



Enhancing Autobiographical Memories through Mindfulness-Based Cognitive Training: An Intervention for Depression Adolescents during the COVID-19 Pandemic

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Abstract

Background: The coronavirus [coronavirus disease 2019 (COVID-19)] pandemic has introduced extraordinary life changes and stress, particularly in adolescents and young adults. This study aimed to evaluate the effectiveness of mindfulness-based cognitive therapy group training on improving autobiographical memories in adolescents with depression during Covid-19.

Methods: This research was a quasi-experimental study and a pre-test, post-test with a control group. The statistical population of this study consisted of all adolescent females with depression in the education of the 13th district of Tehran in 1400. The sampling process applied in this study was purposeful. Regular random sampling from among 240 female students in junior high school, 40 people (20 in the experimental group and 20 in the control group) were selected according to the depression score. The autobiographical memories test and Beck depression inventory were performed as a pre-test on the participants, then the experimental group received 8 sessions of mindfulness group training intervention and at the end of sessions, the research tool as a post-test was administered on both groups. Data were analyzed by SPSS-20 software using analysis of covariance. The significant level was set at 0.05.

Results: Based on the results, the implementation of the independent variable on improving episodic memory dimension ($Pvalue < 0.001$, $F = 12.430$ (24 and 1) and semantic dimension ($Pvalue < 0.001$, $F = 11.134$ (24 and 1) in adolescents with depression was effective. Therefore, mindfulness-based cognitive therapy group training has been effective in strengthening episodic memory and semantic dimension in adolescents with depression.

Conclusions: The result of the study showed that mindfulness-based cognitive therapy had a significant effect to improve episodic memory in adolescents with depression during the COVID-19. Therefore, this study suggests that therapists use this approach properly to reduce depression.

Keywords: Mindfulness-based cognitive therapy group, Autobiographical memories, Adolescents, Depression.

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Introduction

This novel Coronavirus disease [coronavirus disease 2019 (COVID-19)] pandemic has affected millions of individual's

life around the world. In addition to causing major societal disruptions, pandemic diseases may pose substantial challenges to human adaptation.¹ Since March 2020, shelter-in-place orders have been implemented throughout Iran, causing most Iranians to adjust to new conditions (e.g. working at home and studying), take on a new role (e.g. caretaker, teacher), and face new or increased hardships (e.g. unemployment, low income, disease, loneliness, and mobility restrictions). COVID-19's impact and nature are only just beginning to be understood as this unprecedented crisis unfolds. The COVID-19 outbreak has created a high level of psychological stress among adolescents, who have been exposed to health threats and long periods of quarantine, which can exacerbate mental distress, such as depression.²

In this way, the COVID-19 pandemic may lead to greater depressive symptoms in adolescents, as had been reported in the previous studies.³ Thus, many memory impairments in depression seem to be downstream outcomes of chronic stress, and addressing memory disruption can have therapeutic value.⁴ To elaborate, Werner-Seidler and Moulds (2011) discovered that depressed individuals rated positive memories as being less vivid than their non-depressed counterparts;⁵ Fernández-Lansac and Crespo (2015) showed that longer narratives of positive events were associated with depression-related mental health symptoms,⁶ and Contractor et al. (2019) found that reduced positive memory count predicted Post-traumatic stress disorder (PTSD) severity.⁷

There may be dysfunction in more than one memory system, but biased processing of memories, especially those associated with emotional experiences, is fundamental to mood, anxiety, and stress disorders. Emotional memory disturbances contribute to the maintenance of current symptoms and can even persist during remission, thereby increasing the chances of relapse. By targeting maladaptive autobiographical memory patterns, it may be possible to reduce symptom severity and reduce the likelihood of recurrence.⁸ Researchers found that people who had more specific positive memories (a happy 13th birthday, for example) when entering the study had fewer negative thoughts about themselves and lower amounts of stress hormones cortisol one year later. According to this research, teens who are trained to recall

positive memories may be at less risk of depression in the future.⁹

During this vulnerable time, it is particularly important to intervene effectively. There are evidence-based treatments available, but approximately 50% of patients do not respond to first-line treatments, and a significant proportion relapses. In light of this, it is imperative to increase interventions during the critical period of early-onset depression. This can be accomplished by modifying cognitive processes that predict illness development.¹⁰ It has been suggested that a contributing factor to the maintenance of negative beliefs, inappropriate emotions, and avoidance strategies is the inability to retrieve episodic and autobiographical memories accurately. Consequently, modulating and interrupting this vicious cycle is the primary goal of novel approaches.¹¹ The treatment of these disorders has advanced significantly over the past few decades, but many patients are not benefiting from current therapies.¹²⁻¹³

One of these treatment approaches is Mindfulness-based cognitive therapy (MBCT). The MBCT program is an eight-week group-based therapy program that combines cognitive-behavioral therapy and mindfulness meditation to treat depression.¹⁴ Through MBCT, participants learn to use mindful awareness to relate to their thoughts, emotions, and bodily sensations, effectively breaking the recurring cycle of rumination, maladaptive emotion regulation, and self-criticism that makes them vulnerable to depressive relapse. Researchers have developed a variety of conceptualizations of mindfulness, however, there is general agreement that mindfulness involves self-regulation of attention to monitoring present-moment experience and the associated attitudes of acceptance, openness, and nonjudgment.¹⁵ The MBCT method allows adolescents with depression to recognize and observe more clearly patterns in their minds and to create distance from thoughts that would otherwise negatively affect their mood. The focus of mindfulness is on minimizing experiential avoidance by helping individuals become aware of and normalize their emotions and bodily sensations without engaging in futile efforts to challenge or avoid them. The focus is on systematic training to be more aware, in the present moment, of physical sensations and thoughts as transient mental events; letting go without becoming trapped by them.¹⁶ The study provided the opportunity to conduct a pilot evaluation of the efficacy of MBCT in enhancing autobiographical memories for depressed adolescents during the COVID-19 Pandemic.

Materials and Methods

This research was a quasi-experimental study and a pre-test, post-test with a control group. The statistical population of this study consisted of all adolescent females with depression in the education of the 13th district of Tehran in 1400. According to the research plan, the sample size for each experimental and control group was 20 people and a total of 40 people who were selected by purposive sampling from the students of Fatemeh school located in the 13th district in a Shad application bed and purposefully students who scored high on depression and were willing to participate in the study were selected. The cut-off score for depression in this study was 10.

To determine the sample size using, the mean and standard deviation of the control group were 57.11 and 8.63, respectively, and the mean and standard deviation of the experimental group were 69.3 and 6.23, respectively, and $\alpha=0.05$ and $\beta=80\%$ were considered. Using the sub-formula, the sample size for the experimental and control groups was calculated as 17 people and due to the possibility of excluding participants during the study, the sample was increased to 20 people.¹⁷

$$n = \frac{(z_{1-\frac{\alpha}{2}} + z_{1-\beta})^2 (\sigma_1^2 + \sigma_2^2)}{(M_1 - M_2)^2}$$

Regular random sampling from among 240 female students in junior high school, 40 people ($n=20$ in the experimental and $n=20$ in the control group) were selected as a statistical sample according to the depression score. The experimental group received virtual mindfulness-based cognitive training in table 1 for 8 sessions, 1 session of 90 minutes per week, but the control group did not receive any intervention. After selecting the research samples and in order to observe the ethical issues of the participants in the present study, the following measures were taken. At the beginning of the research; by honestly explaining the objectives of the research, informed consent was obtained from individuals to participate in the research. In conducting the research, an attempt was made to support them in terms of possible problems by establishing effective communication with the subjects. The confidentiality of the information was also completely preserved by the researchers. The questionnaire was sent to the students as a link by the school deputy in a Shad application bed. Students who wished to participate sent the answers through the link after two days. Participants were not pressured to continue attending the sessions and could leave the meeting or withdraw from the study. Ethical approval was received from the research deputy of Islamic Azad university, Ardabil Branch, (IR.AZUA.REC.1400.021).

Autobiographical Memories test: This test consists of 48 short sentences that were selected based on the study of Kormi-Nouri et al.¹⁸ In order to examine the types of episodic memory (verbal, practical, and visual), 48 sentences were divided into three lists of 16 sentences, and each list was used for verbal, practical, and visual tasks, respectively. The usual method used for verbal and practical assignments is that the sentences are presented to people by listening.¹⁸ In verbal assignments, sentences are shown to the subject visually (written on the card) and he has to write and memorize the same sentence on paper.

Each sentence was shown to individuals for 6 to 9 seconds. In the practical task, the subject had to perform and memorize the action with the means provided to him/her at the same time as seeing the sentence. In the illustration task, the subject had to visualize and memorize the sentence by seeing it in his mind. In order to neutralize any possible effect of the order, the effect of the sentence itself on the order of execution of the sentences, and their verbal, practical, and illustrative nature in each list was different from the other list so that 48 sentences were

equally among the lists for assignments Verbal, both practical and illustration tasks were used.

For all subjects, a verbal list was presented first and the order of presenting practical lists and illustrations was changed randomly in each group. The reason for presenting the verbal list was initially that the subjects did not use practical and visual solutions in verbal coding. In the semantic memory test, two-fluid language tests (alphabetical letters and semantic categories) were used. The alphabet test consisted of 9 letters of the alphabet that were examined in terms of letter frequency (high frequency, medium frequency, and low frequency). In the semantic categories section, 30 semantic categories were used, and the subjects were asked to recall the words related to those categories. All tests were performed individually and visually via WhatsApp. The test time was about 60 minutes for each subject.

In order to perform episodic memory tests, after presenting instructions and doing some examples, the person was asked to perform tasks. At the end of the list, in order to create a gap between the decoding and recall stages, the semantic memory test was performed. The reason for the gap was to create long-term learning memory for the subjects. To do this, semantic memory tests (alphabetical letters and semantic categories) were divided into three parts. In each section, the semantic category and the alphabet are presented, each section is presented between event memory tasks. The instructions for the alphabet were as follows. "I show you a letter, and you have to memorize and write down every word that starts with that letter." The reminder time for each letter was three minutes. In the semantic categories section, the category was also presented to him, and he had to memorize and write down any number of words that were related to the word in 2 minutes. Free reminders and token reminders were used to measure episodic memory tests. First, a free recall test was introduced, during which the person was given a blank sheet of paper and asked to count any number of sentences he or she remembered.

The subject had no time limit. After that, the reminder test was presented with the help of a token. During which the signs (clues) containing the verbs or nouns that were in the list of sentences were shown to the people, and he was asked to write down as many sentences as he could remember according to the signs. For half of the people, the verb sign was used and for the other half, the noun sign was used.

It should be noted that after the end of one test until the beginning of the next test, the subject was given the opportunity to rest and relieve fatigue. In general, two scoring methods were used on how to score episodic memory tests (free recall tasks and token-assisted recall). Strict scoring and easy scoring if the subject remembers and notes exactly the main sentence of the text (decoding stage), he will be given a strict score and in case of semantic (conceptual) similarity of the sentences by the subjects with the text sentences The main, easy score was given to him. In episodic memory tests (verbal, practical, and visual), once as a complete sentence and once separately for the free reminder and reminder with the help of signs to the name and verb, strict and easy scores were given. In scoring the semantic memory test (alphabetical letters and semantic categories), it was noted that the words written by the subject are semantically related to the categories and not repetitive. And related words were given a score of one and otherwise a score of zero. Cronbach's alpha in this test was reported by Kormi-Nouri et al 18 0.89 and validity was 0.73.

The Beck depression inventory short version (BDI-S, BDI-13):¹⁹ The inventory consists of 13 items assessing the severity of depression symptoms using statements scored from 0 to 3. The Farsi (Persian) version was used for this study. It was translated and validated with three nonclinical college student samples.²⁰ The following norms were proposed: normal (0–3); mild depression (4–7); mild to average depression (8–11); average depression (12–15); and severe depression (16–39). Cronbach's alpha from previous studies with Iranian samples ranged from 0.89 to 0.94.²⁰

Analysis of the data and information was performed with SPSS20 software. The methods used in descriptive statistics and inferential statistics have been used; in the discussion of descriptive statistics with the help of its methods, the mean and standard deviation of variables, frequency, and percentage of variables are mentioned. The covariance test was used in inferential statistics. Finally, they were tested using multivariate analysis of covariance (MANCOVA) and univariate analysis of variance (ANCOVA). But before that, the mean and standard deviation of the dependent variables in the two stages of pre-test and post-test have been calculated and reported. The significant level was set at 0.05.

Table 1. Summary of treatment sessions¹⁴

Meeting	Objectives and interventions
First session	Familiarity with members, presentation of session summaries, introduction to self-guidance, meditation practice, homework presentation
Second session	Practice meditation, analyze barriers to practice, teach the basics of mindfulness, continue practicing meditation and mindfulness
Third session	The practice of seeing and hearing, the practice of meditation and practice of breathing, mindfulness of the body
Fourth session	Recognize stress and people's responses to it, breathing exercises, body scan exercises, and mindfulness
Fifth session	Practice meditation, ensuring the body's mindfulness against stress
Sixth session	Continue practicing mindfulness and meditation against stress reactions
Seventh session	Practice four-dimensional meditation, teaching awareness of the present moment, practicing recognizing and accepting pleasant and unpleasant events
Eighth session	Summarize previous sessions

Results

The present study included 40 participants, all of whom were depressed adolescent girls and ranged in age from 13 to 16 years.

According to table 2, in addition to the mean and standard deviation, the dimensions of autobiographical memories (episodic and semantic) of the Shapiro-Wilk index are also shown in each of them. As can be seen, none of the Shapiro-Wilk indices are significant at the 0.05 level indicates that the distribution of scores of research variables in both pre-and post-test stages is normal. After confirming the assumptions of covariance analysis among the research data, analysis of covariance was performed to test the first hypothesis of the research. Investigation of the assumption of variance-covariance homogeneity by "M. Box" showed that the observed covariance matrices of the dependent variables are the same between the experimental and control groups. On the other hand, the result of the Bartlett sphericity test was significant at the level of 0.05, which indicates a sufficient correlation between the dependent variables. Therefore, MANCOVA is a suitable method for comparing the effects of independent variables in the present study.

Among the four statistics (Pillai's Trace, Wilks' Lambda, Hotelling's Trace, and Roy's Largest Root), the Wilkes Lambda test was selected to report the value of F. The results of multivariate analysis of covariance using Wilkes-Lambda statistic showed that the linear combination of autobiographical memories (Episodic and semantic) was significantly different in the experimental and control groups. The results showed that the value of (Wilkes Lambda=0.207, partial η^2 =0.79, Pvalue<0.001, (F=20.133 (25 and 4)) was significant at the level of 0.01.

As can be seen in table 3, the error variances of posttest variables in the two groups are not significantly different from each other. Therefore, the assumption of the equality of error variances in the two groups is also established among the post-test data.

Based on the results of table 4, the implementation of the independent variable at the significant level of 0.001 episodic memory dimension (Pvalue<0.001, F=12.430 (24 and 1)) semantic dimension (Pvalue<0.001, F=11.134 (24 and 1)) in adolescents with depression. Therefore, mindfulness-based cognitive therapy group training has been effective in improving episodic memory in adolescents with depression.

Table 2. Mean and standard deviation of episodic and semantic memory in pre- and post-test stages

Groups	Stages	Indices	Autobiographical memories	
			Episodic	Semantic
Experimental	Pre-test	Mean \pm SD	31.45 \pm 8.73	29.64 \pm 7.79
		Shapiro -Wilk	0.944	0.914
	Post-test	Mean \pm SD	39.31 \pm 8.44	28.29 \pm 7.80
		Shapiro -Wilk	0.937	.908
Control	Pre-test	Mean \pm SD	28.61 \pm 9.56	27.88 \pm 10.27
		Shapiro -Wilk	0.920	0.908
	Post-test	Mean \pm SD	39.21 \pm 8.95	28.30 \pm 10.72
		Shapiro -Wilk	0.948	0.927

Table 3. Leven test for equality of error variances

Variables	F	Df1	Df2	Pvalue
Episodic	2.176	1	38	0.143
Semantic	0.478	1	38	0.505

Table 4. Univariate analysis of covariance in comparing memory dimensions in experimental and control groups

Variables	Mean Square	Error df	Df	F	Pvalue	Partial η^2
Episodic	48.154	24	1	12.430	0.001	0.36
Semantic	26.690	24	1	11.134	0.002	0.34

Discussion

The current study was based on enhancing autobiographical memories data from adolescents with depression in receiving an 8-week MBCT during the COVID-19 Pandemic. Adolescents with larger increases in mindfulness showed significantly larger increases in episodic memory. Previous researches review the evidence for training programs that manipulate autobiographical processing in order to treat

mood, anxiety, and stress-related disorders. Studies showed the effects of the COVID-19 pandemic on the contents and organization of autobiographical memory.²¹⁻²⁴ Several psychological effects of the COVID-19 pandemic have been reported in adult samples in China.^{25,26}

A study conducted in Italy²⁷ found post-traumatic stress disorder-related psychological symptoms. Based on a recent research review, anxiety, depression, psychological stress, and

poor sleep are among the most common psychological effects associated with living with COVID-19.²⁸ According to Guessoum et al,²⁹ a recent review of adolescents' lockdown experiences for the COVID-19 pandemic talks about the link between the current pandemic and adolescents' anxiety, depression, and post-traumatic stress disorders. Additionally, they found that there is a dearth of data on adolescent mental health, which needs to be improved. As in other studies, emotional arousal results in attention being focused on prominent details rather than irrelevant ones, leading to the loss of relevant details.²⁴ According to Erk et al,³⁰ episodic memories are encoded in different ways depending on the emotional context in which they occur.

The regular practice of MBCT increases the thickness of the cortex in the areas of the somatosensory system, which is positively correlated with increased awareness of the body. It also leads individuals to accept the experience as impermanent, recognizing that neither the positive state nor the negative state are long-lasting and allowing them to realize that the effort exerted to achieve or hold on to a certain state of being is not only useless but can cause suffering.³¹ Depression may be treated effectively with mindfulness-based cognitive therapy (MBCT). It is not specifically targeted at memories, but rather at the enhancement of affective executive control over mental life (including autobiographical memories) through the practice of meditation skills that promote the ability to "step back" from painful (i.e., distressing) mental content. Emerging neurobiological evidence supports the psychological changes induced by MBCT.³²⁻³³

A mindfulness training program has been shown to increase key attention capacities, including orientation and alertness, which may explain why engaging in conscious work by increasing moment-to-moment attention and, in turn, episodic memory. It is better related.³⁴ In addition, mindfulness training led to more engagement with work (higher intrinsic motivation as well as less negative emotion), which to some extent mediated the effect of training on episodic memory. This mediating finding needs to be repeated because it was examined in only one study with a relatively small sample. However, it is consistent with research showing that mindfulness is associated with higher autonomy and less negative emotions and with research showing that intrinsic motivation can enhance episodic memory.³⁵

Episodic memory is a kind of reminder and review of memories in the mind that can sometimes annoy. However, in mindfulness therapy, people learn how to relate differently to their negative thoughts and feelings and focus on changing the content of their beliefs and beliefs. They also learn how to change their thoughts, habits, rumination, negative thoughts, and feelings, become aware of them and see their thoughts and feelings in a broader perspective, which means mindfulness has a significant effect on improving episodic memory.²¹

Several limitations were faced by the authors, including a lack of follow-ups to determine the effectiveness of the method. This study applied a purposeful method because of the special coronary conditions. However, other researchers can refer to psychology clinics to randomly select depressed

people. Another limitation is the lack of control over disturbing variables and consideration of demographic variables.

During the COVID-19, it is important to observe whether mindfulness-based cognitive training has an effect on autobiographical memories of people who are depressed since this identifies the underlying cause of depression. Therefore, this study can be the beginning of orienting therapeutic approaches towards improving executive functions and strengthening memory, and focusing on positive memories and emotions to reduce the rate of depression. This study suggests that therapists use this approach properly to reduce depression. It is hoped that useful strategies can reduce the underlying variables in the development and persistence of depression.

Acknowledgement

Informed consent was given electronically by all participants before the experiment. A study conducted in Ardabil was approved by the Islamic Azad university's ethics committee (IR.AZUA.REC.1400.021). The study followed all the guidelines and regulations.

Conflict of Interest

The authors declare that they have no conflict of interest.

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