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Effectiveness of Acceptance and Commitment Therapy on Psychological Indicators of Girls with Post-Traumatic Stress Disorder

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ABSTRACT

Objective: The purpose of this study was to effectiveness of acceptance and commitment therapy on emotional schemas and post-traumatic growth in girls with post-traumatic stress disorder.

Methods: This experiential investigation was executed utilizing a pretest-posttest framework incorporating a control group, supplemented with a follow-up period of two months. The statistical population pertinent to this inquiry encompassed all females between the ages of 14 and 19 years who were referred to the welfare services in Bushehr city and the Aramesh counseling center; a total of 91 individuals were recorded in 2020, with a sample size of 40 girls selected through purposive sampling, which included one experimental group comprising 20 girls and a control group also consisting of 20 girls. The experimental cohort engaged in acceptance and commitment therapy across 10 sessions of 90 minutes each, whereas the control group did not receive any form of intervention and remained on a waiting list. Data collection was conducted through the PTSD symptom scale-interview, the emotional schemas scale and the posttraumatic growth inventory (PTGI). The analysis of the data was executed using analysis of variance with repeated measures alongside the Bonferroni correction.

Results: The findings of the study indicated that acceptance and commitment therapy yielded a statistically significant impact on emotional schemas and post-traumatic growth during both post-test and follow-up assessments in participants ($P<0.05$).

Conclusions: In light of the findings from this investigation, it can be posited that acceptance and commitment therapy may serve as an effective intervention for the enhancement of emotional schemas and post-traumatic growth in female patients suffering from post-traumatic stress disorder within clinical environments.

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Introduction

Stress constitutes an inherent component of quotidian existence. Stress may be conceptualized as a psychological condition or process that manifests when an individual encounters situations they perceive as detrimental to their physical and psychological health (Griffin et al., 2020; Moeinvaziri et al., 2022). It can be classified as a psychological ailment (Ventura-Silva et al., 2020) that correlates with manifestations of anxiety (Krause et al., 2020), depression (Sumner et al., 2020), social phobia (Kvedaraite et al., 2020), and obsessive-compulsive disorder (Freire et al., 2020). A significant dimension of stress is trauma, which pertains to the occurrence of an adverse event (Carmassi et al., 2021). Trauma represents a fundamental aspect of human existence (Hyland et al., 2021), while post-traumatic stress disorder comprises a constellation of persistent and recurrent symptoms that arise following the experience or observation of a traumatic event. In essence, post-traumatic stress disorder ranks among the most prevalent mental health outcomes subsequent to disasters, traumatic occurrences, and distressing events, irrespective of whether they are natural or anthropogenic in origin (Biresaw & Gebeyehu, 2021). The Diagnostic and Statistical Manual of Mental Disorders (DSM-5) delineates post-traumatic stress disorder as a grave mental health condition characterized by enduring re-experiencing, avoidance behaviors, hyperarousal, and cognitive as well as emotional symptoms triggered either directly or indirectly by a traumatic event (Roehr, 2013). It appears that individuals afflicted with post-traumatic stress disorder encounter difficulties regarding emotion regulation strategies and coping mechanisms for managing adverse emotions. The emotional schema model may provide a comprehensive framework for elucidating several of these characteristics (Naderi et al., 2016).

Schemas have been characterized as structured representations of early life experiences that substantially influence individuals' perceptions, behaviors, and cognitive processes. Among early maladaptive schemas are extensive, pervasive, and significantly detrimental themes concerning the self and interpersonal relationships that are established during the formative years of childhood (Estévez et al., 2019). Emotional schemas represent a formidable element in elucidating emotional disorders (Leahy, 2020) and emphasize the importance of emotions; Leahy has defined these schemas as patterns, methodologies, and strategies employed in reaction to emotional stimuli (Leahy, 2002, 2016). Furthermore, emotional schemas often lead individuals to eschew treatment (Leahy, 2012). In this regard, Leahy posits that these schemas are associated with post-traumatic

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stress disorder, suggesting that familiarity with and treatment of these schemas may prove effective in alleviating the symptoms of this disorder (Leahy, 2012). Conversely, psychological challenges such as post-traumatic stress in later life stages represent some of the repercussions linked with traumatic experiences, and these repercussions are not exclusively negative. Empirical research suggests that certain stressful and distressing situations can establish a conducive environment for personal development, and at times, individuals who have experienced trauma may not only revert to their pre-trauma state but may also attain a superior level of psychological functioning, a phenomenon referred to as post-traumatic growth (Fartoosi et al., 2023).

Post-traumatic growth denotes the beneficial personal and psychological transformations that transpire following a challenging event, resulting from the individual's efforts to contend with such a stressor, which holds adaptive importance. To elaborate, post-traumatic growth, as conceptualized by Tedeschi and Calhoun, can be characterized as a constructive psychological evolution subsequent to a traumatic experience that engenders an elevated operational capacity within the individual (Pollari et al., 2021). Not every individual grapple with psychological difficulties after undergoing a crisis; however, for a substantial number, these adversities serve as catalysts that enhance resilience, augment personal and social resources, develop novel coping mechanisms, and overall foster personal advancement and maturation. The term post-traumatic growth, or post-traumatic growth, encapsulates an individual's encounter with significant positive transformations that stem from formidable life challenges (Zoellner & Maercker, 2006). In light of the aforementioned considerations, post-traumatic growth assumes a pivotal role in the management of symptoms associated with post-traumatic stress. Concurrently, a myriad of interventions have been implemented to ameliorate the symptoms and complications associated with post-traumatic stress disorder, encompassing pharmacotherapy (Hoskins et al., 2021), autobiographical memory specialization training (Moin Farsani & Ranjbar Kohan, 2020), cognitive rehabilitation (Sahragard et al., 2020), logo therapy (Heydari & Meshkinyazd, 2022), cognitive therapy (Murray & Ehlers, 2021), and cognitive-behavioral therapy (Lewis et al., 2020). Moreover, a particularly significant intervention that has undergone extensive investigation and has been substantiated as effective for individuals afflicted with post-traumatic stress disorder is acceptance and commitment therapy (Scarlet et al., 2016). Acceptance and commitment therapy represents a modality within the third-wave therapeutic approaches (Sabouri et al., 2020), which

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serves as an evolution of cognitive-behavioral therapy (Melchior et al., 2019) and aspires to cultivate psychological flexibility (Coto-Lesmes et al., 2020), identify and mitigate cognitive distortions, manage issues effectively, and engage in rational problem analysis (Sloshower et al., 2020). Psychological flexibility is defined as the ability to generate and endorse a more suitable solution among the array of available options, rather than resorting to solutions that evade distressing thoughts, emotions, desires, and recollections (Wharton et al., 2019).

This approach enhances psychological flexibility through the cultivation of psychological acceptance, psychological awareness, cognitive dissonance, clarification of values, and the motivation for committed actions (Flujas-Contreras & Gómez, 2018). In the context of acceptance and commitment therapy, individuals are encouraged to engage in behaviors that align with their values, even in the presence of distressing thoughts and emotions. By adhering to these foundational principles, individuals progress towards personal growth in alignment with established objectives and develop increased adaptability in response to the adversities they encounter. The cumulative effect of these actions within acceptance and commitment therapy contributes to the enhancement of post-traumatic growth and acceptance (Zebhi Zarchi et al., 2023). Drawing upon the existing research framework, acceptance and commitment therapy is recognized as an evidence-based, diagnostic, and integrative approach that has been employed to address these issues (Smith et al., 2021).

Conversely, the historical context of research has indicated that post-traumatic stress disorder ranks as the fourth most prevalent psychiatric diagnosis, impacting 10% of males and 18% of females (Nagpal et al., 2013). Females exhibit a twofold increased likelihood of experiencing post-traumatic stress disorder compared to their male counterparts (Fonkoue et al., 2020). Consequently, females are disproportionately vulnerable to a variety of trauma, particularly sexual assault, leading to the conclusion that, as noted in research literature, when females undergo sexual assault, they may develop post-traumatic stress disorder due to their challenges in emotional regulation (Villalta et al., 2020). Therefore, in light of the higher incidence of post-traumatic stress disorder among females relative to males, the demographic focus of this investigation was determined to be female adolescents. The prevalence of these issues among females with post-traumatic stress disorder underscores the urgent necessity to mitigate the challenges faced by this population, particularly adolescent females, through the application of psychological

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interventions. A gap in the literature exists regarding the efficacy of acceptance and commitment therapy on emotional schemas and post-traumatic growth among females with post-traumatic stress disorder. Thus, in light of the aforementioned considerations, the research inquiry posits: is acceptance and commitment therapy effective in influencing emotional schemas and post-traumatic growth in females diagnosed with post-traumatic stress disorder?

Material and Methods

The methodological approach employed in the present investigation was a semi-experimental design characterized by a pre-test and post-test structure, inclusive of a control group and a two-month follow-up period. The statistical population for this study comprised all females aged 14 to 19 who sought services from the Bushehr City Welfare and the Aramesh Counseling Center, totaling 91 individuals, during the year 2019. Among this cohort, a purposive sampling strategy was utilized to select 40 individuals exhibiting more pronounced symptoms of post-traumatic stress disorder, who subsequently provided informed consent to partake in the study, thereby being allocated into an acceptance and commitment therapy group of 20 participants and a control group of an equivalent size. The eligibility criteria for participation encompassed obtaining a score of 35 on the Posttraumatic Stress Disorder Scale developed by Foa et al. (1993), achieving a minimum score in posttraumatic growth, and attaining a maximum score in emotional schemas, whereas the criteria for exclusion involved absence from more than two educational sessions and concurrent involvement in other psychological interventions. The study adhered to ethical standards by elucidating the research objectives to the participants, securing their informed consent, emphasizing the voluntary nature of their involvement, reiterating their right to withdraw from the study, confirming the non-harmful nature of the therapeutic intervention, addressing any queries raised by the participants, and offering to share the results with them upon request, in addition to providing intensive intervention sessions to the control group participants subsequent to the post-test, thus ensuring that ethical principles were meticulously observed throughout the course of the study. For the analysis of the collected data, descriptive statistics such as means and standard deviations were utilized, alongside inferential statistical methods, specifically repeated measures analysis of variance, employing SPSS software version 24 for data processing.

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Instruments

Post-Traumatic Stress Disorder Symptom Scale (PSS-I): This scale constitutes a self-administered instrument comprising 17 questions that comprehensively addresses all dimensions of this disorder, as delineated by the symptoms identified in the DSM-IV (Foa et al., 1993). In the initial phase, the individual is presented with a list of 12 sections pertaining to their experiences of traumatic events, requiring them to respond to the inquiries and articulate their reactions at the time of the traumatic incident. The scoring framework employs a four-point scale, wherein the individual is mandated to report both the frequency and severity of each of the 17 symptoms associated with post-traumatic stress disorder that they have encountered over the preceding month. A further component of this scale pertains to the life functioning of individuals diagnosed with post-traumatic stress disorder (Ray & Vanstone, 2009). Within this questionnaire, the individual is queried regarding three categories of symptoms: re-experiencing (5 questions), avoidance symptoms (7 questions), and severe arousal symptoms (5 questions). The scoring methodology utilizes a 4-point Likert scale, ranging from 0 points (not at all) to 4 points (very much). The aggregate score from the questions spans from 0 to 51. A diagnosis of post-traumatic stress disorder is established if there is the presence of at least 1 symptom of re-experiencing, 3 or more symptoms of avoidance, and 2 or more symptoms of motivational reactions or severe arousal. A cut-off score of 35 is deemed indicative of concern. In the context of Iran, a study utilized the internal consistency method to assess the reliability of the scale, yielding a Cronbach's alpha coefficient of 0.77 (Mazloom & Yaghubi, 2016). Internationally, another study also employed the internal consistency methodology to evaluate the reliability of the scale, resulting in a Cronbach's alpha coefficient of 0.81 (Melchior et al., 2019). In the current investigation, the internal consistency method was similarly applied to assess the reliability of the inventory, achieving a Cronbach's alpha of 0.82.

Leahy Emotional Schema Scale (ESS): This instrument comprises a condensed version consisting of 50 items, and the Persian adaptation of this instrument was developed and validated by (Khanzadeh et al., 201). Following an analysis of the results obtained from the exploratory factor analysis of Leahy's Emotional Schema Scale, two schemas (namely, emotional numbness and emotional cycle) were excised from the original framework, while the introduction of one additional schema (emotional self-awareness) was made; thus, the Iranian version of this scale

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encompassed 13 schemas, leading to a reduction in the number of items allocated to the 14 schemas in the original version from 48 to 37 items (Khanzadeh et al., 201). In the investigation conducted by Shahvarani and Khormaei (2018), a validated version comprising 22 items was presented, which is subdivided into six distinct subscales: comprehensible and manageable (including items 1, 4, 7, 10, 13, 18, and 20); it assesses rumination (comprising items 5, 11, and 16), general consensus (with items 6, 12, 17, and 19), rational thought (including items 3, 14, and 22), acceptance (consisting of items 8 and 21), and emotional naivety (with items 2, 9, and 15). In the current investigation, the 22-item version was employed. Items 1, 4, 7, 8, 10, 13, 18, 20, and 21 are scored in a reversed manner (Shahvarani & Khormaei, 2018). Within the Iranian context, the reliability of the scale was assessed utilizing Cronbach's alpha, yielding coefficients that ranged between 0.60 and 0.79 (Shahvarani & Khormaei, 2018). In a separate study, the findings from the reliability assessment of this scale indicated that its reliability, as measured by the test-retest methodology over a two-week interval, was 0.78 for the overall scale and ranged from 0.56 to 0.71 for the various subscales; moreover, the internal consistency coefficient for the scale, assessed via Cronbach's alpha, was determined to be 0.84 for the entire instrument and ranged from 0.59 to 0.73 for the subscales, collectively suggesting an acceptable level of reliability for this scale (Nadri et al., 2016). Internationally, the Cronbach's alpha coefficient for the scale has been reported as 0.85 (Edwards & Wupperman, 2019). In the present study, the internal consistency methodology was employed to evaluate the reliability of the inventory, resulting in a Cronbach's alpha value of 0.88.

Post-Traumatic Growth Inventory (PTGI): This inventory comprises 21 items and assesses 5 distinct subscales, which include interpersonal relationships (enhancing intimacy) represented by items 6, 8, 9, 15, 16, 20, and 21; the establishment of new priorities and goals (capitalizing on emerging opportunities or altering life trajectories) indicated by items 3, 7, 11, 14, and 17; inner resilience (the sense of surmounting life's challenges) as reflected in items 4, 10, 12, and 19; spiritual transformations (fostering spiritual development and engaging in existential inquiry) outlined by items 5 and 18; and the perception of life's significance (comprehending the essence of existence) encapsulated in items 1, 2, and 13 (Tedeschi & Calhoun, 1996). The assessment of this inventory utilizes a 6-point Likert scale, which is delineated as follows: 0 (not at all), 1 (very little), 2 (little), 3 (moderate), 4 (high), and 5 (very much). The overall score of this inventory is

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derived from the aggregate of the scores across each component, wherein higher scores are indicative of greater post-traumatic growth within the individual (Sarizadeh et al., 2019). Within the context of Iran, the reliability of the inventory, as measured by Cronbach's alpha coefficient for the totality of items, was determined to be 0.91, while the coefficients for the subscales ranged from 0.55 to 0.81, and the split-half reliability, as computed through the Spearman-Brown formula, yielded a value of 0.87. In an alternative investigation, a Cronbach's alpha value of 0.94 was documented (Najafi Gharehasani et al., 2020). The developers of the inventory employed the internal consistency approach to evaluate its reliability, reporting Cronbach's alpha coefficients for the subscales within a range of 0.67 to 0.85 and for the complete inventory at 0.90 (Tedeschi & Calhoun, 1996). In international studies, the internal consistency method was similarly utilized to assess the reliability of the inventory, with Cronbach's alpha coefficients reported in a range of 0.82 to 0.90 (Gorman et al., 2020). Furthermore, another study indicated a Cronbach's alpha range of 0.75 to 0.89 (Geng et al., 2020). In the current investigation, the internal consistency method was employed to assess the reliability of the inventory, yielding a Cronbach's alpha value of 0.91.

Therapy sessions

Table 1. Acceptance and Commitment Therapy sessions

Session	Content	Time
1	Introducing the leader and group members to each other, explaining the basic rules of the group (informed consent and confidentiality), starting the session with a short mindfulness exercise and explaining the concepts of post-traumatic growth, emotional schemas and post-traumatic stress disorder.	**90 Min.**
2	General review of the first session assignments and providing feedback, practicing mindfulness, understanding constructive frustration, reviewing examples of coping behaviors.	**90 Min.**
3	Reviewing assignments and giving feedback, practicing mindfulness, reviewing the consequences of past coping behaviors and discussing constructive frustration using metaphors such as quicksand and digging a well.	**90 Min.**
4	Reviewing assignments and giving feedback, practicing mindfulness, focusing on values, identifying obstacles to valuable action and role-playing based on the Monsters on the Bus exercise.	**90 Min.**
5	Reviewing assignments from the previous session and giving feedback, practicing mindfulness in order to continue developing this skill, focusing on cognitive dissonance and related metaphors.	**90 Min.**
6	Reviewing assignments and giving feedback, following up on committed actions, focusing on dissonance and evaluating negative labeling.	**90 Min.**
7	Review assignments and provide feedback, review how assignments were completed on the valuable goal during the past week, create a new goal for the upcoming week, and focus on anger as a coping behavior.	**90 Min.**
8	Confront initial distress related to schemas, imagery, and practical exercises focusing on releasing old control strategies.	**90 Min.**
9	Review many of the topics and skills from the previous session as an opportunity to practice and adhere to new behaviors and teach communication skills.	**90 Min.**
10	Begin the session with an extensive mindfulness exercise, practice alternative responses based on values, review potential barriers, and planning strategies to pursue committed actions and post-treatment evaluation, and schedule follow-up and completion sessions.	**90 Min.**

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Results

The results of the demographic variable age showed that the mean age of the acceptance and commitment therapy group was 15.60 and the standard deviation was 1.392. Also, the mean age of the control group was 16.10 and the standard deviation was 1.619. Based on the results of the independent t-test, it was shown that both groups did not have a statistically significant difference in terms of age (sig = 0.302 and t = -1.047), which indicates that the two groups were similar in terms of age.

Table 2. Mean and standard deviation of emotional schemas and posttraumatic growth

Variable	Phase	ACT		Control	
		Mean	SD	Mean	SD
Understandable and controllable	Pretest	31.60	1.144	31.60	1.04
	Posttest	26.75	2.07	31.40	1.31
	Follow-up	26.85	2.007	31.50	1.35
Ruminating	Pretest	10.90	0.96	10.90	0.96
	Posttest	9.15	1.13	10.80	1.10
	Follow-up	9.25	1.11	10.95	1.14
General agreement	Pretest	15.10	0.71	15.30	0.65
	Posttest	11.25	1.51	15.15	0.87
	Follow-up	11.35	1.63	15.15	0.93
Rationalization	Pretest	10.80	1.005	10.80	1.005
	Posttest	9	1.21	10.70	0.92
	Follow-up	9.10	1.41	10.85	0.93
Acceptance	Pretest	8.95	0.68	8.90	0.71
	Posttest	7.30	1.17	8.80	0.61
	Follow-up	7.35	1.18	8.85	0.58
Simplicity of emotions	Pretest	11.05	0.94	11	0.97
	Posttest	9.45	1.23	10.90	0.91
	Follow-up	9.50	1.23	10.95	0.88
Relationships with others	Pretest	15.25	0.78	15	0.79
	Posttest	18.95	1.76	15.10	0.91
	Follow-up	18.90	1.71	15	0.97
New priorities and goals	Pretest	15.20	0.76	15.25	0.78
	Posttest	19.85	1.92	15.30	0.80
	Follow-up	19.75	1.91	15.30	0.80
Inner strength	Pretest	11.90	0.78	12.05	0.68
	Posttest	14.15	1.63	12.15	0.67
	Follow-up	14	1.74	12.15	0.67
Spiritual changes	Pretest	5	0.72	4.70	0.65
	Posttest	8.50	1.10	5.05	1.09
	Follow-up	8.45	1.05	5.10	1.07
Perception of the value of life	Pretest	10.75	0.78	10.75	0.78
	Posttest	12.90	0.85	10.90	0.91
	Follow-up	12.85	0.93	10.95	0.94

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Table 2 shows the mean and standard deviation of emotional schemas and posttraumatic growth of the experimental and control groups in the pre-test, post-test and follow-up in the sample individuals. The results of the repeated analysis of variance are given below. In order to use the inferential statistics of the repeated analysis of variance, the assumptions of this analysis were examined. The Shapiro-Wilks test was used to check normality, and the dependent variables were normal. The assumption of homogeneity of variances (post-test) was checked with the Levene's test, and this assumption was confirmed in the post-test stage (P<05). The results of the Box-M test to check the other assumption of this test, namely the equality of variance-covariance, were not statistically significant, which means that the assumption of equality of variance and covariance matrices was established.

Table 3. Results of the Mauchly's sphericity test on emotional schemas and post-traumatic growth

Variable	Mauchly's sphericity	Chi square	DF	P
Understandable and controllable	0.093	92.07	2	0.001
Ruminating	0.387	35.13	2	0.001
General agreement	0.351	38.72	2	0.001
Rationalization	0.455	29.14	2	0.001
Acceptance	0.142	72.27	2	0.001
Simplicity of emotions	0.201	59.45	2	0.001
Relationships with others	0.118	79.01	2	0.001
New priorities and goals	0.063	102.13	2	0.001
Inner strength	0.087	90.27	2	0.001
Spiritual changes	0.119	78.89	2	0.001
Perception of the value of life	0.148	70.62	2	0.001

Based on Table 3, Mauchly's sphericity test, the significance level for emotional schemas and post-traumatic growth was 0.001. Therefore, the sphericity assumption is rejected. As a result, the assumption of equal variances and, more precisely, the condition of homogeneity of the covariance matrix was not assured, and therefore the F statistical model was violated. As a result of alternative tests, the conservative Greenhouse–Geisser test was used to examine the within-subject effects of the treatment, the results of which are given in Table 4.

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Table 4. Results of repeated measures analysis of variance on emotional schemas and posttraumatic growth

Variable	Source	F	P	Effect size	Power
Understandable and controllable	Factor	74.90	0.001	0.66	0.99
	Group * Factor	66.02	0.001	0.63	0.99
	Group	58.04	0.001	0.60	0.99
Ruminating	Factor	26.28	0.001	0.40	0.99
	Group * Factor	24.41	0.001	0.39	0.99
	Group	13.81	0.001	0.26	0.99
General agreement	Factor	108.64	0.001	0.74	0.99
	Group * Factor	92.77	0.001	0.70	0.99
	Group	73.88	0.001	0.66	0.99
Rationalization	Factor	41.54	0.001	0.52	0.99
	Group * Factor	38.68	0.001	0.50	0.99
	Group	12.83	0.001	0.25	0.93
Acceptance	Factor	29.75	0.001	0.43	0.99
	Group * Factor	24.67	0.001	0.39	0.99
	Group	18.19	0.001	0.32	0.98
Simplicity of emotions	Factor	41.16	0.001	0.52	0.99
	Group * Factor	33.92	0.001	0.47	0.99
	Group	9.62	0.004	0.20	0.85
Relationships with others	Factor	78.03	0.001	0.67	0.99
	Group * Factor	73.82	0.001	0.66	0.99
	Group	63.73	0.001	0.62	0.99
New priorities and goals	Factor	98.31	0.001	0.72	0.99
	Group * Factor	94.13	0.001	0.71	0.99
	Group	76.91	0.001	0.66	0.99
Inner strength	Factor	24.10	0.001	0.38	0.99
	Group * Factor	20.06	0.001	0.34	0.99
	Group	18.48	0.001	0.32	0.98
Spiritual changes	Factor	120.87	0.001	0.76	0.99
	Group * Factor	78.42	0.001	0.67	0.99
	Group	84.20	0.001	0.68	0.99
Perception of the value of life	Factor	64.84	0.001	0.63	0.99
	Group * Factor	46.70	0.001	0.55	0.99
	Group	29.22	0.001	0.43	0.99

The results of Table 4 show that acceptance and commitment therapy has created a significant difference in the three measurement stages of the two groups. In the following, for a pairwise comparison of the means of adjustment of the test stages (pre-test, post-test and follow-up) of emotional schemas and posttraumatic growth (table 5).

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Table 5. Results of the Bonferroni post-hoc test of emotional schemas and post-traumatic growth by measurement stages

Variable	Adjusted mean		Phase difference	Mean difference	P
Understandable and controllable	Pretest	31.60	Pre-test-post-test	2.52	0.001
	Posttest	29.07	Pre-test-follow-up	-2.42	0.001
	Follow-up	29.17	Post-test-follow-up	-0.10	0.14
Ruminating	Pretest	10.90	Pre-test-post-test	0.92	0.001
	Posttest	9.97	Pre-test-follow-up	0.80	0.001
	Follow-up	10.10	Post-test-follow-up	-0.12	0.16
General agreement	Pretest	15	Pre-test-post-test	2	0.001
	Posttest	13.20	Pre-test-follow-up	1.95	0.001
	Follow-up	13.25	Post-test-follow-up	-0.05	0.99
Rationalization	Pretest	10.50	Pre-test-post-test	0.95	0.001
	Posttest	9.85	Pre-test-follow-up	0.82	0.001
	Follow-up	9.75	Post-test-follow-up	-0.12	0.18
Acceptance	Pretest	8.92	Pre-test-post-test	0.87	0.001
	Posttest	8.05	Pre-test-follow-up	0.82	0.001
	Follow-up	8.10	Post-test-follow-up	-0.05	0.49
Simplicity of emotions	Pretest	11.02	Pre-test-post-test	0.85	0.001
	Posttest	10.17	Pre-test-follow-up	0.80	0.001
	Follow-up	10.22	Post-test-follow-up	-0.05	0.49
Relationships with others	Pretest	15.12	Pre-test-post-test	-1.90	0.001
	Posttest	17.02	Pre-test-follow-up	-1.82	0.001
	Follow-up	16.95	Post-test-follow-up	0.07	0.25
New priorities and goals	Pretest	15.22	Pre-test-post-test	-2.35	0.001
	Posttest	17.57	Pre-test-follow-up	-2.30	0.001
	Follow-up	17.52	Post-test-follow-up	0.05	0.46
Inner strength	Pretest	11.97	Pre-test-post-test	-1.17	0.001
	Posttest	13.15	Pre-test-follow-up	-1.10	0.001
	Follow-up	13.07	Post-test-follow-up	0.07	0.22
Spiritual changes	Pretest	4.85	Pre-test-post-test	-1.92	0.001
	Posttest	6.77	Pre-test-follow-up	-1.92	0.001
	Follow-up	6.77	Post-test-follow-up	0.001	0.99
Perception of the value of life	Pretest	10.75	Pre-test-post-test	-1.15	0.001
	Posttest	11.90	Pre-test-follow-up	-1.15	0.001
	Follow-up	11.90	Post-test-follow-up	0.001	0.99

Based on the results of Table 5, the "mean difference between pre-test and post-test" and "mean difference between pre-test and follow-up" are greater and more significant than the "mean difference between post-test and follow-up", which indicates that acceptance and commitment therapy had an effect on emotional schemas and post-traumatic growth in the post-test stage, and this significant effect continued in the follow-up stage.

Discussion

The objective of the present investigation was to evaluate the efficacy of acceptance and commitment therapy in relation to emotional schemas and posttraumatic growth among female adolescents diagnosed with posttraumatic stress disorder. The findings indicated that acceptance

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and commitment therapy exerted a significant influence on the enhancement of emotional schemas in this demographic, with this notable effect being maintained during the follow-up assessment phase. This outcome aligns with the conclusions drawn from previous research conducted by Smith et al. (2021), Herbert et al. (2019), Silberstein et al. (2012), and Kanani et al. (2015).

In elucidating the efficacy of acceptance and commitment therapy on emotional schemas, one may assert that the incorporation of commitment and acceptance methodologies within the therapeutic intervention process enables individuals to experience diminished suffering from adverse emotions through heightened awareness. Consequently, the application of acceptance and disengagement techniques facilitates a decline in distressing emotions, thereby empowering individuals and subsequently mitigating psychological distress (Starabadi et al., 2020). Furthermore, an intervention predicated on acceptance and commitment provides adolescent females suffering from post-traumatic stress disorder the opportunity to affirm their self-worth by articulating their thoughts and feelings in the face of challenges, and through the maintenance of self-regulation, they can alleviate anxiety, irritability, fear, feelings of danger, impatience, and restlessness that arise when confronting difficulties. These elements primarily contribute to the preservation of health and vitality, enhance their efficacy in addressing challenging issues, bolster their coping mechanisms, and diminish emotional schemas.

In discussing the enduring impact of acceptance and commitment therapy on emotional schemas among girls with post-traumatic stress disorder, it can be posited that the central aim of this therapeutic approach is to foster psychological flexibility. Individuals exhibiting cognitive flexibility are inclined to confront their negative experiences rather than evading, controlling, or altering them, and this acceptance is augmented through actions grounded in authentic personal values; hence, the enhancement of cognitive flexibility in trauma-exposed girls positively influences their emotional state. If a girl with post-traumatic stress disorder possesses the capacity to perceive challenging situations as manageable and is able to generate multiple alternative interpretations in response to life events and interpersonal behaviors, she will attain liberation from mental disorders; therefore, girls who exhibit limited capacity to modify cognitive patterns in order to adapt to fluctuating environmental stimuli report a higher incidence of post-traumatic stress disorder symptoms.

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On the contrary, it can be posited that, from the standpoint of acceptance and commitment therapy, the phenomenon of human suffering is fundamentally entrenched in psychological rigidity, which is engendered by cognitive assimilation and the evasion of experiential encounters; what is deemed detrimental is the proclivity to internalize experiences and engage in combat against them through avoidance mechanisms. The transformations inherent in this therapeutic modality stem from methodologies designed to assist individuals afflicted with post-traumatic stress disorder; rather than exerting control over and evading thoughts pertinent to post-traumatic stress disorder, individuals are encouraged to relinquish such control and avoidance, subsequently identifying their life values and structuring their actions to align with these articulated values.

Acceptance and commitment therapy is fundamentally predicated on behavioral exposure and the absence of cognitive and emotional regulation. Individuals grappling with post-traumatic stress disorder encounter challenges in emotional regulation strategies and the management of adverse emotions; the emotional schema model may elucidate several of these characteristics as a cohesive framework. In this context, acceptance and commitment therapy does not endeavor to diminish, alter, evade, suppress, or exert control over these internal experiences; rather, female individuals diagnosed with PTSD acquire the skill to mitigate the repercussions and influence of undesirable thoughts and feelings arising from emotional schemas through the proficient application of mindfulness techniques. Female individuals with PTSD learn to cease their resistance to internal experiences, embrace them with openness, and permit them to manifest and dissipate. Consequently, it is rational to assert that acceptance and commitment therapy concerning emotional schemas in female individuals with PTSD ought to demonstrate durability over time.

Furthermore, in an additional segment, the findings indicated that acceptance and commitment therapy exerted a significant impact on the enhancement of posttraumatic growth in female individuals with posttraumatic stress disorder, and this noteworthy effect persisted throughout the follow-up phase. This finding aligns with the research outcomes of Smith et al. (2021), Herbert et al. (2019) and Wharton et al. (2019). In elucidating the efficacy of acceptance and commitment therapy on the dimensions of posttraumatic growth in female individuals with posttraumatic stress disorder, it can be articulated that, owing to their posttraumatic stress disorder and the resultant experiential avoidance, these females exhibit an increasing rigidity in their endeavors to manage and regulate unwelcome internal reactions to thoughts associated with these conditions, frequently

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resorting to the complete avoidance of such conditions. A primary objective of acceptance and commitment therapy is to facilitate these females in acting in congruence with their personal values. This facet of therapy aids female individuals with PTSD in elucidating their personal and relational values. Upon the clarification and discussion of values, the notion of committed action is introduced. Committed action encompasses the undertaking of steps geared toward the realization of life goals that are grounded in values. Girls diagnosed with post-traumatic stress disorder (PTSD) in this investigation engaged in behavioral objectives congruent with their articulated values by utilizing weekly committed action worksheets that were aligned with these values and highlighted prospective obstacles to their actions. In the context of acceptance and commitment therapy, participants were encouraged to behave in accordance with their values, notwithstanding the presence of distressing thoughts and emotions. By adhering to these guiding principles, the girls progressed toward personal growth aligned with their goals and developed more adaptable strategies to confront the challenges they encountered. The array of actions facilitated through acceptance and commitment therapy fosters post-traumatic growth among girls, while commitment to actionable steps propels them towards their values. In elucidating the enduring impact of acceptance and commitment therapy on post-traumatic growth among girls afflicted with PTSD, it can be articulated that the transformative mechanism within a burden-based framework is rooted in the acceptance and commitment to psychological flexibility; within the context of acceptance and commitment therapy, psychological flexibility is deemed the cornerstone of mental health, striving to enhance flexibility in girls with PTSD through six distinct processes. Each session of acceptance and commitment therapy concentrated on one of these processes; consequently, by the culmination of the treatment, girls with PTSD acquired the ability to perceive their existence as an integrated whole, recognizing the illness as an integral component of this entirety, learning to reside in the present moment, and opting for a cognitive detachment from linguistic constraints rather than merging with them. The principal focus during the therapeutic sessions was on elucidating the patients' values and progressing towards them, with an underlying tenet being the acceptance of the pain and challenges inherent in this journey; rather than attempting to control or evade unpleasant yet essential experiences in pursuit of their values, the process of acceptance enabled the girls with PTSD to embrace responsibility and endure the discomfort and distress associated with behavioral modifications in their lives, thereby acquiring

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the requisite capability to transform ineffective behaviors or to persist in constructive yet arduous actions. Collectively, these factors augmented the individual's psychological flexibility and assisted the girls in acknowledging their disorder, thereby enhancing their post-traumatic growth, an ability that has demonstrated stability over time. Consequently, it is reasonable to assert that therapeutic interventions grounded in acceptance and commitment aimed at fostering post-traumatic growth in girls with PTSD should exhibit temporal stability.

Since this investigation was undertaken among female subjects aged 14 to 19 in Bushehr, it is imperative for researchers and stakeholders utilizing the findings from this research to approach the extrapolation of these results to students in disparate urban settings with caution, given the inherent cultural, ethnic, and social variances. The constraint of the data collection method to a singular questionnaire, alongside the omission of alternative measurement instruments, constitutes an additional limitation of this study. The temporal overlap of the research with the coronavirus (COVID-19) pandemic represented another constraint of the current study, which posed challenges in the acquisition of data. The information and data pertinent to the research variables were procured via self-reporting by the participants through a questionnaire, which is susceptible to various influential factors, including the respondents' inclination to furnish socially desirable responses. Given that post-traumatic stress disorder may manifest as a consequence of trauma and diverse events, the specific type of post-traumatic stress disorder experienced by the female participants was not delineated in this investigation; rather, the mere identification of the presence of post-traumatic stress disorder was deemed adequate, which can be regarded as a methodological shortcoming in this study. This research was exclusively conducted on females aged 14 to 19, thereby limiting its applicability to girls of different ages and to male counterparts.

It is recommended that analogous studies be executed in other urban environments and cultural contexts involving female individuals with post-traumatic stress disorder, as well as male students, to facilitate comparative analyses of the findings across different demographics. Applied research should be undertaken on related themes within the domain of the efficacy of acceptance and commitment therapy in addressing other issues faced by girls with post-traumatic stress disorder, including but not limited to aggression, resilience, distress tolerance, anxiety, and depression. Investigating the comparative effectiveness of acceptance and commitment therapy against other therapeutic modalities such as cognitive-behavioral therapy and self-compassion therapy could

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yield significant advancements in ameliorating the challenges faced by girls with post-traumatic stress disorder. In addition to employing self-report instruments, which may be prone to bias, it is advisable to incorporate alternative research methodologies such as interviews and observational techniques to assess this variable, thereby mitigating potential biases. In light of the prevalence of this disorder and the recognition that the diagnosis and treatment of this condition may yield detrimental psychological, physical, and social ramifications for girls, psychological interventions grounded in an acceptance and commitment-based therapeutic framework may alleviate the intensity of these adverse effects. Furthermore, implementing this therapeutic approach with the objective of fostering post-traumatic growth and enhancing emotional schemas could significantly contribute to the psychological well-being of these young women, offering counselors and clinical psychologists valuable insights for practical application within counseling and psychological service establishments.

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Data availability statement

The original contributions presented in the study are included in the article/supplementary material, further inquiries can be directed to the corresponding author.

Ethics statement

The studies involving human participants were reviewed and approved by the ethics committee of Islamic Azad University. The patients/participants provided their written informed consent to participate in this study.

Author contributions

All authors contributed to the study conception and design, material preparation, data collection, and analysis. All authors contributed to the article and approved the submitted version.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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