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COGNITIVE PROCESSING THERAPY VERSUS MEDICATION FOR THE TREATMENT OF COMORBID SUBSTANCE USE DISORDER AND POST-TRAUMATIC STRESS DISORDER IN EGYPTIAN PATIENTS (RANDOMIZED CLINICAL TRIAL)

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Abstract

Earlier research has established that posttraumatic stress disorder (PTSD) and substance use disorder (SUD) frequently coexist.

Aims: Cognitive Processing Therapy was compared to Sertraline and a placebo in an RCT for treating patients with comorbid SUD and PTSD.

Methods: 150 patients with SUD and PTSD were interviewed by clinicians and asked to fill out the Clinician-Administered PTSD Scale (CAPS-5), Posttraumatic Stress Disorder Checklist (PCL-5), Beck Depression Inventory (BDI-II), Timeline Follow Back Interview (TLFB), and Brief Addiction Monitor (BAM). Patients were randomly assigned to the following conditions: CPT (n=50), Sertraline (n=50), or Placebo (n=50). Pretreatment, posttreatment, six and, twelve-month follow-up assessments were conducted.

Results: When compared to the sertraline group, CPT resulted in much higher reductions in CAPS scores at posttreatment assessment (d=0.93, p < .000). When compared to the control group, CPT considerably reduced PTSD symptoms (the effect size, d=1.9, p < .000). Sertraline resulted in

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many significant decreases in CAPS when compared to control groups (the effect size, d=1.11, $p < .000$). At posttreatment, SUD and depression severity were significantly reduced in both CPT and Sertraline groups. After six and twelve months of follow-up, these differences persisted.
Conclusion: Comparatively to the control group, CPT and Sertraline significantly decreased PTSD, SUD, and depression.

Keywords: Cognitive processing therapy, Sertraline, Posttraumatic stress disorder, Substance use disorder, Depression.

As the name suggests, substance use disorders (SUDs) are a set of symptoms that emerge from the continued use of an addictive substance despite experiencing problems. (American Psychiatric Association, 2013). Substance use disorders affect a person's brain, actions, and emotions, and are linked to heredity as well as to psychological, emotional, cognitive, and familial factors (such as family beliefs and attitudes) and social factors (friends). (Goldman, Oroszi & Ducci, 2005; Hawkins, Catalano & Miller, 1992, Mayberry, Espelage & Koenig, 2009). As a maladaptive stress-coping technique, prolonged exposure to trauma and stress may raise the chance of excessive substance usage. (Chilcoat & Breslau, 1998, McLellan, 2017). Experiencing trauma(s) is linked in many cases to the onset of SUD. Substance Use Disorder (SUD) and Post-Traumatic Stress Disorder (PTSD) are usually associated (Grant et al., 2015, Gulliver & Steffen, 2010, Seal et al., 2011). Posttraumatic Stress Disorder (PTSD) is characterized by invasive, avoidance, hyperarousal, and cognitive and emotional changes (American Psychiatric Association, 2013). As a result of trauma, a person may experience physical discomfort, mental distress, harmful ideas, and/or destructive acts (Fernandez et al., 1999, Fernandez & Kerns, 2012). Trauma can negatively affect a person's quality of life, manifesting as a decline in activity, guilt, shame, and unworthiness as well as damaging self-perception (Kilpatrick, et al., 2013).

Avoidance and escaping are very common maladaptive strategies among PTSD patients. One example of escaping maladaptive strategies of PTSD patients is using alcohol and/or drugs to avoid thinking of trauma/s they experienced. Therefore, PTSD patients have a significant incidence of (SUD) according to various research (Flanagan et al., 2016, Debell et al., 2014, Breslau, Davis, & Schultz, 2003). As a result, patients with SUD and PTSD are less likely to comply with therapy, more likely to quit therapy, more probably to engage in self-destructive actions, and less likely to seek medication and psychological assistance (Smith & Randall, 2012, Brady et al., 1994). Because of this, both disorders must be addressed through the development of new treatments.

The results of a meta-analysis showed that medicine is considered an alternative for treating PTSD and SUD patients (Lee et al., 2016). The Food and Drug Administration has approved sertraline and paroxetine for the treatment of PTSD (Brady et al., 2005). As a first-line treatment for PTSD, sertraline has been proven to have a positive impact on substance abuse outcomes (Huang et al., 2020). Sertraline would be expected to treat SUD based on prior literature (Petrakis & Simpson, 2017). PTSD and alcohol use disorder patients were treated with Seeking Safety (SS) together with Sertraline or a placebo in a study done by Hien, et al. (2015). Seeking Safety is a psychosocial treatment for comorbid substance use disorder and PTSD (Najavits et al., 1998). At the end of the treatment, patients who had taken both sertraline and SS showed significantly less severity of PTSD symptoms than those who had received SS and placebo.

Studies suggest that treatments that address PTSD and SUD simultaneously can be cost-effective, and have more effective outcomes (Mills et al., 2012). The study by Foa, Hembree, & Rothbaum, 2007) suggested that Prolonged Exposure (PE) is an effective treatment for PTSD and SUD. PTSD and SUD patients benefit from cognitive behavioral therapy (CBT), which teaches individuals how to identify destructive and maladaptive beliefs and challenge them with logic (Sannibale et al., 2013). Aside from gaining important behavioral skills, CBT helps patients boost their quality of life and create healthy connections with others (Lydecker et al., 2010, Roberts et al., 2015).

PTSD treatment guidelines were issued in 2017 by the Veterans Health Administration, Department of Defense, and American Psychological Association (APA). The guidelines consist of a set of recommendations for therapists dealing with PTSD patients. The guidelines recommended CPT as a first-line treatment for PTSD. The guidelines also recommended Sertraline, Paroxetine, Fluoxetine, and Venlafaxine for the treatment of PTSD (American Psychological Association, 2017; VA/DoD Clinical Practice Guideline Working Group, 2017). Also, for patients with post-traumatic stress disorder, the International Society for Traumatic Stress Studies suggests Cognitive Processing Therapy (CPT). (Bisson et al., 2019). Clinically proven trauma-focused treatments, CPT and PE, are highly beneficial for patients with PTSD and substance use disorder (Chard et al., 2012). Developed by Resick and Schnicke (1993) and modified by Resick, the CPT is a well-documented treatment program (2001, 2008, 2014, 2016). CPT is a 12-session treatment that includes managing stuck points related to traumas (Resick, Monson, Chard, 2014).

Randomized clinical trials reported that (CPT) is successful in the management of PTSD with long-lasting 5 to 10-year outcomes and the highest impact and effect size of any PTSD therapy (e.g., Forbes, et al., 2012, Haagen, et al., 2015). In a six-week residential treatment program for PTSD and SUD, veterans with and without SUDs both benefited from CPT. (McDowell & Rodriguez, 2013). In a separate study, Kaysen et al. (2014) examined the effectiveness of CPT for individuals with PTSD and AUD who attended at least one CPT session. CPT has been demonstrated to reduce PTSD and depression over time. PTSD and SUD

patients were treated with CPT for six weeks, according to Peck et al. (2018). Their results showed that CPT significantly decreases maladaptive trauma-related cognitions. Bryan et al., (2018) examined the effectiveness of an intensive, 2-week CPT treatment program for veterans diagnosed with PTSD. They found that CPT significantly reduced PTSD symptom severity, rates of PTSD diagnosis, and suicide ideation.

Studies suggested that effective treatment approaches for PTSD in Egypt include CBT (e.g., Jalal et al., 2017), trauma-focused therapy (e.g., Lambert & Alhassoon, 2015), and interpersonal psychotherapy (Meffert et al., 2014).

However, The Veterans Health Administration and Department of Defense or the American Psychological Association do not suggest combining psychotherapy and medication to treat PTSD (Watkins et al., 2018). Therefore, our study compared the effectiveness of CPT and Sertraline in treating comorbid PTSD and SUD in Egyptian patients.

Although individuals with comorbid SUD and PTSD experience significant suffering, disability, and a challenging clinical course, there are still significant gaps in the evidence addressing effective treatment options. Therefore, in the current study CPT and Sertraline were compared to determine their effectiveness in treating patients with comorbid SUD and PTSD. It was hypothesized that treating PTSD will echo improvements in SUD. CPT and Sertraline were compared in the current study for the first time in an Arabic population. The current study is the first in Egypt to establish that Cognitive Processing Therapy may be effectively administered to patients with comorbid SUD and PTSD in a typical clinical environment. It joins an increasing number of studies that have similarly demonstrated this point (Forbes et al., 2012; Nixon et al., 2017). In addition, the most important and useful aspect of CPT is that it teaches individuals with co-occurring PTSD and substance use disorders practical self-help techniques. These are developed to immediately boost the patients' quality of life. This research contributes significantly to the current body of knowledge because it is unique in the Arabic world.

Methods

Design

The current study is a Randomized Control Trial (RCT) that includes three groups with repeated measurements. Patients in Sertraline and placebo and assessor were blind to treatment condition assignment. Three-block randomization was utilized to maintain an equal group size. Participants were assessed at pretreatment, post-treatment, and 6, and 12 months post-treatment. Outcome assessments were PTSD severity, substance use severity, and depression. Using single-identification numbers, the pharmacy at Ain Shams Hospital manufactured sertraline and placebo

kits for patients, and a random code is given to an unblinded statistician. The statistician (---------) informed the psychiatrist on how to allocate kits to patients.

Population and Study Sample

Patients were recruited from Cairo, Egypt's Ain Shams University Teaching Hospital. They were all outpatients seeking therapy for their substance use disorder. CAPS was used to make PTSD diagnoses. The psychiatrist assessed the patients' cravings and physical health via clinical interviews. None of the patients were on medication, and none were experiencing withdrawal symptoms.

Inclusion & Exclusion criteria

Inclusion criteria were as follow: 1) age older than 18 years 2) patients meeting current diagnostic criteria for both PTSD and SUD as defined in DSM-5 3) have a good knowledge of the English language because all assessments and therapy materials were in English. Exclusion criteria were having 1) people with cognitive disorders, 2) schizophrenia (or any other psychotic disorders), and/or 3) being pregnant. The study biostatistician produced the randomization sequence, which was kept secret from the researcher conducting study assessments. A participant's study arm was assigned by the researcher after confirmation that he or she had met the study's inclusion requirements. Recruitment occurred from January 2016 to July 2017. The study was conducted between July 2017 and Jan 2020. All patients' data and demographic information are stored at a much-secured place at the British University in Egypt (BUE).

Settings

The study was conducted at Ain Shams University Hospital, psychiatry department, Cairo, Egypt.

Ethics statement

The study was approved by the Institutional Review Board of the British University in Egypt. (IRB Protocol CL-006). The study was registered in Clinical Trials (ClinicalTrials.gov Identifier: NCT03469128) with all details about the three arms of the underlying investigation. According to the Helsinki Declaration, the study was conducted in strict conformity with all human subject protections. The patients signed the participants' information sheet and consent form and were informed that the experiment included psychological assessments for (PTSD, SUD, and depression) and treatment protocol to investigate the efficacy of the treatment.

Study therapists

The therapist who delivered the CPT is a clinical psychologist and certified CPT therapist. The medicine and placebos were delivered by the psychiatrist who was working in the addiction department at Ain Shams University hospital. `

Study interventions

Cognitive Processing Therapy **(**CPT) is a manual-guided therapy for PTSD symptom reduction that utilizes cognitive processing techniques (Resick et al., 2016). Sessions last 45–50 minutes each and are held once a week for 12 weeks. The outlines of the therapy during the sessions were as follows. The CPT therapist begins by educating the patient on PTSD, as well as providing an outline of the treatment and its rationale for success. They were required to produce an impact statement regarding the event's meaning to them. Clients were taught how to identify events, thoughts, emotions, and the relations between them. Clients were asked to describe the most painful traumatic event in detail. Clients were asked to express their emotions when they wrote about the experience and were invited to read it to themselves regularly. Self-blame and other distortions of the situation were addressed using Socratic questions. Clients were taught how to recognize and challenge their stuck points, as well as how to express themselves in a more balanced way. Clients were asked to modify any stuck points related to safety, trust, power, control, esteem, and intimacy. Their impact statements included their emotional and cognitive reflections related to traumatic experiences.

Medication: Tests on drug compliance were conducted using sertraline or placebo in combination with the vitamin riboflavin. Pill count was also used to check compliance. Over two weeks, patients in the sertraline group were gradually increased from 50 mg to 200 mg daily. All patients received the full dose of sertraline until the trial's completion (12 months). The patients were told to continue taking their pills.

*Supervision and fidelity***:** More than half of the recordings of CPT sessions have been examined. by an expert supervisor for conformity to (Resick and colleagues, 2016) guidelines. The therapist and supervisor met regularly during the experiment. There was greater supervision offered if manual compliance did not meet the competency criteria. Supervisor fidelity was defined using the Adherence Rating Scale (ARS) for CPT developed by Dittmann, et al., (2017). Fidelity was defined as the overall rating of the therapist's adherence to the manual of ARS on the following scale (0: Not adherent to the manual, 1: Great deviation, 2 Minor deviations, 3: Very adherent to the manual). Based on past research, we established the cutoff score of 2 and above as the threshold for “sufficient” adherence and competency (Marques, et al., 2019).

Measures

During the time of the study, all patients met weekly with psychiatrists and their urine samples were collected to investigate drug use and adverse reactions. Blinded professional assessor. conducted evaluation interviews at the end of the treatment phase, six months, and twelve months after treatment.

Patient demographics: Personal information and inquiries, including participants' sociodemographic, family-related, social, financial, and academic-related information.

Clinician-Administered PTSD Scale (CAPS-5; Weathers et al., 2015) is the gold standard for assessing PTSD symptoms before and after therapy. It was developed by the National Center for PTSD at the U.S. Department of Veterans Affairs. The interview can be conducted within 45-60 minutes. According to CAPS, each PTSD symptom is assessed in terms of its frequency and intensity in each inquiry. These questions have been divided into categories for ease of reference. Scores for each criterion are totaled together at the end. Each criterion comprises numerous questions. This test has shown strong psychometric qualities (Weathers, et al., 2018). A high level of inter-rater reliability (κ=.90) was observed in the present investigation. To test the CAPS' inter-rater reliability, a random sample of 35 recordings was selected at random. There was 100% agreement, the kappa coefficient was 1. There was 89.7% agreement among the three clusters of PTSD symptoms, with a combined Kappa value of 0.90. At both time points, the internal consistency (Cronbach's alpha) of the current sample was outstanding (α = 0.94 and 0.96).

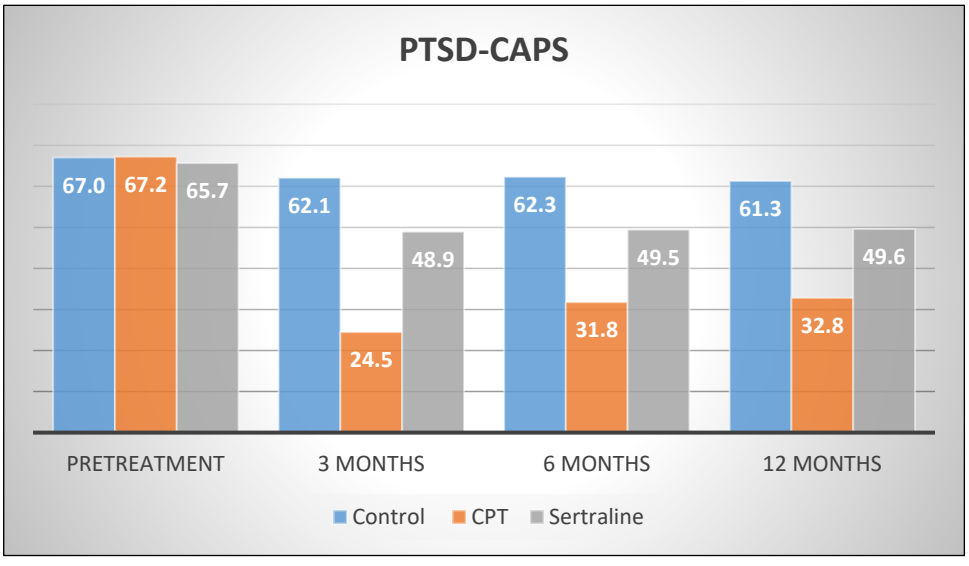

Figure 1: Change in Clinician-Administered PTSD Scale (CAPS)

Posttraumatic Stress Disorder Checklist (PCL-5): By using the 20 items on the (PCL-5) scale, PTSD symptoms are assessed. Individuals self-report their experience with PTSD symptoms as outlined in DSM-5 using the PCL-5 scale (Weathers et al., 2013). On a 5-point Likert scale, items range from 0 (not at all) to 4 (extreme). Items in each of the four PTSD symptom clusters (intrusions, avoidance, negative cognitions and mood, and changes in arousal and reactivity) are added together to create subscale scores. Evidence suggests that a 5- to 10-point change on PCL-5 constitutes a reliable change and a 10- to 20-point shift represents a clinically meaningful change (Weathers, et al. 2013). Psychometric parameters of the PCL are acceptable (Sveen et al., 2016). Internal consistency was adequate at both time points in the current experiment ($\alpha = 0.81$ and 0.94).

Beck Depression Inventory (BDI-II): Depressive symptoms were assessed using the (BDI-II) scale. There are 21 items in the self-report BDI II, which assesses depression-related attitudes and symptoms (Beck, et al., 1996). About 10 minutes are required to complete the BDI. Minimum depression ranges from 0 to 13, mild depression ranges from 14 to 19, and severe depression is from 29 to 64. There has been good reliability and validity proven with the BDI-II test (Beck et al., 1996). In the current study, Cronbach's alpha was excellent both before and after treatment (=0.90 and 0.91, respectively), and test-retest stability was great after one week (.90).

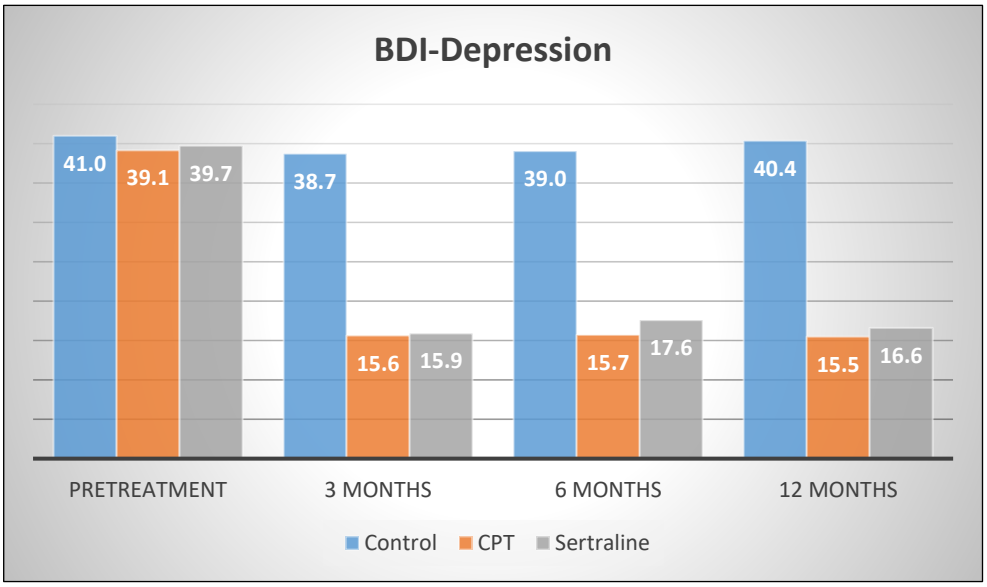

Figure 3: Change in Beck Depression Inventory (BDI-II)

Timeline Follow Back Interview was given to evaluate substance use using a thorough calendar, participants evaluated their daily substance use over the past 30

days. As an instrument for estimating daily substance use, the TLFB is highly reliable (Sobell, Sobell, Leo, & Cancilla, 1988; Sobell and Sobell, 1992).

Brief Addiction Monitor (BAM) to measure the SUD symptoms. BAM is a self-report instrument consisting of 17 items. There are several subscales within this scale, including 1) Use any alcohol or drug, a patient's score of 1 or above indicates that additional clinical attention is needed. 2) The presence of risk factors such as cravings, physical and mental, sleep and mood, as well as family and social problems. If a patient's risk factor score is 12 or above, he needs medical intervention. 3) the protective aspects include self-efficacy, self-help practices, religion/spirituality, engagement in the work or education, a sufficient income, and sober support. Patients with a protective factor score of 12 or less should be evaluated by a clinician. The psychometric qualities of BAM were found to be acceptable in the prior investigations (e.g., Cacciola et al., 2013). This study's internal consistency (Cronbach's alpha) for both time points (α= 0.90 and 0.91) was excellent.

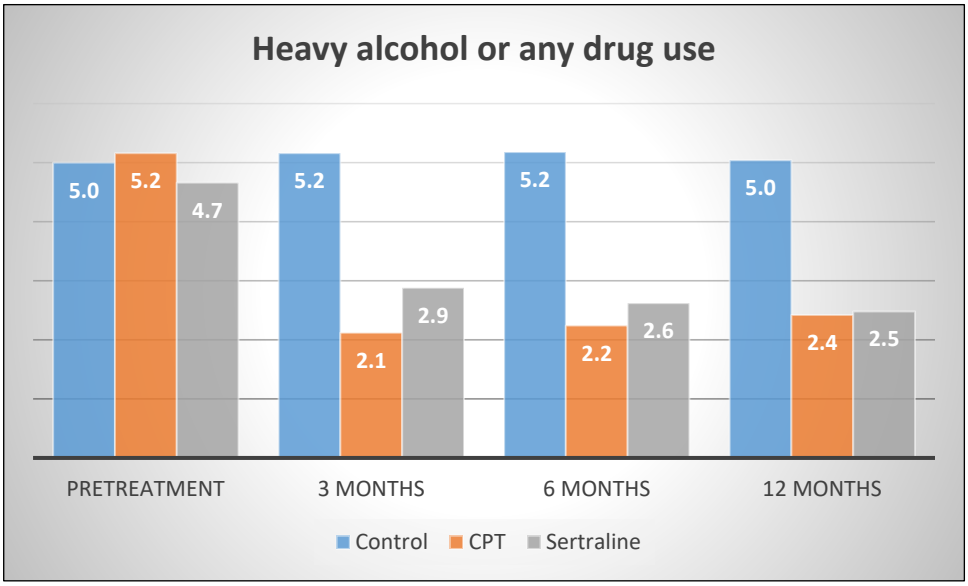

Figure 2: Change in Heavy alcohol use, any drug use according to Brief Addiction Monitor (BAM)

Urine drug screen (UDS) tests (CLIAwaived Inc.) were delivered regularly to check for cocaine, marijuana, benzodiazepines, opioids, and amphetamines in the urine. Patients in the Sertraline and placebo groups had their urine tested for riboflavin to determine whether they were complying with their prescription regimens.

Procedure

At the time of admission, 587 SUD patients completed the PCL. PTSD and SUD were diagnosed according to the DSM-5. Each participant was randomly assigned to one of the three trial arms based on a 1:1:1 ratio of randomization.

We found (170 patients) who were diagnosed with both PTSD & SUD. 150 patients agreed to participate in the trial. The comorbid PTSD & SUD patients were divided into three groups 1) the CPT group (*N*=50 patients), 2) the "medication group" (50 patients) that received the Sertraline. The third group was the control group (50 patients) who received a placebo. Of the (*N*=150) patients who enrolled in the current experiment, there were (*N*=124) patients who completed posttreatment assessments, (*N*=144) patients who completed 6-month follow-up posttreatment assessments, and (*N*=148) patients who completed 12-month follow-up posttreatment assessments. To decrease the patients' dropout to the minimum, each patient was paid (250 EGP) if he showed up at the 6- and 12-month appointments. Standardized tests and checklists of PTSD/SUD symptoms were administered to participants in all groups at baseline; posttreatment, 6 months, and 12 months posttreatment (see CONSORT 2010 Flow Diagram in Appendix A). This trial encountered no adverse effects.

Outcome measures

These were the key outcome measures: the CAPS score, the BAM score, the TLFB, the PCL score, and the BDI II score. After Posttreatment, six months, and twelve months after therapy, all results were assessed. It was determined that the sample size was large enough to detect meaningful differences in primary outcomes using SPSS Sample Power. A two-tailed test of significance, the desired power of 0.80, and an unstructured covariance matrix with four-time points were used. The correlation coefficient was 0.40 between repeated assessments and there was a 5% margin of error and a 30 percent attrition rate from pretreatment to posttreatment. With a (50 per group), the study has 80% power to detect a group (treatment type) difference with a mean effect size of 0.55.

Data analysis strategy

The sociodemographic and baseline characteristics of this sample were described using descriptive statistics (means, standard deviations, frequencies, and percentages). As part of the primary omnibus analyses, bivariate analyses were used to compare demographics and baseline symptom severity between the CPT group, sertraline group, and placebo group. It was administered at pretreatment (baseline) and all follow-up assessments to determine the CAPS and PCL total scores, which

were the key outcome variables for PTSD. The BDI-II total score was the main outcome variable for depression, and it was administered at baseline and all subsequent evaluations. BAM, PDU, and self-reported abstinence from substance use or alcohol in the prior 7 days were considered the key outcome factors for SUD, together with negative urine tests during follow-up evaluations.

All analyses were conducted on the sample that was intended to be treated. Generalized estimating equations GEEs were used to analyze PTSD and SUD outcomes (Ballinger, 2004). A temporal within-subjects autoregressive [AR (1)] correlation matrix was used to represent people across time points according to the distributions of the outcome measures. To model CAPS, PCL, BDI II, and BAM severity ratings, normal distribution identity link functions were used. Negative binomial models with a logit link were used to describe SUD measures of SUD, SU, and PDU, and a binary distribution logit link was used to model the previous 7 days' abstinence rate. GEE was used as it extends the generalized linear model, which processes corresponding data from repeat measurements, needs no assumption of parametric distribution and robust inference for an incorrect description of the internal correlation of subjects, and has good indications of the within-subject correlations (Zeger et al., 1988). For this reason, findings are provided using parameter estimates for CAPS and PCL, as well as for the BDI II and RF, as well as incidence rate ratios for SU and PDU, and odds ratios for abstinence rate... Time, treatment, time-by-treatment interaction, and any demographic or baseline diagnostic factors that differed significantly across groups were included in all models. Interactions with a trend level of at least (i.e., $\alpha < .10$) were investigated for simple effects at the end of treatment and follow-up time points, by prior studies using similar analytic methods and comparable sample sizes (Schneier et al., 2012) and to reduce the probability of Type-II errors (Selvin, 1996). It was decided to model outcomes as the main effects in cases where an interaction did not fit this condition. All simple and main effects were deemed significant at the =.05 level of statistical significance (two-tailed). Missing data in significant models were further evaluated using sensitivity analyses with multiple imputations.

Results

Demographic and Baseline Characteristics

The baseline assessment, as shown in Table 1, contains demographic and descriptive information. In terms of SUD, PTSD severity, depression, and demographic characteristics, there were no significant changes across the treatment conditions.

Table 1. Baseline Demographic and Diagnostic Characteristics by Treatment Group (N = 150).

Variables		Control		Psychotherapy		Sertraline	
		N	*%*	*N*	*%*	*N*	*%*
Sex	**Female**	1	1	2	1	4	3
	Male	49	33	48	32	46	31
Age	**20 - 30**	39	26	38	25	38	25
	31 - 40	7	5	6	4	6	6
	41 - 50	3	2	4	3	6	4
	>50	1	1	2	1	0	0
Marital status	**single**	36	24	37	25	33	22
	married	12	8	7	5	14	9
	divorced	1	1	4	3	1	1
	widowed	1	1	1	1	1	1
	Separated	0	0	1	1	1	1
Educational background	**High school**	11	7	7	5	8	5
	University	39	26	43	29	42	28
Current Employment status	**Full time job**	29	19	27	18	29	19
	Part time job	6	4	4	3	7	5
	unemployed	14	9	15	10	10	7
	Student	1	1	4	3	4	3
Income status	**Income lower than expenses**	8	5	9	6	12	8
	Equal income and expenses	31	21	31	21	28	19
	Income higher than expenses	11	7	10	7	10	7
Substance used	**Alcohol**	0	0	0	0	1	1
	Cannabis	23	15	23	15	26	17
	Hallucinogen	14	9	14	9	6	4
	Inhalant	6	4	6	4	2	1
	Opioid	2	1	2	1	7	5
	Sedative, hypnotic, or anxiolytic	0	0	1	1	0	0
	Amphetamine (or another stimulant)	0	0	0	0	1	1
	Other unknown	5	10	4	8	7	14

Variables		Control		Psychotherapy		Sertraline	
		N	*%*	*N*	*%*	*N*	*%*
Trauma	**War**	1	1	2	1	1	1
	Threatened, or actual physical assault	11	7	15	10	12	8
	Threatened or actual sexual violence	28	19	28	19	28	19
	Severe motor vehicle accidents	10	7	5	3	9	6
Duration of the PTSD	**>6 months**	1	1	2	1	1	1
	12-24 months	11	7	15	10	12	8
	2-5 years	28	19	28	19	28	19
	6-10 years	10	7	5	3	9	6
Duration of SUD	**>12 months**	1	1	0	0	1	1
	2-5 years	8	5	0	0	6	4
	5-10 years	34	23	43	29	35	23
	>10 years	7	5	7	5	8	5
Physical health (past 30 days)1	**Excellent**	6	4	6	4	8	5
	very good	12	8	17	11	14	9
	Good	10	7	10	7	9	6
	Fair	17	11	9	6	16	11
	Poor	5	3	8	5	3	2
Craving food or drugs	**Not at all**	10	7	11	7	7	5
	Slightly	13	9	13	9	10	7
	Moderately	11	7	11	7	11	7
	Considerably	12	8	10	7	17	11
	Extremely	4	3	5	3	5	3

Adherence to Treatment

Riboflavin levels in urine did not differ between the sertraline and placebo groups in terms of medication adherence, $\chi 2(1) = 2.1$, $p = .35$. Detection rates for riboflavin in the Sertraline and placebo groups were 45% and 40%, respectively. All patients in the CPT group attended at least six therapy sessions [$\chi 2(2) = 1.4$; $p = .5$]. Patients on Sertraline (70%) and placebo (78%) had at least six medication visits.

Post-Traumatic Stress Disorder symptoms:

Table 2 displays the pretreatment, posttreatment, six- and twelve-month follow-up periods. The ratings for PTSD severity are reported in Table 3. An interaction variable between time and therapy was added in the final model for PTSD

outcome. A preliminary review of the data indicated that not all participants attended all three follow-up evaluations (the end of treatment, 6- and 12-month follow-ups), with all Ps >.20 in Little's MCAR test (Little, 1988) finding that data were missing at random.

Table 2. Intent-to-Treat Differences (CPT, Sertraline, control) In Observed Means of PTSD and Substance Use Outcomes at Baseline, Post-treatment and 6- and 12-month Follow-up with Model-Based Treatment Effects.

Outcomes	**CPT**		**Sertraline**		**Control**		**TOTAL**		***Esti-***			
CAPS total	***n***	***M (SD)***	***n***	***M (SD)***	***n***	***M (SD)***	***n***	***M (SD)***	***mate***	***95% CI***		***p***
Baseline	50	67.2 (2.8)	50	65.6 (6)	50	67.02 (3.1)	150	66.6 (4.2)	_	_	_	_
Post-treatment	50	24.4 (11.8)	35	48.9 (9.7)	39	62.1 (5.3)	124	45.1 (18.2)	0.007	-24.4	-18.5	.000
6-month	47	31.7 (9.8)	48	49.4 (10.8)	49	62.3 (6.4)	144	47.8 (15.5)	0.009	-21.1	-16.3	.000
12-month	50	32.8 (9.5)	50	49.9 (10.2)	48	61.3 (5.6)	148	47.9 (14.5)	0.003	-20.9	-16.3	.000
PCL total	***n***	***M (SD)***	***n***	***M (SD)***	***n***	***M (SD)***	***n***	***M (SD)***	***Esti-mate***	***95% CI***		***p***
Baseline	50	67.1 (7.1)	50	65.9 (8.2)	50	66.9 (7.2)	150	66.6 (7.5)	_	_	_	_
Post-treatment	50	26.3 (7.3)	35	48.1 (9.3)	39	59.9 (7.1)	124	44.8 (16.1)	0.001	-24.6	-19.1	.000
6-month	47	31.3 (8.5)	48	47.7 (10.5)	49	60.1 (8.1)	144	46.4 (14.9)	0.003	-22.8	-17.6	.000
12-month	50	32.9 (7.7)	50	48.2 (10.4)	48	59.4 (7.6)	148	46.8 (13.9)	0.001	-22.2	-17.2	.000
BDI-II total	***n***	***M (SD)***	***n***	***M (SD)***	***n***	***M (SD)***	***n***	***M (SD)***	***Esti-mate***	***95% CI***		***p***
Baseline	50	39.1 (7.1)	50	39.7 (5.8)	50	41 (4.5)	150	39.9 (5.9)	_	_	_	_
Post-treatment	50	15.4 (2.7)	35	16.6 (5.1)	39	40.3 (5.2)	124	24.1 (12.3)	0.1	-17.9	-13.6	0.04
6-month	47	15.7 (3.6)	48	17.5 (4.6)	49	39.1 (7.2)	144	24.1 (11.8)	0.1	-18.1	-14.1	.08
12-month	50	15.9 (3.1)	50	16.5 (3.2)	48	38.7 (6.8)	148	23.7 (11.6)	0.5	-18.5	-14.5	0.5
BAM (SU)	***n***	***M (SD)***	***n***	***M (SD)***	***n***	***M (SD)***	***n***	***M (SD)***	***IRR***	***95% CI***		***p***
Baseline	50	5.1 (2.3)	50	4.6 (2.2)	50	5 (2.3)	150	4.9 (2.3)	0.6	.5	0.7	.000
Post-treatment	50	2.1 (2.2)	35	2.8 (2.4)	39	5.1 (2.6)	124	3.3 (2.7)				
6-month	47	2.2 (2.1)	48	2.6 (2.3)	49	5.1 (2.4)	144	3.3 (2.6)				
12-month	50	2.4 (2.2)	50	2.4 (2.2)	48	5.1 (2.1)	148	3.3 (2.5)				
BAM (Risk Factors)	***n***	***M (SD)***	***n***	***M (SD)***	***n***	***M (SD)***	***n***	***M (SD)***	***Esti-mate***	***95% CI***		***p***
Baseline	50	16.1 (2.1)	50	16.2 (2.7)	50	16.7 (1.8)	150	16.3 (2.2)	-	-	-	-
Post-treatment	50	4.7 (1.9)	35	15.1 (3.04)	39	14.6 (2.8)	124	11.4 (5.4)	0.008	-3.9	.008	.000
6-month	47	3.8 (1.5)	48	14.3 (2.7)	49	15.5 (3.2)	144	11.2 (5.8)	0.006	-4.1	0.006	.000
12-month	50	3.5 (1.2)	50	15.2 (3.3)	48	17.1 (2.8)	148	11.9 (6.5)	0.012	-3.3	0.01	.000
BAM (Protective Factors)	***n***	***M (SD)***	***n***	***M (SD)***	***n***	***M (SD)***	***n***	***M (SD)***	***Esti-mate***	***95% CI***		***p***
Baseline	50	3.9 (1.5)	50	4.3 (1.5)	50	4.2 (1.5)	150	4.1 (1.5)	-	-	-	-
Post-treatment	50	15.1 (4.1)	35	4 (1.6)	39	4.3 (1.3)	124	7.8 (5.7)	38.3	14.7	99.7	.000
6-month	47	16.3 (1.7)	48	3.9 (1.5)	49	4.3 (1.5)	144	8.1 (5.9)	55.7	20.6	149.9	.000

Outcomes	**CPT**		**Sertraline**		**Control**		**TOTAL**		***Esti-***			
CAPS total	***n***	***M (SD)***	***n***	***M (SD)***	***n***	***M (SD)***	***n***	***M (SD)***	***mate***	***95% CI***		***p***
12-month	50	13.9 (5.3)	50	4.5 (2.3)	48	4.02 (2.6)	148	7.5 (5.7)	28.2	10.7	73.9	.000
PDU	***n***	***M (SD)***	***n***	***M (SD)***	***n***	***M (SD)***	***n***	***M (SD)***	***IRR***	***95% CI***		***p***
Baseline	50	39.3 (11.3)	50	36.3 (12.2)	50	39.9 (10.8)	150	38.5 (11.5)	0.5	0.4	0.6	.000
Post-treatment	50	10.2 (7.7)	35	22.3 (10.4)	39	37.7 (11.4)	124	23.4 (15.1)				
6-month	47	10 (8.2)	48	22.6 (14.2)	49	37.5 (9.1)	144	23.4 (15.5)				
12-month	50	12.9 (8.1)	50	22.9 (13.6)	48	38.9 (11.4)	148	24.9 (15.5)				
Abstinence	***n***	***M (%)***	***n***	***N***	***n***	N	***n***		***OR***	***95% CI***		***p***
Baseline	50	4 (8)	50	5 (10)	50	5 (10)	150	14 (9.3)	0.7	0.1	3.1	0.7
Post-treatment	50	15 (30)	35	12 (24)	39	6 (12)	124	33 (22)				
6-month	47	15 (30)	48	13 (26)	49	8 (16)	144	36 (24)				
12-month	50	13 (26)	50	14 (28)	48	7 (14)	148	34 (22.7)				

Note. CPT= Cognitive Processing Therapy, CAPS-5=Clinician-Administered PTSD Scale; PCL-5=post-traumatic stress disorder checklist. BDI-II=Beck Depression Index-II. BAM = Brief Addiction Monitor, SU= In the past 30 days, heavy alcohol use, any drug use, specific drug use; PDU= Percent days using substance or drinking alcohol; Abstinence = using substance or drinking alcohol for previous 7 days, CI=confidence interval; IRR = incident rate ratio, OR = odds ratio. PTSD, SUD, and depression outcomes were probed at each timepoint after trend-level time-by-treatment interaction.

CPT resulted in much greater PTSD reductions than Sertraline, as evidenced by CAPS ratings in Tables 2 and 4 (the effect size, d=0.93, p<.000), CPT resulted in much greater PTSD reductions than the control condition (the effect size, d=1.9, p < .000). Sertraline led in significantly greater CAPS reductions compared to placebo groups (the effect size, d=1.11, p < .000).

Following therapy, PCL-5 scores decreased significantly across all groups (CPT: *M difference* = − 40.70, *CI95*: − 38 to − 43.39, p < .000; Sertraline: *M difference* =− 17.84, CI95: − 14.72 to − 20.95, p < .000, Control: *M difference* =−6.98, CI95: − 4.59 to − 9.36, p < .000) which were maintained at the 6-month follow-up point (CPT: *M difference* = − 35.74, *CI95*: − 33.11 to − 38.36, p < .000; Sertraline: *M difference* = − 18.18, *CI95*: − 14.68 to − 21.67, p < .000, Control: *M difference* =− 6.80, *CI95*: − 3.65 to − 9.94, p < .000) and 12-month follow-up (CPT: *M difference* = − 34.10, *CI95*: − 31.45 to − 36.74, p < .000; Sertraline: *M difference* = −17.68, *CI95*: − 14.58 to – 20.77, p < .000, Control: *M difference* = -7.50, *CI95*: -10.46 to -4.53, p < .000) (see Table 3)

Table 3. Intent-to-Treat Differences (CPT, Sertraline, control) on CAPS Subscales at Baseline, Post-treatment, 6- and 12-month Follow-up with Model-Based Treatment Effects.

Outcomes **CAPS total**	**CPT**		**Sertraline**		**Control**		**TOTAL**		**Treatment Group effects**			
Re-experiencing	***n***	***M (SD)***	***n***	***M (SD)***	***n***	***M (SD)***	***n***	***M (SD)***	***Esti-mate***	***95% CI***		***p***
Baseline	50	17.2 (2.6)	50	16.7 (3.1)	50	17.2 (1.9)	150	17.1 (2.6)	_	_	_	_
Post-treatment	50	6.9 (5.1)	35	12.3 (5.3)	39	14.7 (2.9)	124	11.3 (5.5)	0.003	6.7	4.7	<.000

Outcomes												
CAPS total	**CPT**		**Sertraline**		**Control**		**TOTAL**		**Treatment Group effects**			
6-month	47	9.5 (5.1)	48	14.1 (4.7)	49	16.2 (3.2)	144	13.2 (5.2)	0.02	4.7	2.8	<.000
12-month	50	10.5 (5.6)	50	12.4 (4.4)	48	15.1 (3.3)	148	12.6 (4.9)	0.01	5.2	3.5	<.000
Avoidance	***n***	***M (SD)***	***n***	***M (SD)***	***n***	***M (SD)***	***n***	***M (SD)***	***Esti-mate***	***95% CI***		***p***
Baseline	50	6.1 (1.4)	50	5.6 (1.7)	50	5.7 (1.3)	150	5.8 (1.5)	_	_	_	_
Post-treatment	50	3.1 (1.6)	35	5.1 (1.6)	39	5.1 (1.3)	124	4.4 (1.8)	0.2	1.7	1.02	<.000
6-month	47	3.4 (1.6)	48	5.1 (1.3)	49	5.5 (1.5)	144	4.6 (1.7)	0.3	1.5	0.8	<.000
12-month	50	3.3 (1.8)	50	4.8 (1.5)	48	5.5 (1.6)	148	4.5 (1.8)	0.2	1.6	0.8	<.000
Cognitions & Mood	***n***	***M (SD)***	***n***	***M (SD)***	***n***	***M (SD)***	***n***	***M (SD)***	***Esti-mate***	***95% CI***		***p***
Baseline	50	23.4 (2.3)	50	23.1 (3.2)	50	23.2 (2.1)	150	23.2 (2.5)	_	_	_	_
Post-treatment	50	6.9 (4.4)	35	16.6 (6.3)	39	22.5 (2.9)	124	15.3 (7.9)	0	9.1	6.5	<.000
6-month	47	10.3 (5.1)	48	15.7 (7.3)	49	22.1 (3.6)	144	15.1 (7.3)	0.001	8.3	6.01	<.000
12-month	50	10.1 (5.1)	50	17.8 (4.7)	48	22.6 (2.6)	148	16.8 (6.7)	0.002	7.5	5.2	<.000
Arousal and reactivity symptoms	***n***	***M (SD)***	***n***	***M (SD)***	***n***	***M (SD)***	***n***	***M (SD)***	***Esti-mate***	***95% CI***		***p***
Baseline	50	20.4 (1.7)	50	20.1 (3.1)	50	20.7 (1.8)	150	20.4 (2.3)	_	_	_	_
Post-treatment	50	7.4 (5.7)	35	14.8 (5.9)	39	19.7 (2.3)	124	13.9(7.1)	0.002	7.6	5.2	<.000
6-month	47	8.4 (4.5)	48	14.6 (5.3)	49	18.4 (3.5)	144	13.8 (6.1)	0.001	7.6	5.6	<.000
12-month	50	8.7 (4.9)	50	14.5 (5.2)	48	18.1 (4.6)	148	13.7 (6.2)	0.001	7.6	5.6	<.000
Depersonalization	***n***	***M (SD)***	***n***	***M (SD)***	***n***	***M (SD)***	***n***	***M (SD)***	***Esti-mate***	***95% CI***		***p***
Baseline	50	2.8 (0.8)	50	2.8 (0.9)	50	2.7 (0.8)	150	2.8 (0.9)	_	_	_	_
Post-treatment	50	0.3 (0.4)	35	2.1 (0.9)	39	2.6 (1.1)	124	1.7 (1.2)	0.1	2.3	1.4	<.000
6-month	47	0.5 (0.7)	48	1.8 (1.1)	49	2.7 (0.9)	144	1.7 (1.2)	0.1	2.5	1.6	<.000
12-month	50	0.2 (0.4)	50	1.5 (0.8)	48	2.1 (1.3)	148	1.3 (1.2)	0.06	3.2	2.1	<.000
Derealization	***n***	***M (SD)***	***n***	***M (SD)***	***n***	***M (SD)***	***n***	***M (SD)***	***Esti-mate***	***95% CI***		***p***
Baseline	50	2.4 (1.1)	50	2.5 (1.1)	50	2.4 (0.9)	150	2.4 (1.04)	_	_	_	_
End-of-treatment	50	0.3 (0.4)	35	1.9 (0.9)	39	2.3 (0.9)	124	1.5 (1.2)	0.2	1.8	0.9	<.000
6-month	47	0.4 (0.7)	48	1.7 (1.1)	49	2.4 (0.9)	144	1.5 (1.2)	0.2	1.7	0.8	<.000
12-month	50	0.2 (0.4)	50	1.5 (0.8)	48	1.7 (1.2)	148	1.2 (1.1)	0.1	2.6	1.5	<.000
SD	***n***	***M (SD)***	***n***	***M (SD)***	***n***	***M (SD)***	***n***	***M (SD)***	***Esti-mate***	***95% CI***		***p***
Baseline	50	3.5 (0.8)	50	3.4 (0.8)	50	3.5 (0.8)	150	3.5 (0.8)	_	_	_	_
Post-treatment	50	1.3 (0.5)	35	2.4 (1.1)	39	3.3 (0.7)	124	2.3 (1.1)	0.2	1.6	0.8	<.000
6-month	47	1.4 (0.6)	48	2.2 (1.1)	49	3.5 (0.6)	144	2.4 (1.1)	0.9	0.5	0.5	0.9
12-month	50	0.9 (0.6)	50	2.2 (1.03)	48	3.5 (0.6)	148	2.2 (1.3)	1.007	0.5	0.6	0.9
ISF	***n***	***M (SD)***	***n***	***M (SD)***	***n***	***M (SD)***	***n***	***M (SD)***	***Esti-mate***	***95% CI***		***P***
Baseline	50	3.1 (0.6)	50	3.2 (0.6)	50	3.1 (0.6)	150	3.1 (0.6)	_	_	_	_
Post-treatment	50	1.4 (0.6)	35	2.8 (0.8)	39	3 (0.7)	124	2.4 (1.1)	0.2	1.8	0.8	<.000
6-month	47	1.1 (0.7)	48	2.7 (0.9)	49	3.1 (0.7)	144	2.3 (1.1)	0.1	2.5	1.5	<.000
12-month	50	0.8 (0.5)	50	2.7 (0.9)	48	2.9 (0.8)	148	2.1 (1.2)	0.1	2.5	1.5	<.000
IO	***n***	***M (SD)***	***n***	***M (SD)***	***n***	***M (SD)***	***n***	***M (SD)***	***Esti-mate***	***95% CI***		***P***
Baseline	50	3.3 (0.7)	50	2.9 (0.7)	50	3 (0.7)	150	3.1 (0.7)	_	_	_	_
Post-treatment	50	1.3 (0.6)	35	2.8 (0.8)	39	2.8 (0.8)	124	2.3 (1)	8.8	0.6	3.7	<.005
6-month	47	1.1 (0.6)	48	2.5 (1.0)	49	2.9 (0.8)	144	2.2 (1.1)	4.5	0.8	2.1	<.000
12-month	50	0.6 (0.5)	50	2.6 (1.0)	48	3.1 (0.7)	148	2.1 (1.3)	0.8	0.5	0.1	0.2

Note. CPT= Cognitive Processing Therapy, CAPS=Clinician-Administered PTSD Scale; CI=confidence interval; SD= Subjective distress; ISF=Impairment in social functioning; IO= CAPS-Impairment in occupational or other important area of functioning.

Table 4. The Diagnostic Remission of the Patients at Baseline, Post-treatment, 6- and 12-month Follow-up with Model-based Treatment Effects.

Outcomes		**CPT**		**Sertraline**		**Placebo**	**CPT Vs. Sertraline**				**CPT Vs. Placebo**				**Sertraline Vs. Placebo**			
CAPS total	***n***	***%***	***n***	***%***	***n***	***%***	**Estimate**	***95% CI***		***P***	***Estimate***	***95% CI***		***P***	**Estimate**	***95% CI***		***P***
Post-treatment	50	80	35	28	39	2	10.2	4.1	26	.000	.005	.001	.04	.000	.05	.007	.4	<.000
6-month	47	76	48	22	49	18	11.2	4.4	28.5	.00	.06	.02	.2	.000	.77	.2	2.1	.6
12-month	50	80	50	18	48	22	18.2	6.7	49.5	.000	.07	.02	.1	.000	1.2	.4	3.4	.6
BAM total	*n*	*%*	*n*	*%*	*n*	*%*	*Estimate*	*95% CI*		*P*	*Estimate*	*95% CI*		*P*	*Estimate*	*95% CI*		*P*
Post-treatment	50	3.04	35	1.7	39	-.1	1.2	.08	1.7	.000	3.2	2.7	3.6	.000	1.9	1.4	2.3	<.000
6-month	47	2.9	48	2.04	49	-.1	.8	.2	1.5	.01	3.1	2.4	3.7	.000	2.2	1.5	2.8	<.000
12-month	50	2.7	50	2.1	48	-.04	.5	-.2	1.3	.2	2.7	1.9	3.5	.000	2.2	1.4	3	<.000
PDU	*n*	*%*	*n*	*%*	*n*	*%*	*Estimate*	*95% CI*		*P*	*Estimate*	*95% CI*		*P*	*Estimate*	*95% CI*		*P*
Post-treatment	50	29.1	35	13.9	39	2.2	15.1	7.1	23.1	.000	26.8	18.8	34.8	.000	11.6	3.6	19.6	<.00
6-month	47	29.3	48	13.6	49	2.4	15.6	7.9	23.3	.000	26.8	19.1	34.5	.000	11.2	3.4	18.9	<.00
12-month	50	26.4	50	13.3	48	1.02	13.1	5.03	21.1	.000	25.4	17.3	33.4	.000	12.3	4.2	20.3	<.00
BDI-II	*n*	*%*	*n*	*%*	*n*	*%*	*Estimate*	*95% CI*		*P*	*Estimate*	*95% CI*		*P*	*Estimate*	*95% CI*		*P*
Post-treatment	50	23.5	35	23.8	39	2.2	-.2	-2.5	2.1	.9	-23.1	-25.3	-20.8	.000	-22.8	-25.1	-20.5	<.000
6-month	47	23.4	48	21.05	49	1.9	-1.8	-4.4	.7	.2	-23.3	-25.9	-20.7	.000	-21.4	-24.1	-18.8	<.000
12-month	50	23.6	50	23.1	48	.6	-1.1	-3.3	1.1	.6	-24.8	-27.1	-22.6	.000	-23.7	-25.9	-21.5	<.000

Substance Use disorder Outcomes:

Tables 2 and 4 demonstrate a reduction in Substance Use ratings across all groups from pretreatment to posttreatment (*M difference* = − 1.55, *CI95*: -1.29 to − 1.81, *p* = .64) which were maintained at the 6-month follow-up point (*M difference* = − 1.59, *CI95*: − 1.28 to − 1.90, *p* = .54) and 12-month follow-up (*M difference* = − 1.62, CI95: − 1.29 to – 1.95, *p* = .93). CPT resulted to a reduction in excessive alcohol or drug use (SU) compared to Sertraline, although the change was not statistically significant, as revealed by BAM (the effect size, *d*=0.07, *CI95:* -.41 to 0.06, *p* = .34) CPT resulted in significant greater reductions in SU compared to the control condition (the effect size *d*=0.85, *CI95*: -2.37 to -1.84, *p* < .000). In comparison to control group, sertraline significantly decreased Substance Use (the effect size *d*=0.79, *CI95*: -2.14 to -1.72, *p*<.000).

Comparing CPT to Sertraline groups, SUD risk factors were considerably decreased (the effect size, *d*=1.91, *CI95:* - 8.76 to -7.59, *p*<.000). Compared to the control group, CPT led to considerably larger reductions in Risk factors (the effect size *d*=1.59, *CI95*: - 9.52 to -8.39, *p*<.000). Compared to control groups, sertraline resulted in significant reductions in Risk factors (the effect size *d*=0.26, *CI95*: - 1.47 to -0.08, *p*<.05).

Patients in the CPT group increased their protective factors against substance use disorder much more than those in the Sertraline group (the effect size, *d*=2.07, *CI95*: - 7.43 to – 8.80, *p* < .000) Compared to the control group, patients in the CPT group exhibited a significant increase in protective factors against substance use disorder. (the effect size *d*=2.14, *CI95*: - 7.37 to – 8.78, *p* < .000).

The PDU score and the seven-day abstinence rate reduced in all treatment groups from pretreatment to posttreatment Ps<.00, as shown in Table 2.

Depression outcomes

As indicated in Tables 2 and 4, there was a significant decrease in BDI-II scores between pretreatment and posttreatment for all groups. Compared to the control condition, CPT caused significantly greater decreases in BDI-II scores (the effect size *d*=2.12, CI95: − 19.49 to – 17.07, *p* < .000). Sertraline significantly reduced BDI-II scores compared to control groups (the effect size *d*=2.01, CI95: − 18.62 to – 16.02, *p*<.000).

Discussion

Cognitive Processing Therapy (CPT) was compared to Sertraline and a placebo in a randomized controlled trial in patients with SUD and PTSD. Cognitive Processing Therapy and sertraline are both beneficial in treating PTSD, with some suggestion that CPT is more effective. According to some study, trauma-focused treatment may be preferable than medicine (e.g., Lee et al., 2016). However, research

comparing psychotherapy and medication for the treatment of PTSD have revealed similar results. (e.g., Zoellner et al., 2019).

(28.9%) of patients seeking treatment for SUD fit the criteria for PTSD, according to our findings. However, while estimating the incidence of PTSD and SUD in our sample, it is essential to consider the sample's unique features, as well as its generalizability and representativeness. This outcome may be explained by the fact that people with PTSD typically struggle with communicating with themselves and others. They avoid connections with loved ones out of fear of experiencing the bad emotions again. Patients with PTSD may thus turn to alcohol or drugs to avoid experiencing the distressing experience. This avoidance state can result in considerable social isolation and impair the capacity of PTSD patients to feel happy emotions (Moore et al., 2021).

Our findings, which are consistent with the findings of previous research (e.g., Moore et al., 2019; Petrakis, Rosenheck, & Desai, 2011), indicate that many individuals who use substances have had traumatic events and may also be depressed. As a result of trauma-related stress or emotional memories, a person may choose unhealthy escape methods. Substance abuse, alcohol abuse, and overeating are examples of maladaptive coping mechanisms (Browne et al., 2016). Consequently, educating patients about harmful thoughts and emotions, stuck points, and recovery procedures would assist them in accepting their trauma-related memories. Patients are instructed in flexible, balanced thinking, the promotion of protective factors, and the reduction of SUD risk factors (Resick & Monson, 2017). Therefore, they would not require the use of substances such as alcohol or narcotics to enhance their mood or escape their feelings and emotions. In other words, patients will develop more adaptable and healthier coping strategies for stressors and traumas (Moring et al., 2020, Resick et al., 2017, Mcfall, et al 1992).

Our study also intended to evaluate the therapeutic impact of CPT on the management of co-occurring PTSD and SUD patients. It has been discovered that CPT reduces the intensity of SUD and PTSD symptoms. We discovered that the intensity of PTSD symptoms altered substantially over time in response to treatment conditions. Our findings resembled those of prior study (e.g., Kaysen et al., 2014; Resick et al., 2002, 2008; Monson et al., 2006; Hein et al., 2014) indicating that the treatment of PTSD patients improved significantly when CPT was utilized.

Our findings demonstrated that CPT substantially decreased the intensity of PTSD symptoms as compared to medication and the control group.

Compared to Sertraline, CPT produced much greater PTSD reductions. Consequently, therapy improves substance use disorder symptoms. Our findings were consistent with those of Haller et al. (2016), who demonstrated that CPT was effective in treating individuals with co-occurring SUD, PTSD, and depression.

Our outcomes in the current experiment were quite comparable to those obtained when we used CPT to Syrian refugee war trauma survivors (ElBarazi et al., 2022; ElBarazi & Ahmed, 2022). During our therapy work with Syrian refugees, we discovered that PTSD is accompanied with complex feelings of guilt, anxiety, dread,

and depression. Cognitive processing treatment greatly improved the symptoms of post-traumatic stress disorder (PTSD), depression, and anxiety, according to our experience dealing with individuals who had suffered the tragedy of war.

It is crucial to emphasize, however, that the current study has numerous critical limitations. First, the study's small number of female participants precluded the study's analysis of gender disparities. Further research is needed to determine whether female patients responded differently than male ones. As a second point, CPT (12 sessions) and medication/placebo interventions have varied periods of intervention (daily for 12 months). Because the sample size was small, it is necessary to conduct bigger randomized controlled studies on the therapeutic effectiveness of CPT in similar groups to confirm the present findings. Third, only having one CPT therapist can be considered another limitation.

In conclusion, CPT can be a useful treatment intervention for treating PTSD and SUD symptoms. SUD and PTSD have a strong link. Research in the future should include contemporaneous integrated treatment strategies for SUD and PTSD. As a result of the scarcity of empirical evidence on the effectiveness of therapy for comorbid SUD and PTSD, there is a growing urgency to find a solution.

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Appendix A: CONSORT 2010 Flow Diagram