

The Efficacy of TF-CBT in Reducing Post-traumatic Stress Symptoms and Improving Attention Bias and Response Inhibition in Children

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This study aimed to explore the effectiveness of TF-CBT in reducing post-traumatic stress symptoms and enhancing attention bias and response inhibition in children aged 7 to 13. It was a randomized controlled semi-experimental study that included a pretest, a posttest with the control group, and a 3-month follow-up. The selection of 34 participants was based on predetermined criteria, and they were randomly assigned to either the intervention or control group following their initial evaluation. The intervention group received 16 treatment sessions, and the participants were reevaluated immediately and three months after completing the intervention. The findings indicate that the TFCBT intervention significantly reduces posttraumatic stress symptoms ($p < 0.05$) and enhances attention bias and response inhibition, with these results being sustained for three months after the treatment. IRCT Id: IRCT20190701044063N1

Keywords: TF-CBT, PTSD, RCT, posttraumatic stress symptoms

According to the Diagnostic and Statistical Manual of Mental Disorders, a traumatic event is defined as an exposure to the threat of death, serious harm, or sexual violence. This exposure can happen directly to the individual or indirectly by witnessing an event happen to a significant other, or repeatedly encountering the negative details of such an event (e.g., emergency responders). Studies have shown that in developed countries, a large number of people have been exposed to at least one traumatic event during their lifetime (estimated from 28 to 90%), with the unexpected death of a loved one and motor vehicle accidents being the most common events (Benjet et al., 2015). Additionally, a previous World Health Organization study of 21 countries found that over 10% of respondents witnessed violence (21.8%) or experienced interpersonal violence (18.8%), accidents (17.7%), exposure to war (16.0%) or damage to a friend (12.5%). In 2013, about 6.3% of the world's population suffered from posttraumatic stress disorder (WHO, 2013),

and in Iran, the prevalence of posttraumatic stress disorder among children is reported to be 12% (Attari, 2006). Despite this, the exact statistics of the experience of the traumatic event have not been reported, and this study's location is not specified in the research literature of Iran.

Trauma symptoms are behavioral, cognitive, physical, or emotional problems that a child experiences after a traumatic event (Mannarino, Deblinger, & Cohen, 2017). Childhood trauma is a key risk factor for psychological problems. Childhood trauma can lead to emotional and behavioral problems, including post-traumatic stress, depression, conduct disorder, disruption of normal development, and social, emotional, and cognitive development (Curran, Adamson, Rosato, De Cock, & Leavey, 2018), anxiety, destructive behaviors, substance abuse, development of psychotic disorder, psychotic symptoms and subthreshold psychotic experiences, the experience of positive psychotic symptoms

(Heins, 2011), eating disorders (Moulton, Newman, Power, Swanson, & Day, 2015), bipolar disorder and difficulty in emotional regulation, impulse control, and suicide attempts (Etain et al., 2017), compulsive sexual behavior (Efrati & Gola, 2019), borderline personality disorder (Cattane, Rossi, Lanfredi, & Cattaneo, 2017), antisocial personality disorder (Berenz et al., 2013), Oppositional defiant disorder and interpersonal violence (Carliner, Dahsan, Katie, & Katherine, 2017), sexual and dissociative problems, no suicidal self-mutilation (Dunn, Nishimi, Gomez, Powers, & Bradley, 2018), running away from home and street violence in adolescence (Davies & Allen, 2017), Symptoms of attention-deficit/hyperactivity disorder (Karayađmurlu, Aytaç, & Gülpen, 2019), sleep problems (Hall Brown, Belcher, Accardo, Minhas, & Briggs, 2016), attention problems, physical complaints, social problems, law-breaking behaviors, aggressive behaviors, restlessness, agitation, and ringing (Fjeldheim et al., 2014).

People who have been through trauma often have trouble paying attention. This is usually linked to post-traumatic stress disorder (PTSD). However, new evidence indicates that these difficulties could also be due to the trauma itself or a co-existing mental health condition like dissociative disorder (Bandy, 2010). PTSD patients often struggle with concentration, arousal, and intrusive thoughts, indicating attentional abnormalities. They exhibit inattention, difficulty concentrating, and a high comorbidity with ADHD. Additionally, they may show altered attentional bias toward emotional stimuli and have difficulties in neuropsychological tests of attention, along with problems in neural networks related to attention (Block, 2016). While many studies have examined the relationship between childhood trauma and subsequent psychological trauma in adolescence and adulthood, less attention has been given to

the impact of childhood stressors on executive functions and prefrontal cortex development, which are crucial for higher-order cognitive processes (Marshall, 2016). Childhood trauma may have pervasive effects on neural circuits that facilitate inhibitory control and processing of stressful stimuli and anxiety (Zhai, 2018). Although PTSD does not typically affect general cognition, research indicates that it may result in subtle deficits in inhibiting automatic responses and regulating attention in both emotional and non-emotional contexts (Aupperle, 2012). Further research in this area is needed, particularly regarding childhood trauma, as most research to date has focused on adulthood.

In the therapeutic literature on post-traumatic stress disorder and trauma in young people, trauma-focused cognitive behavioral therapy, and school-based interventions have received the most therapeutic research (Stein, 2019). Trauma-focused cognitive-behavioral therapy was developed by Dr. Tony Mannarino, Judith Cohen, and Esther Deblinger during the 1990s and has since undergone modifications to help children and adolescents who have experienced a traumatic event (Takazawa, 2015).

Trauma-focused cognitive behavioral therapy has been effective in 21 worldwide trials, typically involving 8 to 25 sessions. It helps individuals of all ages and backgrounds recover from trauma, proving effective across various trauma types, developmental stages, and cultural contexts.. (de Arellano et al., 2014; Holtzhausen, Ross, & Perry, 2016; Murray et al., 2013; Orengo-Aguayo, 2021). The components of this treatment are designed to target PTSD symptoms, depression, anxiety, and associated features. The central values of the trauma-focused cognitive behavioral therapy model include being component-oriented, culturally sensitive, adaptable, family-focused,

relationship-driven, and empowering (Jørgensen, Cantio, & Elklit, 2019; Paul, 2017). The treatment components include psychoeducation and parenting, relaxation, emotional regulation, trauma-related cognitive processes, trauma narrative, gradual exposure, joint child/caregiver sessions, building safety skills, and future growth (Santarnecchi et al., 2019; Unterhitzberger & Rosner, 2016).

This treatment has been proven effective in improving post-traumatic stress disorder, depression, anxiety, shame, and behavioral problems in children through 12 clinical trials. The studies focused on children and adolescents who had experienced traumatic events, and the benefits were sustained for up to 24 months, particularly for PTSD symptoms. (J. Cohen & Mannarino, 2015; J. A. Cohen, 2019; Cooley, Mitchell, Pastrana, & Hanson, 2022; Lutz Goldbeck, Muche, Sachser, Tutus, & Rosner, 2016; Unterhitzberger et al., 2015).

Given the importance of addressing childhood trauma and its social costs, along with the impact on family members and the patient's quality of life, it is essential to treat this disorder. Furthermore, there is a need to increase the involvement of psychological approaches in its treatment. In this context, the effectiveness of TF-CBT stands out.

Method

Design and Hypotheses

The study is a semi-experimental pretest-posttest with a control group, comprising pretest, posttest, and a 3-month follow-up. We hypothesize a reduction in posttraumatic stress symptoms in the treatment group compared to the control, along with improvements in attention bias and response inhibition.

Procedure

The research focused on children living in Tehran who experienced symptoms after

a traumatic event. The study included children aged 7 to 13 and whose caregivers accessed social media platforms. The sample size was determined to be 34 people using the G*POWER software. Sampling for this research was done through social media platforms such as WhatsApp, Rubika, and Instagram due to the global spread of the COVID-19 virus. Before the treatment, the researchers obtained the RCT code and online TF-CBT certification from the University of Medical Sciences of South Carolina.

The participants were randomly assigned to either the control or intervention groups using the random.org website. The intervention group received 16 sessions of trauma-focused cognitive behavioral therapy over two months, with two sessions per week, each lasting 90 minutes. The sessions were conducted online using the Skyroom platform. The program was designed based on the cognitive behavioral therapy of Cohen and colleagues, with online treatment tools provided by the University of Medical Sciences of South Carolina. Out of 49 applicants, 37 met the entry criteria, which included having a history of trauma at least six months prior to the study, displaying trauma-related symptoms and post-traumatic stress, not participating in psychotherapy sessions in the last year, and the child having the ability to read, as well as the absence of close contacts being infected with COVID-19 at the time of the study. Thirty-four of these individuals agreed to continue and participate in the research.

Measurements

Parent Report of Posttraumatic Stress Symptoms: The PROPS is a measure designed for assessing post-traumatic symptoms in children and adolescents. In this study, the Persian version of the measure was utilized to gauge the general level of post-traumatic stress symptoms. Scores on

the scale range from 0 to 60, with higher scores indicating more severe symptoms. A cutoff score of 16 suggests cause for clinical concern. This scale has demonstrated good reliability (Cronbach's alpha 0.91). Also, the validity and the test-retest reliability are good (Greenwald & Rubin, 1999).

Child Report of Posttraumatic Stress Symptoms: The CROPS is a self-report tool for children and adolescents used to assess a wide range of post-traumatic symptoms. In this study, the Persian version was used to measure post-traumatic stress symptoms. The score is calculated by adding the responses, with a range of 0 to 52. A score of 19 or above indicates clinical concern. The scale has good reliability (Cronbach's alpha 0.91), validity, and test-retest reliability (Greenwald & Rubin, 1999).

Emotional Stroop Task: The Stroop test, developed by Ridley Stroop in 1935, measures selective attention and cognitive flexibility through visual processing. It has been used in various research to measure response inhibition ability, selective attention, cognitive variability, and cognitive flexibility. The emotional Stroop test modifies the classic test by presenting neutral and meaningful words in red and green, using response time to evaluate interference (Ben-Haim, 2016). This test has relatively good validity and reliability in children aged 5 to 13 (Strauss, 2005).

Brief treatment sessions

session	TF-CBT	
	phase	principle
1	First	Psychoeducation
2,3	First	Parenting
4,5	First	Relaxation
6	First	Affect Identification and Regulation
7	First	Cognitive coping
8	First	Cognitive coping

9	Second	Trauma Narration and Processing I
10	Second	Trauma Narration and Processing I
11	Second	Trauma Narration and Processing II
12	Second	Trauma Narration and Processing II
13	Second	Trauma Narration and Processing II
14,15	Third	Conjoint ParentChild Sessions
16	Third	Enhancing Safety & Future Development

Data Analysis

All data analyses were performed using the Statistical Package for the Social Sciences, version 26 (SPSS version 26; IBM Corp.). First, the data were checked for outliers, missing variables, randomness (Run test $p > 0.05$), homogeneity of variance (Levin's test $p < 0.05$), and normality (Shapiro-Wilk test $p < 0.05$). Next, a two-way repeated measures ANOVA was conducted with an external factor (the group with two levels: intervention and control) and an internal factor (time with three levels: pretest, posttest, follow-up) to test differences between groups on CROPS and PROPS at different study stages. A post hoc Bonferroni test was also calculated to investigate the significance of the time factor further, the group factor, and their interactions.

Results

A two-way repeated measures ANOVA was conducted with a between-subject factor (intervention and control) and a within-subject factor (pretest, posttest, follow-up). Table 1 shows the means and standard deviations for post-traumatic stress symptoms, attention bias, and inhibition response.

Table 1. Descriptive statistics.

variable	scale	time	group	mean	Standard deviation
Post-traumatic stress symptoms	CROPS	Pre-test	treatment	27/47	3/51
			control	28/29	3/82
		Post-test	treatment	14/47	4/88
			control	29	5/488
		Follow-up	treatment	13/82	4/78
			control	29/70	5/56
	PROPS	Pre-test	treatment	31/23	3/052
			control	30/94	3/26
		Post-test	treatment	14/52	5/06
			control	29/41	5/64
		Follow-up	treatment	14/29	5/09
			control	29/41	5/74
Attention bias	Reaction Time(Neutral)	Pre-test	treatment	536/35	64/52
			control	561/94	97/70
		Post-test	treatment	469/79	60/49
			control	550/47	89/93
		Follow-up	treatment	456/47	61/58
			control	542/20	95/58
	Reaction Time (Emotional)	Pre-test	treatment	615/35	68/06
			control	635/20	73/24
		Post-test	treatment	546/23	95/52
			control	723/32	122/31
		Follow-up	treatment	540/58	84/26
			control	712/32	117/26
Inhibition Response	Reaction Time (Neutral)	Pre-test	treatment	536/35	64/52
			control	561/94	97/70
		Post-test	treatment	469/79	60/49
			control	550/47	89/93
		Follow-up	treatment	456/79	61/58
			control	542/20	95/58

	Reaction Time (Emotional)	Pre-test	treatment	615/35	68/06
			control	695/20	107/24
		Post-test	treatment	546/23	95/52
			control	723/32	112/31
		Follow-up	treatment	540/58	84/68
			control	712/32	117/26

Results of post-traumatic stress symptoms

Table 2. Tests of BetweenSubjects Effects

Source	Measure	Tests of BetweenSubjects Effects			F	Sig.	Partial Eta Squared
		Type III Sum of Squares	df	Mean Square			
Intercept	crops	57748.324	1	57748.324	1145.644	.000	.973
	props	63600.088	1	63600.088	1162.088	.000	.973
group	crops	2764.324	1	2764.324	54.840	.000	.684
	props	2500.245	1	2500.245	45.684	.000	.754
Error	Crops	1613.020	32				
	Props	1751.333	32				

We found a highly significant main effect for the group factor in both CROPS ($F(1,32) = 276.324, p < 0.000$) and PROPS ($F(1,32) = 2500.245, p < 0.000$) scales.

Using a Bonferroni follow-up procedure with a significance level of $p = 0.05$, we observed a statistically significant difference ($p < 0.05$) in the post-traumatic stress symptoms scores for individuals in the treatment group on both CROPS and PROPS scales across the pre-test, post-test, and follow-up assessments (Table 3).

Table 3. Bonferroni test results

measure	group	time(i)	time(j)	Mean Difference	Std.Error	Sig. ^b
Crops	treatment	pretest	posttest	13.000	1.232	.000
			follow up	13.647	1.174	.000
		posttest	pretest	-13.000	1.232	.000
			follow up	.647	.330	.177
		follow up	pretest	-13.647	1.174	.000
			posttest	-.647	.330	.177
	control	pretest	posttest	-.706	1.232	1.000
			follow up	-1.412	1.174	.714
		posttest	pretest	-.706	1.232	1.000

Props	treatment	follow up	follow up	.706	.330	.121
		follow up	pretest	1.412	1.174	.714
		follow up	posttest	.706	.330	.121
		pretest	posttest	16.706	1.081	.000
		follow up	follow up	16.941	1.091	.000
		posttest	pretest	-16.706	1.081	.000
		follow up	follow up	.235	.166	.501
	control	follow up	pretest	-16.941	1.091	.000
		posttest	posttest	-.235	.166	.501
		pretest	posttest	1.529	1.081	.500
		follow up	follow up	1.529	1.091	.511
		posttest	pretest	-1.529	1.081	.500
		follow up	follow up	.000	.166	1.000
		follow up	pretest	-1.529	1.091	.511
		posttest	.000	.166	1.000	

The results show that individuals in the treatment group had significantly lower post-test and follow-up scores compared to the pre-test, indicating the potential effectiveness of the treatment. The control group did not show a significant difference. The time factor was significant, driven by the intervention group's decreasing scores. This suggests a reduction in post-traumatic stress symptoms.

Results of Attention Bias and Inhibition Response

Table 4. Tests of BetweenSubjects Effects

Source	Measure	Tests of BetweenSubjects Effects			F	Sig.	Partial Eta Squared
		Type III Sum of Squares	df	Mean Square			
Intercept	Reaction time(Neutral)	27531941.66	1	27531941.66	1887.35	.000	.983
	Reaction time(Emotional)	41627657.67	1	41627657.67	1539.20	.000	.980
group	Reaction time(Neutral)	104448.00	1	104448.00	7.16	.012	.183
	Reaction time(Emotional)	520663.29	1	520663.29	19.25	.000	.376
Error	Reaction time(Neutral)	466802.34	32				
	Reaction time(Emotional)	865435.61	32				

Following between-subject tests, a significant main effect was observed for the group factor in both neutral ($F(1,32)=7.16, p<0.000$) and emotional ($F(1,32)=19.25, p<0.000$) reaction time scales. Utilizing the Bonferroni follow-up procedure, we identified statistically significant differences in post-traumatic stress symptoms for both reaction time scales.

Table 5. Bonferroni test results

measure	group	time(i)	time(j)	Mean Difference	St. Error	Sig. ^b
Reaction time (Neutral)	treatment	pretest	posttest	66.55	19.99	.007
			follow up	79.88	20.12	.001
		posttest	pretest	-66.55	19.99	.007
			follow up	13.32	2.76	.000
		follow up	pretest	-79.88	20.12	.001
			posttest	-13.32	2.76	.000
	control	pretest	posttest	11.47	19.99	1.000
			follow up	19.73	20.12	1.000
		posttest	pretest	-11.47	19.99	1.000
			follow up	8.26	2.76	.016
		follow up	pretest	-19.73	20.12	1.000
			posttest	-8.26	2.76	.016
Reaction time (Emotional)	treatment	pretest	posttest	69.11	14.95	.000
			follow up	74.76	15.59	.000
		posttest	pretest	-69.11	14.95	.000
			follow up	5.64	12.21	1.000
		follow up	pretest	-74.76	15.59	.000
			posttest	-5.64	12.21	1.000
	control	pretest	posttest	-28.11	14.95	.2
			follow up	-17.11	15.59	.84
		posttest	pretest	28.11	14.95	.2
			follow up	11	12.21	1.000
		follow up	pretest	17.11	15.59	.8
			posttest	-11	12.21	1.000

The results reveal that individuals in the treatment group reported significantly lower scores on the Reaction time (Neutral) scale in the post-test and follow-up compared to the pre-test, with a statistically significant difference at the 0.05 level for all three-time points. Conversely, the control group did not demonstrate any statistically significant

differences. On the Reaction time (Emotional) scale, participants in the treatment group also exhibited significantly lower scores in the post-test and follow-up compared to the pre-test, while the control group did not display significant differences across the test stages.

Discussion

The present study was conducted to investigate the efficacy of trauma-focused cognitive behavioral therapy in reducing trauma symptoms in children with posttraumatic stress symptoms. The results of Tables 3 and 4 show that the symptoms of trauma after the intervention in the children of the intervention group are significantly less than the control group. The results show that in the crops and props scales, people in the treatment group reported lower scores in the post-test and follow-up compared to the pre-test, and this difference is statistically significant at the 0.05 level, while the people in the control group do not have a statistically significant difference. From these tables, it can be concluded that although the time factor has become significant, this significance seems to have been influenced by the group factor because only the scores of the people in the intervention group have become significant over time since the scores have decreased, it can be concluded that the people in the intervention group have a low level of Trauma symptoms reported that this could be a result of treatment effectiveness because the group factor was significant.

The results of Tables 4 and 5 show that the reaction time to emotional words after the intervention in the children of the intervention group is significantly less than that of the control group. From these results, it can be concluded that children's attention bias and inhibition response are improved after the treatment, so the child's attention is more focused on doing the emotional Stroop task than the threats of the words.

When interpreting these outcomes, it can be stated that every child may encounter stressful situations that have an impact on their cognitive and emotional state. Traumatic experiences can result in issues with self-control, self-harm or harm towards others, poor focus and concentration, physical

ailments, challenges with self-identity and establishing fulfilling relationships, as well as influencing the child's ability to make predictions and process information.

Childhood trauma is a major risk factor for psychological trauma. Trauma has extensive and frequent effects on brain development and subsequently on biological/physiological, interpersonal, emotional, behavioral, and cognitive self-regulation capacities. Disturbances in these areas lead to psychological damage to the child, which will remain stable until adulthood if not treated.

Trauma-focused cognitive behavioral therapy is an empirically supported treatment model designed to help children, adolescents, and their parents deal with traumatic experiences. This treatment is effective in reducing the symptoms of trauma and post-traumatic stress for the community of children and adolescents who have experienced a traumatic event; Therefore, the design and implementation of interventions based on these treatments can be necessary for the field of education and promotion of mental health of children and adolescents.

These results are in agreement with many research findings such as those (Canale et al., 2022; J. A. Cohen, Mannarino, Kliethermes, & Murray, 2012; J. A. Cohen, Mannarino, & Murray, 2011; J. A. Cohen, Mannarino, Perel, & Staron, 2007; Dorsey et al., 2021; Dueweke, Orengo-Aguayo, & Stewart, 2021; Esterer et al., 2023; L. Goldbeck, Kirsch, Seitz, & Fegert, 2012; Jensen, 2012; Metzger, 2021; Zinny, 2022) and many others.

Failure to address childhood trauma leads to significant societal and financial costs. Effective prevention and intervention programs are available but require support from public policy. Policymakers play a crucial role in providing necessary resources. A "trauma-informed care" system

is needed to diagnose and treat childhood trauma. This requires a multifaceted approach, including developing culturally relevant programs, building strong partnerships, training specialized personnel, and informed public policy.

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