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Original Article

Comparison of the Effectiveness of Mindfulness Training and Internet-Based Acceptance and Commitment Training on Academic Engagement, Mental Time Travel, and Students' Anxiety during the COVID-19 Pandemic

Fahimeh Ghasemi[1], PhD Candidate; Seyedeh Olia Emadian[1]*, PhD; Ramazan Hasanzadeh[1], PhD

[1]Department of Psychology, Sari Branch, Islamic Azad University, Sari, Iran

Corresponding author:* Seyedeh Olia Emadian, PhD; Department of Psychology, Sari Branch, Islamic Azad University, Sari, Iran. **Tel: +98 9113511791; **Email:** emadian2012@yahoo.com

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Abstract

Background: Today, the country's education system, especially in high school, is facing the challenge of academic failure and lack of academic motivation among students. This study aimed to compare the effectiveness of mindfulness training and internet-based acceptance and commitment training on academic engagement, mental time travel, and students' anxiety during the COVID-19 pandemic.

Methods: This study was semi-experimental designed by pre-test and post-test with a control group and a follow-up period. The statistical population consisted of all the female senior high school ((including 3 years from the ninth to the twelfth grade). in districts 1 and 2 of Sari city, Mazandaran province, Iran in the academic year 2021-2022. The research sample consisted of 45 female students (15 female students from the first experimental group, 15 female students from the second experimental group, and 15 female students from the control group) from among all the female senior high school in districts 1 and 2 of Sari city in the academic year 2020-2021, and they were selected by a random multi-stage sampling method. To collect data, Schaufeli et al.'s (2002) academic engagement questionnaires, Eren's mental time travel scale (2009), and Beck anxiety inventory (1999) were used. For the experimental groups, mindfulness training and internet-based acceptance and commitment training were implemented during eight sessions, and during this period, the subjects of the control group did not receive any intervention. The data of the research were analyzed using the analysis of variance test with repeated measurements in SPSS version 26 and a significance level of 0.05.

Results: Based on the demographic findings, the mean±SD age in the acceptance and commitment group was 15.98±3.17, in the ACT group it was 16.11±3.24, and in the control group it was 16.36±3.49. The results of analysis of variance with repeated measurement showed that mindfulness training and internet-based acceptance and commitment training have a significant effect on students' academic engagement, mental time travel, and anxiety ($P<0.001$). Also, the effectiveness of education based on acceptance and commitment on academic engagement was higher than mindfulness education ($P<0.001$). However, the effectiveness of mindfulness training on mental time travel and anxiety was higher than training based on acceptance and commitment ($P<0.001$).

Conclusion: Based on the results of the analysis, it can be concluded that internet-based mindfulness training and acceptance and commitment therapy can be considered in academic engagement, mental time travel, and anxiety of students.

Keywords: Mindfulness, Acceptance and commitment, Academic engagement, Mental time travel, Anxiety, COVID-19

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1. Introduction

The concept of academic engagement refers to the quality of effort that students spend on targeted educational activities to directly achieve desired results. In other words, academic engagement is a type of psychological investment and direct effort to learn, understand, and master knowledge, skills, and arts that promote academic activities (1). Academic engagement is among the variables that affect students' academic performance (2). Research showed that academic engagement plays a major role in both improving academics and reducing high-risk behaviors of students in schools (3).

Mental time travel includes mental travel to the future by imagining possible future events and mental travel to the past by remembering past events (4). A higher capacity for mental time travel has been reported to improve people's performance

in social learning. On the other hand, mental time travel is related to characteristics such as personality, personal goal system, motivation to progress, effort, and performance (5). Anxiety is a vague and unexplained unpleasant feeling that often accompanies symptoms of the autonomic nervous system and plays a central role in many mental disorders. Considering that anxiety is not dependent on a specific time, people may feel anxiety in any field (6). Anxiety caused by a possible disease like Covid-19 leads to psychological abnormalities and stress in people (7).

There are many educational methods that are used to moderate negative emotions caused by anxieties and negative attitudes towards school in students; among the therapeutic methods considered by the researchers in this research, we can mention the training of interventions based on mindfulness and acceptance and commitment (8-10). Mindfulness is a form of cognitive-behavioral treatment rooted in Eastern religious teachings and practices, especially Buddhism (11). The optimal goal of mindfulness is non-reactive awareness about internal and external experiences, instead of suppressing or rejecting one's painful and negative thoughts and feelings (12). Therefore, interventions based on mindfulness require metacognitive learning and new behavioral strategies to focus on interpersonal relationships and prevent interpersonal conflicts that cause expansion and renewal of new thoughts and reduce unpleasant events. Also, in conflict situations, instead of getting involved with ineffective cyclical interpretations, a person tries to expand the spaces of awareness and inner awareness and directs their awareness from automatic and negative thoughts to new aspects of life (11).

Acceptance and Commitment Therapy (ACT) can be described as a combination of acceptance and self-awareness strategies for overt behavior change, striving to improve what is called psychological flexibility. Therefore, one of the primary goals of ACT treatment is to create psychological flexibility (13). In ACT, individuals are encouraged to increase their psychological acceptance of mental experiences.

Patients are taught that any action taken to avoid or control unwanted mental experiences is ineffective, and can even intensify these experiences. Instead, individuals are taught to accept these experiences without internal or external reaction in order to remove them completely. In the second stage, psychological awareness is increased in the present moment, helping individuals become aware of their mental states, thoughts, and behavior. In the third stage, individuals are taught to separate themselves from these mental experiences. In the fourth stage, efforts are made to reduce excessive focus on self-image or the personal story an individual has created in their mind. In the fifth stage, individuals are helped to identify and clearly define their main personal values and turn them into specific behavioral goals. Finally, motivation is created for committed action, aimed at achieving specified goals and values, while accepting mental experiences, such as depressing thoughts, obsessions, thoughts related to accidents, fears, or social anxieties (14).

The COVID-19 pandemic, which began in December 2019 in Wuhan, China, has had a significant impact on education systems worldwide. One of the most effective solutions has been electronic education, which uses media elements such as images and words to convey content. Teachers, as facilitators, should provide support, feedback, and guidance through simultaneous and non-simultaneous communication (15). Therefore, during the COVID-19 epidemic, internet-based education was able to overcome the challenge of continuous attendance in face-to-face meetings while increasing social support and providing the potential for presenting content in attractive digital environments at various times (10).

Research findings showed that ACT, by addressing a variety of unpleasant private events in which most people choose escape or avoidance behavior, can significantly help behavior analysts in their treatment during the COVID-19 pandemic (16). The research of Samuel and colleagues showed that mental health problems are increasing among students, especially since the COVID-19 pandemic, and ACT is an effective approach in preventing and reducing students' mental health problems (17). Additionally, Schanche and colleagues showed that mindfulness training has an effect on reducing anxiety disorders (13).

Today, the country's education system, especially in the secondary period, is facing the challenge of academic failure and lack of academic motivation among students (18). Therefore, female

senior high school students, especially those who are struggling with several major stressors during the COVID-19 epidemic, are experiencing negative impacts on their physical and mental health due to the pressure and stress created. Additionally, comprehensive research on the challenges of COVID-19, especially in the secondary period, has not been fully considered. Therefore, the results of the current research help to determine the impact of using each of the educational methods of mindfulness and internet-based ACT. Comparing these two educational methods will also identify the superior method, if any. As a result, students who, for any reason, were not successful in achieving their expected success or who intend to achieve higher success will have a clearer picture of their future success, increasing their interest in achieving. Therefore, the main question of the current research is whether there is a difference between the effectiveness of comparing the effectiveness of mindfulness training and Internet-based acceptance and commitment training on academic enthusiasm, mental travel in time, and students' anxiety during the covid-19 pandemic.

2. Methods

2.1. Participants

This study was semi-experimental designed by pre-test and post-test with a control group and a follow-up period. The statistical population consisted of 8839 female senior high school students in the 1st and 2nd districts of Sari city, Mazandaran province, Iran during the academic year 2020-2021. Inclusion criteria included being female, registered in a secondary school during the academic year 2020-2021, having no prior experience of participating in workshops or similar training classes, having easy access to electronic tools such as phones, internet, and webcams to attend online classes related to the course, completing the written consent form, and meeting the exclusion criteria, which included the inability to participate in 8 training sessions or absence of more than two sessions, dissatisfaction with meetings at any stage of project implementation, continuous internet outages, and not being able to use all the educational content of online classes.

The research sample was selected using a multi-stage cluster sampling method. In the first stage, two educational districts from Sari city were selected by lottery. In the second stage, technical and professional high schools for girls were selected from among different academic branches. Then, in the third stage, students of graphic and accounting fields were selected as the final cluster. It should be noted that all the selections were selected at different stages using a lottery. After determining the sampling clusters, necessary information was provided regarding the training courses, and finally 67 students were willing to participate in the research.

Due to the spread of the Covid-19 pandemic and the adoption of a global decision to observe social distancing, it was decided that all school educations in all levels of education will be provided to students online. Therefore, considering the possibility of the effect of the corona virus conditions and the resulting anxiety on the results of the research, in order to select the members, 67 volunteer students who had signed the consent form were asked to answer the questions of the corona disease anxiety questionnaire, which was created in the Iranian sample by Alipour and colleagues (19). After completing the questionnaires, the scores were extracted, and the average corona anxiety score for the 67 sample members was found to be 3.17 with a standard deviation of 0.72. The formula of Swanson and Holton was used to determine the cut-off point. The results showed that among the 67 students who volunteered, 45 (67%) were diagnosed with anxiety due to the corona disease (with a cut-off point of one standard deviation from the mean: equivalent to 68%) (20). Consequently, students who scored from 1.99 to 4.35 in the Iranian sample of the study by Alipour and colleagues were selected as the statistical sample (19). This collection included 45 students, equivalent to 67% of all students who requested to participate in this research project and met all the inclusion criteria. Finally, using a simple random sampling method (using a lottery), the sample members were randomly divided into three groups. Two experimental groups named Experimental Group 1 (15 students), for training based on Internet-based mindfulness, and Experimental Group 2 (15 students), for training based on Internet-based acceptance and commitment, and one control group (15 students) were chosen.

The total sample size of 45 was calculated using G*Power statistical software (F tests-ANOVA: Repeated measures, within-between interaction) with an effect size of 0.25, a significance level of 0.05, a test power of 0.91 (1-B), and a group size of

three (n=15). The mean±SD of the main variable in the Acceptance and Commitment Therapy (ACT) group, control group, and combined ACT and control groups were 3.89±0.59, 4.63±0.55, and 3.06±0.58, respectively. These results indicated that the sample size was adequate based on previous research (17). In order to comply with ethical principles, several ethical standards were taken into consideration, including obtaining informed consent from participants, ensuring the confidentiality of personal information, and assuring that no physical or psychological harm would be inflicted upon them.

2.2. Instrument

2.2.1. Academic Engagement Questionnaire: To measure the students' academic engagement, the 17-item academic engagement questionnaire developed by Schafeli and co-workers (21) was used. The maximum score that respondents can receive on this scale is 85, and the minimum score is 17. Schafeli and co-workers examined the psychometric properties of the questionnaire in Iran and found that the reliability of the test, as measured by Cronbach's alpha, was good for the subscales of strength (0.94), attraction (0.79), and self-dedication (0.92) (21). Content Validity Ratio (CVR) and Content Validity Index (CVI) were also used, and the results for each were 0.77 and 0.69, respectively, which were confirmed according to the Lawshe table.

2.2.2. Questionnaire of Mental Time Travel: Eren questionnaire was used to measure mental time travel. This scale consists of 10 items related to past and future events (22). Respondents were asked to recall a positive personal event related to the past and to describe a positive personal event related to the future. Eren reported the value of Cronbach's alpha coefficient for this scale as 0.85 (22). In the research of Jalalian and Ahi, the Cronbach's alpha coefficient for each factor of past mental journey and future mental journey was reported as 0.83 and 0.79, respectively (8). Additionally, the CVR (0.75) and CVI (0.81) indicators confirmed the content validity of the scale in the current research (8).

2.2.3. Anxiety Questionnaire: The Beck Anxiety Inventory was used to measure students' anxiety levels. This scale consists of 21 items and specifically measures the severity of clinical symptoms (23). A self-report questionnaire was prepared to measure the intensity of anxiety in teenagers and adults, and its measurement scale is an interval based on the Likert attitude scale. The range of changes of each item is 0-3, where the respondent chooses the option that applies: 0 points for "not at all," 1 point for "mild (didn't bother me much)," 2 points for "moderate (it was very unpleasant but I tolerated it)," and 3 points for "severe (I could not tolerate it)." Therefore, the total score ranges from 0 to 63, and the cut-off point is set at 16. In Iran, its reliability has been calculated using the method of internal consistency coefficient (Cronbach's alpha coefficient) equal to 0.92 (24). The content validity ratio index (0.76) and content validity index (0.78) indicated confirmation of the content validity of the current instrument (24).

2.3. Content of Mindfulness Training Sessions: The content of mindfulness-based therapy sessions was presented in accordance with the training program of Kabat-Zinn (25). As shown in Table 1, a summary of the mindfulness sessions is presented.

2.4. Content of Acceptance and Commitment Training Sessions: The content of the therapy sessions based on acceptance and commitment was presented according to the educational program of Bach and Moran (26).

As can be seen in Table 2, a summary of treatment sessions based on acceptance and commitment is presented. The research data were analyzed using the analysis of variance test with repeated measurements in SPSS version 26, with a significance level of 0.05.

3. Results

Based on the demographic findings, the mean age in the acceptance and commitment group was 15.98±3.17, in the ACT group it was 16.11±3.24, and in the control group it was 16.36±3.49. More than 13 (28.88%) of the students were in the 10th grade, 19 (42.22%) were in the 11th grade, and 13 (28.88%) were in the 12th grade. The results also showed that the three groups were comparable in terms of age (Table 2).

As seen in Table 3, the independent t-test results indicated the homogeneity of the groups with regard to age. Additionally, the Chi-square test comparing the educational levels of the three groups showed a similar distribution of students based on the educational level.

Table 1: Content of mindfulness training sessions

Sessions	Content of each session
1	Introducing and familiarizing the members with each other and the course instructor, presenting the group rules and regulations, stating the importance of the plan and the importance of participating in all meetings and preliminary discussions about the importance of the discussions and the implementation of the pre-test.
2	Getting to know the obstacles and resistances of mindfulness exercises and their solutions, the technique of recording thoughts for three minutes, teaching and implementing the technique of breathing space for three minutes, examining the whole body and discussing this experience.
3	Review of the topics of the previous session and assignments, the technique of using the five senses in mindfulness, calm and conscious yoga movements, visualization meditation from a safe place using the five senses, mindfulness training as a pleasant event.
4	Review of the topics of the previous meeting and assignments, a review of the table of body sensations, emotions and thoughts, teaching the technique of consciously walking in the street, describing and expressing emotions, the technique of switching attention, sitting meditation with emphasis on breathing and body sounds, examination of the whole body and 9-minute breathing space exercise.
5	Reviewing the topics of the previous meeting and assignments, the technique of teaching kindness to yourself and others and meditation of kindness.
6	Reviewing the topics of the previous meeting and assignments, teaching fundamental acceptance of oneself and others without judgment, four-dimensional meditation and awareness of everything that enters the consciousness at the moment, three-minute breathing space practice and thought diffusion meditation.
7	Reviewing the topics of the previous meeting and assignments, training to recognize judgment, training to accept yourself and others without judgment, beginner's mind meditation, diffusion technique training, and mindfulness training as daily activities.
8	Reviewing the topics of the previous session and assignments, summarizing the course and taking the post test.

Table 2: Content of acceptance and commitment training sessions

Sessions	Content of each session
1	Introducing and familiarizing the members with each other and the course instructor, presenting the group rules and regulations, stating the importance of the plan and the importance of participating in all meetings and preliminary discussions about the importance of the discussions and the implementation of the pre-test.
2	Getting to know the concepts of commitment, creating insight into the problem and challenging negative thoughts and feelings.
3	Reviewing the topics of the previous meeting and assignments, getting familiar with the problems and frustrations caused by negative thoughts and feelings and creative hope.
4	Reviewing the topics of the previous session and assignments, acceptance and mindfulness by letting go of trying to control and separate cognitive and emotional.
5	Reviewing the topics of the previous meeting and assignments, value-oriented life, its importance and its impact on life.
6	Reviewing the topics of the previous meeting and assignments, choosing realistic goals, obstacles, evaluating and their importance.
7	Reviewing the topics of the previous meeting and assignments, declaration of values, actions, involvement with enthusiasm and commitment.
8	Reviewing the topics of the previous meeting and assignments, its meaning and importance, summarizing the course and doing the post test.

Table 3: Demographic characteristics of participants in the three study groups

Demographic factors		Mindfulness (n=15)		ACT (n=15)		Control (n=15)		P value*
		mean±SD		mean±SD		mean±SD		
Age		15.98±3.17		16.11±3.24		16.36±3.49		0.06
Demographic factors		N	%	N	%	N	%	0.07
Grade	10th grade	4	%26.64	4	%26.64	5	%33.3	
	11th grade	7	%46.62	6	%39.96	6	%39.96	
	12th grade	4	%26.64	5	%33.3	4	%26.64	

ACT: Acceptance and Commitment Therapy

Table 4: Mean and standard deviation of academic engagement, mental time travel and anxiety with Significance level of Shapiro-Wilk test

Variable	Phase	Mindfulness training	P value (Shapiro-Wilk)	Internet-based ACT	P value (Shapiro-Wilk)	Control group	P value (Shapiro-Wilk)	P value (between groups)
		mean±SD		mean±SD		mean±SD		
Academic engagement	Pre-test	2.95±0.37	0.108	2.90±0.37	0.090	2.99±0.48	0.210	0.061
	Post-test	3.89±0.59	0.091	4.63±0.55	0.101	3.06±0.58	0.188	<0.001
	Follow-up	3.83±0.58	0.340	4.53±0.30	0.221	3.27±0.53	0.091	<0.001
	P value	<0.001		<0.001		0.135		
Mental time travel	Pre-test	2.62±0.41	0.241	2.51±0.40	0.410	2.72±0.46	0.553	0.052
	Post-test	4.41±0.75	0.071	3.69±0.88	0.079	2.73±0.48	0.414	0.003
	Follow-up	4.29±0.44	0.119	3.73±0.55	0.373	2.77±0.28	0.175	0.004
	P-value	0. 011		0.024		0.091		
Anxiety	Pre-test	1.89±0.58	0.091	1.89±0.43	0.149	1.84±0.37	0.114	<0.001
	Post-test	1.06±0.65	0.231	0.44±0.27	0.151	1.83±0.38	0.081	<0.001
	Follow-up	1.37±0.74	0.190	0.54±0.28	0.182	1.83±0.39	0.144	0.001
	P value	<0.001		0.003		0.114		

ACT: Acceptance and Commitment Therapy

Table 5: The results of Scheffe Post Hoc test on dependent variables of the research

Variable	Phase	I–J	P	I–K	P	J-K	P
Academic engagement	Group	0.05	0.939	-0.04	0.957	-0.10	0.809
	Phase	-0.74	0.004	0.83	<0.001	1.57	<0.001
	Phase* Group	-0.69	<0.001	0.56	<0.011	1.25	<0.001
Mental time travel	Group	0.12	0.755	-0.09	0.844	-0.21	0.417
	Phase	0.73	0.031	1.68	<0.001	0.95	0.003
	Phase* Group	0.57	0.04	1.52	<0.001	0.96	<0.001
Anxiety	Group	-0.04	0.764	-0.05	0.640	-0.01	0.978
	Phase	0.30	0.020	-0.41	<0.001	-0.71	<0.001
	Phase* Group	0.17	0.243	-0.45	<0.001	-0.62	<0.001

Table 4 shows a significant difference between the groups in academic engagement (P<0.001), mental time travel (P<0.003), and anxiety (P<0.001) in the post-test phase. Furthermore, the examination of intra-group differences showed that, unlike the control group, significant changes were made from pre-test to follow-up in the mindfulness group for academic engagement (P<0.001), mental time travel (P<0.011), and anxiety (P<0.001). Within-group changes in the ACT group also showed a significant increase from pre-test to follow-up for all variables. However, pairwise comparison was used to determine the nature of the changes made, as reported in Table 5.

The results in Table 5 showed that in the post-test and follow-up stages, there is a statistically significant difference between the group of mindfulness training and acceptance and commitment therapy. There is also a statistically significant difference between these two groups and the control group (P=0.003). In fact, the effectiveness of education based on acceptance and commitment on academic engagement is greater than mindfulness education. However, the effectiveness of mindfulness training on mental time travel and anxiety is greater than training based on acceptance and commitment.

4. Discussion

This study aimed to compare the effectiveness of mindfulness training and internet-based ACT on academic engagement, mental time travel, and students' anxiety during the COVID-19 pandemic. Based on the first finding of this research, it was determined that mindfulness training and internet-based ACT have a significant effect on the academic engagement of female students. However, ACT compared to mindfulness has been more effective on the variables. The results of this finding are consistent with the research of

Hashemi and colleagues (27), Ataei and colleagues (28), Khorrami (29), Porparizi and c-workers (30), and Mak and colleagues (11). In explaining the results obtained, Mihandost and co-workers stated that third-wave interventions such as ACT in non-clinical populations reduce anxiety and depression and promote general well-being (31). In other words, challenges caused by academic, life, and puberty stressors can create psychological and emotional problems for students, interfering with academic progress. Therefore, in education based on ACT, cognitive methods such as evaluation and familiarity with concepts such as worry and despair are used to improve emotion regulation (32). Consequently, people who have been given training based on ACT have become fully aware of their worries, frustrations, and thoughts. After gaining awareness, they take action to resolve them, leading to a reduction in cognitive and emotional evaluations and an increase in psychological well-being, positive thinking, and hope (31).

Moreover, considering that education based on ACT emphasizes creating a positive attitude and reducing negative mental beliefs through mindfulness, this method is effective in improving emotional regulation and reducing psychological symptoms. It also emphasizes avoiding painful experiences and awareness of their consequences, teaching the steps of acceptance, changing the concepts of language using parables, and teaching calmness. All of these create cognitive and emotional awareness in individuals, which eventually leads to positive emotional regulation (8). This method also reduces mental ruminations or negative conversations in the mind, opening the channels of absorbing positive energy. As a result, it increases the student's hope and desire to study (33).

Furthermore, it was found in this research that mindfulness training and Acceptance and Commitment Therapy (ACT) have a significant impact on the mental time travel of students. In terms of effectiveness, mindfulness training has a greater impact on the amount of mental time travel of the studied students compared to ACT. These results were in line with previous research (34, 35).

To explain these findings, it can be stated that over time, people have discovered that recalling past events helps them learn what to avoid and how to behave in the future. Mental imagery is a mental skill that creates and reconstructs clear mental images in the brain by consciously using the power of imagination, according to Moradhaseli (36). In fact, meditation allows anyone to travel through time with their mind. Mindfulness is a state of mind that allows thoughts and feelings to be observed and accepted as they arise. According to Marks (37), mindfulness activates parts of the brain that are involved in attention, memory, and empathy, and helps individuals become aware of and recognize automatic patterns of the mind, such as "I am worthless" or "I am incapable."

Mindfulness teaches individuals to enter a state of being and remain in that state, to open the doors of the mind and body to any experience (openness). By practicing mindfulness, a person becomes aware of their daily activities and the automatic functioning of the mind in the past and future world. Through moment-to-moment awareness of thoughts, feelings, and physical states, they gain control over them, and are able to abandon the everyday mind and the automatic focus on the past and future. In fact, mindfulness causes a person's mind not to focus on repetitive thought patterns and reduces rumination. As a result, visualization and mental time travel to the past and future become easy and simple for people.

Mindfulness training was found to have a greater impact on the anxiety of students compared to Acceptance and Commitment Therapy (ACT), which is in line with previous findings (34, 35, 24, 10). The results can be explained by the fact that many news, events, and life challenges such as the Covid-19 pandemic, cause more stress, anxiety, and confusion in people. In such cases, the brain perceives danger, triggering the "fight or flight" response, which can weaken the body and disrupt peace. Mindfulness; therefore, involves the human's basic ability to be fully present in the moment, to be aware of what is going on, and not to be immediately affected by external conditions or react momentarily to their emotions.

Through mindfulness exercises, individuals can increase their ability to manage behaviors and create pleasant thoughts, regulate concentration and attention, thereby increasing working memory and reducing anxiety, stress, and depression (37). Additionally, mindfulness reduces dysfunctional attitudes by changing the content of thoughts. During mindfulness training, individuals gain the ability to stop the cycle of thoughts that lead to

severe anxiety and distance themselves from their negative thoughts. By increasing flexibility, mental enrichment, modification of positive beliefs, and challenging negative beliefs and negative emotions, mindfulness is effective in improving anxiety symptoms. Therefore, mindfulness exercises help students to better moderate and regulate their emotions by increasing their awareness.

4.1. Limitations

The current research faced some limitations. For example, it was only conducted on female students during the Covid-19 epidemic. Thus, caution should be made in generalizing the results of this research to other groups and contexts.

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Ethical Approval

The research was approved in the ethics committee of Islamic Azad University, Sari Branch, Mazandaran Province, Iran with the code of IR.IAU.SARI.REC.1400.031. Also, written informed consent was obtained from the participants.

Conflict of Interest: None declared.

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