RESEARCH ARTICLE

Effectiveness of cognitive behavioral conjoint therapy for posttraumatic stress disorder (PTSD) in a U.S. Veterans Affairs PTSD clinic

Nicole D. Pukay-Martin[1] | Steffany J. Fredman[2] | Colleen E. Martin[1] | Yunying Le[2] | Alison Haney[1] | Connor Sullivan[1] | Candice M. Monson[3] | Kathleen M. Chard[1,4]

[1] Trauma Recovery Center, Cincinnati Veterans Affairs Medical Center, Cincinnati, Ohio, USA

[2] Department of Human Development and Family Studies, The Pennsylvania State University, University Park, Pennsylvania, USA

[3] Department of Psychology, Ryerson University, Toronto, Canada

[4] Department of Psychiatry and Behavioral Neuroscience, University of Cincinnati, Cincinnati, Ohio, USA

Correspondence
Nicole D. Pukay-Martin, Trauma Recovery Center, Cincinnati VA Medical Center, 1000 S. Ft. Thomas Ave., Ft. Thomas, KY, 41075.
Email: Nicole.Pukay-Martin@va.gov

Alison Haney is now at the Department of Psychological Sciences, University of Missouri, Columbia, MO. Connor Sullivan is now at the Department of Psychiatry and Behavioral Sciences, Duke University, Durham, NC.

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Abstract

Cognitive behavioral conjoint therapy (CBCT) for posttraumatic stress disorder (PTSD) is a 15-session conjoint treatment for PTSD designed to improve PTSD symptoms and enhance intimate relationship functioning. Numerous studies of CBCT for PTSD document improvements in patient PTSD and comorbid symptoms, partner mental health, and relationship adjustment. However, little is known about its effectiveness in real-world clinical settings. Using an intention-to-treat sample of couples who participated in CBCT for PTSD in an outpatient U.S. Veterans Affairs (VA) PTSD clinic ($N = 113$), trajectories of session-by-session reports of veterans' PTSD symptoms and both partners' relationship happiness were examined. Across sessions, there were significant reductions in veteran-rated PTSD symptoms, $d = -0.69$, and significant increases in veteran- and partner-rated relationship happiness, $ds = 0.36$ and 0.35, respectively. Partner ratings of veterans' PTSD symptoms increased before significantly decreasing, $d = -0.24$. Secondary outcomes of veteran and partner relationship satisfaction, $ds = 0.30$ and 0.42, respectively; veteran and partner depressive symptoms, $ds = -0.75$ and -0.29, respectively; and partner accommodation of PTSD symptoms, $d = -0.44$, also significantly improved from pre- to posttreatment. The findings suggest that CBCT for PTSD was effective for decreasing PTSD and comorbid symptoms in veterans, as well as for improving relationship

functioning and partners' mental health, among a sample of real-world couples seeking treatment in a VA PTSD specialty clinic.

Posttraumatic stress disorder (PTSD; American Psychiatric Association [APA], 2013) is associated with intimate relationship dysfunction, including relationship discord, aggression, and impairments in emotional intimacy (Birkley et al., 2016; Taft et al., 2011). Intimate relationship factors, such as family negativity, poor communication, emotional withdrawal, and partner accommodation of symptoms are posited to maintain or exacerbate PTSD symptoms (Fredman et al., 2016; Monson et al., 2010). PTSD is also associated with partner distress (Lambert et al., 2012). Given the interpersonal nature of the disorder, several couple-based or conjoint treatments for PTSD have been developed and investigated, including cognitive behavioral conjoint therapy for PTSD (CBCT for PTSD; Monson & Fredman, 2012). CBCT for PTSD is a trauma-focused PTSD treatment. It is associated with significant reductions in patient PTSD and comorbid symptoms, decreases in partner psychological distress, and improvements in relationship adjustment for one or both members of the couple in both veteran and community samples (see Liebman et al., 2020, for a review). The aim of the current study was to test the effectiveness of CBCT for PTSD in a real-world clinical sample of veterans and their partners presenting for PTSD treatment at a U.S. Veterans Affairs (VA) specialty PTSD clinic.

CBCT for PTSD (Monson & Fredman, 2012) is a 15-session PTSD treatment designed to simultaneously decrease PTSD symptoms and enhance intimate relationship functioning. It is appropriate for couples who report levels of relationship satisfaction ranging from distressed to satisfied (Shnaider et al., 2015). The therapy is grounded in the cognitive behavioral interpersonal theory of PTSD (CBIT; Monson et al., 2010), which posits that cognitive, behavioral, and emotional factors interact within and between members of a dyad to maintain the disorder and associated relationship difficulties. CBIT theorizes a bidirectional association between PTSD and relationship factors wherein PTSD symptoms can contribute to relationship difficulties (e.g., impairments in conflict management, communication, and intimacy; diminished relationship satisfaction and support), and aspects of the intimate relationship can exacerbate or maintain PTSD symptoms.

One disorder-relevant relationship factor hypothesized to influence PTSD is partner accommodation of PTSD symptoms. Partner accommodation refers to ways in which partners alter their behaviors in response to PTSD symptoms to decrease patient distress or decrease PTSD-related relationship conflict (Fredman et al., 2014). For example, partners may take part in PTSD-related avoidance of places, situations, or people that trigger patients' anxiety (e.g., going grocery shopping for the patient, not going to crowded events), participate in safety behaviors (e.g., switching up driving routes, barricading doors and windows), or refrain from discussing relationship-relevant concerns that may trigger patient PTSD-related anger or distress. Partner accommodation is often motivated by a desire to be supportive of trauma survivors or avoid relationship conflict (Renshaw et al., 2020). Unfortunately, accommodation is associated with partners' psychological distress and relationship distress for both members of the couple (Fredman et al., 2014) and can impede PTSD recovery (Fredman et al., 2016), likely through the reinforcement of patients' avoidance behaviors (Campbell et al., 2017). CBCT for PTSD is designed to target both individual and relationship factors, including accommodation, that are theorized to maintain PTSD.

To date, there have been three small uncontrolled studies (Monson et al., 2004, 2011; Schumm et al., 2013) and one randomized controlled trial (RCT) of CBCT for PTSD (Monson et al., 2012) published. Two of these studies included VA samples. Monson et al. (2004) was a small pilot study of seven male Vietnam combat veterans and

their wives who completed CBCT for PTSD. Similarly, Schumm et al. (2013) was a small trial of six men who were Iraq and Afghanistan combat veterans and their women partners. The other two studies included community couples ($N = 6$ completers, Monson et al., 2011; $n = 20$ couples assigned to CBCT for PTSD, $n = 20$ couples assigned to a waitlist condition; Monson et al., 2012). Collectively, these studies demonstrated associations between CBCT for PTSD and improvements in patient PTSD symptoms. In fact, among RCT participants enrolled in CBCT for PTSD, Monson and colleagues (2012) found an effect size for PTSD symptom improvement (i.e., Hedges' $g = 1.13$) that was on par with those reported for gold-standard individual PTSD treatments (Liebman et al., 2020). As reviewed by Liebman et al. (2020), increases in general relationship adjustment or satisfaction for one or both partners were also seen across studies, as were improvements in patient comorbid symptoms and partner mental health (i.e., depression, anxiety, anger). Improvements in PTSD symptoms and relationship functioning and decreases in partner accommodation have also been observed for several adaptations of CBCT for PTSD, including an abbreviated version delivered in multicouple groups over a single weekend (Fredman et al., 2020, 2021), a present-focused version (Pukay-Martin et al., 2015), and a mindfulness-based version delivered in multicouple groups in a retreat format (Davis et al., 2021).

The goal of the current study was to examine the effectiveness of CBCT for PTSD over the course of treatment when delivered to a large sample of veterans and their partners who presented to a U.S. VA PTSD clinic for PTSD treatment. Veterans with PTSD and their partners are an important population to study for several reasons. First, the associations between PTSD and relationship discord, physical aggression, and partner psychological and relationship distress have been shown to be stronger in military and veteran samples compared with civilian samples (Lambert et al., 2012; Taft et al., 2011). Second, veterans with PTSD identify PTSD as a source of family stress and report a desire for more family involvement in their care (Batten et al., 2009). Consistent with VHA Directive 1163.04, which requires that veterans diagnosed with mental health conditions have access to family services to promote their recovery and psychosocial functioning, CBCT for PTSD is currently being nationally disseminated within the U.S. VA system. However, the current VA/Department of Defense (DoD; 2017) guidelines for the treatment of PTSD state, "There is insufficient evidence to recommend for or against trauma-focused … couples therapy for the primary treatment of PTSD." Therefore, it is imperative to understand whether this treatment is effective for veterans in a real-world clinical setting.

In addition to being the first known study to evaluate the effectiveness of CBCT for PTSD in a clinical setting and with veterans from a range of service eras, the present study was novel for several additional reasons. First, it represents the largest sample in which the full, 15-session version of CBCT for PTSD has been evaluated. Second, except for one study (Schumm et al., 2013), all prior studies of CBCT for PTSD have been conducted among samples of couples presenting for research studies (Liebman et al., 2020). Third, previous studies of the 15-session CBCT for PTSD protocol have analyzed data individually, a method that does not account for the potential interdependence of data within dyads. In the current study, we examined outcomes within a dyadic context to both account for the potential interdependence of data within dyads and permit the formal comparison of changes in veteran and partner ratings over the course of treatment. Fourth, this was the first study of which we are aware to evaluate the trajectory of symptom change over the course of CBCT for PTSD. Prior studies have included data from pre- and posttreatment only, with just one study including a single midtreatment assessment point (Monson et al., 2012). For the present study, session-level data were included to more precisely examine the course of symptoms across sessions.

Because CBCT for PTSD is a disorder-specific couple therapy, we included measures of veterans' PTSD symptoms, broad relationship functioning (i.e., happiness and satisfaction), veteran comorbid symptoms and partner psychological distress (i.e., depressive symptoms), and relationship functioning focal to PTSD (i.e., partner accommodation of PTSD symptoms). Assessment of these domains is part of routine clinical practice in CBCT for PTSD and is consistent with the assessment protocol used as part of the VA's national dissemination of CBCT for PTSD. Given that previous studies have shown CBCT for PTSD to be associated with decreases in patient- and partner-rated PTSD symptoms, we hypothesized that both veteran and partner ratings of PTSD symptoms would decrease over time during CBCT for PTSD. We also hypothesized that both veteran and partner relationship happiness ratings would increase over the course of CBCT for PTSD. We further hypothesized that veterans and partners would demonstrate improvement with respect to relationship satisfaction and depressive symptoms and that ratings of partner accommodation of veterans' PTSD symptoms would decrease from pre- to posttreatment.

METHOD

Participants and procedures

Participants were 113 veterans and their intimate partners who presented for treatment at an outpatient PTSD specialty clinic at a VA medical center in the midwestern United States between July 2014 and July 2020. Prior to

treatment, all veterans met the criteria for PTSD according to the *Diagnostic and Statistical Manual of Mental Disorders* (5th ed.; *DSM-5*; APA, 2013) or subthreshold PTSD, defined as meeting the criteria for two or three PTSD symptom clusters (i.e., Criteria B–E) in the *DSM-5* (McLaughlin et al., 2015). Demographic information is provided in Table 1.

The University of Cincinnati's institutional review board and Cincinnati VA's Research and Development Committee approved the use of clinical data for research purposes. At the beginning of each session of CBCT for PTSD, veterans and their partners completed assessments consisting of each individual's ratings of the veterans' PTSD symptom severity and their own relationship happiness. Couples also completed full assessment batteries at pre- and posttreatment (i.e., following the final therapy session). These self-report measures were administered as part of routine care for treatment planning and the evaluation of treatment progress. Because these measures were collected for clinical purposes only, when couples dropped out of treatment, they were not asked to continue completing assessments.

Veterans were referred by a VA provider or self-referred for treatment at the outpatient specialty PTSD clinic. Eligibility for the outpatient program required that participants be diagnosed with PTSD by the referring mental health clinician or at the PTSD clinic intake appointment. Participants were excluded from the outpatient treatment program if they were actively dependent on substances and unable to control their use around treatment sessions and out-of-session assignments, had current unmanaged psychosis or mania, or expressed current suicidal or homicidal intent necessitating immediate psychiatric hospitalization. At the initial clinic intake appointment, which was conducted by a master's- or doctoral-level clinician, the clinician and veteran collaboratively agreed upon the type of treatment that would best suit the veteran. All veterans were provided with an overview of all available treatment options and informed that they could elect to participate in any of the treatments offered. Only veterans who elected to participate in CBCT for PTSD were included in the current study. Consistent with CBCT for PTSD treatment recommendations (Monson & Fredman, 2012), veterans were excluded from CBCT for PTSD if, during the individual assessment sessions that preceded CBCT for PTSD, either partner reported severe physical aggression in the relationship within the past 6 months or fearing for their physical safety when with their partner.

In total, 126 veterans requested CBCT for PTSD at clinic intake during the study period. Following intake and before beginning the 15-session treatment, all couples completed two assessment sessions that consisted of unstructured clinical interviews and self-report questionnaires. During the first assessment session, the veteran and partner provided their relationship history, discussed the effects of PTSD on their relationship, and received an overview of CBCT for PTSD. In the second assessment session, each member of the couple was assessed individually regarding their mental health history, prior treatment, and family mental and physical health backgrounds. If a veteran's partner reported a history of trauma exposure, they were first given the PTSD Checklist for *DSM-5* (PCL-5). Individuals who scored 33 or above on the PCL-5 underwent a clinician-administered interview for PTSD. Of the 126 veteran couples initially enrolled in CBCT for PTSD, 11 couples elected not to begin treatment, one couple was deemed inappropriate for treatment due to severe intimate partner violence, and one couple was excluded from the analyses because they were a nonromantic dyad, resulting in an analytic sample of 113 veteran couples for the current study.

Treatment protocol

CBCT for PTSD (Monson & Fredman, 2012) consists of 15 sessions divided into three phases: (a) providing psychoeducation about PTSD and relationships and safety-building, (b) enhancing relationship satisfaction through communication skills and behavioral approach tasks to undermine avoidance and partner accommodation, and (c) making new meaning of the traumatic event(s) as well as addressing here-and-now thoughts that maintain PTSD or relationship conflict through a dyadic cognitive intervention designed to enhance cognitive flexibility for both members of the couple. Out-of-session assignments are programmed to encourage couples to implement the skills taught through therapy in their day-to-day lives. For specific session-by-session details, see Monson and Fredman (2012).

Participants received an average of 10.50 CBCT for PTSD sessions (SD = 4.85). For couples in which both partners had PTSD, one to two sessions were added in the trauma-focused phase of the therapy to allow enough time to address both individuals' trauma histories. Fourteen therapists who were doctoral-level psychologists ($n = 9$) or psychology trainees engaged in a year-long clinical rotation specific to CBCT for PTSD ($n = 5$) delivered the treatment to at least one couple during the study period. All therapists received therapy training and consultation from a CBCT-approved trainer, and there were no significant differences in treatment outcome by level of therapist experience, ps = .159–1.000. Among the 113 couples who started treatment, 58 (51.3%) completed the full CBCT for PTSD treatment protocol or were considered early completers (i.e., the therapist and couple agreed to end treatment early because the goals of treatment had been met; $n = 9$, 15.5% of the completer subsample), and 55 (48.7%)

TABLE 1 Demographics and baseline scores for the full, treatment completer, and treatment dropout samples

Variable	Full sample (n = 113)				Treatment completers (n = 58)				Treatment dropouts (n = 55)				Statistical test[a]
	n	%	*M*	*SD*	*n*	%	*M*	*SD*	*n*	%	*M*	*SD*	
Men	103	91.2			54	93.1			49	89.1			$\chi^2(1) = 0.56$
Age (years)			45.78	14.77			46.62	14.72			44.89	14.90	$t(111) = -0.62$
Race/ethnicity													$\chi^2(4) = 2.82$
White	98	86.7			51	87.9			47	85.5			
Black	10	8.9			4	6.9			6	10.9			
Hispanic/Latino	1	0.9			1	1.7			0	0.0			
Native American	1	0.9			0	0.0			1	1.7			
Unknown	3	2.7			1	1.7			2	3.6			
Marital status													$\chi^2(2) = 4.66$
Married	95	84.1			52	89.7			43	78.2			
Cohabitating	17	15.0			5	8.6			12	21.8			
Dating	1	0.9			1	1.7			0	0.0			
Same-sex couple	3	2.7			1	1.7			2	3.6			$\chi^2(1) = 0.40$
Service era													$\chi^2(6) = 6.55$
Vietnam	24	21.2			13	22.4			11	20.0			
Post-Vietnam	10	8.9			5	8.6			5	9.1			
Persian Gulf	24	21.2			15	25.9			9	16.4			
Afghanistan/Iraq	52	46.0			23	39.7			29	52.7			
Somalia	1	0.9			0	0.0			1	1.8			
Kosovo	2	1.8			2	3.5			0	0.0			
Service-connected for PTSD[b]	61	54.0			28	48.3			33	60.0			$\chi^2(1) = 1.56$
Percentage service connected[a]													$\chi^2(5) = 5.47$
10	1	0.9			1	1.7			0	0.0			
30	15	13.3			9	15.5			6	10.9			
50	21	18.6			8	13.8			13	23.6			
70	21	18.6			8	13.8			13	23.6			
100	3	2.7			2	3.5			1	1.8			
Modality													$\chi^2(2) = 1.92$
In-person	82	72.6			40	69.0			42	76.4			
Video conferencing	26	23.0			14	24.1			12	21.8			
Combination	5	4.4			4	6.9			1	1.8			
Partner is a woman	106	93.8			55	94.8			51	92.7			$\chi^2(1) = 0.21$
Partner is a veteran	8	7.1			3	5.2			5	9.1			$\chi^2(1) = 0.66$
Veteran diagnosis													$\chi^2(1) = 0.05$
PTSD	102	90.3			52	89.7			50	90.9			
Subthreshold PTSD	11	9.7			6	10.3			5	9.1			

(Continues)

TABLE 1 (Continued)

Variable	Full sample (n = 113)				Treatment completers (n = 58)				Treatment dropouts (n = 55)				Statistical test[a]
	n	%	M	SD	n	%	M	SD	n	%	M	SD	
Partner has PTSD	17	15.0			8	13.8			9	16.4			$\chi^2(1) = 0.15$
PCL-5			49.78	11.97			49.55	11.60			50.03	12.46	$t(110) = 0.21$
PCL-5-C			43.05	15.88			41.71	17.15			44.49	14.41	$t(110) = 0.92$
PHQ-9 patient			13.88	4.79			13.21	4.77			14.62	4.75	$t(109) = 1.57$
PHQ-9 partner			7.33	5.81			6.52	5.51			8.23	6.05	$t(109) = 1.56$
CSI-32 patient			121.62	30.64			122.09	30.34			121.11	31.26	$t(109) = -0.17$
CSI-32 partner			117.43	30.48			122.44	26.01			111.96	34.13	$t(96.93^{b}) = -1.81$
SORTS			31.87	22.22			30.51	21.01			33.39	23.61	$t(108) = 0.68$
Number of sessions			10.50	4.85			14.43	1.94			6.35	3.27	$t(86.81^{c}) = -15.87^{***}$

Note: PTSD = posttraumatic stress disorder; PCL-5 = PTSD Checklist for PTSD for *DSM-5*; PCL-5-C = PCL-5–Collateral Version; PHQ-9 = nine-item Patient Health Questionnaire; CSI-32 = 32-item Couples Satisfaction Index; SORTS = Significant Others' Responses to Trauma Scale.
[a]$N = 113$ for all chi-squares. [b]Veterans who are service connected for PTSD are considered by the Department of Veterans Affairs to have PTSD related to their military service. They receive free medical care related to their PTSD and also may receive compensation for the related disability. [c]Levene's test for equality of variances was significant; thus, the t test conducted did not assume equality of variance, leading to degrees of freedom that were not an integer value.
***$p < .001$.

couples dropped out prior to completing the treatment. Couples who dropped out received an average of 6.35 sessions (*SD* = 3.27), which represents a point in the treatment protocol shortly before the trauma-focused portion of therapy would typically begin (i.e., Session 8). There were no statistically significant differences between treatment dropouts and completers regarding available demographic characteristics or pretreatment assessment measures (see Table 1).

Measures

PTSD symptoms

The PTSD Checklist for *DSM-5* (PCL-5; Weathers et al., 2013) is a 20-item self-report measure that is used to assess *DSM-5* symptoms of PTSD. Respondents rate how much they are bothered by each symptom on a scale from 0 (*not at all*) to 4 (*extremely*). Participants reported on past-week symptoms at each session. Similar to previous CBCT for PTSD studies (e.g., Monson et al., 2012), partners' ratings of the veterans' symptoms were also obtained using the PCL-5, which was modified to ask partners to rate how much they perceived their partner was bothered by each symptom. Total scores of 33 and above are indicative of probable PTSD (Bovin et al., 2016). In the current sample, the internal consistency for measures completed by veterans and partners was excellent across assessment points,

Cronbach's αs = .90–.97 for veterans, Cronbach's αs = .92–.98 for partners.

Relationship happiness

Consistent with routine clinical care guidelines for CBCT for PTSD at the time the study was conducted, veterans and partners completed a one-item measure of relationship happiness at each session: "On the scale below, please circle the number that best indicates the degree of happiness, all things considered, of your relationship in the past week." Responses were scored on a scale of 0 (*extremely unhappy*) to 6 (*perfect*), with a score of 3 representing *happy*. This item corresponds with the first item on the Couples Satisfaction Index (CSI; Funk & Rogge, 2007) and Item 31 on the Dyadic Adjustment Scale (DAS; Spanier, 1976). In a psychometric evaluation of the DAS, Sharpley and Cross (1982) found that this item accounted for 75% of the variance in the corrected total DAS score and stated that this item "represents a most powerful means of classifying respondents" (p. 740) into distressed versus nondistressed categories. In a reanalysis of data from two previous studies, Goodwin (1992) found that this one item correctly classified 93.4% and 84.3% in Study 1 and Study 2, respectively, of respondents as relationally distressed or nondistressed and concluded that this item can provide a brief measure of global relationship satisfaction or happiness. It has been used in prior CBCT for PTSD studies

(Monson et al., 2012; Schumm et al., 2013) as a low-burden, session-level measure of relationship satisfaction as part of the clinical provision of the therapy but has not been analyzed or reported.

Relationship satisfaction

The CSI (Funk & Rogge, 2007) is a well-validated, 32-item self-report measure that is used to assess relationship satisfaction, with higher scores indicating higher levels of relationship satisfaction. Items are rated on a 6-point scale except for the first item, which is rated on a 7-point scale. Total scores below 104.5 indicate relationship distress. Both veterans and partners completed the CSI at pre- and posttreatment. In the present sample, Cronbach's alpha was .98 at pretreatment and .98 at posttreatment for veterans; for partners, Cronbach's alpha was .97 at pretreatment and .97 at posttreatment.

Depressive symptoms

The nine-item Patient Health Questionnaire (PHQ-9; Kroenke et al., 2001) is a self-report measure used to assess depressive symptoms over the past 2 weeks. Items are rated on a scale of 0 (*not at all*) to 3 (*nearly every day*) and are summed to create a total score, with higher scores indicating more severe depressive symptoms. Total scores of 0–4 indicate minimal depressive symptoms, 5–9 mild depressive symptoms, 10–14 moderate depressive symptoms, 15–19 moderately-severe depressive symptoms, and 20–27 severe depressive symptoms. Both veterans and partners completed the PHQ-9 at pre- and posttreatment. In the current study, internal consistency for the PHQ-9 was adequate for veterans at pretreatment, Cronbach's $\alpha = .76$, and good at posttreatment, Cronbach's $\alpha = .88$; for partners, internal consistency was good at both pretreatment, Cronbach's $\alpha = .88$, and posttreatment Cronbach's $\alpha = .85$.

Partner accommodation of PTSD symptoms

The Significant Others' Responses to Trauma Scale (SORTS; Fredman et al., 2014) is a 14-item self-report measure used to assess partners' accommodation behaviors in relation to the identified patients' PTSD symptoms. Participants were asked to indicate the frequency of these behaviors, rating responses on a scale of 0 (*never*) to 4 (*daily or almost every day*), as well as the level of distress associated with engaging in certain behaviors over the past month (e.g., "Avoid doing things, going place, or seeing people with [veteran] that make him/her anxious or

uncomfortable," "Not share your own feelings or concerns with [veteran] due to concerns that he/she would become upset"), rating responses on a scale of 0 (*not at all*) to 4 (*extremely*). Items are summed to create a total score, with higher scores indicating higher degrees of accommodation. Partners of veterans with PTSD completed the SORTS at pre- and posttreatment. Prior studies have demonstrated that the SORTS has strong psychometric properties (Fredman et al., 2014; Renshaw et al., 2020). In the present sample, internal consistency for the SORTS was excellent at both pretreatment, Cronbach's $\alpha = .94$, and posttreatment, Cronbach's $\alpha = .94$.

Data analysis

Session-by-session veteran- and partner-rated PTSD symptoms and relationship happiness were considered the primary outcomes of this study because these measures best reflect changes that occur during treatment. Due to the effectiveness nature of the study, these outcomes were collected from couples as long as they were actively participating in treatment. All data, regardless of treatment completion status, were used, resulting in a modified approach to intention-to-treat principles. Analyses that use session-level ratings allow for the inclusion of the maximum amount of data from couples, both completers and dropouts, to inform models. Measures rated at pre- and posttreatment were considered secondary outcomes due to fewer measurement occasions.

Data were analyzed using mixed-effects regression and conducted using SAS software (Version 9.3) and IBM SPSS Statistics (Version 23). To address the primary study aims, growth curve analyses were conducted with session-level PTSD symptoms and relationship happiness in a dyadic context using a dual-intercept approach (see Kenny et al., 2006). These models allowed for the simultaneous estimation of separate intercepts and slopes for veterans and partners while accounting for the interdependence of the data between partners. Both linear and quadratic effects of time were tested in the models. Random intercepts and slopes, as well as their covariances, were estimated for veterans and partners. These models were supplemented with follow-up interaction models that tested whether veteran and partner slopes were significantly different from each other. Specifically, fixed effects for "role," a binary, effect-coded variable; time; and the interaction between role and time were included in the model. In short, the dual-intercept models tested whether veteran and partner scores each significantly changed over time, whereas the interaction models tested whether they changed at significantly different rates. The dual-intercept and interaction models for trajectories of veterans' PTSD symptoms as well

as veterans' and partners' relationship happiness were run first in the full sample and then in the treatment completer subsample to determine whether the pattern of results was similar.

To address the secondary study aims, pre- and post-treatment veteran and partner relationship satisfaction and veteran and partner depressive symptoms were analyzed using similar statistical procedures. Random slopes were not estimated because these variables were only measured at two assessment points, and random intercepts were unable to be estimated due to convergence problems when they were included in the models. Data for partners' accommodation of veterans' PTSD symptoms were only collected from the partner and, thus, were not modeled dyadically. In this model, only time was included as a fixed effect.

In all models for all outcomes except for partner accommodation, a direct product AR(1) covariance structure (UN@AR(1)) was specified to account for autocorrelation and the interdependence of veterans and partners at Level 1. For accommodation, data were collected at pre- and post-treatment from the partner only; therefore, an unstructured covariance matrix was specified to allow for free estimation of variances and covariances.

For the full sample, 33.13% of the data were missing, and, in the completer subsample, 7.78% of data were missing. The results of Little's Missing Completely at Random Test (Little, 1988) indicated that data were missing completely at random, $\chi^2(1,904, N = 113) = 1,782.11, p = .978$. All available data were included in the analyses, and restricted maximum likelihood was used as the method of estimation. Sensitivity analyses were conducted separately by (a) including PTSD service connection as a covariate when modeling changes in session-level PTSD symptoms in the full sample model and (b) including demographic variables and baseline scores as covariates in all full-sample models. The pattern of findings remained the same. Thus, these covariates were not retained in the final models.

Consistent with previous studies of CBCT for PTSD, within-participant effect sizes in the form of Cohen's d ($\frac{t}{\sqrt{n}}$) were calculated to determine the magnitude of change in the least squared means of the outcomes from Session 1 to Session 15, for PTSD symptoms and relationship happiness, or from pre- to posttreatment, for relationship satisfaction, depressive symptoms, and partner accommodation, and were interpreted consistent with Cohen's (1988) recommendations, where 0.2, 0.5, and 0.8 represent small, medium, and large effects, respectively. Clinically significant change for PTSD symptoms was determined using the formulas and categories outlined by Jacobson and Truax (1991) as recovered (i.e., reliably improved and crossed diagnostic threshold), improved (i.e., reliably improved but did not cross diagnostic thresh-

old), worsened (i.e., reliably deteriorated), or unchanged (i.e., no reliable change).

RESULTS

Primary outcomes: Trajectories of PTSD symptoms and relationship happiness

Trajectories of veterans' PTSD symptoms as rated by veterans and partners

Results from the dual-intercept models predicting session-level veteran and partner ratings of veterans' PTSD severity in the full sample and treatment completer subsample are reported in Table 2 and illustrated in Figure 1. Results from the follow-up interaction models are reported in Supplementary Table S1. The quadratic effect of time was significant, and, therefore, both quadratic and linear effects of time were retained in the final model.

In the full sample, veteran-rated PTSD symptoms were highest at the first assessment point and significantly decreased at an accelerating rate across sessions. Post hoc tests revealed that the veteran-rated scores at Session 15 ($M = 33.26, SE = 2.32$) were significantly lower than scores at Session 1 ($M = 44.98, SE = 1.40$), $t(76.9) = -6.07, p < .001$. On average, veteran-rated PTSD symptoms were above the cutoff for probable PTSD at Session 1 and at the cutoff for Session 15. For partners' ratings of veterans' PTSD severity, scores first increased, then decreased across sessions. Post hoc tests demonstrated that partners' ratings were highest at Session 6 ($M = 36.29, SE = 1.65$), which was significantly higher than partners' ratings at Session 1 ($M = 34.05, SE = 1.82$), $t(295) = 2.06, p = .040$, and Session 15 ($M = 30.17, SE = 2.38$), $t(186) = 3.26, p = .001$. However, partners' ratings at Sessions 1 and 15 were not significantly different, $t(98.1) = -1.69, p = .095$. On average, partners' ratings of veterans' PTSD symptoms were above the cutoff for PTSD at Sessions 1 and 6 and below the cutoff at Session 15. The effect size associated with change in veteran-rated PTSD severity from Session 1 to Session 15 was medium, $d = -0.69, 95\%$ CI $[-0.91, -0.46]$, whereas the effect size associated with partner-rated change in veterans' PTSD was small, Session 1–Session 15: $d = -0.17, 95\%$ CI $[-0.37, 0.03]$; Session 6–Session 15: $d = -0.24, 95\%$ CI $[-0.38, -0.09]$. Results from the follow-up interaction model indicated that the change in the rate of change (i.e., the quadratic effect) of veterans' and partners' PTSD ratings did not significantly differ but that veterans' and partners' linear rates of change in PTSD symptom ratings did. Regarding clinically significant change for veterans' ratings of PTSD, 39 (34.8%) veterans were classified as recovered, 31 (27.7%) as reliably improved, and

TABLE 2 Change in session-by-session veteran- and partner-ratings of veterans' posttraumatic stress disorder (PTSD) symptom severity in the full sample and treatment completer subsample

Variable	Full sample			Treatment completers		
	B	*SE*	*p*	*B*	*SE*	*p*
Fixed effects						
Intercept$_{Veteran}$	44.98	1.40	< .001	43.61	2.00	< .001
Intercept$_{Partner}$	34.05	1.82	< .001	32.65	2.59	< .001
Time$_{Veteran}$	0.01	0.24	.969	−0.09	0.29	.748
Time$_{Partner}$	0.85	0.30	.004	0.99	0.36	.006
Time$^2_{Veteran}$	−0.06	0.02	< .001	−0.06	0.02	.001
Time$^2_{Partner}$	−0.08	0.02	< .001	−0.10	0.02	< .001
Random effects						
Var (Intercept$_{Veteran}$)	177.17	27.63	< .001	194.61	41.02	< .001
Var (Intercept$_{Partner}$)	309.82	47.20	< .001	336.93	69.13	< .001
Var (Time$_{Veteran}$)	1.05	0.26	< .001	0.86	0.24	< .001
Var (Time$_{Partner}$)	1.72	0.36	< .001	1.89	0.45	< .001
Cov (Intercept$_{Veteran,}$ Intercept$_{Partner}$)	112.03	28.03	< .001	144.69	42.79	< .001
Cov (Intercept$_{Veteran,}$ Time$_{Veteran}$)	0.84	2.04	.682	1.43	2.29	.533
Cov (Intercept$_{Veteran,}$ Time$_{Partner}$)	5.84	2.43	.016	6.39	3.19	.045
Cov (Intercept$_{Partner,}$ Time$_{Veteran}$)	0.76	2.54	.764	−0.64	2.90	.826
Cov (Intercept$_{Partner,}$ Time$_{Partner}$)	−8.59	3.28	.009	−9.47	4.31	.028
Cov (Time$_{Veteran,}$ Time$_{Partner}$)	0.79	0.24	.001	0.75	0.26	.004
Residuals						
Var (Veteran)	48.04	2.75	< .001	49.43	3.25	< .001
Var (Partner)	71.33	4.34	< .001	65.53	4.69	< .001
Cov (Veteran, Partner)	18.07	2.13	< .001	18.60	2.44	< .001
ρ[a]	0.35	0.03	< .001	0.37	0.04	< .001

Note: Var = variance; Cov = covariance.

[a]The correlation between adjacent elements in the first-order autoregressive covariance structure specified in the model.

19 (17.0%) as deteriorated. Similarly, for partners' ratings of veterans' PTSD, 44 (39.6%) were categorized as recovered, 24 (21.6%) as reliably improved, and 20 (18.0%) as deteriorated.

Within the treatment completer subsample, the pattern of findings was the same with one exception: the initial increase in partners' ratings from Session 1 to Session 6 was nonsignificant, $t(169) = 1.81$, $p = .072$. The effect size associated with change in veteran-rated PTSD symptoms was large, $d = −0.88$, 95% CI [−1.15, −0.61], whereas the effect size associated with change in partners' ratings of veterans' PTSD symptoms was small, Session 1–Session 15: $d = −0.25$, 95% CI [−0.51, 0.02]; Session 6–Session 15: $d = −0.38$, 95% CI [−0.58, −0.18]. Regarding clinically significant change for veterans' ratings of PTSD in the completer subsample, 31 (53.4%) veterans were classified as recovered, 14 (24.1%) as reliably improved, and five (8.6%) as deteriorated. For partners' ratings of veterans' PTSD, 25 (43.9%) were categorized as recovered, 10 (17.5%) as reliably improved, and 12 (21.1%) as deteriorated.

Trajectories of veterans' and partners' relationship happiness

Results from the dual-intercept model predicting session-level veteran and partner relationship happiness in the full sample and treatment completer subsample are reported in Table 3. Results from the follow-up interaction models are reported in Supplementary Table S2. Only the linear effect of time was retained in the final model because the quadratic effect of time was not significant, ps = .201–.688. For the full sample, both veterans' and partners' relationship happiness significantly increased over time. Post hoc tests revealed that the difference between Session 1 and Session 15 scores was significant for both veterans (Session 1: $M = 3.34$, $SE = 0.10$; Session 15: $M = 3.68$, $SE = 0.13$), $t(60.7) = 2.79$, $p = .007$, and partners (Session 1: $M = 3.20$, $SE = 0.10$; Session 15: $M = 3.54$, $SE = 0.11$), $t(67.1) = 2.89$, $p = .005$. For both veterans and partners, mean ratings of relationship happiness fell between *happy* and *very happy* at Sessions 1 and 15. The effect sizes associated with change
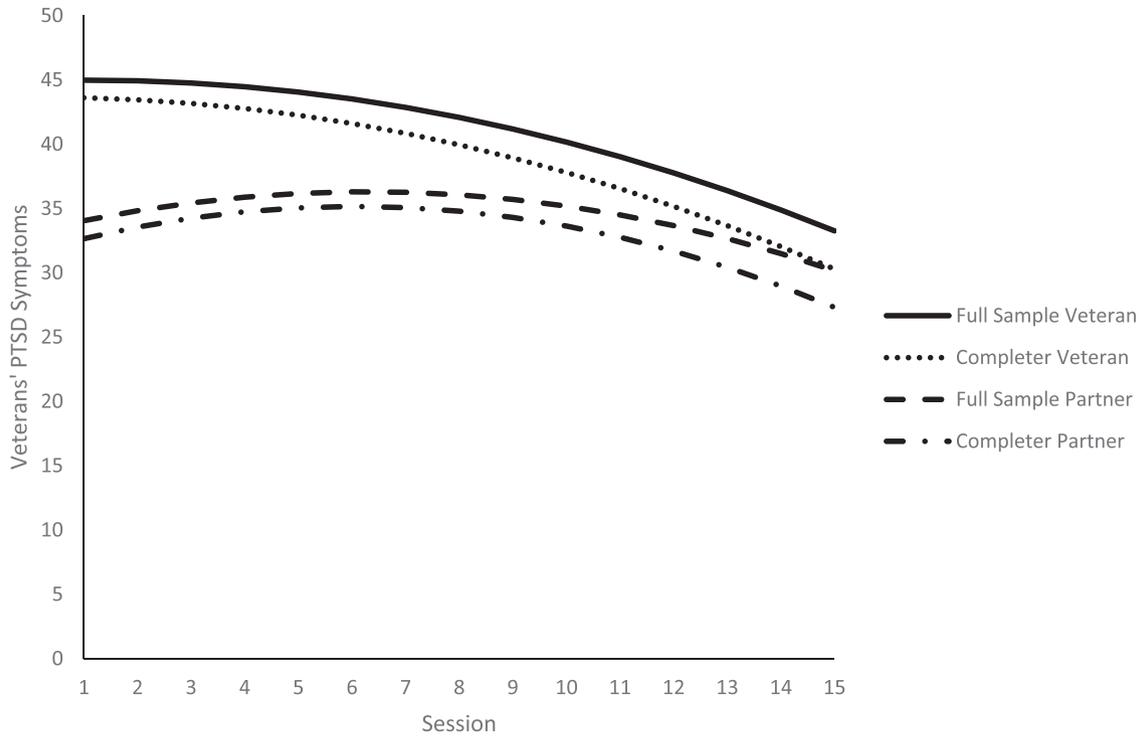
FIGURE 1 Model-implied trajectories of session-level veteran and partner ratings of veterans' posttraumatic stress disorder (PTSD) symptoms in the full sample and treatment completer subsample

TABLE 3 Change in session-by-session relationship happiness for veterans and partners in the full sample and treatment completer subsample

Variable	Full sample			Treatment completers		
	B	SE	p	B	SE	p
Fixed effects						
Intercept$_{Veteran}$	3.34	0.10	< .001	3.38	0.13	< .001
Intercept$_{Partner}$	3.20	0.10	< .001	3.26	0.14	< .001
Time$_{Veteran}$	0.02	0.01	.007	0.03	0.01	< .001
Time$_{Partner}$	0.02	0.01	.005	0.03	0.01	.002
Random effects						
Var (Intercept$_{Veteran}$)	0.95	0.14	< .001	0.94	0.19	< .001
Var (Intercept$_{Partner}$)	1.07	0.16	< .001	1.05	0.22	< .001
Var (Time$_{Veteran}$)	0.00	0.00	< .001	0.00	0.00	< .001
Var (Time$_{Partner}$)	0.00	0.00	< .001	0.00	0.00	< .001
Cov (Intercept$_{Veteran}$, Intercept$_{Partner}$)	0.81	0.14	< .001	0.84	0.19	< .001
Cov (Intercept$_{Veteran}$, Time$_{Veteran}$)	−0.01	0.01	.155	−0.02	0.01	.115
Cov (Intercept$_{Veteran}$, Time$_{Partner}$)	−0.03	0.01	.002	−0.03	0.01	.006
Cov (Intercept$_{Partner}$, Time$_{Veteran}$)	−0.01	0.01	.508	−0.01	0.01	.213
Cov (Intercept$_{Partner}$, Time$_{Partner}$)	−0.03	0.01	.004	−0.03	0.01	.009
Cov (Time$_{Veteran}$, Time$_{Partner}$)	0.00	0.00	< .001	0.00	0.00	< .001
Residuals						
Var (Veteran)	0.29	0.02	< .001	0.27	0.02	< .001
Var (Partner)	0.31	0.02	< .001	0.30	0.02	< .001
Cov (Veteran, Partner)	0.09	0.01	< .001	0.09	0.01	< .001
ρ[a]	0.19	0.03	< .001	0.23	0.03	< .001

Note: Var = variance; Cov = covariance.

[a]The correlation between adjacent elements in the first-order autoregressive covariance structure (AR(1)) specified in the model.

TABLE 4 Pretreatment to posttreatment change in veteran and partner relationship satisfaction and veteran and partner depressive symptoms in the full sample

	Relationship satisfaction			Depression		
Variable	**B**	**SE**	**p**	**B**	**SE**	**p**
Fixed effects						
Intercept$_{\text{Veteran}}$	121.58	2.83	< .001	13.83	0.49	< .001
Intercept$_{\text{Partner}}$	117.65	2.64	< .001	7.28	0.54	< .001
Time$_{\text{Veteran}}$	10.35	3.54	.004	−4.15	0.58	< .001
Time$_{\text{Partner}}$	11.64	3.30	< .001	−1.84	0.64	.005
Residuals						
Var (Veteran)	875.96	106.31	< .001	26.18	3.08	< .001
Var (Partner)	762.49	86.36	< .001	31.69	3.80	< .001
Cov (Veteran, Partner)	591.77	81.38	< .001	3.51	2.40	.143
ρ	0.57	0.07	< .001	0.62	0.06	< .001

Note: Var = variance; Cov = covariance.

[a]The correlation between adjacent elements in the first-order autoregressive covariance structure (AR(1)) specified in the model.

in veterans' and partners' scores were small, $d = 0.36$, 95% CI [0.10, 0.61], for veterans; $d = 0.35$, 95% CI [0.11, 0.59], for partners. Results from the follow-up interaction model demonstrated that trajectories of session-level relationship happiness were not significantly different between veterans and partners. The pattern of findings in the treatment completer subsample was the same, with a medium effect size change in veterans' scores, $d = 0.54$, 95% CI [0.26, 0.82], and a small-to-medium effect size change in partners' scores, $d = 0.44$, 95% CI [0.17, 0.72].

Secondary outcomes: Changes in relationship satisfaction, depressive symptoms, and partner accommodation from pre- to posttreatment

Results for pre- to posttreatment change in veteran and partner relationship satisfaction and veteran and partner depressive symptoms in the full sample are reported in Table 4. Results from the follow-up interaction models are reported in Supplementary Table S3.

Both veteran and partner relationship satisfaction significantly increased from pre- to posttreatment (veterans: $M = 121.58$, $SE = 2.83$ at pretreatment, $M = 131.93$, $SE = 3.69$ at posttreatment; partners: $M = 117.65$, $SE = 2.64$ at pretreatment, $M = 129.29$, $SE = 3.44$ at posttreatment). On average, veteran and partner relationship satisfaction was in the "satisfied" range at pre- and posttreatment. The effect sizes associated with change in veteran and partner satisfaction were small for veterans, $d = 0.30$, 95% CI [0.10, 0.51], and small-to-medium for partners, $d = 0.42$, 95% CI [0.18, 0.65]. Results from the follow-up interaction model indicated that the amount of change in relationship sat-

isfaction scores for veterans and partners was not significantly different.

Both veteran and partner depressive symptoms significantly decreased from pre- to posttreatment (veterans: $M = 13.83$, $SE = 0.49$ at pretreatment, $M = 9.68$, $SE = 0.63$ at posttreatment; partners: $M = 7.28$, $SE = 0.54$ at pretreatment, $M = 5.43$, $SE = 0.69$ at posttreatment). On average, veteran depressive symptoms were in the moderate range at pretreatment and the mild range at posttreatment whereas, on average, partner depressive symptoms were in the mild range at both pre- and posttreatment. The effect size associated with change in veteran depressive symptoms was medium-to-large, $d = -0.75$, 95% CI [−0.96, −0.54], whereas the effect size for partner depressive symptoms was small, $d = -0.29$, 95% CI [−0.50, −0.09]. Results from the follow-up interaction model indicated that the change in veteran depressive symptoms was significantly larger than the change for partners from pre- to posttreatment.

Partner accommodation significantly decreased from pretreatment ($M = 31.69$, $SE = 2.15$) to posttreatment ($M = 21.65$, $SE = 2.39$), $B = -10.04$, $SE = 2.75$, $t(68.8) = -3.65$, $p < .001$. There was a small-to-medium effect size for the reduction in partner accommodation, $d = -0.44$, 95% CI [−0.68, −0.20].

DISCUSSION

The goal of this study was to evaluate the effectiveness of CBCT for PTSD in a large, treatment-seeking sample of veteran couples presenting to a U.S. VA PTSD specialty clinic. Using a dyadic approach, we investigated changes in session-level veteran and partner ratings of veterans' PTSD

symptoms and each member of the couple's relationship happiness in the full sample and treatment completer subsample. We also examined changes from pre- to post-treatment in veteran and partner relationship satisfaction, veteran and partner depressive symptoms, and partner accommodation of PTSD symptoms. The results from these analyses supported study hypotheses regarding the effectiveness of CBCT for PTSD for each of these outcomes.

First, veteran-rated PTSD symptoms significantly decreased over treatment in both the full sample and treatment completer subsample. However, partners' ratings of veterans' PTSD symptoms followed a different trajectory. Partner-rated PTSD symptoms initially started lower and increased until they reached their highest point at Session 6 and then significantly decreased through the end of treatment. It appears that many partners present for treatment unaware of the actual level of their veteran partner's PTSD symptoms. Early in therapy, there is a heavy emphasis on psychoeducation about PTSD and its impact on relationships, and couples are taught to use communication skills to more effectively communicate about PTSD. Through these interventions, partners are theorized to become more aware of veterans' PTSD symptoms and better able to attribute veterans' behaviors and resulting relationship difficulties to PTSD. As such, this may help to explain the initial increase in partners' ratings of veterans' PTSD symptoms. This finding is consistent with previous research that has found that the negative association between service members' PTSD symptoms and partners' relationship satisfaction weakens as the internal attributions partners make for those symptoms decrease (Renshaw et al., 2014).

Overall, the results regarding veterans' PTSD symptoms are consistent with prior CBCT for PTSD research in both veteran and community samples in that, in most previous studies, both patient- and partner-reported PTSD symptoms significantly decreased over the course of treatment (Liebman et al., 2020). The treatment effect sizes for veterans' self-reported PTSD symptoms in this sample (i.e., $d = -0.69$ for the full sample; $d = -0.88$ for completers) are similar to those observed in previous studies involving veteran samples (i.e., $d = -0.64$, Monson et al., 2004; $d = -1.43$, Schumm et al., 2013). Given the small sample sizes of previous CBCT for PTSD studies in veterans, which have had fewer than 10 participants, this study likely provides a more precise and reliable estimate of treatment effect size.

Second, in both the full sample and treatment completer subsample, veteran and partner relationship happiness increased over the course of treatment, and the rate of change was similar for veterans and partners. Similarly, veteran and partner relationship satisfaction significantly increased from pre- to posttreatment, and the increase was

similar for veterans and partners. This finding is notable given that both veterans and partners were, on average, in the satisfied range at pretreatment and suggests that the treatment potentiates enhancements in relationship satisfaction even if the sample, on a whole, is not relationally distressed.

Third, veteran and partner depressive symptoms significantly decreased from pre- to posttreatment. Change in depressive symptoms was greater for veterans than partners, likely because veterans had more room to improve. On average, veterans reported experiencing moderate levels of depressive symptoms at pretreatment, whereas partners reported mild symptoms. These results are similar to previous studies with military and veteran samples that have found decreases in patient depressive symptoms (Fredman et al., 2020; Monson et al., 2004; Schumm et al., 2013) and partner depressive symptoms (Fredman et al., 2020). During treatment, couples work together to address PTSD symptoms as a team, which can alleviate the burden of PTSD on both veterans and partners. The increased communication and teamwork around PTSD, as well as decreased PTSD symptoms, likely leads to decreased psychological distress in partners, as demonstrated by decreased depression scores, even in a sample of partners with relatively low levels of depressive symptoms.

Finally, partner accommodation of PTSD symptoms significantly decreased from pre- to posttreatment. This result is counter to findings from the RCT in which partner accommodation did not significantly decrease over the course of treatment (Fredman et al., 2016) but similar to findings from a small pilot study of a present-focused version of CBCT for PTSD (Pukay-Martin et al., 2015) and a recent adaptation of CBCT for PTSD in which treatment was abbreviated and delivered intensively in a multicouple group format (Fredman et al., 2021). As CBCT for PTSD has developed over time, more attention has been focused on targeting partner accommodation to reduce couple-level PTSD avoidance and promote more direct expression of thoughts and feelings about relationship concerns. Therefore, the difference between the findings in Fredman and colleagues' (2016) study and those from more recent studies may be due to the relatively larger emphasis on accommodation as an explicit treatment target.

This study had a number of strengths. It was the first to evaluate the effectiveness of CBCT for PTSD in a real-world clinical setting and included the largest sample of the full 15-session CBCT for PTSD protocol published to date. We used dyadic data analyses to model data from both members of the couple and examined the trajectories of symptom change over the course of treatment. Finally, we investigated treatment outcomes in an important population: veterans with PTSD and their partners. There are also limitations to discuss. First, the sample consisted

primarily of White, veteran men and their women partners (i.e., mixed-gender couples). The high percentage of White veteran men is similar to that of veterans seeking individual treatment in our clinic (Wierwille et al., 2016) and to the overall population of veterans enrolled at our VA. Treatment effects might be even more robust in a sample with a larger proportion of women veterans, as previous studies have suggested that women benefit more from PTSD treatment than men (Watts et al., 2013), and when family members are involved in veterans' treatment for PTSD, women veterans have been shown to demonstrate more robust response than veteran men (Laws et al., 2018). Additional research is needed to extend these findings to samples that include more women and couples who are more diverse with respect to race, ethnicity, and gender composition. Second, the study relied on self-report measures rather than clinician-rated measures of symptoms. At the same time, these measures are consistent with usual clinical practice and likely mirror the measurement approach many VA clinicians employ, which increases the generalizability of the study results. Weekly relationship happiness was measured using one item, which may not be as psychometrically sound as instruments with more items (e.g., the CSI-4; Funk & Rogge, 2007). Additionally, we did not have information about comorbid diagnoses, concurrent treatment, or demographic information about partners or relationship duration. Therefore, we cannot determine the impact of these factors on therapy outcomes. Third, the current study did not include a control group or an active comparison treatment. It is possible that other factors could account for changes in symptoms and relationship satisfaction (e.g., the passage of time, repeated assessment, nonspecific therapy factors). Future research should compare CBCT for PTSD to gold-standard individual treatments for PTSD and couple therapy to determine if the changes that occur in CBCT for PTSD are similar to other treatments. Couples in the current study self-selected into CBCT for PTSD, consistent with real-world clinical care. Additional research is essential to investigate the characteristics of veterans and couples that benefit the most from CBCT for PTSD (c.f. Fredman et al., 2016) to inform treatment matching. Finally, the dropout rate in the current study was high, although it is similar to previous studies of individual trauma-focused treatment when dropout is defined in a similar way (Wierwille et al., 2016). Future research should continue to focus on strategies to enhance treatment retention, such as massed treatment delivered in a retreat format (Davis et al., 2021; Fredman et al., 2020) or abbreviated formats (Fredman et al., 2020; Morland et al., 2019), as couples who completed treatment experienced larger gains than those who dropped out. Future research can also expand upon using session-level data to explore concurrent change

in veterans' and partners' perceptions of veterans' PTSD and both partners' depression symptoms and relationship satisfaction while participating in CBCT for PTSD.

The results from this study demonstrate the effectiveness of CBCT for PTSD in a real-world, treatment-seeking sample of veteran couples, as CBCT for PTSD was associated with reductions in veterans' PTSD symptoms, increases in both partners' relationship happiness and overall satisfaction, as well as reductions in both partners' depressive symptoms and in partners' accommodation of veterans' PTSD symptoms. As such, these findings lend further support for the efficiency of CBCT for PTSD in improving patient, partner, and relationship outcomes through a single intervention and efforts to disseminate this treatment within the VA.

OPEN PRACTICES STATEMENT

The study reported in this article was not formally preregistered. Neither the data nor the materials have been made available on a permanent third-party archive; requests for the data or materials can be sent via email to the lead author at Nicole.Pukay-Martin@va.gov

ORCID

Nicole D. Pukay-Martin https://orcid.org/0000-0002-5837-9282
Connor Sullivan https://orcid.org/0000-0001-5758-2644

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