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Comparison of the Effectiveness of Mental Deactivation Therapy and Cognitive-Behavioral Therapy Based on Hofmann's Model on State-Trait Anxiety and Fatigability in Adolescents with Generalized Anxiety Disorder

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A B S T R A C T

Objective: The aim of this study was to investigate and compare the effectiveness of mental deactivation therapy and cognitive-behavioral therapy based on Hofmann's model on state-trait anxiety and fatigability in adolescents with generalized anxiety disorder.

Materials and Methods: This experimental study used a pre-test-post-test design with a control group and a follow-up test. The population of this study included all adolescents with generalized anxiety disorder in Bushehr County, from which 45 individuals were selected using purposive sampling based on inclusion and exclusion criteria. The participants were randomly assigned to three groups: 15 to the first experimental group, 15 to the second experimental group, and 15 to the control group. Participants responded to the State-Trait Anxiety Inventory (Spielberger et al., 1983) and the Fatigue Severity Scale (Farmer & Sandberg, 1986). Group 1 received a 12-weekly-session, 120-minute therapy program based on the Jelodari Guide (2021), and Group 2 received a 12-weekly-session, 120-minute therapy program based on the Hofmann and Otto Guide (2008), while the control group did not receive any intervention. Data were analyzed using univariate and multivariate covariance analysis and Bonferroni post hoc test with SPSS-26.

Findings: The results of the multivariate covariance analysis indicated a significant difference between the post-tests of the groups ($p < .001$). Bonferroni post hoc test results showed that both experimental groups led to a reduction in anxiety ($p < .001$) and fatigability ($p < .001$) compared to the control group. Moreover, mental deactivation therapy had a better performance in reducing anxiety ($p < .001$) and fatigability ($p < .001$) compared to cognitive-behavioral therapy based on Hofmann's model.

Conclusion: Based on the results, it can be concluded that mental deactivation therapy, due to its individualized nature, is more effective in treating individuals with various needs and issues. In contrast, cognitive-behavioral therapy based on Hofmann's model, due to its primary focus on social anxiety disorder, has lower efficacy in treating non-anxiety disorders.

Keywords: *Mental Deactivation Therapy; Cognitive-Behavioral Therapy Based on Hofmann's Model; State-Trait Anxiety; Fatigability; Adolescents.*

1. Introduction

Adolescence is a significant and prominent stage in an individual's social and psychological development. Some psychologists consider adolescence to be a period of storm and stress, characterized by numerous crises and changes in the adolescent's body, mind, and social life (Sawyer et al., 2018). One common disorder that occurs during adolescence is generalized anxiety disorder (GAD) (Mohammadi et al., 2020). Anxiety disorders in adolescence can vary from one individual to another and may include excessive fear and worry, inner restlessness, and a tendency toward hypervigilance and caution. Even in the absence of real threats, some adolescents describe a constant feeling of nervousness, restlessness, or severe stress (Chiu et al., 2021). In social environments, anxious adolescents may appear dependent, withdrawn, or restless. They may seem overly restricted or excessively emotional. They might worry about losing control or have unrealistic concerns about social competence. Adolescents suffering from excessive anxiety regularly experience a range of physical symptoms. They may complain of muscle tension, stomachaches, headaches, limb pain, back pain, fatigue, or discomforts related to pubertal changes (Corr et al., 2021). Generalized anxiety disorder can be associated with restlessness, fatigue (Lee et al., 2020), concentration problems, irritability, muscle tension, and sleep disturbances (Meers et al., 2020).

Spielberger et al. (1983) were the first to divide anxiety into two dimensions: trait anxiety and state anxiety. Trait anxiety is a personality trait reflecting the frequency and intensity of an individual's emotional response to stress, indicating a relatively stable predisposition towards anxiety (Saviola et al., 2020). This type of anxiety is a personality trait rather than a situational feature faced by the individual. State anxiety is an emotional reaction that varies from situation to situation. Both trait and state anxiety are factors that play an active role, albeit minor, in the development of generalized anxiety disorder (Mohammadi & Bita, 2015). This phenomenon often arises during new experiences, and high levels can damage an individual's identity and self-confidence (Dale et al., 2019). Moreover, it has been shown that high levels of anxiety can be associated with increased depression and lower quality of life (Özkuk et al., 2018).

On the other hand, research has shown that anxiety is directly related to psychological fatigue. If left unchecked, fatigue can lead to the growth of negative emotions in a person and endanger their mental health (Babapoor et al., 2019). Many people experience feelings of fatigue. A large percentage of individuals occasionally or frequently feel this way (Loades et al., 2017). Fatigue is considered a temporary unpleasant state in which the individual becomes highly disinterested in their activities. A fatigued person finds it difficult to focus on their tasks, and time seems to pass slowly for them. Fatigue is usually accompanied by feelings of restlessness, irritation, a desire to escape the work environment, change the environment, and engage in activities that are more attractive to them (Abrahams et al., 2018). Fatigue is defined in contrast to enthusiasm for work. Sometimes, it is characterized as an individual trait, and some people experience it more than others. Chronic fatigue can lead to irrational thinking, depression, negative emotions, hostility, and the emergence of physical and psychological symptoms (Aarnes et al., 2020).

One of the newest treatments developed to help adolescents with anxiety is Mental Deactivation Therapy (MDT). The theoretical conceptualization of MDT is essentially based on the cognitive theory concepts developed by Aaron T. Beck in the 1960s, linking automatic negative thought patterns or cognitive distortions to depression (Corr et al., 2021). Beck refined his cognitive model by introducing the concept of mindsets, defined as networks of cognitive, emotional, motivational, and behavioral components, acting as integrated subsets of personality designed to address specific demands or problems, often occurring as semi-conscious responses (Swart et al., 2014). Consequently, MDT was developed to treat adolescents in the context of their comprehensive experiences, reflected in their thoughts and beliefs.

Additionally, one approach that has been successful in treating anxiety disorders is Cognitive-Behavioral Therapy based on Hofmann's model (CBT-HM) (Asghari et al., 2014). Hofmann introduced his modern cognitive behavioral therapy as a Social Self-Assessment Therapy (SSRT). Hofmann's model is a perceptual model utilizing indirect cognitive restructuring and exposure to situations. The main tool for change in this therapy is gradual exposure, referring to detachment from an object or person, which leads to long-term distress reduction. Based on Hofmann's model, initially developed for treating social anxiety disorder, individuals with anxiety in social situations perceive social standards (such as expectations and social goals) as high. They wish to make a specific impression on others but doubt their ability to achieve this. This outcome occurs partly because they are unable to clearly define their goals and select appropriate strategies to achieve them (Hofmann et al., 2012; Hofmann

& Otto, 2008; Hofmann et al., 2010). Given the above, the primary aim of this study was to examine whether Mental Deactivation Therapy and Cognitive-Behavioral Therapy based on Hofmann's model are effective on state-trait anxiety and fatigability in adolescents with generalized anxiety disorder.

2. Methods and Materials

2.1. Study Design and Participants

This experimental study used a pre-test-post-test design with a control group and follow-up test. The study population included all adolescents with generalized anxiety disorder in Bushehr County. From this population, 45 individuals were selected using purposive sampling based on inclusion and exclusion criteria and were randomly assigned to three groups: 15 to the first experimental group, 15 to the second experimental group, and 15 to the control group. Inclusion criteria included being aged between 14 and 18 years, having a diagnosis of generalized anxiety disorder based on DSM-5 criteria, scoring above 86 on the State-Trait Anxiety Inventory (above 43 in state anxiety and above 46 in trait anxiety) and 112 on the Fatigue Severity Scale. Exclusion criteria included being a student, taking psychiatric medications, receiving any psychological treatment, and experiencing any psychological trauma, such as the death of parents or close relatives, in the past six months.

With the assistance of specialized psychology and counseling clinics in Bushehr County, adolescents with generalized anxiety disorder were identified among the clients. After identifying the necessary number, the researcher conducted an initial interview to explain the research objectives, ethical principles, answer any questions the subjects might have, and obtain informed consent. During the initial interview, all research questionnaires were administered as a pre-test to the subjects. After completing the initial interview, each subject was randomly assigned to one of the three groups (first experimental, second experimental, or control). Each experimental group received the respective number of training sessions based on their specific instructions, while the control group received no intervention. After the last session of the experimental groups, the research questionnaires were administered as a post-test. Finally, a follow-up test was conducted for all three groups after two months. It should be noted that due to attrition in the second experimental group (CBT-HM), 15 individuals were included in the final analysis for each group (initially, 20 subjects were considered for each group). The data were then analyzed and interpreted.

2.2. Measures

2.2.1. State-Trait Anxiety

This inventory, created by Spielberger et al. (1983), includes two factors, state anxiety and trait anxiety, with 40 items. The items are scored on a 4-point Likert scale (1 = not at all to 4 = very much). However, items 1, 2, 5, 8, 10, 11, 15, 16, 19, 20, 21, 23, 26, 27, 30, 33, 34, 36, and 39 are reverse-scored. The score range is between 40 and 160, with higher scores indicating greater anxiety. Spielberger et al. (1983, as cited in Monshi Toosi et al., 2015) reported the reliability of the inventory's factors using Cronbach's alpha as 0.92 and 0.90, and test-retest reliability as 0.62 and 0.68. Monshi Toosi et al. (2015) reported the reliability of this inventory using Cronbach's alpha for trait anxiety, state anxiety, and the entire inventory as 0.91, 0.89, and 0.94, respectively (Mohammadi & Bita, 2015).

2.2.2. Fatigue Severity

This scale, developed by Farmer and Sundberg (1986), includes 28 items. The items are scored on a 7-point Likert scale (1 = strongly disagree to 7 = strongly agree). However, items 1, 7, 8, 11, 13, 15, 18, 22, 23, and 24 are reverse-scored. The score range is between 28 and 196, with higher scores indicating greater fatigue. Vadanovich (2003) reported the test-retest reliability of this scale as between 0.71 and 0.91. The construct validity of this scale is shown through significant positive correlations with questionnaires related to various negative emotions, including anxiety, depression, anger, hostility, hopelessness, and life dissatisfaction. Ghamkhar Fard et al. (2019) reported the reliability of this scale using Cronbach's alpha in an experimental group as 0.64 (Babapoor et al., 2019; Sharif et al., 2018).

2.3. Interventions

2.3.1. Mental Deactivation

Mental Deactivation Therapy (MDT) is designed to address the individualized needs and psychological issues of adolescents with anxiety by focusing on their thought patterns and emotional regulation. This 12-session intervention aims to promote mindfulness, acceptance, and emotional regulation skills to reduce anxiety and fatigue

(Apsche et al., 2006; Bass et al., 2014; Murphy & Siv, 2007; Swart et al., 2014).

Session 1: The initial session involves obtaining informed consent, establishing a therapeutic rapport, addressing patient ambiguities, explaining the MDT theory and its principles, and providing homework. The session concludes with a review of the patient's homework between the first and second sessions.

Session 2: Completion of the Multi-Component Core Beliefs Questionnaire – Short Form (Epsh & Daimyo, 2012, translated by Hosseini & Jelodari, 2020).

Session 3: Completion of the Fear Strengths Questionnaire (Epsh & Daimyo, 2012, translated by Hosseini & Jelodari, 2020).

Session 4: Emphasis on the importance of becoming aware of and observing problematic or unpleasant thoughts and feelings. Explanation of the concepts of internalized and externalized behavior, the importance of mindfulness and acceptance to eliminate the need to control or avoid negative experiences, understanding, awareness, realistic evaluation of emotional cues, and developing emotion regulation skills. Homework is provided.

Session 5: Training in mindfulness, acceptance, and empathy for oneself and others. Practical mindfulness exercises are introduced.

Session 6: Review of key principles, assessment of progress, feedback provision, addressing concerns, and encouraging the patient to describe their therapy experiences.

Session 7: Completion of the Triggers, Fears, and Beliefs Worksheet (Epsh & Daimyo, 2012, translated by Hosseini & Jelodari, 2020).

Session 8: Completion of the Composite Beliefs and Behaviors Worksheet (Epsh & Daimyo, 2012, translated by Hosseini & Jelodari, 2020).

Session 9: Introduction of the Validation, Clarification, and Reorientation (VCR) process. Validation of the patient's beliefs using the "grain of truth" method.

Session 10: Clarification of the patient's beliefs and perspectives.

Session 11: Reorientation of the patient's beliefs.

Session 12: Reinforcement and summary of the therapy process.

2.3.2. Cognitive-Behavioral Therapy Based on Hofmann's Model

Cognitive-Behavioral Therapy based on Hofmann's model (CBT-HM) is structured to help adolescents with anxiety disorders through psychoeducation, cognitive restructuring, and exposure techniques. This 12-session intervention emphasizes the development of coping strategies to manage anxiety and enhance social skills (Hofmann et al., 2012; Hofmann & Otto, 2008; Hofmann et al., 2010).

Session 1: The first session involves psychoeducation, including: a) teaching the basic principles of CBT and presenting the rationale for the therapy, b) explaining the basics of anxiety symptoms and discussing the cognitive-behavioral model of anxiety disorder, c) engaging the patient in therapy sessions and homework assignments, and d) providing homework to review the cognitive-behavioral model form of anxiety disorder.

Session 2: a) Reviewing the therapy model, b) informing the patient about anxiety and the role of avoidance in maintaining anxiety, c) educating the patient on the importance of exposure and the nature of exposure situations, and d) preparing a hierarchy of fear and avoidance. Homework involves daily recording of anxiety-provoking situations.

Session 3: a) Familiarizing the patient with automatic negative thoughts and dysfunctional beliefs, b) teaching the skill of identifying and categorizing automatic negative thoughts and challenging them, and c) providing homework to complete the automatic thought challenge form.

Sessions 4 & 5: a) Creating a hierarchy of fear and avoidance, b) introducing the patient to the feedback video technique, and c) conducting video feedback exposure in the session: the patient is asked to talk about what they have learned in previous sessions in front of a camera, then the recorded video is played for the patient and others in the exposure session. Homework includes standing in front of a mirror daily for a few minutes, discussing a topic, or describing one's features.

Sessions 6 to 8: a) Preparing the patient for exposure in natural environments outside the therapy session, b) designing appropriate exposure situations based on the fear and avoidance hierarchy, c) conducting exposure in natural environments, and d) providing feedback after the exposure. Homework involves the patient designing and conducting several exposure situations and assessing their anxiety levels before and after exposure.

Sessions 9 & 10: a) Teaching the patient assertiveness skills, b) familiarizing the patient with various forms of assertiveness, and c) providing homework for the patient to identify situations that require assertiveness, which they previously avoided, and applying these skills.

Sessions 11 & 12: a) Relapse prevention, b) identifying sustaining factors to prevent relapse in daily life, c) preparing the patient to cope with temporary anxiety relapses, and d) reviewing all therapy sessions, summarizing patient progress, and providing feedback.

2.4. Data Analysis

In this study, data were analyzed using descriptive statistics methods, including mean and standard deviation, and inferential statistics methods, including univariate and multivariate covariance analysis and Bonferroni post hoc test. Data analysis was performed using version 26 of the Statistical Package for the Social Sciences (SPSS-26).

3. Findings and Results

In the Mental Deactivation Therapy (MDT) group, there were 9 females (60%) and 6 males (40%); in the Cognitive-Behavioral Therapy based on Hofmann's Model (CBT-HM) group, there were 8 females (53.3%) and 7 males (46.7%); and in the control group, there were 9 females (60%) and 6 males (40%).

Regarding the living status of the participants' parents, in the MDT group, 6 (40%) had normal living conditions, 2 (13.3%) had one deceased parent, and 7 (46.7%) had divorced parents. In the CBT-HM group, 10 (66.7%) had normal living conditions, 2 (13.3%) had one deceased parent, and 3 (20%) had divorced parents. In the control group, 12 (80%) had normal living conditions, 1 (6.7%) had one deceased parent, and 2 (13.3%) had divorced parents.

Regarding the academic level of the participants, in the MDT group, 1 (6.7%) was in eighth grade, 5 (33.3%) in ninth grade, 1 (6.7%) in tenth grade, 4 (26.7%) in eleventh grade, and 4 (26.7%) in twelfth grade. In the CBT-HM group, 3 (20%) were in eighth grade, 3 (20%) in ninth grade, 3 (20%) in tenth grade, 5 (33.3%) in eleventh grade, and 1 (6.7%) in twelfth grade. In the control group, 5 (33.3%) were in eighth grade, 3 (20%) in ninth grade, 1 (6.7%) in tenth grade, 2 (13.3%) in eleventh grade, and 4 (26.7%) in twelfth grade.

Additionally, the mean age and standard deviation of the participants in the MDT group were 15.27 years (SD = 1.486), in the CBT-HM group 14.87 years (SD = 1.302), and in the control group 14.80 years (SD = 1.699).

Table 1

Mean and Standard Deviation of State-Trait Anxiety and Fatigability in Experimental Group 1, Experimental Group 2, and Control Group in Pre-test, Post-test, and Follow-up Stages

Variable	Group	Pre-test Mean	Pre-test SD	Post-test Mean	Post-test SD	Follow-up Mean	Follow-up SD
State-Trait Anxiety	State	Group 1	56.13	5.027	41.53	3.335	43.73
		Group 2	57.87	6.255	47.67	5.394	49.87
		Group 3	58.47	7.337	58.67	6.230	58.00
	Trait	Group 1	58.20	6.293	43.80	5.596	45.60
		Group 2	57.67	5.790	48.47	5.566	50.67
		Group 3	56.80	6.847	56.47	5.041	56.40
Fatigability		Group 1	143.80	18.986	113.33	17.670	114.20
		Group 2	146.47	15.679	130.87	18.322	130.33
		Group 3	145.00	18.466	146.07	21.161	143.47

As shown in Table 1, the mean and standard deviation of state-trait anxiety and fatigability in adolescents with generalized anxiety disorder in the experimental groups (1 and 2) and the control group (3) are presented for the pre-test, post-test, and follow-up stages.

Before analyzing the research data, the assumptions of covariance analysis, including linearity, multicollinearity, homogeneity of variances, homogeneity of regression slopes, and normality of variable distribution, were examined. In this study, the pre-tests of state-trait anxiety and fatigability were considered as covariates, and their post-tests were considered as dependent variables. The correlation coefficients between the pre-test and post-test (state anxiety, trait anxiety, and fatigability) were 0.591, 0.583, and 0.792, respectively ($p < .05$), thus fulfilling the linearity assumption between covariates and dependent variables.

The calculated correlation coefficients ranged from 0.019 ($p < .01$) to 0.277 ($p < .05$), confirming the assumption of multicollinearity among the covariates.

Levene's statistics for state anxiety, trait anxiety, and fatigability were 1.348, 0.341, and 0.742, respectively, which were not statistically significant at the 0.05 level, confirming the homogeneity of variances assumption.

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Additionally, the F value of the group × pre-test interaction showed that the regression slopes of the pre-test and post-test in the experimental and control groups were not significant ($p < .05$), confirming the homogeneity of regression slopes assumption. The Kolmogorov-Smirnov test significance levels for state anxiety (0.155), trait anxiety (0.148), and fatigability (0.126) were greater than 0.05, confirming the normality assumption.

Table 2

Results of Univariate Covariance Analysis (ANCOVA) on Post-test Scores of Dependent Variables

Source	Variable	Component	Sum of Squares	df	Mean Squares	F	p	η^2	Effect Size
Group	State-Trait Anxiety	State	1791.738	2	895.869	105.624	.001	.848	1
		Trait	1306.879	2	653.439	177.773	.001	.903	1
	Fatigability		6831.069	2	3415.535	106.642	.001	.849	1

As shown in Table 2, the F ratios for the univariate covariance analysis for state anxiety ($F = 105.624$, $p = .001$), trait anxiety ($F = 177.773$, $p < .001$), and fatigability ($F = 106.642$, $p < .001$) indicate significant differences among the three groups in the dependent variables. Bonferroni post hoc tests were used to determine the differences between the groups in the dependent variables.

The developed model focused on practical exercises and techniques, avoiding extensive theoretical concepts. These exercises were conducted over 14 sessions. The content aimed to improve psychological adjustment to grief in family members of COVID-19 victims. Table 3 shows the descriptive statistics for the research variables.

Table 3

Bonferroni Post Hoc Test Results for Comparing Adjusted Means of Dependent Variables in Experimental and Control Groups in Post-test Stage

Dependent Variables	Group (I)	Group (J)	Mean Difference (I-J)	SE	p	95% CI Lower	95% CI Upper
State-Trait Anxiety	State	Group 1	Group 2	-4.956	1.081	.001	-7.663
		Control	-15.589	1.100	.001	-18.345	-12.833
	Group 2	Group 1	4.956	1.081	.001	2.249	7.663
		Control	-10.632	1.069	.001	-13.310	-7.954
	Trait	Group 1	Group 2	-4.962	0.712	.001	-6.744
		Control	-13.468	0.724	.001	-15.282	-11.653
	Group 2	Group 1	4.962	0.712	.001	3.179	6.744
		Control	-8.506	0.704	.001	-10.269	-6.743
Fatigability		Group 1	Group 2	-14.540	1.200	.001	-19.801
		Control	-31.185	2.138	.001	-36.540	-25.829
	Group 2	Group 1	14.540	1.200	.001	9.279	19.801
		Control	-16.645	2.078	.001	-21.849	-11.441

As shown in Table 3, Bonferroni post hoc test results indicated statistically significant differences between Group 1 and the control group regarding state anxiety, trait anxiety, and fatigability ($p < .001$). Therefore, MDT is effective in reducing state-trait anxiety and fatigability in adolescents with generalized anxiety disorder in Bushehr County.

Additionally, the results in Table 3 show statistically significant differences between Group 2 and the control group regarding state anxiety, trait anxiety, and fatigability ($p < .001$). Therefore, CBT-HM is effective in reducing state-trait anxiety and fatigability in adolescents with generalized anxiety disorder in Bushehr County.

Moreover, based on the results in Table 3, there are statistically significant differences between Group 1 and Group 2 regarding state anxiety, trait anxiety, and fatigability ($p < .001$). Therefore, there is a significant difference between MDT and CBT-HM in reducing state-trait anxiety and fatigability in adolescents with generalized anxiety disorder in Bushehr County.

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Table 4

Results of Univariate Covariance Analysis (ANCOVA) on Follow-up Scores of Dependent Variables

Source	Variable	Component	Sum of Squares	df	Mean Squares	F	p	η^2	Effect Size
Group	State-Trait Anxiety	State	1095.32	2	547.66	81.765	.001	.811	1
		Trait	1000.099	2	500.05	67.479	.001	.780	1
	Fatigability		5279.088	2	2639.544	80.076	.001	.808	1

As shown in Table 4, the F ratios for the univariate covariance analysis for state anxiety (F = 81.765, p = .001), trait anxiety (F = 67.479, p < .001), and fatigability (F = 80.076, p < .001) indicate significant differences among the three groups in the dependent variables. Bonferroni post hoc tests were used to determine the differences between the groups in the dependent variables.

Table 5

Bonferroni Post Hoc Test Results for Comparing Adjusted Means of Dependent Variables in Experimental and Control Groups in Follow-up Stage

Dependent Variables	Group (I)	Group (J)	Mean Difference (I-J)	SE	p	95% CI Lower	95% CI Upper
State-Trait Anxiety	State	Group 1	Group 2	-4.638	0.961	.001	-7.044
		Control	-12.346	0.978	.001	-14.796	-9.897
	Group 2	Group 1	4.638	0.961	.001	2.232	7.044
		Control	-7.708	0.950	.001	-10.088	-5.329
	Trait	Group 1	Group 2	-5.523	1.010	.001	-7.993
		Control	-11.930	1.029	.001	-14.506	-9.354
	Group 2	Group 1	5.523	1.010	.001	3.054	7.993
		Control	-6.406	0.999	.001	-8.903	-3.909
Fatigability		Group 1	Group 2	-13.211	2.131	.001	-18.548
		Control	-27.436	2.169	.001	-32.869	-22.003
	Group 2	Group 1	13.211	2.131	.001	7.874	18.548
		Control	-14.225	2.108	.001	-19.504	-8.946

As shown in Table 5, Bonferroni post hoc test results indicated statistically significant differences between Group 1 and the control group regarding state anxiety, trait anxiety, and fatigability (p < .001). Therefore, the effectiveness of MDT in reducing state-trait anxiety and fatigability in adolescents with generalized anxiety disorder in Bushehr County has been sustained.

Additionally, the results in Table 5 show statistically significant differences between Group 2 and the control group regarding state anxiety, trait anxiety, and fatigability (p < .001). Therefore, the effectiveness of CBT-HM in reducing state-trait anxiety and fatigability in adolescents with generalized anxiety disorder in Bushehr County has been sustained.

Moreover, based on the results in Table 5, there are statistically significant differences between Group 1 and Group 2 regarding state anxiety, trait anxiety, and fatigability (p < .001). Therefore, the significant difference between MDT and CBT-HM in reducing state-trait anxiety and fatigability in adolescents with generalized anxiety disorder in Bushehr County has been sustained.

4. Discussion and Conclusion

The primary aim of this study was to examine whether Mental Deactivation Therapy (MDT) and Cognitive-Behavioral Therapy based on Hofmann's Model (CBT-HM) are effective in reducing state-trait anxiety and fatigability in adolescents with generalized anxiety disorder. The results showed that MDT was effective in reducing state-trait anxiety, and this effectiveness persisted at the 2-month follow-up; therefore, the answer to the first research question is affirmative. One of the main techniques used in MDT is conducting specific interviews and using specific questionnaires to identify distressing beliefs, anxiety-provoking and fearful situations, and patients' goals and aspirations. The results of the interviews and specific questionnaires can identify their destructive fears and precisely determine the causal factors of anxiety and replace

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them with constructive beliefs. An important strategy of this therapy is identifying intervention fears, which allows serious barriers to therapy, such as distrust, fear of being judged, and avoidant behaviors, to be identified and addressed, creating a safe environment for cooperation and participation between the patient and therapist. Constructive therapeutic alliance and mutual trust between patients and therapists in MDT are of great importance, as the main role in case formulation lies with the patients themselves. Therefore, creating a warm and collaborative atmosphere where patients trust the therapist and actively participate in their therapy makes them feel accepted and affirmed by the therapist, enhancing their self-esteem and confidence (Apsche et al., 2006; Swart et al., 2014). This initially helps them believe they have control over the situation, and with increased positive feelings and constructive beliefs about themselves, their state anxiety, which is related to worries about their inability to manage the current situation, is reduced. Reinforcing and sustaining the patients' constructive alternative beliefs and encouraging them to practice these beliefs and behaviors strengthens and deepens them in the patients' belief system, deactivating the previous destructive mindsets. As a result of not experiencing state anxiety in situations previously perceived as stressful, dangerous, shameful, and anxiety-provoking, trait anxiety (or the general belief of becoming anxious and nervous quickly and the anxious personality) is reduced, and the individual experiences more calmness and capability. Deactivating previous destructive mindsets and creating functional alternative beliefs empowers patients to achieve immediate recovery during therapy sessions and sustain them over time (Apsche et al., 2006; Bass et al., 2014).

Furthermore, it was found that CBT-HM is effective in reducing state-trait anxiety, and this effectiveness persisted at the 2-month follow-up; therefore, the answer to the second research question is affirmative. This finding is consistent with the prior results (Asghari et al., 2014; Atrifard & Shoaeri, 2012; Hofmann et al., 2012; Hofmann & Otto, 2008; Hofmann et al., 2010). CBT-HM is specifically designed to treat anxiety disorders by providing a systematic set of opportunities for patients to learn that social situations are not threatening, social mistakes are not fatal and embarrassing, and deficiencies in social performance are not as catastrophic as anticipated. During the sessions, the therapist's task is to provide new learning opportunities in various ways that patients deny themselves, allowing them to realize the fallacy and destructiveness of their previous beliefs. One of the main methods is exposing the patient to stressful situations to abandon experiential avoidance. The therapist acts as a skilled coach, setting learning opportunities, guiding the patient to adopt correct interpretations of their current performance (rejecting anxious interpretations and providing positive interpretations to prevent shame and anxiety), and creating an environment with humor, motivation, encouragement, and other techniques that allow the patient to test new interpretations and alternatives for most anxiety-provoking and fearful situations. After presenting educational models and theories, the main tool for change is step-by-step exposure. The therapist helps patients learn through action, staying in anxiety-provoking situations long enough, and rationally evaluating what is happening in those situations to avoid irrational interpretations (Hofmann & Otto, 2008; Hofmann et al., 2010). This practical training to abandon avoidance and safety behaviors involves intensive and repeated exposures combined with learning to evaluate experiences neutrally and correctly. The insights gained from these practices result from educational and cognitive interventions, making patients feel that exposure during therapy might not have different effects compared to their self-exposures and that they have acquired the necessary skills to cope. The specific focus of Hofmann's model theories and therapeutic techniques on anxiety explains the sustained effectiveness of this approach over time.

The results showed a significant difference in the effectiveness of MDT and CBT-HM in reducing state-trait anxiety, which persisted at the 2-month follow-up; therefore, the answer to the third research question is affirmative. In other words, the results indicated that MDT had a significantly better performance in reducing state-trait anxiety compared to CBT-HM. This finding is consistent with the results of Murphy and Siegel (2007) who found MDT superior to CBT for various internalizing and externalizing disorders. MDT, by identifying core destructive beliefs formed over time about having deficiencies that make them unable to manage anxiety-provoking situations, unworthiness due to not learning natural skills and not having experiences gained naturally during development, while validating the naturalness of these beliefs in experienced situations, uses the Validation, Clarification, and Reorientation (VCR) process to change and transform them from unhealthy and non-constructive beliefs into constructive ones (Murphy & Siv, 2007). With numerous exercises and assignments (including learning the theoretical foundation of therapy, cognitive-behavioral sequence, identifying life goals, etc.), MDT teaches

individuals that they can handle anxiety-provoking situations well with natural anxiety without fear of being threatened or judged, relying on their capability and self-efficacy beliefs. The VCR process is an active therapeutic element in the MDT treatment plan. This approach differs from traditional cognitive-behavioral therapy in that acceptance and validation are intentionally projected onto the patient, and through mindfulness and unconditional positive regard, instead of directly challenging and attacking core non-constructive beliefs as irrational and unrealistic, functional alternatives are developed in the patient. Additionally, the therapist-patient relationship is also an opportunity to practice and experience anxiety, where the patient practices anxiety control skills that they previously did not know or were afraid to try without fear of being judged, simultaneously increasing their assertiveness (Murphy & Siv, 2007).

Another finding of this study showed that MDT was effective in reducing fatigability, and this effectiveness persisted at the 2-month follow-up; therefore, the answer to the fourth research question is affirmative. Fatigability, as a psychological characteristic, stems from individual attitudes and beliefs, lifestyle, negative mood states, and continuous failures (Apsche et al., 2006). Therefore, targeting the underlying causes of fatigue is important to eliminate it and restore mental energy. One of the major causes of fatigue and boredom is trait anxiety (Loades et al., 2017). MDT empowers individuals to effectively face and cope with state anxiety, gradually reducing their perception of being anxious (trait anxiety), thereby conserving mental energy to cope with anxiety and preventing fatigability. Additionally, acceptance processes help individuals accept their feelings and emotions rather than avoid and suppress them, and while recognizing some of them as natural, engage in energy-restoring activities like exercise, small recreations such as walking or watching movies, and listening to joyful music, thus restoring lost mental energy and improving their mood. Acceptance and commitment therapy assumes that a significant portion of psychological distress is created by linguistic processes that trap the individual and lead to psychological inflexibility. Similarly, MDT follows these linguistic theoretical assumptions and creates a passage for psychological flexibility through focusing on functional alternative beliefs validated by the therapist in the moment. Functional beliefs like not being condemned to helplessness and being capable of making changes in life and growing and progressing help individuals create more motivation to set new goals and strive to achieve them. Changing beliefs through the validation-clarification-reorientation process gradually with the therapist's support and achieving small successes step by step is a factor that makes the changes in patients persist and deepen over time.

The present study showed that CBT-HM was effective in reducing fatigability, and this effectiveness persisted at the 2-month follow-up; therefore, the answer to the fifth research question is affirmative. CBT-HM helps patients become their own therapists for solving various problems by learning the theoretical foundations of therapy and its techniques and skills without dependence on the therapist, a factor that ensures more lasting treatment over time. Such practical independence in using therapeutic skills begins with providing a model of the disorder by the therapist. This model serves as a guide for interventions, helping patients see that each component of the interventions is part of an overall plan to eliminate the sustaining factors of their generalized anxiety disorder. As previously mentioned, generalized anxiety and trait anxiety are significant factors contributing to psychological fatigue. Additionally, this model provides a space for patients to view their disorder in a way that may help them abandon ineffective problem-solving efforts and respond differently to the incongruence and surge of symptoms that emerge in moments of fear (Hofmann et al., 2012; Hofmann & Otto, 2008; Hofmann et al., 2010). As a result, the exhaustion and fatigue resulting from constant coping with distress and anxiety symptoms are reduced, providing more opportunities for self-renewal and motivation recovery. Moreover, the focus on facing social anxiety and exposure through controlled social situations, changing threat expectations and social misfortune, and emotion control techniques, mirror feedback, group feedback, etc., leads to significant changes in patients' moods and increased self-efficacy beliefs, resulting in reduced fatigability and increased energy and joy.

Finally, the present study showed that there was a significant difference in the effectiveness of MDT and CBT-HM in reducing fatigability, which persisted at the 2-month follow-up; therefore, the answer to the sixth research question is affirmative. In other words, the results indicated that MDT had a significantly better performance in reducing fatigability in adolescents with generalized anxiety disorder compared to CBT-HM. This finding is consistent with the results of Biesecker et al. (2014), Murphy and Siegel (2007), and Epsh et al. (2006), who found MDT superior to CBT for various internalizing and externalizing disorders. As a new approach in the third wave of cognitive-behavioral therapies, which combines treatments such as acceptance and

commitment therapy, cognitive-behavioral therapy, behavioral therapy, and dialectical behavior therapy, MDT has the advantage over CBT-HM by including components like mindfulness techniques, acceptance, empathy, and especially the VCR process, making it a more comprehensive therapy that targets various aspects of the patient. While CBT-HM primarily focuses on anxiety and related processes, MDT has the advantage of identifying and targeting unique fears, anxieties, and false and disruptive beliefs specific to each patient and providing them with functional alternative beliefs. Therefore, it does not include the limitations CBT-HM has in addressing diverse patient concerns.

5. Limitations & Suggestions

Finally, it is important to mention the limitations encountered in this study. One limitation was the use of an experimental design, which limits the generalizability of the results. Additionally, due to the study population being limited to adolescents with generalized anxiety disorder in Bushehr County, caution should be taken when generalizing the results to other age and cultural groups. Another limitation was the dropout of 5 participants from the control group and 2 from the experimental group 2 (CBT-HM), which may indirectly affect the results. Conducting the study during the widespread COVID-19 pandemic and the resulting anxiety could also affect the study's results. Furthermore, it is recommended that MDT be used for adolescents with conduct disorders, especially anxiety disorders, depression disorders, addiction and substance use disorders, to determine its effectiveness. Future research should compare MDT with other therapeutic approaches such as Acceptance and Commitment Therapy (ACT), Mindfulness-Based Cognitive Therapy (MBCT), Metacognitive Therapy, Positive Psychotherapy, etc. Considering the group and family applications of MDT, it is also recommended for use in future research on dysfunctional families and other populations, including adults.

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Declaration of Interest

The authors of this article declared no conflict of interest.

Ethical Considerations

The study protocol adhered to the principles outlined in the Helsinki Declaration, which provides guidelines for ethical research involving human participants. This research was reviewed and approved by the Ethics Committee of Bushehr University of Medical Sciences with the ethical code IR.BPUMS.REC.2021.039.

Transparency of Data

In accordance with the principles of transparency and open research, we declare that all data and materials used in this study are available upon request.

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Authors' Contributions

All authors equally contributed to this article.

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