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Predictors of dropout from a randomized clinical trial of cognitive processing therapy for female veterans with military sexual trauma-related PTSD

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ABSTRACT

Many veterans do not complete evidence-based treatments (EBTs) for posttraumatic stress disorder (PTSD). Veterans with military sexual trauma (MST)-related PTSD were shown to have higher than average rates of dropout from PTSD treatment in a national study of EBT implementation. Although predictors of dropout from EBTs have been identified, these factors are largely unmodifiable (e.g., age, service era). The purpose of the present study was to identify dynamic psychosocial predictors of dropout among female veterans from cognitive processing therapy (CPT). Data were utilized from 56 female veterans who participated in a randomized clinical trial investigating the effectiveness of CPT for MST-related PTSD. Dropout was defined continuously (i.e., number of sessions attended) and dichotomously (i.e., attending six or more sessions). Potential predictors included sociodemographic factors, psychotherapist fidelity, PTSD-related service connection, psychiatric symptom severity (i.e., PTSD, depression), trauma-related negative cognitions (about self, self-blame, world), and treatment expectations. Higher trauma-related negative cognitions about self-blame and lower trauma-related negative cognitions about self were protective against dropout. The current study generated testable hypotheses for further research on dynamic predictors of dropout from CPT in female veterans with MST-related PTSD. With replication, results may assist with identifying pre-treatment strategies to reduce dropout in this clinical population.

1. Introduction

Trauma-focused evidence-based treatments (EBTs) for posttraumatic stress disorder (PTSD), including Cognitive Processing Therapy (CPT) and Prolonged Exposure Therapy (PE), have been widely disseminated by the Department of Veterans Affairs (VA; Karlin et al., 2010; Karlin and Cross, 2014). Multiple recent meta-analyses have shown that CPT and PE provide some of the greatest reductions in PTSD symptom severity compared to other PTSD treatments (Watts et al., 2013; Lee et al., 2016; Lenz et al., 2017). Despite these reductions, dropout from these treatments remains high (Najavits, 2015), with approximately 25% of veterans dropping out of published randomized clinical trials (RCTs; Steenkamp et al., 2015). Within naturalistic treatment settings for veterans, dropout rates may be even higher than during RCTs (Hoge et al., 2017), with studies of dropout in two VA Medical Center PTSD clinics finding that more than a third of veterans dropped out of trauma-focused EBTs (Mott et al., 2014; Kehle-Forbes et al., 2016).

Dropout from trauma-focused EBTs may be particularly important to assess for veteran survivors of military sexual trauma (MST) who are diagnosed with PTSD, considering that these veterans had significantly higher rates of dropout (40%) compared to the study average (28%) during a large study of the effectiveness of a trauma-focused EBT (Eftekhari et al., 2013). MST remains an understudied trauma type that disproportionately affects female veterans (Wilson, 2018). According to a recent meta-analysis (Wilson, 2018), approximately 38.4% of female veterans report MST (vs. 3.9% of male veterans), when defined as psychological trauma which resulted from sexual assault or sexual

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harassment occurring during one's military service (U.S. Code, Title 38 § 1720D). Although MST survivors experience a number of psychosocial consequences (e.g., depression, substance misuse, risk of interpersonal abuse, poorer health, poorer social support) following MST (Surís et al., 2013a), MST-related PTSD is among the most commonly studied and reported (Williamson et al., 2017). By federal definition, not all MST qualifies as a criterion A index trauma for PTSD (American Psychiatric Association, 2000); however, when MST does qualify as an index trauma, MST-related PTSD is associated with more severe symptomatology compared to childhood sexual (Surís et al., 2004), civilian sexual (Surís et al., 2004), and combat trauma (Sexton et al., 2017). Further, female MST survivors report considerable barriers to care including stigma and discomfort in seeking care in settings that are perceived to be male-dominated, such as the VA (Turchik et al., 2014).

Considering the increased symptomatology, substantial stigma, and high rates of dropout in this population, identifying factors which predict dropout among female veterans with MST-related PTSD carries important clinical implications. Across studies of dropout from trauma-focused EBTs, the most consistently identified predictors are younger age and service during the wars in Iraq and Afghanistan, constructs with substantial overlap (Rizvi et al., 2009; Garcia et al., 2011; Gros et al., 2011; Jeffreys et al., 2014; Mott et al., 2014; Kehle-Forbes et al., 2016; Szafranski et al., 2016). However, other studies have failed to confirm age and service era as predictors of dropout (van Minnen et al., 2002; Chard et al., 2010). Similar patterns have been observed for other fixed sociodemographic predictors of dropout. Some studies have identified that racial/ethnic minority participants drop out at higher rates than White participants (Lester et al., 2010; Spoont et al., 2017) and others have found no effect (Zoellner et al., 1999; Chard et al., 2010; Gros et al., 2011). Higher education has been shown to reduce dropout (Rizvi et al., 2009; Zimmermann et al., 2017), but education has also been shown to have no effect on dropout (van Minnen et al., 2002; Chard et al., 2010). Service connection (i.e., monetary disability benefit for a veteran due an injury or illness that occurred or was worsened during military service) is one variable that is often hypothesized to influence dropout, but has not been found to affect dropout in previous investigations (Chard et al., 2010; Gros et al., 2011; Mott et al., 2014). Despite the importance of recognizing these factors in clinical practice and potentially making treatment accommodations because of these factors, they are unmodifiable. Therefore, considering psychosocial factors that are dynamic may be particularly important for reducing dropout by identifying ideal timing to initiate treatment or developing brief interventions to address modifiable predictors of dropout.

Dynamic predictors of dropout have been studied much less consistently than fixed sociodemographic characteristics. Baseline PTSD and depression symptom severity are among the most consistently studied of these factors. Some studies indicate that greater PTSD or depression symptom severity at the start of treatment *reduces* dropout (Zayfert et al., 2005; Garcia et al., 2011); however, other studies have shown no effect of baseline PTSD or depression symptom severity (van Minnen et al., 2002; Chard et al., 2010; Gros et al., 2011). Treatment expectations are a second predictor of dropout which has been investigated in psychotherapy generally (Zimmermann et al., 2017) and in PTSD treatment (van Minnen et al., 2002; Taylor, 2003), with some studies showing that greater expectations reduce dropout (Taylor, 2003; Zimmermann et al., 2017) and others showing no effect (van Minnen et al., 2002). Individuals who believe a treatment will work for them may be less likely to drop out. Therapist approach and experience has been shown to have a meaningful effect on dropout (Ehlers et al., 2013; Zimmermann et al., 2017), with higher dropout among patients treated by less experienced therapists (Ehlers et al., 2013). Therefore, the quality or skill level (i.e., treatment fidelity) of psychotherapy provided has the potential to influence patient behavior and treatment response (Holder et al., 2018). One variable that is particularly important to trauma-focused EBT treatment outcomes that has not been investigated in the context of dropout is trauma-related negative cognitions (NCs; Schumm et al., 2015; LoSavio et al., 2017; Carroll et al., 2018; Holliday et al., 2018). NCs describe an individual's view of themselves, others, and the world (Foa et al., 1999), potentially affecting their beliefs regarding their capacity to complete treatment, trust in their providers, and/or trust in their treatment setting. Additionally, it is possible that NCs affect dropout via their effect on treatment outcome (Schumm et al., 2015; LoSavio et al., 2017; Carroll et al., 2018; Holliday et al., 2018) as veterans may be less likely to discontinue treatment that they perceive to be effective (Szafranski et al., 2017). Targeting or leveraging these factors prior to engaging in treatment (e.g., providing psychoeducation, utilizing motivational interviewing techniques, additional fidelity monitoring) may help to reduce dropout from treatment. Alternatively, these dynamic factors could be used to identify when over the course of an illness an individual is less likely to drop out of treatment.

Unfortunately, methodological differences have made it difficult to integrate and consolidate the discrepant results that have come from existing studies (Schottenbauer et al., 2008). For example, the term “dropout” (also referred to as “attrition,” “treatment non-completion,” “early termination,” and “premature termination”) is operationalized in highly discrepant ways throughout the literature (e.g., completion of all sessions in a protocol as required by a manual, completion of 75% of sessions, ending treatment before reaching good end state functioning, failure to receive a minimally adequate dose of a treatment; Schottenbauer et al., 2008; Szafranski et al., 2017). The purpose of the study was to identify sociodemographic and psychosocial predicators of predictors of dropout from CPT among veterans with MST-related PTSD using multiple operational definitions of dropout, with an emphasis on generating hypotheses about dynamic predictors of dropout. Specifically, dropout was operationalized in two ways (i.e., number of sessions attended [continuously] and minimum number of recommended sessions in a treatment course [dichotomously]) to identify how differences in operational definitions may affect results and provide multiple points of comparison for future research. Sociodemographic predictors (i.e., age, education, racial-ethnic self-identification) and PTSD-related service connection were included as potential fixed predictors of dropout. Additional factors, including baseline symptom severity (i.e., PTSD and depression), treatment expectations, psychotherapist treatment fidelity, and NCs were also included.

2. Method

2.1. Participants

Data for the current study were collected from a previously published RCT examining the effectiveness of CPT in veterans with MST-related PTSD (Surís et al., 2013b). Veterans were recruited from a large, southwestern Veterans Affairs Medical Center via posted advertisements, recruitment letters, and clinician referral. Inclusion criteria were: (1) veteran status with a diagnosis of MST-related PTSD as confirmed by the Clinician Administered PTSD Scale (CAPS; *see* the Measures section below for further information), (2) MST occurred at least 3 months prior to baseline assessment, (3) MST was identified as the most distressing PTSD-related trauma, (4) at least one clear memory of the MST, and (5) no changes were made to psychiatric medication in the 6 weeks before baseline assessment. Exclusion criteria were: (1) substance dependence/abuse in the 3 months before baseline assessment, (2) current psychotic symptoms, (3) unstable bipolar disorder, (4) severe cognitive impairment, (5) concurrent enrollment in a psychotherapy for PTSD, (6) involvement in a violent intimate partner relationship, and/or (7) suicidal/homicidal intent warranting immediate intervention. The study was approved by the local Institutional Review Board and each veteran provided informed consent before participation.

Of veterans enrolled in the parent RCT (n = 161), 32 veterans were

excluded due to not meeting inclusion criteria/meeting exclusion criteria ($n = 16$), participant declining enrollment ($n = 13$), or other reasons ($n = 3$). Enrolled veterans ($n = 129$) were randomized to receive either CPT or a non-trauma-focused comparison condition (Present Centered Therapy [PCT]). Because the purpose of the current study was to examine female veterans' dropout from CPT, only data from female veterans randomized to CPT ($n = 60$) were analyzed. Data from male veterans randomized to CPT ($n = 12$) were not analyzed due to the focus of the study on female veterans as well as complete separation in the outcome variables (i.e., all male participants completed 12 sessions of CPT). One female participant did not attend any sessions of CPT. As predictors of treatment *initiation* may differ from treatment *dropout*, this veteran was excluded from analyses. Complete data for analyses were available from 54 female veterans, and 5 veterans had missing data in variables of interest. Multiple imputation was utilized to preserve data from participants who were missing a single item of a questionnaire; however, data could not be recovered for three veterans who were missing an entire questionnaire (see data analysis below). This resulted in a final analytic sample of 56 female veterans. Sociodemographic information for veterans included in the analysis is provided in Table 1.

2.2. Procedure

At baseline, veterans completed an assessment which included administration of a sociodemographic questionnaire, CAPS, Posttraumatic Cognitions Inventory (PTCI), PTSD Checklist, Military Version (PCL-M), & Quick Inventory of Depressive Symptomatology-Self Report version (QIDS-SR_{16}). Eligible veterans were then randomized into a treatment condition. Veterans randomized to the CPT treatment condition were expected to receive a total of 12, 1-h psychotherapy sessions. CPT was delivered by therapists using the treatment manual adapted for the treatment of PTSD in veterans and military personnel (Resick et al., 2007). A version of CPT which is now referred to as CPT + A was utilized, meaning that a written account was included in treatment protocol. Veterans completed the Expectancy of Treatment Outcome (ETO) questionnaire after completing the first session of CPT. After completion of the RCT, treatment fidelity analysis indicated significant differences in treatment fidelity between psychotherapists (Holder et al., 2018). Based on these differences, veterans were separated into groups of those who received treatment from a therapist with "good" treatment fidelity vs. "below average" treatment fidelity (see Holder et al., 2018 for additional information).

Table 1
Sociodemographic information and baseline characteristics of the sample.

Variable	Attended less than 6 sessions ($n = 23$)		Attended more than 6 sessions ($n = 33$)		Full sample ($n = 56$)	
	M	*SD*	*M*	*SD*	*M*	*SD*
Age	42.78	10.66	45.91	9.63	44.63	10.09
Years of education	13.87	3.03	14.70	1.99	14.36	2.03
ETO Total	24.83	6.69	27.79	5.12	26.55	5.93
NCs about Self	4.25	1.18	4.08	1.24	4.15	1.21
NCs about the World	5.91	1.04	5.55	1.02	5.70	1.03
NCs about Self-Blame	3.35	1.84	4.01	1.49	3.74	1.66
PCL-M Total[a]	67.81	8.54	64.88	13.12	66.05	11.35
QIDS-SR_{16} Total	17.22	4.23	16.61	5.33	17.86	4.88
	n	%	*n*	%	*n*	%
Racial-ethnic self-identification						
Black, non-Hispanic	9	16.7%	16	28.6%	25	44.6%
White, non-Hispanic	6	10.7%	12	21.4%	18	32.1%
Other[b]	2	3.6%	11	19.6%	13	23.2%
PTSD-SC						
Yes	4	7.1%	6	10.7%	10	17.9%
No	13	23.2%	33	58.9%	46	82.1%
Treatment Fidelity						
"Good"	6	10.7%	17	30.4%	23	41.1%
"Below Average"	11	19.6%	22	39.3%	33	58.9%

Note. ETO = expectancy of therapeutic outcome; NCs = trauma-related negative cognitions; PCL-M = posttraumatic stress disorder checklist, military version; PTSD-SC = posttraumatic stress disorder service connection; QIDS-SR_{16} = quick inventory of depressive symptomatology, self-report.

[a] Two participants in the attended less than six sessions group had missing data on the PCL and are not included in calculations of mean and standard deviation.

[b] "Other" included individuals who identified as "multi-racial."

2.3. Measures

The CAPS was administered to diagnose PTSD related to MST as defined by the *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition, Text Revision* (DSM-IV-TR; Blake et al., 1995; American Psychiatric Association, 2000). The CAPS has strong psychometric properties including high convergent validity with other commonly utilized measures of PTSD symptom severity and is widely considered to be a "gold-standard" assessment tool for diagnosing PTSD (Weathers et al., 2001). The current study used an overall severity cutoff score of 45 and the "1–2″ rule of scoring for PTSD diagnosis (Blake et al., 1990).

The ETO was administered to assess veterans' beliefs about treatment (Resick et al., 2002). The ETO uses four questions to measure the perceived credibility of CPT: (1) "How logical does this type of treatment seem to you?"; (2) "How successful do you think that this treatment will be in reducing your trauma-related symptoms?"; (3) "How successful do you think that this treatment will be in reducing other personal problems?"; and (4) "How confident would you be in recommending this treatment to a friend with similar problems?" Veterans responded to each question on a 9-point scale ranging from 0 ("Not at all") to 8 ("Extremely"). ETO total scores were calculated by summing the items, and higher scores indicate more positive beliefs of CPT treatment. Three veterans did not complete any items of the ETO and were therefore excluded from data analysis. In the current study, internal consistency for the ETO was excellent ($\alpha = 0.91$).

The PTCI was administered to assess self-reported trauma-related NCs (Foa et al., 1999). The PTCI is divided into three subscales: NCs about self, NCs about the world, and NCs about self-blame. Each of the 36 items of the PTCI are rated from 1 ("Totally Disagree") to 7 ("Totally Agree"), with higher scores indicating more problematic NCs. Subscale scores are generated using the mean score of items endorsed in that subscale. The PTCI has demonstrated good internal consistency and convergent validity (Foa et al., 1999). Internal consistency for the PTCI subscales ranged from good ($\alpha = 0.83$) for the NCs about self-blame subscale and ($\alpha = 0.85$) for the NCs about world subscale to excellent ($\alpha = 0.93$) for the NCs about self subscale.

The PCL-M was used to assess self-reported, *DSM-IV-TR* PTSD symptom severity (Weathers et al., 1993). The PCL-M was anchored to each veteran's worst military trauma, which was identified as MST. The PCL-M is a 17-item measure with each item scored from 1 ("Not at all") to 5 ("Extremely"), summing to generate a total score ranging from 17–85. Across populations, the PCL-M has been shown to have strong test-retest reliability and concurrent validity to other measures of PTSD (Wilkins et al., 2011). Internal consistency for the PCL-M was good ($\alpha = 0.89$) in the current study.

The QIDS-SR_{16} was administered to assess depression symptom severity (Rush et al., 2003). The QIDS-SR_{16} is a 16-item self-report measure that assesses how much a participant endorses a symptom of depression, with each item scored from 0 (no endorsement of symptom) to 3 (endorsement of severe symptomatology). Scoring of the QIDS-SR_{16} ranges from 0–27, with higher scores indicating higher depressive

Table 2
Bivariate correlation matrix for predictor variables.

Variable	1	2	3	4	5	6	7	8	9
1. Years of education	–								
2. Age	0.17	–							
3. QIDS-SR_{16}total	0.16	0.12	–						
4. PCL-M total	0.15	0.09	0.64***	–					
5. ETO	0.11	0.06	−0.04	0.05	–				
6. NCs about self	0.00	−0.08	0.61***	0.45**	−0.34*	–			
7. NCs about self-blame	0.07	−0.17	0.25	0.21	−0.19	0.64***	–		
8. NCs about the world	−0.03	−0.01	0.41**	0.54***	−0.18	0.67***	0.25	–	
9. Dropout (Continuous)	0.23	0.05	−0.02	−0.11	0.23	−0.07	0.23	−0.22	–
10. Dropout (Dichotomous)	0.21	−0.03	0.02	−0.10	0.16	−0.04	0.26	−0.19	0.91***

Note. ETO = expectancy of therapeutic outcome; NCs = trauma-related negative cognitions; PCL-M = posttraumatic stress disorder checklist, military version; QIDS-SR_{16} = quick inventory of depressive symptomatology, self-report.
* $p < 0.05$.
** $p < 0.01$.
*** $p < 0.001$.

symptom severity. The QIDS-SR_{16} has strong concurrent validity to measures of depression symptomatology and strong internal consistency (Rush et al., 2003; Cameron et al., 2013; Reilly et al., 2015). The QIDS-SR16 has been validated for use in veterans with military-related PTSD (Surís et al., 2016a). In the current study, internal consistency for the QIDS-SR_{16} was adequate ($\alpha = 0.76$).

Additionally, a sociodemographic questionnaire was administered to assess gender, age, years of education, racial-ethnic self-identification, and PTSD-related service connection (PTSD-SC). PTSD-SC was confirmed by review of the veteran's electronic medical record.

2.4. Data analysis

Of the 59 female veterans who initiated CPT, five had at least one item of missing data. Three did not complete any items on the ETO, and two did not complete a single item on the PCL-M. For the veterans that missed an item on the PCL-M, multiple imputation in STATA (StataCorp, 2014) was utilized to calculate these veteran's PCL-M total scores. However, multiple imputation is substantially less powerful when data is missing at a scale-level, because the typically robust inter-item correlations are not available (Gottschall et al., 2012). Further, there were not auxiliary variables that were strongly correlated with the ETO such that multiple imputation at a scale level would be possible. Therefore, the three veterans that did not complete the ETO were excluded from data analysis. The amount of missing data in our sample at was small (<5%). All other statistical analyses were conducted in SPSS (IBM Corp, 2013). Internal consistency (i.e., Chronbach's Alpha) was calculated for each of the scales and subscales that were used as predictor variables for data analysis. When calculating the internal consistency of the PCL-M, missing data was not imputed.

Because of the different definitions of “dropout” in previous research, separate analyses were conducted to examine predictors of attrition using two separate operational definitions of dropout. First, dropout was defined continuously (i.e., number of sessions attended). A multiple linear regression analysis was conducted using a stepwise regression method (i.e., possibility of both entry and removal at every step) with variable entry and removal based on predictors' statistical significance at that step (Tabachnick and Fidell, 2013). Stepwise regression identifies predictors with a data-driven method and is best utilized to generate testable hypotheses regarding associations to be replicated (Tabachnick and Fidell, 2013). Number of sessions attended was entered as the outcome variable. Predictor variables in this model included demographic factors (i.e., age, education, racial-ethnic self-identification), presence or absence of PTSD-SC, psychiatric symptom severity (i.e., PCL-M total score, QIDS-SR_{16} total score), NCs (i.e., NCs about self, self-blame, the world), treatment expectations (i.e., ETO), and CPT fidelity (i.e., treatment by a therapist with “good” vs. “below-average” treatment fidelity). Entry criteria were set to $p < 0.10$, with removal criteria of $p > 0.15$ (Tabachnick and Fidell, 2013). To ensure that assumptions of multiple linear regression were met, residuals were assessed for normality, linearity and homoscedasticity; independence of errors was assessed using the Durbin–Watson statistic; and multicollinearity was assessed using the tolerance statistic and Variable Inflation Factor (VIF).

Dropout was also operationalized dichotomously (i.e., 0 = attended fewer than six sessions, 1 = attended six or more sessions). Six sessions has been defined in the treatment manual as the minimum number of recommended sessions in a treatment course of CPT + A (Resick et al., 2017 pg. 63, 79). Baseline characteristics were compared between dropout groups using chi-square analyses for categorical variables and independent samples *t*-tests for continuous variables. A backward stepwise logistic regression was conducted, with dropout entered as the outcome variable. As mentioned above, this data-driven method is best utilized to generate hypotheses regarding predictor variables (Tabachnick and Fidell, 2013). Predictor variables in this model again included demographic factors (i.e., age, education, racial-ethnic self-identification), presence or absence of PTSD-SC, psychiatric symptom severity (i.e., PCL-M total score, QIDS-SR_{16} total score), NCs (i.e., NCs about self, self-blame, the world), treatment expectations (i.e., ETO), and CPT fidelity (i.e., treatment by a therapist with “good” vs. “below-average” treatment fidelity). Removal criteria was set to $p > 0.10$. To ensure that assumptions of logistic regression were met, linearity in the logit was tested and multicollinearity was assessed using tolerance and VIF.

3. Results

3.1. Sample characteristics

The sociodemographic characteristics and baseline scores on predictor variable are provided in Table 1. Female veterans attended an average of $M = 8.95$ ($SD = 3.93$) sessions, with 69.6% ($n = 39$) completing six or more sessions. No significant differences were observed between veterans who did and did not attend 6 or more sessions on any measured characteristic ($p \geq 0.05$). A correlation matrix for all continuous predictor variables is provided in Table 2.

3.2. Multiple regression analysis (number of sessions attended)

Assumptions of normality, linearity, homoscedasticity, independence of errors, and multicollinearity were met (Menard, 2002; Tabachnick and Fidell, 2013). Results of the stepwise multiple regression indicated that a model including three predictors provided the strongest prediction of variance in number of sessions attended, $F(3,$

Table 3
Multiple regression model of predictors of number of CPT sessions attended.

Variable	*b*	*SE*	β	*t*	*p*	Partial correlation
ETO	0.17	0.09	0.25	1.96	0.055	0.24
NCs about self-blame	0.80	0.31	0.34	2.60	0.012	0.33
NCs about the world	−0.99	0.50	−0.26	1.99	0.052	−0.25

Note. ETO = expectancy of therapeutic outcome; NCs = trauma-related negative cognitions.
*Overall Model was Significant $F(3, 52) = 4.13$, $p = 0.011$, $R^2_{adj.} = 0.15$.

52) = 4.13, $p = 0.011$, $R^2_{adj.} = 0.15$. Predictors in this model included ETO, NCs about self-blame, and NCs about the world (see Table 3). All other predictor variables were not included ($p > 0.10$).

3.3. Logistic regression analysis (attending six or more sessions)

Linearity in the logit and multicollinearity were not observed (Menard, 2002; Tabachnick and Fidell, 2013). Model fit was further confirmed through examination of Akaike information criterion (AIC) and area under the receiver operating curve (ROC). In the model, dropout was defined as: 0 = attended fewer than six sessions, and 1 = attended six or more sessions. Results of the backward, stepwise logistic regression indicated that the model was statistically reliable with three predictors (χ^2 (2) = 8.32, $p = 0.016$). The Hosmer–Lemeshow goodness-of-fit test was nonsignificant ($p = 0.305$) indicating that the model was correctly specified and suggesting good model fit. The variance in dropout accounted for was moderate (Cox & Snell $R^2 = 0.14$; Nagelkerke $R^2 = 0.20$). The model displayed adequate ability to predict dropout, accurately classifying 78.6% of cases overall. Significant predictors in the model included NCs about self and NCs about self-blame (*see* Table 4).

4. Discussion

The present study investigated both sociodemographic and dynamic psychosocial predictors of dropout from CPT in female veterans with MST-related PTSD during an RCT. In this sample, none of the sociodemographic factors were found to predict dropout. When defined continuously (i.e., number of sessions attended), higher NCs about self-blame predicted more CPT sessions attended. Although not statistically significant predictors, greater treatment expectations and lower NCs about others/the world were also associated with more CPT sessions attended in this model. When defined dichotomously (i.e., attending six or more sessions), only higher NCs about self-blame and lower NCs about self predicted attending six or more sessions.

Regardless of how dropout was operationalized, higher NCs about self-blame predicted attending more CPT sessions. As a treatment, CPT focuses on identifying and challenging cognitive "stuck points" (i.e., erroneous thoughts and beliefs dating from the time of the trauma; Resick et al., 2017). Stuck points related to self-blame fall within the category of "assimilated" stuck points, which therapists target early in the course of therapy (Resick et al., 2007). Successful and early targeting of these assimilated stuck points has been shown to be one of the most important elements to elicit symptom change within the CPT protocol (Farmer et al., 2017). Trauma-related guilt can also be considered an assimilated stuck point that is similar to self-blame. Rizvi et al. (2009) found that women with higher pretreatment guilt had larger reduction in PTSD symptoms over the course of CPT treatment compared to those with less guilt. Additionally, research has found that reductions in NCs about self-blame predict treatment improvement over the course of CPT (Carroll et al., 2018; Holliday et al., 2018). This may indicate that CPT is particularly effective for veterans with high NCs about self-blame; therefore, veterans may be more likely to remain engaged in a treatment that is effectively reducing their symptoms. However, it is important to note that NCs about self-blame, while a significant predictor/correlate, were enhanced in the presence of other concurrent predictors.

Table 4
Logistic regression model of predictors of attending six or more CPT sessions.

Variable	*b*	*SE*	Wald	*p*	Exp(B)
NCs about self	−0.70	0.36	3.90	0.028	0.50
NCs about self-blame	0.70	0.27	6.92	0.009	2.02

Note. NCs = trauma-related negative cognitions; dropout: 0 = attended fewer than six sessions, 1 = attended six or more sessions.
*Overall Model was Significant χ^2 (2) = 8.32, $p = 0.016$ Cox & Snell $R^2 = 0.14$; Nagelkerke $R^2 = 0.20$.

Lower NCs about self predicted that female veterans would receive six or more sessions of CPT. NCs about self refer to beliefs that one is "weak," "inadequate," and/or "unreliable" (Foa et al., 1999). Individuals with lower NCs about self may also have a good sense of self-efficacy which may improve their ability to engage early in treatment, before treatment gains become apparent (Foa and Rothbaum, 1998). Improving perception of self-efficacy prior to treatment may assist in boosting treatment retention.

When dropout was defined continuously, both NCs about the world and treatment expectations contributed to the model predicting number of sessions attended; however, both variables were not statistically significant (i.e., $p \leq 0.055$). In the final model, lower NCs about others and the world and greater treatment expectations trended toward significantly predicting that female veterans would attend more sessions. NCs about others and the world typically fall into the category of "overaccommodated" stuck points, which are typically targeted later in treatment (Farmer et al., 2017; Resick et al., 2017). For female veteran survivors of MST, NCs about the world may include distrust of male-dominated-environments or may experience VA providers, researchers, other patients at the VA or even the VA itself as untrustworthy (Surís et al., 2004; 2016b; Turchik et al., 2014; Resick et al., 2017; Holliday and Monteith, 2019). It is possible that veterans who report NCs about the world that include negative beliefs about their providers or treatment setting may be more likely to drop out of treatment. These NCs about the world could be addressed early in or prior to CPT treatment through providing psychoeducation; a concurrent, brief and targeted intervention aimed at building trust in providers; or developing accommodations early in treatment to reduce the therapy interfering nature of these NCs (e.g., telehealth). In the final model, higher treatment expectations also trended toward a significant association with attending more sessions. Female veterans with high treatment expectations may "buy-in" to the complete treatment package, and therefore attend more sessions. Providing additional or targeted psychoeducation prior to treatment initiation may improve treatment expectations. While both NCs about the world and treatment expectations were not statistically significant in the final model, it is possible that one or both served as an "enhancer" variable, where the effect of one variable on an outcome is magnified in the presence of other explanatory variables (Pandey and Elliott, 2010). Therefore, it may be important to continue to investigate these variables in combination with NCs about self-blame in the future, even though neither NCs about the world or treatment expectations were statistically significant on their own.

Regarding sociodemographic risk factors, age was not a significant predictor of treatment dropout regardless of how dropout was operationalized, inconsistent with multiple previous studies (Rizvi et al., 2009; Garcia et al., 2011; Gros et al., 2011; Jeffreys et al., 2014; Mott et al., 2014; Kehle-Forbes et al., 2016; Szafranski et al., 2016). This may be due to this sample being older than previous studies; therefore, the younger veterans that may be disproportionately likely to drop out of treatment may not have been included in our sample. Despite some prior support of other variables being predictive of dropout from

treatment (i.e., education, racial-ethnic self-identification, PTSD symptom severity, psychotherapist fidelity), none of these variables significantly predicted dropout among female veterans with MST-related PTSD from this RCT.

By defining treatment dropout as both continuous and dichotomous in our analyses, the effects of inconsistent operational definitions of the same underlying construct could be studied directly. The two models yielded modestly different results, which highlights how inconsistent operational definitions of dropout have the potential to influence findings. It is possible that predictors of remaining in treatment shift over the course of treatment, generating discrepant results based on how dropout is operationalized. The change in predictors of dropout across treatment could be attributed to differing demands of the treatment protocol, differences in symptom improvement, or other factors. Additional research on session-by-session predictors of dropout (particularly in the early phase of treatment) may be beneficial in boosting treatment retention.

Due to the exploratory nature of this study and the modest sample size relative to the number of predictors, these results should be considered preliminary and results are intended to generate further testable hypotheses. Replication in a larger, more representative (e.g., diverse racial-ethnic background, diverse gender) sample of veterans should be considered. The results of this study are from an RCT investigating CPT including only female veterans with MST-related PTSD conducted at the VA. Therefore, results may not generalize to male veterans, non-veterans, naturalistic treatment settings, settings other than the VA, veterans with PTSD related to traumas other than MST, other trauma-focused EBTs, or non-trauma-focused EBTs. For example, NCs about self and self-blame may not be as relevant for survivors of fear-based trauma, logistical challenges may be less relevant in RCTs than in naturalistic treatment settings, and non-VA offices may have fewer trauma reminders (Surís et al., 2016b). Further, male MST survivors experience similar psychosocial consequences to MST (Morris et al., 2014) and are also less likely to access and engage in VA mental health services than female MST survivors (Turchik et al., 2012). It should not be assumed that these predictors are universal considering the specific study that the sample was drawn from. Veterans may experience logistical barriers (e.g., transportation, childcare) to attending mental health treatment sessions at the VA and these factors were not investigated directly in this study. Future studies could benefit from collecting information regarding reasons for dropout as well as how these barriers relate to NCs and treatment expectations, as clarity regarding the relationship between logistical barriers and psychosocial predictors may help with developing targeted methods to reduce dropout. While the present study focused on dropout from CPT, dropout from non-trauma-focused psychotherapy (e.g., PCT) is also worthy of investigation to determine whether predictors of dropout generalize across treatment approaches. Although veterans were randomized to receive PCT in the parent RCT for this study, the sample was insufficient to replicate analyses in the current study due to 28% fewer veterans being randomized to PCT and a non-significant trend toward less dropout in the PCT condition (Surís et al., 2013b). Dropout may be the result of improvement in symptoms (Szafranski et al., 2017). It may be important for future studies to differentiate predictors of problematic dropout from early treatment response. Finally, the statistical approaches utilized for this study (i.e., stepwise linear and backward stepwise logistic regression analyses) are data-driven (Tabachnick and Fidell, 2013). Stepwise regression may overfit data to the sample from which the data is drawn, and therefore is best utilized to develop hypotheses about specific predictor variables. Additionally, partial correlations for some predictor variables exceeded zero-order correlations for these variables, an effect which may describe an “enhancer variable” (Pandey and Elliott, 2010). While determining when the difference between partial correlation and zero-order correlation is sufficient to indicate an “enhancer variable” (Tabachnik and Fidell, 2013), it may indicate that factors identified in the present study are better predictors of dropout in combination than alone or represent an artifact of the statistical approach. These limitations underscore the need to continue to test hypotheses which were derived from the results of the present study.

Treatment dropout remains a significant concern in the treatment of PTSD (Najavits, 2015; Steenkamp et al., 2015), particularly among female veterans with MST-related PTSD, and it is important to continue to identify variables that influence treatment retention and can be leveraged prior to or early in treatment. Our preliminary results suggest that NCs about self and self-blame may be predictors of CPT dropout and that predictors in combination may be stronger than predictors alone. Additionally, predictors may vary somewhat based on how dropout is defined; therefore, it is important to consider how operationalization of dropout may affect findings and work toward consistent definitions of treatment dropout. Our results are designed to generate testable hypotheses regarding dynamic predictors of dropout. With replication of these findings, specific strategies can be designed to target these factors in hopes of identifying strategies to reduce dropout among female veterans with MST-related PTSD.

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