



Effectiveness of trauma-focused cognitive behavioral therapy on quality of trauma-related memory, dissociative experiences, and body image dissatisfaction in adolescents with complex post-traumatic stress disorder: A randomized controlled clinical trial

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Abstract:

BACKGROUND: Repeated or prolonged experience of trauma can lead to complex post-traumatic stress disorder (CPTSD). This study aimed to determine the effectiveness of trauma-focused cognitive behavioral therapy (TF-CBT) on the quality of trauma-related memory, dissociative experiences, and body image dissatisfaction in adolescents with complex post-traumatic stress disorder (CPTSD).

METHODS AND MATERIALS: This study was conducted as a single-blind randomized controlled clinical trial with pre-test, post-test, and 6-month follow-up of experimental and control groups. Based on a convenience sampling method, 31 adolescents with CPTSD were selected from welfare correctional centers in the city of Zahedan, Iran, in 2022. In total, 15 and 16 people were randomly assigned to the experimental and control groups, respectively. The participants in the experimental group received 12 sessions of TF-CBT each for 45 min. The participants in the control group, however, received no intervention for the study. Data were analyzed using the SPSS-20 software, descriptive indices (frequency, percentage, mean, and standard deviation), Chi-square, independent *t*-test, and repeated measures analysis of variance (ANOVA) tests.

RESULTS: The mean and standard deviation of participants' age in experimental and control groups were 14.60 ± 1.55 and 15 ± 1.71 , respectively ($t = -0.68$, $P = 0.502$). The results of repeated measures ANOVA revealed that TF-CBT had a significant promoting effect on trauma-related memory quality, dissociative experiences, and body image dissatisfaction in adolescents with CPTSD ($P < 0.05$).

CONCLUSIONS: Overall, it is suggested that correction centers and other related centers utilize the results obtained from this study as scientific and practical guides to improve the mental health status of adolescents with CPTSD.

Keywords:

Body dissatisfaction, cognitive-behavioral therapy, dissociative, memory, post-traumatic stress disorder

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Introduction

Repeated or prolonged experiences of trauma can lead to complex post-traumatic stress disorder (CPTSD). The common symptoms of CPTSD fall into three main clusters of symptoms observed in post-traumatic stress disorder (PTSD), including re-experiencing, avoidance, and over-arousal. The main symptoms may accompany other symptoms in the context of self-organization such as impaired emotional control, identity disorder, and interpersonal relationship issues.^[1] According to previous studies, 70% of people experience at least one trauma in their lifetime.^[2] In addition, in the UK, epidemiological studies on different populations demonstrated that approximately 1–20% of affected people experience CPTSD for 1 month^[3-8] and 13% for their lifetime.^[7] Moreover, the prevalence of CPTSD among adolescents in the UK was reported to be 5.6%, which is substantially higher than that of PTSD.^[9] In Iranian society, the prevalence of CPTSD has not been reported in different age groups. However, Motlagh *et al.* (2005)^[10] reported that the prevalence of PTSD among adolescents after the Bam earthquake was 6.84%. The distinguishing characteristic of CPTSD between adolescents and adults is associated with different classifications of this experience such as Disturbances in Self-Organization (DSO).^[9] Experiencing trauma can affect memory, regardless of whether it leads to PTSD. The effects of trauma on long-term memory include loss or distortion of memories. Furthermore, the alteration of implicit and explicit memory in PTSD is possible (e.g., lack of explicit memory in victims of sexual abuse).^[11]

One of the symptoms of PTSD is related to memory function because one of the most serious and common symptoms of PTSD is intrusive memories of a traumatic event.^[12] Trauma-related memory refers to the devastating effects that trauma has on memory. These effects can be related to the same traumatic event and pre-traumatic events or post-traumatic events. In addition, disorganization in traumatic memory is greater than in non-traumatic memory.^[13] Trauma can affect memory in the form of perceived physical distress, interpersonal trauma (such as different forms of abuse), and exposure to a traumatic event.^[14-16] In addition, trauma has various effects on the physiological aspects of patients' brains, to the extent that it can have detrimental impacts similar to actual physical harm. For example, previous research has shown that people who have experienced severe trauma have a smaller hippocampus and medial prefrontal cortex, with its possible implications being impaired memory organization and involuntary recall (intrusive thoughts).^[17-19] Treatments that facilitate traumatic event narrative (such as exposure therapies for the trauma-induced disorder) can affect

memory components including processing as well as reorganization of traumatic event memories and lead to reduced anxiety.^[20] In addition, in CPTSD, dissociative problems in memory, called dissociative amnesia, may occur.^[21]

Although dissociative experiences are not included as diagnostic criteria for CPTSD in the 11th edition of the International Classification of Diseases (ICD-11), they may be considered as common symptoms associated with CPTSD.^[21,22] In Kaplan and Sadock's psychiatric summary, dissociation is defined as "an unconscious defense mechanism in which a group of psychological or behavioral processes is separated from the rest of the mental activity of an individual."^[23] Patients with CPTSD have more severe dissociative disorders than those with PTSD or without CPTSD. Although a scarce number of studies have reported the prevalence of dissociative symptoms in people with CPTSD, many patients are likely to experience clinically significant levels of these symptoms.^[22] In addition, there is a relationship between CPTSD and psychosomatic dissociation symptoms.^[21,22] Dissociative symptoms are experienced as amnesia, absorption, derealization of reality, and depersonalization.^[21] The high prevalence and severity of symptoms of dissociative experiences in CPTSD as well as the correlation of different manifestations of dissociation with CPTSD are factors that indicate the treatments used for patients with CPTSD should be more focused on dissociative symptoms.^[22]

Body dissatisfaction is a term that is used to describe negative self-assessment of physical appearance.^[24] Body dissatisfaction is likely to be caused by childhood abuse (including sexual, physical, and emotional abuse).^[25] Childhood abuse at critical stages of development is likely to disrupt the formation of personal identity and subject individuals to sociocultural pressures, which can lead to potential impairments associated with body image.^[26-28] According to previous studies, body image impairment occurs following childhood maltreatment.^[29,30]

According to the literature search, there is scant evidence to suggest the use of therapeutic recommendations specifically for people with CPTSD. Guidelines from relevant professional organizations include the use of evidence-based trauma-focused therapies and multi-component therapies for PTSD with more frequent sessions.^[1] Assessing the results of two meta-analyses revealed that trauma-focused therapies and multi-component therapies that include trauma-focused strategies would result in a more significant reduction of PTSD in patients with coexisting CPTSD symptoms than other treatments.^[31,32] One of these treatments is trauma-focused cognitive behavioral therapy (TF-CBT). TF-CBT is derived from

cognitive-behavioral therapy (CBT), which is designed specifically for the psychological needs of children and adolescents who have been traumatized as well as for their caregivers. TF-CBT has five basic components including psychological training, coping strategies, gradual exposure, cognitive processing, and caregiver participation. According to previous studies, in TF-CBT, a narrative created by gradual exposure exercises and cognitive processing can alter the memory associated with that trauma.^[33] In addition, the participation of caregivers can have a significant effect on the improvement of memory-related psychological symptoms in affected individuals.^[2] Hébert and Amédée (2020) reported that TF-CBT leads to improved dissociative symptoms in children with CPTSD who experienced sexual abuse. TF-CBT reduces dissociative symptoms in these children.^[34] Kenny *et al.* (2019)^[35] also noted that TF-CBT leads to improved self-concept and reduces problems associated with body image. In this regard, environmental factors and the person's beliefs about himself, abilities and limitations, self-esteem, and self-confidence lead to the control of emotions and relationships. It also exposes them to anxiety, aggression, depression, isolation, and other psychological crises. Therefore, this study aims to determine the effectiveness of TF-CBT on trauma-related memory quality, dissociative experiences, and body image dissatisfaction in adolescents with CPTSD.

Subjects and Methods

Study design and setting

The present study was conducted in a single-blind randomized controlled clinical trial with pre-test, post-test, and 6-month follow-up of experimental and control groups.

Study participants and sampling

It included all adolescents with CPTSD who were members (under care) of welfare detention/correctional centers of Zahedan, Iran, in 2022.

In this study, the sample size was determined using the G-power software with effect size of 0.50, alpha 0.05, statistical power of 0.80, number of groups 2, number of measurements 3, and correlation among repeated measures 0.70. The sample size required for the two groups was calculated to be 28.^[36] However, considering the 15% dropout rate of participants during the study, four people were added to the sample size. Therefore, 32 adolescents with CPTSD were selected via convenience sampling from the welfare correctional centers in the city of Zahedan, Iran. A participant in the experimental group was excluded from the study due to the lack of cooperation in the continuation of the treatment (he participated only in three therapy sessions). Figure 1 presents the sampling flowchart in the present study.

Inclusion criteria: 1) Age ranging from 12 to 18 years, 2) diagnosis of CPTSD based on structured clinical interview for DSM-5 (SCID-5-CV), PTSD and CPTSD Symptoms according to ICD-11, 3) no history of mental disorders necessitating immediate treatment such as substance and alcohol use disorder and psychotic disorders based on clinical interviews, 4) lack of intense thinking about self-harm or suicide, 5) having received at least five sessions of other psychological interventions in the past year, 6) informed consent and willingness to participate in the research, and 7) not taking psychiatric medications.

Exclusion criteria: 1) Unwillingness to continue treatment and lack of cooperation, 2) suicidal ideation during the study, 3) simultaneous psychological intervention during the research, and 4) random, incomplete, and biased responses to the questionnaires.

Research procedure

After the approval of the Ethics Committee of Shahid Beheshti University of Medical Sciences, the researcher referred to the detention and education centers of Zahedan, Iran, to obtain the approval of the authorities for conducting research in these centers. Then, the record of adolescents was assessed. By considering the inclusion criteria, the vulnerable individuals to CPTSD were identified based on SCID-5-CV and ICD-11. The eligible participants were provided with explanations about the goals and ethical considerations of the present study by the researcher. Then, using a convenience sampling method, from eligible participants, 32 people (16 people in each group) were randomly (random allocation law^[37]) selected and assigned to the experimental and control groups. However, one of the participants in the experimental group was excluded from the study due to a lack of cooperation in continuing the treatment. Participants in the experimental group received TF-CBT individually in 12 weekly sessions each for 45 min according to the Cohen *et al.* (2016)^[2] protocol. The intervention was performed by a trained Ph.D. student of clinical psychology under the supervision of the principal investigator. The participants in the control group who were on the waiting list did not receive any intervention during the study period, but after the end of the study, they received TF-CBT intervention. The participants completed all the pre-test, post-test, and follow-up measures employed to assess the effectiveness of the intervention in this study. Finally, the data obtained at these stages were analyzed. The number and content of TF-CBT sessions based on the Cohen *et al.* (2016) protocol are presented in Table 1.

Research tools

In this study, the following tools were used for data collection:

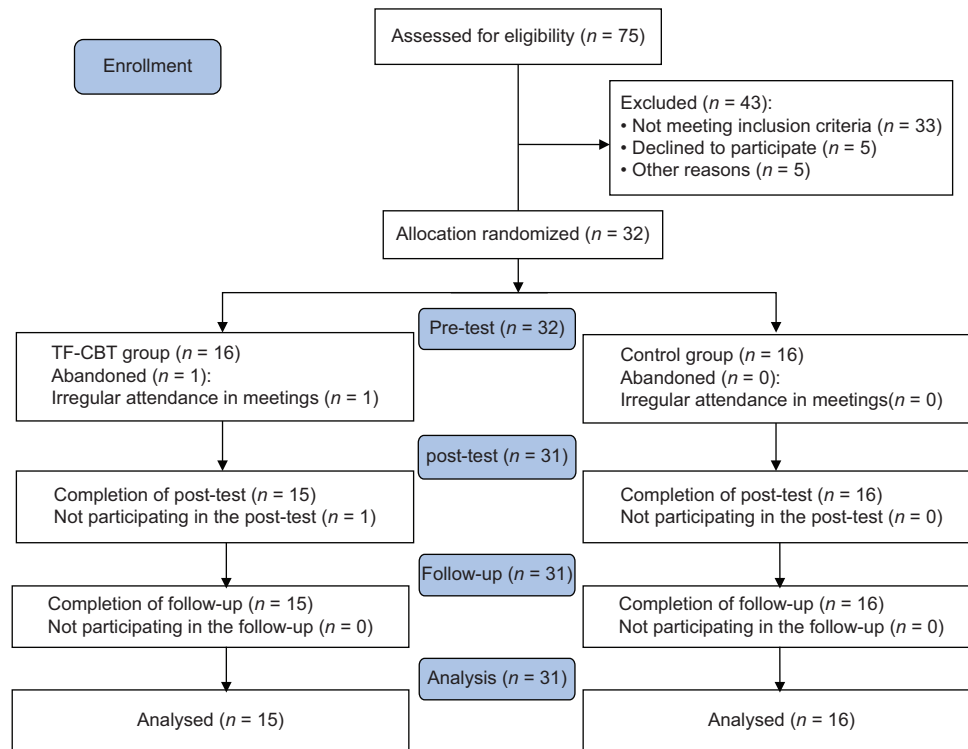


Figure 1: The sampling flowchart in the present study (n = 31)

Demographics information form

This form contained information about participants' gender and age.

Structured clinical interview for DSM-5 disorders-clinician version (SCID-5-CV)

The SCID-5-CV is a comprehensive standardized tool for evaluating major psychiatric disorders based on DSM-5 definitions and criteria. According to DSM-5, diagnosis categories include schizophrenia spectrum and other psychiatric disorders, bipolar and related disorders, depressive disorders, substance-related and addictive disorders, anxiety disorders, obsessive-compulsive and related disorders, post-traumatic stress disorder, attention-deficit/hyperactivity disorder, and other disorders. This interview is designed for clinical and research purposes. SCID-5-CV is usually implemented in one run, which takes between 45 and 90 min.^[38,39] Shabani *et al.* (2021)^[40] reported that according to the psychiatrist's diagnosis as the gold standard, in most diagnoses except anxiety disorders, Kappa was higher than 0.80, which indicates the favorable characteristics of this tool in diagnosing disorders. The sensitivity of all diagnoses was higher than 0.80.

Trauma Memory Quality Questionnaire (TMQQ2)

This questionnaire was developed by Meiser-Stedman *et al.* (2007)^[41] to assess an individual's memories of a traumatic event. The questionnaire had 14 items, 3 of which were eliminated and 11 items remained. These 11

items assess the sensory, fragmented, and unorganized aspects of the memory of a traumatic event in a 4-point Likert scale from completely disagree = 1 to completely agree = 4. The Cronbach alpha of the two samples was 0.76 and 0.82. In addition, this questionnaire has a good criterion and construct validity. However, its test-retest reliability has not been investigated. The psychometric properties of this questionnaire have been investigated in Iran, but it has not yet been published; so, it cannot be cited at this time.

Dissociative experiences scale (DES-II)

The initial version of this scale was developed by Bernstein and Putnam (1986).^[42] The revised version of this scale was prepared by Carlson and Putnam (1993).^[43] This scale was developed with the aim of quantifying the dissociative experiences. The scale has 28 questions, and all questions can be scored in the range of never = 0% to always = 100%. The score determines how often specific experiences have occurred to the subject, which is effective for diagnosing dissociative identity disorder and PTSD. The scale has three subscales, including dissociative amnesia, depersonalization-derealization of reality, and absorption-imagination. The score of each subscale is calculated by dividing the questions of that subscale by the total score of that subscale, and finally, a total score for the scale is obtained.^[44] Cronbach's alpha for this scale was 0.93,^[42] its test-retest reliability was 0.79–0.96,^[42,45] and its diversion coefficient ranged from 0.83 to 0.93.^[42,46] In a study by Amrollahi *et al.* (2016),^[47]

Table 1: The number and content of TF-CBT sessions according to Cohen *et al.* (2016) protocol

Session	Adolescent section	Caregiver section
1 st	Introduction, introducing therapist, setting rules (including secrecy and rules about appropriate boundaries), psychological–training of trauma, CPTSD, and treatment, setting therapeutic goals, instilling a sense of hope, homework assignment	Introduction, encouraging caregivers to participate in treatment, psychological–training of trauma, CPTSD, treatment main components, giving hope, explaining the role of a caregiver
2 nd	Task review, psychological training, identifying social context and support networks for adolescents, investigating the impact of traumatic events on adolescents, identifying adolescent supporters and gaps in support network, homework assignment	Child-rearing–Increased use of general and special admiration, productive time of the caregiver and the adolescent
3 rd	Task review, assessment of adolescent background and trauma narrative, normalization of the impact of traumatic events on adolescents, homework assignment.	N/A
4 th	Task review, emotional regulation training, normalization of a range of different emotions, presenting coping patterns, practicing new coping skills, homework assignment	Encouraging caregivers to model and admiring them to share feelings
5 th	Task review, normalization of physical reactions related to anxiety, traumatic event and offering an instruction for coping with them, practicing new coping skills (calming and relaxation), homework assignment	Attracting adolescents' collaboration
6 th	task overview, practicing the new coping skills, diagnosis of negative, anxious and dysfunctional self-talk, introducing new coping self-talk, homework assignment	N/A
7 th	Task review, presenting a new coping pattern (problem solving), trauma narrative, and homework assignment	Reviewing parenting and coping skills, child rearing - age-appropriate rules and the outcomes
8 th	Task review, presenting a new coping pattern, self-assessment and self-rewarding, trauma narrative, homework assignment	Reviewing child-rearing and coping skills
9 th	Trauma narrative focusing on identifying the feelings and thoughts associated with the imagined exposure, relaxation exercise and relaxation strategies, homework assignment	Psychological training of the caregiver on trauma
10 th	Task review, skills training including cognitive coping, gradual exposure (fear ladder), visual exposure (if needed), planning for future reminders, homework assignment	Reviewing the skills
11 th	Task review, skills review and planning for visual exposure (if needed), continuing real exposure to reminders in the future, preparation for the completion of treatment, homework assignment	Emphasizing the supporting role, preparation for the completion of the treatment
12 th	Reviewing the homework, training and practicing safety skills, reviewing the entire treatment process and identifying improvements	Safety skills, reviewing the entire treatment process and identifying improvements/progress

Cronbach's alpha of this scale was reported as 0.93 on 40 patients (non-clinical sample).

Body image concern inventory (BICI)

This inventory was developed and validated by Littleton *et al.* (2005). The inventory has 19 items assessing factors such as dissatisfaction, shame, and dysmorphic appearance concern, checking and hiding perceived defects, and the extent to which a person's concern about their appearance interferes with their social functioning. All items of this questionnaire are scored on a 5-point Likert scale, ranging from never = 1 to always = 5. A higher score indicates higher levels of dissatisfaction with body image. Littleton *et al.* (2005)^[48] reported Cronbach's alpha of 0.93; the correlation of all the items was between 0.32 and 0.73 and its validity coefficient for the body dysmorphic disorder scale was 0.83. In a study by Bassak Nejad and Ghafari (2007) in Iran, Cronbach's alpha in females, males, and total students was reported 0.93, 0.95, and 0.95, respectively. In addition, correlation coefficient analysis for the Fear of Negative Appearance Evaluation (FNAE) Scale and the Fear of Negative Evaluation (FNE) Scale in this questionnaire was reported as 0.55 and 0.43, respectively.^[49]

Ethical considerations

All followed procedures were in accordance with the ethical standards of the responsible committee on human experimentation (institutional and national) and with the Helsinki Declaration of 1975, as revised in 2000. The present study has been approved by the Ethics Committee of the Shahid Beheshti University of Medical Sciences (IR.SBMU.MSP.REC.1400.830).

Analysis

Data were analyzed using the SPSS-20 software. Frequency, percentage, mean, and standard deviation indicators were utilized to check the descriptive findings. In addition, Chi-square, independent *t*-test, and repeated measures ANOVA tests were employed to check the results of research hypotheses.

Results

In this study, 31 adolescents with CPTSD participated, 15 (48.39%) in the experimental group and 16 (51.61%) in the control group. In the experimental group, 7 (46.67%) participants were male and 8 (53.33%) were female. In

the control group, 6 (37.50%) participants were male and 10 (62.50%) were female. Based on the results of the Chi-square test, there was no significant difference between the experimental and control groups in terms of gender (Chi-square value = 0.267, $P = 0.722$). The mean and standard deviation of the age of participants in the experimental and control groups were 14.60 ± 1.55 and 15 ± 1.71 , respectively. Based on the results of the independent t -test, there was no significant difference between the experimental and control groups in terms of age ($t = -0.68$, $P = 0.502$). Descriptive indices (mean and standard deviation) and independent t -test results are presented for the research variables in Table 2.

As reported in Table 2, there was no significant difference between the groups in terms of trauma-related memory quality, dissociative experiences, and body image dissatisfaction using an independent t -test ($P > 0.05$). In this regard, a repeated measures ANOVA test was employed to analyze the results of trauma-related memory quality, dissociative experiences, and body image dissatisfaction. The ANOVA test assumptions were assessed and confirmed by repeated measurements. The results of Muchley's test for trauma-related memory quality, dissociative experiences, and body image dissatisfaction are presented in Table 3.

As outlined in Table 3, Muchely's sphericity assumption for trauma-related memory quality and dissociative experiences was not confirmed due to the significance level of less than 0.05. In this regard, the Greenhouse-Geisser test was employed for the indicated. However, the sphericity assumed for body image dissatisfaction

was confirmed given the significance level above 0.05. Therefore, for body image dissatisfaction, the spherical assumption test was used. Table 4 outlines the results of Multivariate Analysis of Variance (MANOVA) for assessing within-group effects of trauma-related memory quality, dissociative experiences, and body image dissatisfaction.

As reported in Table 4, the effect of stages of research was significant on the multivariate model of trauma-related memory quality ($F = 47.36$, $P < 0.001$), dissociative experiences ($F = 45.88$, $P < 0.001$), and body image dissatisfaction ($F = 75.14$, $P < 0.001$). Furthermore, the reported effect size of the research stages was defined as 62%, 61%, and 72% of the variance for trauma-related memory quality, dissociative experiences, and body image dissatisfaction, respectively. Also, according to Table 4, the interaction effects of stages of the study with the group were significant on the multivariate model of trauma-related memory quality ($F = 14.73$, $P < 0.001$), dissociative analysis ($F = 12.85$, $P < 0.001$), and body image dissatisfaction ($F = 26.24$, $P < 0.001$). With regard to the reported effect size, the interaction effect of research stages with the group was defined as 34%, 31%, and 47% of the variance for trauma-related memory quality, dissociative experiences, and body image dissatisfaction, respectively. Hence, to investigate the difference points within the group in terms of trauma-related memory quality, dissociative experiences, and dissatisfaction with body image, the interaction effect of the research stages with the study group was assessed separately. Table 5 reports the results of Muchely's test for trauma-related memory quality, dissociative experiences,

Table 2: Descriptive indices (mean and standard deviation) and independent t -test results for research variables ($n=31$)

Variables	Stage	TF-CBT group ($n=15$)		Control group ($n=16$)		Independent t -test	
		M	SD	M	SD	t	P
Trauma-related memory quality	Pre-test	28.13	3.09	28.94	2.84	-0.75	0.456
	Post-test	23.87	3.02	27.81	2.64	-3.88	<0.001**
	Follow-up	21.60	4.04	27.06	3.49	-4.03	<0.001**
Dissociative experiences	Pre-test	37.06	8.76	40.22	7.48	-1.08	0.288
	Post-test	32.64	8.78	38.69	8.17	-1.99	0.057
	Follow-up	29.01	8.64	37.76	7.81	-2.96	0.006*
Body image dissatisfaction	Pre-test	45.53	8.76	43.50	8.66	0.65	0.521
	Post-test	35.53	9.64	40.44	7.91	-1.55	0.131
	Follow-up	30.93	8.65	39.87	8.15	-2.96	0.006*

Note. M=Mean; SD=Standard deviation. ** $P<0.001$; * $P<0.01$

Table 3: Muchely's test results for trauma-related memory quality, dissociative experiences, and body image dissatisfaction ($n=31$)

Variables	Within Subjects Effect	Muchely's test				Epsilon		
		Mauchly's W	Chi-Square	df	P	Greenhouse-Geisser	Huynh-Feldt	Lower-bound
Trauma-related memory quality	Research stages	0.679	10.843	2	0.004**	0.757	0.817	0.500
Dissociative experiences	Research stages	0.736	8.587	2	0.014*	0.791	0.858	0.500
Body image dissatisfaction	Research stages	0.918	2.398	2	0.302	0.924	1	0.500

** $P<0.005$; * $P<0.05$

Table 4: Multivariate within-group effect test results for trauma-related memory quality, dissociative experiences, and body image dissatisfaction ($n=31$)

Variables	Source	Test	Type III sum of squares	df	Mean Square	F	P	Eta
Trauma-related memory quality	Research stages	Greenhouse–Geisser	280.956	1.514	185.581	47.36	<0.001*	0.62
	Research stages × group	Greenhouse–Geisser	87.408	1.514	57.736	14.73	<0.001*	0.34
Dissociative experiences	Research stages	Greenhouse–Geisser	430.217	1.582	271.923	45.88	<0.001*	0.61
	Research stages × group	Greenhouse–Geisser	120.478	1.582	76.149	12.85	<0.001*	0.31
Body image dissatisfaction	Research stages	Sphericity assumed	1366.273	2	683.134	75.14	<0.001*	0.72
	Research stages × group	Sphericity assumed	477.112	2	238.556	26.24	<0.001*	0.47

* $P<0.001$ **Table 5: The results of Muchely's test for trauma-related memory quality, dissociative experiences, and body image dissatisfaction for each study group ($n=31$)**

Variables	Group	Within-subjects effect	Muchely's test				Epsilon		
			Mauchly's W	Chi-square	df	P	Greenhouse–Geisser	Huynh-Feldt	Lower-bound
Trauma-related memory quality	TF-CBT ($n=15$)	Research stages	0.606	6.501	2	0.039*	0.718	0.777	0.500
	Control ($n=16$)		0.721	4.586	2	0.101	0.782	0.856	0.500
Dissociative experiences	TF-CBT ($n=15$)	Research stages	0.679	5.025	2	0.081	0.757	0.830	0.500
	Control ($n=16$)		0.732	4.376	2	0.112	0.788	0.865	0.500
Body image dissatisfaction	TF-CBT ($n=15$)	Research stages	0.963	0.494	2	0.781	0.964	1	0.500
	Control ($n=16$)		0.875	1.870	2	0.392	0.889	1	0.500

* $P<0.05$

and dissatisfaction with body image separately for each study group.

As indicated in Table 5, Muchely's sphericity assumption was confirmed for the trauma-related memory quality in the control group, but not in the experimental group. In addition, for dissociative experiences and body image dissatisfaction in experimental and control groups, Muchely's sphericity assumption was confirmed given the significance level above 0.05. Table 6 provides the results of multivariate within-group effect tests for trauma-related memory quality, dissociative experiences, and body image dissatisfaction separately for the experimental and control groups.

As shown in Table 6, there was a significant difference among different stages of the study in the experimental group in terms of the trauma-related memory quality ($F = 46.28$, $P < 0.001$), dissociative experiences ($F = 71.55$, $P < 0.001$), and body image dissatisfaction ($F = 110.53$, $P < 0.001$). As such, TF-CBT had a significant effect on trauma-related memory quality, dissociative experiences, and image dissatisfaction during the study stages. Also, the reported effect size of TF-CBT explained 77%, 84%, and 89% of the differences in within-group variance for the trauma-related memory quality, dissociative experiences, and body image dissatisfaction over the course of the study, respectively. In addition, as outlined in Table 6, in the control group there was a significant difference among different stages of the study in terms of the trauma-related quality of memory ($F = 5.92$, $P = 0.007$), dissociative experiences ($F = 4.22$, $P = 0.024$), and body image dissatisfaction ($F = 5.79$, $P = 0.007$).

Further, considering the reported effect size, the passage of time explained 28%, 22%, and 28% of the differences of within-group variance in the trauma-related memory quality, dissociative experiences, and dissatisfaction with body image at different stages of the study.

Bonferroni post-hoc test was utilized to investigate the difference between the stages of the study. The results of the Bonferroni posthoc test of the experimental group revealed a significant difference between the pre-test, post-test, and follow-up stages ($P < 0.001$) as well as between the post-test and follow-up stages ($P < 0.05$) of trauma-related memory quality. The results of the Bonferroni post-hoc test of the control group also indicated a significant difference in terms of the trauma-related memory quality between the pre-test and follow-up stages ($P < 0.05$). In terms of dissociative experiences, the results of the Bonferroni posthoc test in the experimental group revealed a significant difference between the pre-test, post-test, and follow-up stages ($P < 0.001$) as well as between the post-test and follow-up stage ($P < 0.001$). However, based on the results of the Bonferroni post-hoc test in the control group, there was no significant difference in dissociative experiences between pre-test, post-test, and follow-up stages as well as between post-test and follow-up stage ($P > 0.05$). In addition, the results of the posthoc Bonferroni test in the experimental group indicated that there was a significant difference in body image dissatisfaction between the pre-test, post-test, and follow-up stages ($P < 0.001$) as well as between the post-test and follow-up stages ($P < 0.001$). In the control group, the difference in body image dissatisfaction between the pre-test and follow-up stages ($P < 0.05$) was significant.

The interaction effects of trauma-related memory quality [Figure 2], dissociative experiences [Figure 3], and body image dissatisfaction [Figure 4] at different stages of the research for experimental and control groups are presented.

The results of the multivariate between-group effect test for trauma-related memory quality, dissociative experiences, and body image dissatisfaction are reported in Table 7.

As outlined in Table 7, there was a significant difference between the experimental and control groups in terms of trauma-related memory quality ($F = 10.73$, $P = 0.003$) and dissociative experiences ($F = 4.42$, $P = 0.049$). Note, that the TF-CBT had a significant effect on reducing the trauma-related memory quality and dissociative experiences in the post-test and follow-up stages. Further, in regard to the reported effect size, TF-CBT explained 27% and 13% of the between-group variance of trauma-related memory quality and dissociative experiences, respectively. However, there was no substantial difference in body image dissatisfaction ($F = 1.75$, $P = 0.196$) between the experimental and control groups.

Discussion

The purpose of this study was to determine the effectiveness of TF-CBT on trauma-related memory quality, dissociative experiences, and body image dissatisfaction in adolescents with CPTSD. The results

of this study indicated that TF-CBT has significant effects on trauma-related memory quality. However, a scarce number of studies have investigated the effect of TF-CBT on trauma-related memory quality. For instance, Akbarian *et al.* (2015)^[50] found that memory performance improves over time, and this improvement accelerates under experimental and interventional conditions. Also, they showed that CBT improves the treatment of PTSD in accordance with the symptoms and autobiographical memory of patients. In addition, De Arellano *et al.* (2014)^[33] reported that TF-CBT can alter trauma-related memory, whose results are consistent with the results of the present study.

One of the main components of TF-CBT is the visual re-experience of disturbing memories.^[51,52] In this regard, distressing cognitions that arise can be corrected^[51] leading to reminiscences of the event, which are more organized and coherent memories and are less susceptible to involuntary retrieval. Therapists working within the TF-CBT framework may use the Foa model (2011), which employs repeated exposure to stimuli to reduce emotional responses through visual re-exposure.^[53] A recent study has shown that it is possible to facilitate the re-experience of an event by encouraging allocentric processing (independent of perspective).^[54] This is achieved by purposeful manipulation of trauma-related memory perspective in visualization.^[55] It is also a process by which the systems in the brain that are responsible for the memory of trauma and the reduction of prominent emotional influences are activated.^[56] The findings of this study

Table 6: Results of multivariate within-group effect test for trauma-related memory quality, dissociative experiences, and body image dissatisfaction in the experimental and control groups ($n=31$)

Variables	Source	Test	Type III sum of squares	df	Mean Square	F	P	Eta
Trauma-related memory quality	Research stages × TF-CBT	Greenhouse–Geisser	330.133	1.435	230.021	46.28	<0.001***	0.77
	Research stages × control	Sphericity assumed	28.500	2	14.25	5.92	0.007**	0.28
Dissociative experiences	Research stages × TF-CBT	Sphericity assumed	486.935	2	243.468	71.55	<0.001***	0.84
	Research stages × control	Sphericity assumed	49.654	2	24.827	4.22	0.024*	0.22
Body image dissatisfaction	Research stages × TF-CBT	Sphericity assumed	1671.600	2	835.800	110.53	<0.001***	0.89
	Research stages × control	Sphericity assumed	121.792	2	60.896	5.79	0.007**	0.28

*** $P < 0.001$; ** $P < 0.01$; * $P < 0.05$

Table 7: Multivariate within-group effect test results for trauma-related memory quality, dissociative experiences, and body image dissatisfaction ($n=31$)

Variables	Source	Type III Sum of Squares	df	Mean Square	F	P	Eta
Trauma-related memory quality	Intercept	63945.02	1	63945.02	2549.55	<0.001***	0.99
	Group	269.15	1	269.15	10.73	0.003**	0.27
	Error	727.35	29	25.08	N/A	N/A	N/A
Dissociative experiences	Intercept	119718.35	1	119718.35	610.58	<0.001***	0.95
	Group	831.80	1	831.80	4.42	0.049*	0.13
	Error	5686.10	29	196.07	N/A	N/A	N/A
Body image dissatisfaction	Intercept	143503.32	1	143503.32	698.63	<0.001***	0.96
	Group	360.09	1	360.09	1.75	0.196	0.06
	Error	5956.81	29	205.41	N/A	N/A	N/A

*** $P < 0.001$; ** $P < 0.005$; * $P < 0.05$

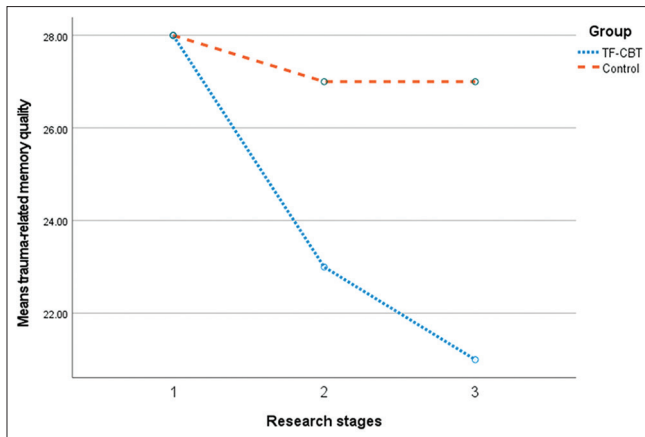


Figure 2: Interaction effects of trauma-related memory quality at different stages of the research for experimental and control groups ($n = 31$)

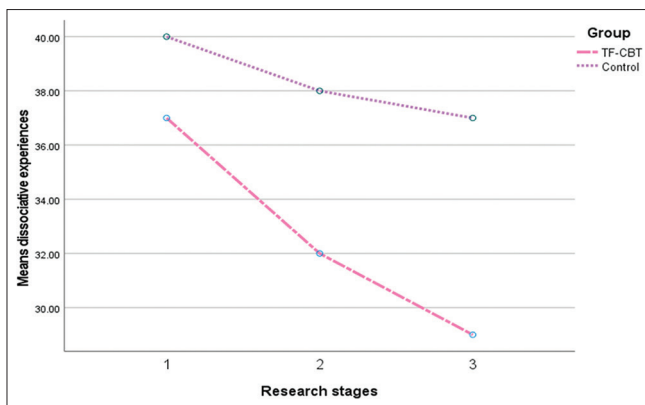


Figure 3: Interaction effects of dissociative experiences at different stages of the research for experimental and control groups ($n = 31$)

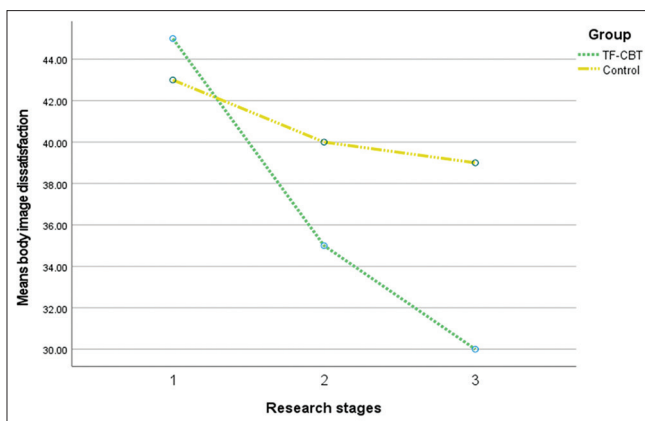


Figure 4: Interaction effects of body image dissatisfaction at different stages of the research for experimental and control groups ($n = 31$)

highlight the fact that exposure to traumatic events leads to serious injury, and long-time exposure to traumatic events causes damage to the hippocampus (related to memory and recall). That is why a person uses coping strategies (avoidance and safety behavior) when exposed to a traumatic event (or its reminders) to avoid experiencing the anxiety associated with that event.

The use of coping strategies in the long term increases anxiety. In this regard, TF-CBT emphasizes visual and real exposure as well as not avoiding traumatic events for the cognitive reconstruction of misinterpretations. In TF-CBT, a patient encounters memories of traumatic events, internal and external clues, as well as avoidable situations. This facilitates recovering parts of the memory that have become unreachable due to avoidance of the traumatic events and their recalls.

The results of this study indicate that TF-CBT has a significant effect on dissociative experiences. Based on the literature search, a limited number of studies have investigated the effect of TF-CBT on dissociative experiences. As an example, Hussain (2023) showed that TF-CBT is effective in improving dissociative experiences in the short term, but its effectiveness in the long term should be investigated in a larger population.^[57] Hébert and Amédée (2020) also found that TF-CBT leads to improved dissociative symptoms in children with CPTSD.^[34] Hyland *et al.* (2020)^[58] reported that people with CPTSD had significantly higher levels of dissociative experiences compared to those with PTSD and those who were not diagnosed with the symptoms. This finding is in line with the results of the present study. Van der Hart *et al.* (2005),^[59] based on the structural theory of dissociation, believed that people who have complex traumatic reactions experience their own personality division, which leads to multiple dysfunctional outcomes such as stabilization and avoidance. Based on this theory, it is expected that the severity of the dissociation to be considered among PTSD, CPTSD, and dissociative identity disorder. As a secondary process, dissociative experiences can lead to anxiety. These experiences not only impair neurocognitive function, they can also be seen as a loss of self-control.^[60] In the same vein, repeated dissociations are likely to diminish one's confidence in the ability to monitor reality, perceived control, and feelings about self-efficacy, which in turn can lead to an increased burden of the disease.^[61] In this regard, in TF-CBT, psychological training is provided to patients to help them understand the symptoms of trauma. Additionally, the child and family of the patient are informed about the normality of the patient's reaction to a traumatic experience. Furthermore, before cognitive processing and controlled exposure to traumatic memories, a therapist teaches the child self-relaxation techniques such as controlled breathing, mental techniques such as stopping thought, as well as labeling sensations.^[62] Thus, TF-CBT can enhance individual control while reducing the vulnerability against dissociative experiences.

The results of this study revealed that TF-CBT has a significant effect on body image dissatisfaction. Our literature search indicated that so far, only a few studies have been conducted to assess the effect of TF-CBT on

body image dissatisfaction. In a study, Zamiri-Miandoab *et al.* (2021)^[63] showed that CBT is effective in reducing body image dissatisfaction. Kenny *et al.* (2019)^[35] also reported that TF-CBT leads to improved self-concept (reduced body image problems). Further, Mirhasani *et al.* (2020)^[64] together with Harrison *et al.* (2016)^[65] in separate studies, reported that cognitive-behavioral counseling can be effective in body image satisfaction. In line with the findings of these studies, Prazeres *et al.* (2013)^[66] found that the cognitive-behavioral approach is significantly effective in treating body image disorder. Because TF-CBT is derived from CBT, their results are similar to the findings of the present study. The principles of cognitive-behavioral therapy are now being used globally to treat body image disorder as CBT is more effective for creating positive changes in body image than indirect therapies.^[67] TF-CBT is partly based on the theory of emotional processing, particularly trauma narrative and treatment stage processing. Therapists help patients develop a narrative of trauma, which activates a network of cognitive, emotional, behavioral, and physiological responses to trauma memories. Therapists then guide patients to process their traumatic experiences, as well as provide corrective information to help them learn more adaptive responses.^[68]

Dissatisfaction with body image can lead to mental disorders and reduce the quality of life.^[69] Body dysmorphia is basically treated with CBT by correcting false beliefs, ritual behaviors such as excessive self-checking in the mirror, and avoidance of being in society. However, distorted thoughts play an essential role in the sustainability of this disorder.^[70] In this regard, it can be mentioned that in TF-CBT with emphasis on psychological training, the narrative of a traumatic event, normalization of a traumatic event, exposure, and relaxation can help the patient assess and challenge automatic distorted thoughts, dysfunctional assumptions, and maladaptive fundamental beliefs. This leads to a reduction in the use of coping behaviors such as avoidance and safety behaviors as well as assists the patient to achieve psychological acceptance of the traumatic event. This, in turn, reduces the psychological symptoms associated with that event and improves the quality of life.

Limitation and recommendation

In this study, there were some limitations. One of the limitations was related to the target population (restricted to the adolescents with CPTSD [under care] who were the members of welfare correctional and training centers in the city of Zahedan, Iran. The study on the local population in a restricted area reduces the generalizability of the results (thus warranting caution). Another limitation of the present study was the high number of questions in the questionnaires, which may

lead to participant's fatigue and biased completion of the form. Therefore, it is suggested to utilize short questionnaires and interview-based tools in future studies.

Conclusion

The purpose of this study was to determine the effectiveness of TF-CBT on trauma-related memory quality, dissociative experiences, and body image dissatisfaction in adolescents with CPTSD. It was found that TF-CBT has a significant effect on the quality of trauma-related memory quality, dissociative experiences, and body image dissatisfaction in adolescents with CPTSD, who were members (under care) of welfare correctional centers in Zahedan, Iran. Thus, it is suggested that correctional centers and other related centers employ the results of this study as scientific guides to improve the mental health status of adolescents with CPTSD.

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Informed consent

All participants completed an informed written consent form to enroll in the study.

Data availability statement

It is possible to access the data after coordination with the corresponding author by email.

Clinical trial ID

The present study was registered with the code IRCT20201009048974N4 on 05/07/2022 in the Iranian clinical trial system (<https://fa.irct.ir/trial/63030>).

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Conflicts of interest

There are no conflicts of interest.

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