


Investigation of Therapist Effects on Patient Engagement in Evidence-Based Psychotherapies for Posttraumatic Stress Disorder in the Veterans Health Administration

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The present study examined whether certain Veterans Health Administration (VHA) therapists have more success than others in keeping patients engaged in evidence-based psychotherapies for posttraumatic stress disorder (PTSD). Our objective was to use multilevel modeling to quantify the variability between therapists in two indicators of patient engagement: early dropout (i.e., < 3 sessions) and adequate dose (i.e., ≥ 8 sessions). The phenomenon of systematic variability between therapists in patients' treatment experience and outcomes is referred to as "therapist effects." The sample included the 2,709 therapists who provided individual cognitive processing therapy (CPT) or prolonged exposure (PE) to 18,461 veterans with PTSD across 140 facilities in 2017. Data were extracted from administrative databases. For CPT, therapist effects accounted for 10.9% of the variance in early dropout and 8.9% of the variance in adequate dose. For PE, therapist effects accounted for 6.0% and 8.8% of the variance in early dropout and adequate dose, respectively. Facility only accounted for an additional 1.1%–3.1% of the variance in early dropout and adequate dose. For CPT, patients' odds of receiving an adequate dose almost doubled, $OR = 1.41/0.72 = 1.96$, if they were seen by a therapist in the highest compared with the lowest retention decile. For PE, the odds of a patient receiving an adequate dose were 84% higher, $OR = 1.38/0.75 = 1.84$, when treated by a therapist in the highest compared with the lowest retention decile. Therapist skills and work environment may contribute to variability across therapists in early dropout and adequate dose.

The U.S. Veterans Health Administration (VHA) has invested considerable resources to disseminate two evidence-based psychotherapies (EBPs) for posttraumatic stress disorder (PTSD): cognitive processing therapy (CPT; Resick

et al., 2017) and prolonged exposure (PE; Foa et al., 2019). This national dissemination initiative includes policy requiring that CPT and PE be made available at all VHA facilities, competency-based training of mental health providers, the installation of local EBP champions at each facility, the establishment of national PTSD mentoring and consultation programs, and the creation of chart note templates for documentation and monitoring of EBPs (Karlin et al., 2010). Although this dissemination initiative has necessarily increased the availability of these EBPs to veterans with PTSD, implementation challenges remain (Rosen et al., 2016). For instance, CPT and PE have been shown to be underused (Maguen et al., 2020; Sripada et al., 2018), and among individuals who initiate an EBP for PTSD, many drop out before completing an adequate treatment course (Kehle-Forbes et al., 2016; Maguen et al., 2020). It is important to note that patients who discontinue treatment before receiving an adequate dose of an EBP for PTSD, particularly those who

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dropout early in the course of treatment, are less likely to experience significant symptom reductions (Holder et al., 2020; Holmes et al., 2019).

Research has examined patient- and treatment-level factors and, to a lesser extent, facility characteristics that are associated with patient initiation and completion of CPT and PE (Hale et al., 2019; Kehle-Forbes et al., 2016; Maguen et al., 2019, 2020; Rosen et al., 2019). For example, in a large national sample of U.S. veterans from the wars in and around Afghanistan and Iraq, military sexual trauma, older age, race/ethnicity, and deployment characteristics were positively associated with receiving an adequate dose of an EBP for PTSD (Maguen et al., 2019). Relatively unexamined, however, is another potential source of variability in treatment completion—the therapists who deliver the interventions. Therapists may vary in their ability to initially engage and ultimately keep patients engaged throughout a treatment course, due either to their own skills or to the characteristics of their work environment that affect their practice. For example, certain clinics are better structured to facilitate the delivery of EBPs for PTSD (Sayer et al., 2017). The phenomenon of variability between therapists in patients' treatment experience and clinical outcomes (e.g., satisfaction, retention, or symptom improvement) is referred to as “therapist effects” (Baldwin & Imel, 2013). When therapist effects are present, certain therapists consistently achieve better results than others. Ignoring therapist effects can result in an overestimation of treatment effects (Crits-Christoph & Mintz, 1991; Kim et al., 2006). Furthermore, if therapist effects are found, one can evaluate whether therapist characteristics (e.g., training, experience), skills (e.g., treatment fidelity, empathy), or characteristics of their work environment (e.g., leadership support, clinic organization) account for the identified therapist effects. This information can then be used to inform interventions to improve therapist performance.

Prior research has suggested that therapists account for an average of 5%–10% of the variance in patients' clinical outcomes (Baldwin & Imel, 2013; Kim et al., 2006). However, the proportion of variance attributable to therapists has been shown to vary enormously, ranging from 0%–50% across studies (Baldwin & Imel, 2013; Crits-Christoph et al., 1991). Therapy manuals that prescribe session content tend to reduce therapist effects on clinical outcomes (Baldwin & Imel, 2013; Crits-Christoph et al., 1991). Conversely, therapist effects tend to be larger in studies based on routine practice than in clinical trials in which therapists are carefully selected and supervised and protocol adherence is monitored (Baldwin & Imel, 2013; Lutz et al., 2007). It is important to understand whether the manualized nature of CPT and PE or another aspect of the VHA's CPT and PE dissemination initiative, such as the use of templated notes for documentation and standardized training and consultation, offset the potential for variations between therapists.

Despite the implications for therapist training and quality improvement efforts, therapist effects in the context of EBP delivery in VHA facilities have received little empirical attention. To our knowledge, only one study has examined therapist ef-

fects for CPT (Laska et al., 2013). The authors found that therapists accounted for approximately 12% of the variability in posttreatment PTSD symptom levels. The study, however, was based on a small number of therapists ($n = 25$) working in one VHA PTSD clinic and only included the 192 patients who had completed a course of CPT (Laska et al., 2013). To reliably estimate the size of therapist effects, a large sample of therapists and a very large sample of patients would be required (Maas & Hox, 2005). In a study of 1,105 VHA therapists providing PE to 3,133 patients as part of the PE training program, Eftekhari et al. (2015) found that therapists of every profession, theoretical orientation, and level of experience and prior training achieved positive clinical outcomes (Eftekhari et al., 2015). However, although the authors examined the effect of therapist characteristics on PTSD symptom improvement, they did not quantify the proportion of variation in these outcomes attributable to variation between therapists. Furthermore, to study therapist effects, a considerably larger number of patients per therapist is required (Schiefele et al., 2017). In addition, the therapists included in these two studies were trainees receiving ongoing case consultation with an expert, which limits these findings' generalizability to the majority of practicing therapists.

The present study used multilevel modeling to estimate the magnitude of therapist effects on patient engagement in EBPs for PTSD in VHA routine care. The number of sessions a patient attends is an important indicator of patient engagement and has been associated with clinical outcomes (Holder et al., 2020; Holmes et al., 2019; Saxon, Firth, et al., 2017). Although a few studies have examined the variation between therapists with regard to patient dropout from psychotherapies for anxiety and depression (Saxon, Barkham, et al., 2017; Zimmermann et al., 2017), we are not aware of any study that has examined the systematic differences between therapists in terms of patient retention in EBPs for PTSD. We used a large, national sample of VHA therapists and patients to examine whether certain therapists had more success than others in keeping patients engaged through the active components of CPT and PE. Our primary objective was to quantify therapist effects for CPT and PE on two indicators of patient engagement: early dropout (i.e., less than three sessions) and adequate dose (i.e., at least eight sessions). Secondarily, we considered whether available therapist characteristics accounted for therapist effects and if therapists with lower early dropout rates were also the therapists with higher adequate dose rates. Should therapist effects in early dropout and adequate dose for EBPs for PTSD exist, then further research explaining these therapist effects would be warranted.

Method

Participants and Procedure

We identified all veterans diagnosed with PTSD in fiscal year (FY) 2017 who received individual psychotherapy in a mental health or PTSD specialty clinic and began a course of CPT or PE that was documented with an EBP template. Sessions of

CPT or PE linked to interns, residents and fellows, peer specialists, and staff not licensed to provide mental health treatment were excluded. Therapists are required to use EBP templates for documentation of individual CPT and PE, although some may not do so. The VHA's EBP templates facilitate the tracking of CPT and PE delivery, which cannot be identified through therapy procedure codes alone. Evidence suggests that since being mandated in 2015, EBP template use has increased (Shiner et al., 2018). Furthermore, in a study that used VHA electronic medical record data from FYs 2018 and 2019, EBP templates identified 96% of EBPs for PTSD (Sayer et al., 2020). The EBP templates include the therapy type (i.e., CPT or PE) and protocol session number; thus, the beginning of a course of CPT or PE would be labeled as Session 1.

Data were extracted from the VHA's Corporate Data Warehouse, which is a national repository of administrative and clinical data, in preparation for a more comprehensive prospective study of therapist effects on EBP delivery and patient outcomes. We extracted data from FY 2017 into the first half of FY 2018 to ensure that all patients had 6 months of data. A very small proportion of patients had more than one EBP treatment course over the year. If a veteran initiated more than one course of an EBP with the same therapist, we included only the first treatment course. If a patient initiated more than one course of an EBP with different therapists, we included both EBP episodes. This approach was consistent with our focus on therapist effects. We excluded group EBP sessions because therapists are not required to use the EBP templates for documentation of groups, and group sessions are often facilitated by two therapists. The Minneapolis VA Health Care System Institutional Review Board approved this research and granted a waiver of informed consent for access to the requisite administrative data.

Measures

Patient Engagement

The two patient engagement outcomes were early dropout and adequate dose. Early dropout was operationalized as completing fewer than three sessions within 6 months of Session 1; adequate dose was defined as completing at least eight sessions within 6 months of Session 1. These definitions are consistent with prior research (e.g., Kehle-Forbes et al., 2016; Maguen et al., 2019).

Demographic Characteristics

We extracted limited demographic information on patients and therapists. For patients, we extracted age, gender, and race and ethnicity. For therapists, we extracted gender, discipline (i.e., psychologist, social worker, and "other," which comprised of physicians, nurses, and behavioral health staff), and years of VHA employment. We also computed therapists' CPT and PE workload as the number of patients each therapist treated with CPT or PE within the year.

Data Analysis

Initial analyses were performed to summarize data at the patient level and assess the distribution of early dropout and adequate dose rates among patients. We calculated each therapist's CPT and PE early dropout and adequate dose rates among their specific patients and used descriptive statistics to describe the variation between therapists.

We used multilevel logistic regression models to examine therapist effects. This allowed us to model the structure of clinical care with patients nested within therapists and to partition the total variance in early dropout and adequate dose between patient and therapist levels. The therapist effect is the proportion of variance at the therapist level. Given that the VHA is an integrated healthcare system, we also examined facility effects, with facility being the specific medical center, and its associated community-based outpatient clinics, where the patient received CPT or PE.

The initial models included random effects for facility (Level 3) and therapist (Level 2), together with fixed effects for the available patient variables (i.e., age, gender, race, and ethnicity) to assess the magnitude of therapist and facility effects while accounting for patient case-mix (Level 1). The initial analyses demonstrated significant therapist- and facility-level effects. Therefore, we expanded these models to include all of the therapist characteristics listed earlier to assess the extent to which these therapist characteristics explained therapist effects. The inclusion of therapist characteristics resulted in no substantive change in the estimated variances for the random effects, and several associations between the therapist characteristics and the engagement outcomes were insignificant, $ps > .187$. For simplicity, we dropped therapist characteristics with a p value higher than .10. For CPT, the final model included therapist gender, discipline (i.e., psychologist, social worker, other), and CPT or PE workload. For PE, length of VHA employment was the only therapist characteristic included in the final model. The Bayesian information criterion (BIC) measures from the analyses of early dropout and adequate dose indicated that inclusion of the fixed effects for patient and therapist characteristics improved the model fit compared with models that only included random effects. The one exception was the analysis of early dropout from PE, wherein patient characteristics did not improve the likelihood statistic enough to overcome the increased penalty due to the number of model parameters. However, because the results for the random effects and remaining fixed effects differed very little when these patient characteristics were omitted from the PE early dropout model, we retained the patient case-mix measures.

The final hierarchical model for early dropout or adequate dose is given by

$$\begin{aligned} \text{logit } p_{ijk} &= \beta_0 + \tau_i + \tau_j + \beta'_j x_j + \beta'_k x_k, \quad \tau_i \sim N(0, \sigma_F^2), \\ \tau_j &\sim N(0, \sigma_T^2) \end{aligned} \quad (1)$$

where p_{ijk} is the probability of the outcome for participant k treated by therapist j at facility i , β_0 is the model intercept, β_k

is the vector of coefficients for the patient-level predictors x_k , β_j is the vector of coefficients for the therapist-level predictors x_j , whereas τ_i and τ_j are the random effects, or residuals, for the facilities and therapists.

The magnitude of the therapist and facility effects is typically summarized using estimates for the variance components σ_F^2 and σ_T^2 and the corresponding proportions of variance captured in the facility and therapist random effects. For each fitted model, we used likelihood ratio tests to test for the presence of therapist and facility effects. We estimated the proportion of variance explained at the therapist and facility levels using the estimates for the variance components, $\hat{\sigma}_F^2$ and $\hat{\sigma}_T^2$.

The therapist residuals present here represent the degree to which each therapist varied in their impact on early dropout and adequate dose relative to the average therapist at the same facility, controlling for the included patient and therapist characteristics. The size of the estimated residuals, $\hat{\tau}_j$, can be used to make comparisons between therapists. For these models, the exponentiated therapists' residuals represent the odds ratio (*OR*) for early dropout or adequate dose associated with a given therapist relative to the average therapist at the same facility. The sum of the therapist and facility residuals represents the odds ratio for this therapist relative to the average therapist within the VHA. We also plotted the summed therapist and facility residuals from the early dropout and adequate dose models against each other as a scatter plot to illustrate how therapist early dropout and adequate dose rates were related.

In sensitivity analyses, we removed therapists who provided CPT or PE to fewer than three patients. This allowed us to evaluate whether the observed patterns were skewed by the inclusion of therapists who had seen very few patients. Supplemental Tables 1 and 2 illustrate the effect of removing these therapists from the residual components. When we reimplemented the multilevel models omitting therapists with fewer than three patients, the results were essentially unchanged.

There was little missing data. The measures of early dropout and adequate dose were not missing for any patient. Patient race and ethnicity were missing for 5.6% and 2.9% of patients, respectively (i.e., 6.9% unique individuals were missing information on both race and ethnicity). Therapist gender was missing for 26.6% of therapists. As the objective of this study was to assess the degree to which there was variation between therapists and the extent to which we could explain the variation between therapists using therapist characteristics as opposed to estimating the effect of patient and therapist characteristics on early dropout and adequate dose, we addressed the missing data for patient race and ethnicity and therapist gender by including a missing category for these categorical variables. The analyses were implemented in SAS (Version 9.4) and R (Version 4.02).

Results

In 2017, 2,709 therapists working at 140 facilities across the VHA provided template-documented individual CPT or PE to

18,461 unique patients diagnosed with PTSD in 18,634 separate EBP episodes of care. Approximately 61% ($n = 1,659$) of these therapists were psychologists, 34.3% ($n = 928$) were social workers, and the remaining 4.5% were physicians ($n = 19$), nurses ($n = 27$), and behavioral health staff ($n = 76$). Approximately 80% of the PTSD patients were male ($n = 14,735$). Two-thirds of the patients were White ($n = 12,305$), almost one-quarter were African American ($n = 4,311$), 4.4% were either Hawaiian or Pacific Islander ($n = 231$), American Indian ($n = 221$), Asian American ($n = 207$) or multiracial ($n = 158$), and the race of 5.6% of participants ($n = 1,028$) was unknown. Approximately half of the patients were married ($n = 9,580$), and 27.1% ($n = 5,008$) were classified as divorced or separated, 18.1% ($n = 3,342$) were single, and the remaining 2.9% were widowed ($n = 201$) or their status was unknown ($n = 330$). The median patient age was 43 years, and 8,554 (46.3%) patients had served in the military operations in and around Afghanistan or Iraq.

On average, each therapist initiated an EBP for PTSD with 6.88 ($SD = 7.73$, $Mdn = 4$, $Mode = 1$) patients over the 12-month period. Over this 12-month period, slightly more than half of the therapists provided individual CPT only ($n = 1,460$, 53.8%), 34.4% ($n = 931$) provided both individual CPT and PE, and approximately 12% ($n = 318$) provided PE only. Thus, it is not surprising that most patients who initiated an EBP for PTSD received CPT ($n = 13,452$, 72.9%). A small proportion of patients ($n = 379$, 2.1%) had more than one course of an EBP that resulted in unique provider-therapy combinations, with 207 (1.1%) receiving CPT and PE from the same therapist, 99 (0.5%) repeating CPT or PE with a different therapist, and 73 (0.4%) receiving CPT and PE from different therapists.

Table 1 shows the distribution of early dropout and adequate dose rates at the patient and therapist levels. As shown, at the patient level, almost one quarter of CPT patients and 18.7% of PE patients dropped out before the third session. Receiving CPT was associated with a higher rate of early dropout compared to PE, $OR = 1.44$, 95% CI [1.32, 1.58]. Approximately 40% of CPT and PE patients completed at least eight sessions and, therefore, were categorized as having received an adequate therapeutic dose. On average, patients who received an adequate dose of CPT completed 11.29 ($SD = 2.39$, $Mdn = 12$) sessions, and patients who received an adequate dose of PE completed 10.96 ($SD = 2.79$, $Mdn = 10$) sessions. At the therapist level, the mean early dropout rate was 26.0% ($SD = 30.9\%$) and 18.7% ($SD = 27.8\%$) for CPT and PE, respectively, while the adequate dose rates were roughly 40%. The interquartile range (IQR) demonstrates the spread in early dropout and adequate dose rates between therapists in the first and third quartiles. Although these patterns were largely unchanged when we restricted the sample to therapists who provided CPT or PE to at least three patients, the IQRs were somewhat smaller (Supplemental Table 1). This is not surprising given that the early dropout and adequate dose rates for providers with just one patient would be either 0% or 100%.

Table 1

Distribution of Early Dropout and Adequate Dose for Cognitive Processing Therapy and Prolonged Exposure for Posttraumatic Stress Disorder

Variable	<i>n</i>	%	<i>M</i>	<i>SD</i>	<i>Mdn</i>	<i>IQR</i>
Patient-level						
Early dropout						
CPT ^a	3,304	24.6				
PE ^b	977	18.7				
Adequate dose						
CPT ^a	5,670	42.3				
PE ^b	2,145	41.0				
Therapist-level						
Early dropout (%)						
CPT ^c			26.0	30.9	17	0–40
PE ^d			18.7	27.8	0	0–33
Adequate dose (%)						
CPT ^c			40.7	34.1	40	0–67
PE ^d			41.0	36.3	37	0–67

Note. IQR = interquartile range; CPT = cognitive processing therapy; PE = prolonged exposure. ^a*n* = 13,404 patients received CPT. ^b*n* = 5,230 patients received PE. ^c*n* = 2,385 therapists provided CPT. ^d*n* = 1,244 therapists provided PE.

Tables 2 and 3 present the variance components for the random effects and the odds ratios for the fixed effects for the patient case-mix and therapist characteristics included in the final multilevel models. For CPT (Table 2), patients who were younger, male, and Hispanic were more likely to drop out early and less likely to receive an adequate dose of treatment. Compared with White patients, patients who were multiracial were more likely to drop out early, whereas patients whose race was unknown were less likely to drop out early and those who were African American were less likely to receive an adequate dose. Male therapists had higher early dropout rates and lower adequate dose rates than female therapists when delivering CPT. We note, however, that 26.6% of therapists had missing gender information. Therapists who provided CPT to more patients had lower early dropout rates. For PE (Table 3), younger patients had higher early dropout rates and lower adequate dose rates. Therapists with more years of VHA employment had lower adequate dose rates.

Likelihood ratio tests from the fitted multilevel models showed therapist effects on early dropout and adequate dose for CPT and PE, as well as smaller facility effects. In the final model for CPT (Table 2), therapist effects accounted for 10.9% of the variance in early dropout and 8.9% of the variance in adequate dose. The model without the therapist characteristics produced therapist effects for CPT of 11.0% for early dropout and 9.1% for adequate dose, indicating that the included therapist characteristics (i.e., therapist gender, discipline, and CPT workload) explained only 0.10% and 0.20% of the variance between CPT therapists with regard to early dropout and adequate dose, respectively. In the final model for PE (Table 3),

therapist effects accounted for 6.0% and 8.8% of the variance in early dropout and adequate dose, respectively. Therapist effects were the same in the initial PE model that did not include years of VHA employment, the only therapist characteristic that met the model inclusion criteria. For CPT, facility accounted for an additional 1.1% and 1.7% of the variance in early dropout and adequate dose, respectively. For PE, facility accounted for an additional 1.7% and 3.1% of the variance in early dropout and adequate dose, respectively.

For a given therapist, the sum of the estimated therapist residual and their respective facility residual can be viewed as the difference in the log odds of early dropout or adequate dose between this therapist and the rest of the therapists practicing within the VHA. We used these summed residuals to rank therapists with regard to early dropout and adequate dose. The summed residuals for early dropout and adequate dose were negatively correlated for both CPT and PE, $r_s = -.61$ and $-.52$, respectively, $p_s < .001$. This association is shown in Figure 1, with the summed residuals plotted on the *x*-axis for adequate dose and the *y*-axis for early dropout. As shown, with 0 on each axis representing the average therapist, therapists who were above average in providing an adequate dose tended to be below average in early dropout. Figure 2 presents boxplots of the observed therapist early dropout and adequate dose rates within therapist groupings, which were formed using the deciles from the respective model-estimated summed random effects. These boxplots illustrate considerable differences in the distribution of early dropout and adequate dose rates across therapist decile groups even after omitting therapists who saw fewer than three patients.

Table 4 presents the odds of early dropout and adequate dose for patients seen across the distribution of therapists. The odds of a patient dropping out early from CPT were approximately 31% lower, $OR = 0.83/1.21 = 0.69$, for patients treated by therapists grouped in the low early dropout quartile compared with the high early dropout quartile. Similarly, the odds of a patient receiving an adequate dose of CPT were 41% higher, $OR = 1.20/0.85 = 1.41$, for patients who saw therapists who were grouped in the top compared with the bottom adequate dose quartile. The differences between therapists were even clearer at the extremes of the distribution. When comparing the odds of early dropout and adequate dose for patients seen by therapists in the highest retention deciles to those seen by therapists in the lowest retention deciles, we found that the odds of early dropout were halved, $OR = 0.72/1.44 = 0.50$, and the odds of adequate dose were almost doubled, $OR = 1.41/0.72 = 1.96$.

The odds of a patient dropping out early from PE were 16% lower, $OR = 0.92/1.10 = 0.84$, for patients treated by therapists grouped in the low early dropout quartile compared with the high early dropout quartile. The odds of a patient receiving an adequate dose of PE were 38% higher, $OR = 1.19/0.86 = 1.38$, for patients who saw therapists in the top compared with the bottom adequate dose quartile. Again, the implications of variation between therapists are even clearer at the extremes of the distributions. The odds of a patient dropping out early from

Table 2*Estimated Variance Components for Random Effects and Odds Ratios for Fixed Effects for Cognitive Processing Therapy (CPT)*

Variable	Early dropout model ^a					Adequate dose model ^a				
	Est.	SE	Proportion of variance	OR	95% CI	Est.	SE	Proportion of variance	OR	95% CI
Random effects										
Estimated variance components										
Facility ^b , σ^2_F	0.039	0.017	0.011**			0.063	0.016	0.017***		
Therapist ^c , σ^2_T	0.407	0.041	0.109***			0.329	0.034	0.089***		
All random effects			0.119***					0.107***		
Fixed effects										
Patent case-mix										
Age				0.99	[0.99, 0.99]***				1.02	[1.01, 1.0]
Male (ref.: female)				1.18	[1.06, 1.32]**				0.82	[0.75, 0.91]**
Race (ref.: White)										
Native American				1.32	[0.90, 1.92]				0.71	[0.50, 1.01]
Asian American				0.89	[0.59, 1.36]				1.17	[0.82, 1.67]
African American				1.01	[0.91, 1.13]				0.88	[0.80, 0.97]**
Native Hawaiian/Pacific Islander				1.02	[0.71, 1.48]				1.04	[0.75, 1.44]
Multiracial				1.91	[1.28, 2.82]**				0.81	[0.55, 1.20]
Unknown				0.77	[0.62, 0.94]*				1.10	[0.93, 1.32]
Ethnicity (ref.: non-Hispanic)										
Hispanic				1.18	[1.02, 1.37]*				0.83	[0.73, 0.95]**
Unknown				1.23	[0.94, 1.60]				0.90	[0.71, 1.14]
Therapist characteristics										
CPT workload				0.99	[0.99, 1.00]**				1.00	[1.00, 1.01]
Gender (ref.: female)										
Male				1.18	[1.02, 1.35]*				0.82	[0.72, 0.93]**
Missing				0.96	[0.84, 1.09]				1.01	[0.90, 1.14]
Discipline (ref.: Psychologist)										
Other									0.80	[0.61, 1.05]
Social worker									0.85	[0.76, 0.94]**

Note. OR = odds ratio; ref. = reference group used for the OR comparison.

^aModel Bayesian information criterion values for early dropout and adequate dose were 14,608 and 17,700, respectively, compared to 14,641 and 17,816 for the respective models without fixed effects. ^bCalculated as $\sigma^2_F / (\sigma^2_F + \sigma^2_T + p^2/3)$. ^cCalculated as $\sigma^2_T / (\sigma^2_F + \sigma^2_T + p^2/3)$.

* $p < .05$. ** $p < .01$. *** $p < .001$.

PE were 28% lower, $OR = 0.86/1.20 = 0.72$, when they saw a therapist grouped in the highest retention decile compared with the lowest retention decile. The odds of a patient receiving an adequate dose of PE were approximately 84% higher, $OR = 1.38/0.75 = 1.84$, for patients who saw therapists in the highest compared with the lowest retention decile of therapists for adequate dose. The differences in the odds ratios between the high- and low-performing therapists with regard to early dropout and adequate dose for both CPT and PE were unchanged or somewhat more extreme when we removed therapists who had provided an EBP for PTSD to fewer than three patients over the 12-month period (see Supplemental Table 2), indicating that

the observed systematic variation in retention was not due to the inclusion of therapists who saw very few patients.

Discussion

The present study used multilevel modeling to quantify therapist effects for CPT and PE on early dropout (i.e., fewer than three sessions) and adequate dose (i.e., at least eight sessions). For both EBPs for PTSD, we observed significant therapist effects on these two indicators of treatment engagement. Specifically, for CPT, therapist effects accounted for 10.9% of the

Therapist Effects on Patient Engagement

Table 3

Estimated Variance Components for Random Effects and Odds Ratios for Fixed Effects for Prolonged Exposure (PE)

Variable	Early dropout model ^a					Adequate dose model ^a				
	Est.	SE	Proportion of variance	OR	95% CI	Est.	SE	Proportion of variance	OR	95% CI
Random effects										
Facility ^b , σ^2_F	0.060	0.033	0.017**			0.114	0.036	0.031***		
Therapist ^c , σ^2_T	0.214	0.065	0.060***			0.327	0.057	0.088***		
All random effects			0.077***					0.118***		
Fixed effects										
Patient case-mix										
Age				0.99	[0.98, 0.99]***				1.02	[1.02, 1.03]***
Male (ref.: female)				1.09	[0.90, 1.34]				1.02	[0.86, 1.20]
Race (ref.: White)										
Native American				0.99	[0.52, 1.89]				0.77	[0.46, 1.30]
Asian American				1.05	[0.56, 1.97]				1.16	[0.69, 1.94]
African American				1.07	[0.90, 1.28]				0.87	[0.74, 1.01]
Native Hawaiian/Pacific Islander				1.16	[0.63, 2.16]				0.94	[0.54, 1.63]
Multiracial				0.90	[0.39, 2.09]				0.84	[0.42, 1.68]
Unknown				0.86	[0.60, 1.24]				0.91	[0.68, 1.21]
Ethnicity (ref.: non-Hispanic)										
Hispanic				1.07	[0.84, 1.35]				0.85	[0.69, 1.04]
Unknown				0.97	[0.60, 1.56]				1.12	[0.77, 1.62]
Therapist characteristics										
Years of VHA employment				1.01	[1.00, 1.03]				0.99	[0.95, 1.00]*

Note. OR = odds ratio = reference group used for the OR comparison; VHA = Veterans Health Administration.

^aModel Bayesian information criterion values for early dropout and adequate dose were 5,032 and 6,880, respectively, compared to 5,014 and 6,935 for the respective models without fixed effects. ^bCalculated as $\sigma^2_F / (\sigma^2_F + \sigma^2_T + p^2/3)$. ^cCalculated as $\sigma^2_T / (\sigma^2_F + \sigma^2_T + p^2/3)$.

* $p < .05$. ** $p < .01$. *** $p < .001$.

variance in early dropout and 8.9% of the variance in adequate dose; for PE, therapist effects accounted for 6.0% and 8.8%, of early dropout and adequate variances, respectively. Patients who completed an adequate dose of CPT or PE tended to re-

ceive close to the number of sessions used to define a complete course of treatment in the respective treatment protocols (Foa et al., 2019; Resick et al., 2017) and efficacy studies (Forman-Hoffman et al., 2018). Despite considerable interest in reducing

Table 4

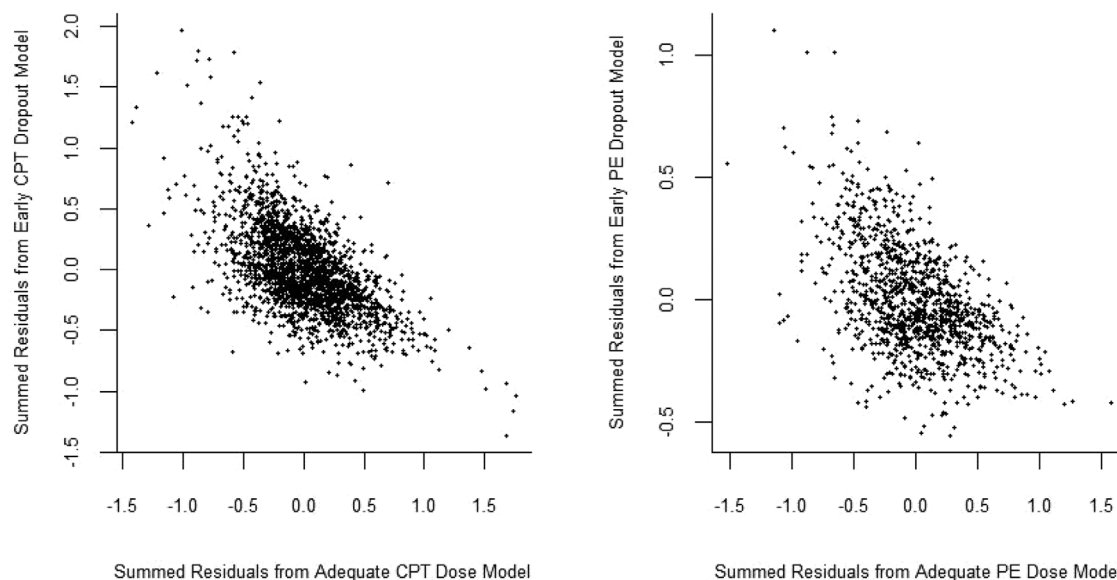
Odds Ratios for Early Dropout and Adequate Dose Across the Distribution of Therapists

Variable	Therapist ranking (OR)					
	Minimum	10th percentile	25th percentile	75th percentile	90th percentile	Maximum
CPT						
Early dropout	0.38	0.72	0.83	1.21	1.44	6.39
Adequate dose	0.29	0.72	0.85	1.20	1.41	2.79
PE						
Early dropout	0.64	0.86	0.92	1.10	1.20	2.46
Adequate dose	0.38	0.75	0.86	1.19	1.38	3.28

Note. Odds ratios (ORs) adjusted for the patient case-mix and therapist characteristics presented in Tables 2 and 3. CPT = cognitive processing therapy; PE = prolonged exposure.

Figure 1

Scatterplot of Summed Therapist and Facility Residuals from Early Dropout and Adequate Dose Models



Note. CPT = cognitive processing therapy; PE = prolonged exposure.

dropout and ensuring that patients receive a sufficient dose of active therapy components, this was the first study of which we are aware to assess therapist effects on patient retention in CPT and PE and one of only a few studies (cf. Saxon, Barkham, et al., 2017; Zimmermann et al., 2017) to examine therapist effects on dropout from any form of psychotherapy. Our findings demonstrate that therapist effects on early dropout and adequate dose exist for EBPs for PTSD even though both are manualized treatments and all patients in the current sample carried a PTSD diagnosis.

The practical implications of therapist effects on early dropout and adequate dose are conveyed most strikingly by comparing the early dropout and adequate dose rates for therapists at the extremes across the distribution of therapists. For CPT, the odds of early dropout were halved and the odds of adequate dose were doubled for patients seen by therapists in the highest (i.e., best) compared to patients seen by therapists in the lowest (i.e., worst) retention deciles. For PE, the odds of early dropout were 28% lower and the odds of receiving an adequate dose were 84% higher for patients who saw a therapist in the highest compared with the lowest retention deciles. This magnitude of variability between therapists was not due to the inclusion of therapists who provided an EBP for PTSD to a very small number of patients. Taken together, the findings from this investigation support expanding the focus of research on EBP for PTSD to include an examination of therapist effects on patients' treatment experiences and outcomes.

Research examining the reasons for therapist effects on early dropout and adequate dose has the potential to inform interventions to improve patient retention in treatment until they receive an adequate dose of the active therapy components. The ther-

apist characteristics examined, namely therapist gender; discipline; CPT or PE workload, defined as the number of CPT or PE patients; and years of VHA employment, explained little of the variation between therapists in CPT outcomes and even less of the variation between therapists in PE outcomes. Thus, although it is interesting that therapists who provided CPT to more patients had lower early dropout rates and that therapists with more years of VHA employment had lower adequate dose rates for PE, these therapist characteristics do not account for much of the observed variation between therapists with regard to early dropout and adequate dose.

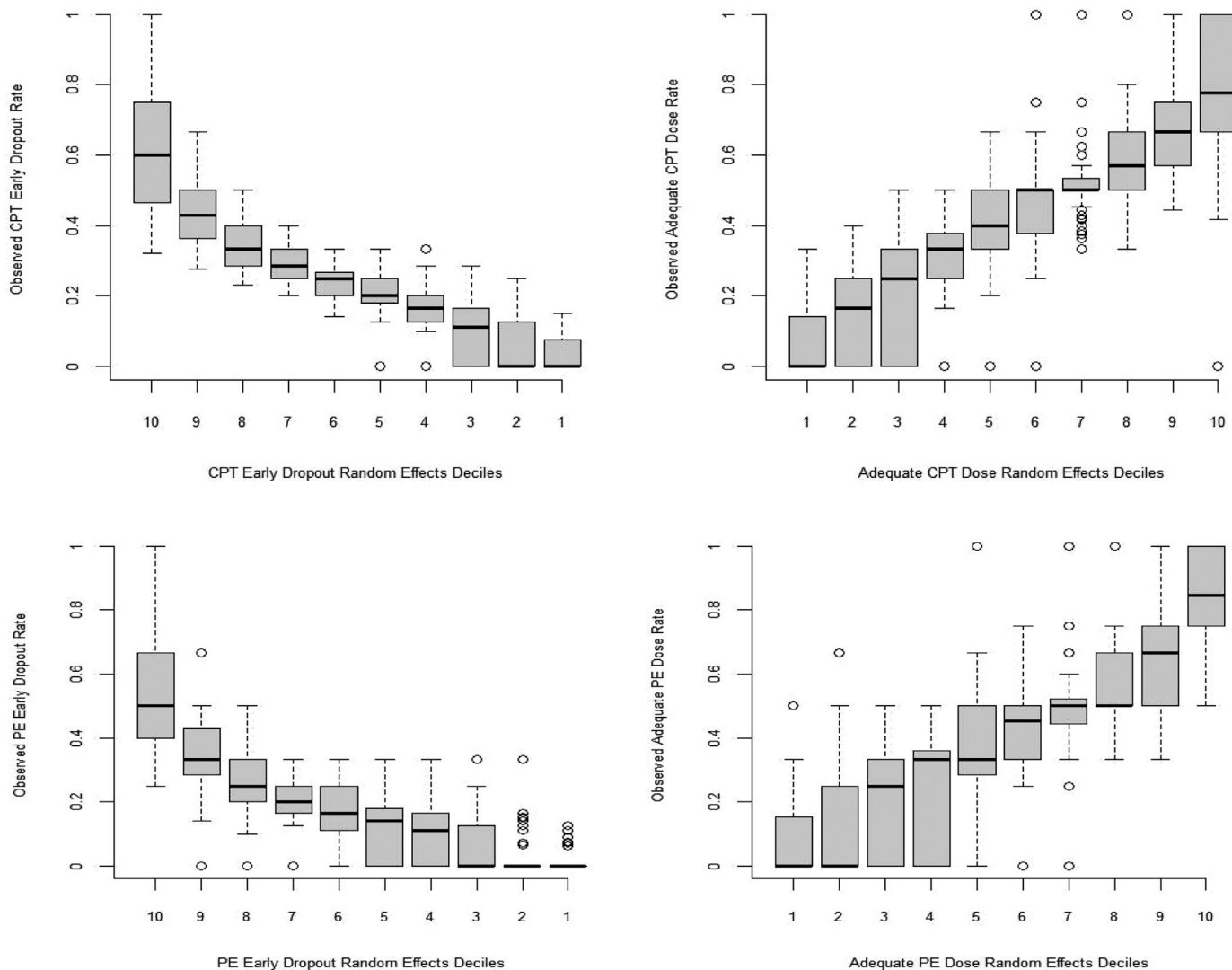
Modifiable factors that are more difficult to assess, such as therapist skills or attitudes, may better account for the observed variation across therapists in patient retention. Certain therapist skills that contribute to patient retention may be specific to CPT or PE (e.g., protocol adherence, the ability to explain the treatment rationale) whereas others may be nonspecific (e.g., empathy, warmth, the ability to instill hope) and reflect strengths of certain therapists across therapeutic modality and patients' presenting problems. Treatment fidelity is of particular interest given that preliminary work has suggested that therapist fidelity during CPT is associated with clinical improvement (Holder et al., 2018). We also observed that therapists who were above average in providing an adequate dose tended to be below average in early dropout, suggesting a meaningful but not complete overlap in therapist behaviors that facilitate patient engagement near the beginning of therapy, when the therapeutic alliance is being formed, and those that promote patient retention later in the treatment course.

Therapists' work environment may also contribute to therapist effects on patient early dropout and adequate dose. Seen in

Therapist Effects on Patient Engagement

Figure 2

Boxplots of Therapist Early Dropout and Adequate Dose Rates, by Decile Groups, for the Model-Estimated Summed Random Effects



Note. The boxplots omit observed rates for therapists with fewer than three patients. Reading left to right, therapist deciles ordered from worst to best in terms of early dropout and adequate dose rates.

this light, a therapist effect would be difficult to separate from a clinic effect, something we were not able to fully explore. Prior research has suggested that clinic structure and team processes, two factors we could not describe based on the administrative data used, are associated with therapist adoption of EBPs to treat PTSD and, hence, the number of patients with PTSD who receive an EBP (Hundt et al., 2018; Sayer et al., 2017). In a pragmatic effectiveness trial, Fortney and colleagues (2015) found that a telemedicine-based collaborative care model improved patient engagement in CPT. Clinic-level factors that may affect a therapists' ability to keep patients engaged in an EBP include team mission, organization and culture, and EBP-supportive practices, such as symptom monitoring, as well as the magnitude and distribution of therapists' workload. These factors may vary across different clinics within the

same facility; thus, the small facility-level effect we observed does not preclude identifying clinic-level factors or models of care that affect patient engagement in EBPs either directly or through their effect on therapist behaviors. An important topic for future research is whether providing psychotherapy in specialized PTSD clinics rather than general mental health clinics results in more consistency between therapists and thereby minimizes therapist effects on patient engagement in EBPs for PTSD.

The finding of larger therapist effects for early dropout from CPT than for PE is interesting and difficult to interpret. Given that more therapists provided CPT than PE, the finding related to larger variation between therapists who administered CPT is perhaps not surprising. Therapists who deliver CPT may vary more in their ability to engage patients in the initial sessions,

may work in more varied clinical contexts with different types and levels of support for EBP delivery, or their patients may be more difficult to engage than those of PE therapists. Alternatively, the larger therapist effect for early dropout from CPT than PE may stem from differences inherent to the treatments themselves. The fact that CPT involves more components and is more cognitively based than PE may make CPT more difficult for some therapists to learn, although this has not been empirically evaluated. Differences between therapist training models for CPT and PE may also contribute to differences in the mastery of CPT versus PE. Specifically, PE employs a centralized model with a small cadre of trainers, whereas CPT employs a regional model with a larger number of trainers (Rosen et al., 2016). In addition, the original PE training program lasted for 4 days, whereas the CPT training lasted for 2 days (Karlin et al., 2010). Even if CPT is not more difficult to master than PE, the CPT training model may need to be augmented to reduce heterogeneity between therapists and, potentially, between trainers. Interventions to reduce therapist effects for both EBPs could include enhanced supervision, ongoing fidelity checks, and further training. The effect of different EBP training models on therapist fidelity and skill acquisition is important but infrequently studied (Valenstein-Mah et al., 2020).

The present study included all FY 2017 VHA therapists who documented delivery of CPT or PE with an EBP template and their patients diagnosed with PTSD. An important limitation is that even though template use has increased since 2015 (Sayer et al., 2020; Shiner et al., 2018), some therapists may not have documented CPT and PE with these templates. If the therapists delivering CPT and PE who use templates are systematically different from those who do not in ways that affect early dropout and adequate dose, we may have underestimated the variation between therapists. Another significant limitation is that we were not able to identify and remove trainees whose workload would have been credited to the licensed mental health professional supervising them. For most therapists in the sample, the therapist provided CPT or PE to all patients associated with them. However, some therapists in the sample were supervisors of mental health trainees, and some proportion of the patients associated with these therapists were treated by the trainees under the therapist's supervision. In an ongoing national study that involves manual chart review of all individual CPT and PE sessions for 2,700 veterans who initiated an EBP for PTSD over a 12-month period (Sayer, 2021), 13% of the patients were seen by a mental health trainee. In the analyses presented for the present study, the therapist identifier can be conceptualized as corresponding to groups of therapists, with most groups comprising an individual therapist and a smaller number comprising a supervising therapist and their trainees. The fitted analyses can be viewed as missing individual therapist effects within the supervisor/trainee groups. We would fully expect the estimated variance at the therapist level in the presented analyses to be comparable to or smaller than the total variance stemming from therapist effects and grouped supervi-

sor/trainee effects. That is, had we been able to nest trainees within their supervisors (i.e., to account for the trainee contribution), our estimates would have been more precise, and we would have explained even more of the total variation in early dropout and adequate dose. Given the range of variation in early dropout and adequate dose that we observed (see Figure 2), we can still conclude that there was substantial variation between therapists. In sum, although this limitation may affect the precision of our estimate of therapist effects, it does not take away from the conclusion that therapist effects on early dropout and adequate dose exist for EBPs for PTSD. More precise estimates of the magnitude of therapist effects on early dropout and adequate dose across the VHA will require research designs that address these limitations.

Additional limitations worth noting are that we were not able to ascertain the reasons for early dropout nor did we evaluate whether therapists provided a therapy other than CPT or PE to the patients who discontinued an EBP for PTSD. Such information would aid in the interpretation of the early dropout and adequate dose rates that we observed. We did not have data on important variables that are likely to be associated with early dropout and adequate dose, such as patient clinical severity or comorbidity; thus, were not able to fully adjust for case-mix. We also acknowledge that our definitions of early dropout and adequate dose, while consistent with prior research (Kehle-Forbes et al., 2016; Maguen et al., 2019), allowed for between-session spacing to be considerably longer than specified in the CPT and PE treatment manuals (Foa et al., 2019; Resick et al., 2017) and did not necessarily mean that a patient completed treatment or improved. There are other meaningful indicators of treatment engagement, such as homework completion, that we did not measure. Finally, we did not link early dropout and adequate dose to clinical outcomes, such as PTSD symptom improvement.

The study limitations notwithstanding, our findings related to therapist effects on early dropout and adequate dose for CPT and PE signal the need for more research on variation between therapists in EBP delivery. To address the study limitations, future studies of therapist effects should include manual chart review and examine the reasons for therapist effects, with particular attention paid to modifiable factors at the provider (e.g., adherence, empathy) and clinic (e.g., clinic mission, leadership support) levels. Such work has the potential to inform therapist training, clinic design, and novel strategies to support therapists in their efforts to deliver evidence-based care and, hence, has the potential to improve patient retention and clinical outcomes from EBPs for PTSD.

Open Practice Statement

This study was not formally preregistered. The data have not been made available on a permanent third-party archive, and we do not have IRB approval to post or share the data.

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