helpful at the 4-month follow-up date. It is important to note that this is potentially a misleading result, as it is possible that Veterans experience symptom exacerbation immediately after and are then quickly referred to trauma-focused treatment, which still may be an effective and necessary intervention at that time. Examining longer-term (*e.g.*, 1-year) follow-up data can help clarify this relationship. Regardless, these results point to the need to explore the utility of booster sessions in this population and, if they are truly not effective for Veterans who experience attenuated treatment gains during residential treatment, what other interventions might be necessary to build upon their modest gains.

Limitations and Future Directions

There are several limitations to the current study. First, the variation in VA PTSD RRTP programming, especially concerning evidence-based PTSD treatment, likely impacts the needs of Veterans postdischarge. As a result, conclusions based on postdischarge psychotherapy are highly tentative, as we cannot say if additional trauma-focused treatment is serving as a true "booster" or introducing new material. One way to address the problem of variation in EBP delivery and subsequently better contextualize aftercare needs may be to implement massed PTSD treatment, in which a full course of a PTSD EBP is delivered in a compressed period. Programs that use this approach (*e.g.*, Held et al., 2020) are better able to track EBP dose and fidelity and have demonstrated positive long-term results with Veterans receiving care outside of VA (Ragsdale et al., 2020).

Another area in need of further exploration is the utility of specific aftercare approaches after VA PTSD RRTP discharge. Given the financial investment VA has made in residential PTSD programming, providing additional resources (or reallocating existing resources) in the service of maintaining residential treatment gains seems to be an essential step in providing effective PTSD care. Our results point to potential avenues for exploration concerning aftercare (*e.g.*, providing additional trauma-focused sessions for Veterans who experienced reliable clinical change during treatment), but we urge caution in interpreting these findings due to the relatively low numbers of Veterans who received additional trauma-focused intervention or care in a PTSD specialty clinic. For example, model results were not available for additional sessions of PE due to extremely low numbers of Veterans who received these treatments. Generally, future research on this topic would benefit from larger sample sizes across groups, which might allow for more sophisticated sample matching techniques to help mitigate any bias that might result from uneven sample sizes among "nonresponders," "marginal responders," and "clinically significant responders." This may be aided by an additional focus on aftercare, as concentrating resources on the period after residential discharge can help to improve follow-up assessment response rates. It is also important to explore a variety of aftercare options, ideally attempting to match offered treatments to the needs of individual Veterans. It is also important to consider the continuity of care between residential care and postdischarge care, so it is likely critical to assess the impact of different aftercare approaches across traditional (*i.e.*, those contained in this study) and massed PTSD treatment programs. As many of these programs exist outside of the traditional VA structure, it may also be helpful to examine differences in VA and non-VA settings with respect to aftercare impact.

Another important consideration is that, although the VA PTSD RRTPs collect a wide range of data, several variables that are likely important for understanding the full impact of PTSD, such as functioning and quality of interpersonal relationships, are not routinely collected or assessed. In addition, with respect to trauma measurement, we did not have access to more specific trauma-related information that might be derived from a clinician-administered PTSD assessment. This, combined with our reliance on patient-completed PTSD symptom checklists, precludes us from knowing if Veterans anchored different PCLs to different index traumas. More assessment information generally would help expand our findings, as we were unable to assess the impact of a variety of psychiatric comorbidities that may play a role in postdischarge PTSD symptom severity.

In conclusion, this study points to several potentially important factors related to maintenance of treatment gains after discharge from VA PTSD residential treatment, including pain severity, overall mental health treatment engagement, and receipt of additional trauma-focused treatment. Our results highlight a need for increased focus on residential program aftercare, including identifying effective interventions for Veterans dependent upon their PTSD symptom course during residential treatment. More broadly, our results support a larger trend in the PTSD diagnostic literature, suggesting that it is increasingly common for individuals to only receive partial benefit from treatment. The fluctuating course of PTSD symptoms and the limited number of individuals who experienced full remission from PTSD support the idea that PTSD diagnosis may benefit from "partial remission" classification, as was suggested by Fischer et al. (2023). Like many mental health conditions, PTSD seems to have periods of exacerbation and remittance, so effective treatment might be best conceptualized as an initial period of major symptom reduction (*e.g.*, residential treatment engagement) with subsequent periods focused on symptom mitigation and reinforcement of previous treatment gains. In such cases, consistently available, "as needed" application of evidence-based treatment principles might help to minimize the burden of periods of PTSD symptom exacerbation on Veterans and the healthcare system. Importantly, this conceptualization may require a longitudinal approach to PTSD treatment and research that has rarely been used to date.

Because of the limited amount of data available focused on this aftercare period, our results should serve as a first step in identifying areas of concern and creating more consistent, Veteran-centric aftercare policies and procedures for the large number of Veterans who benefit from VA PTSD residential treatment.

DISCLOSURE

All authors have read and approved the submitted article. Author contributions are as follows: P.P.G. contributed to the theoretical and analytic conceptualization, writing of the first draft, and revision; I.H.-R. contributed to the theoretical conceptualization and revision; M.A.I. contributed to the revision and analytic consultation; D.G. contributed to the

analytic conceptualization and data analysis; R.K.S. contributed to the theoretical and analytic conceptualization, and revision.

The views expressed in this article are those of the authors and do not necessarily reflect the position or policy of the VA. This study was approved and granted a waiver of informed consent for access to protected health information by the local institutional review board.

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