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The Role of Education and Mindfulness in Predicting Working Memory Mediated by Emotional Intelligence in Hospitalized Children

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Abstract

Purpose: The present study aimed to investigate the role of training and mindfulness in predicting working memory mediated by emotional intelligence in hospitalized children.
Methods: This research is applied and has been conducted using a descriptive correlational method. The statistical population consists of children hospitalized in hospitals in Tehran. The sampling method was random and the sample size was estimated to be 384 people using the unlimited population formula. To collect data, the Daniman and Carpenter Working Memory Test (1980), Schering.s Emotional Intelligence Questionnaire, and Mindfulness Questionnaire (Bayer et al., 2004) were used. The validity of the questionnaire was confirmed by professors and Cronbach's alpha method was used to measure reliability. Descriptive and inferential statistics were used in data analysis.
Results: The results showed that training and mindfulness have a positive effect on improving working memory and emotional intelligence in hospitalized children. Emotional intelligence also has a positive effect on improving working memory in hospitalized children.
Conclusion: Mindfulness training and exercises by strengthening emotional intelligence can significantly help improve the working memory of hospitalized children.

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Introduction

In recent years, attention has increased to the role of psychological and cognitive factors in improving health status, especially in special situations such as hospitalization of children. One of the important aspects that can help the treatment process and improve the psychological and cognitive conditions of children is the concepts related to education and mindfulness (1). Mindfulness is the ability to focus and pay conscious attention to the present moment without judgment or evaluation. This concept includes a set of activities and exercises that help children pay attention to their feelings and thoughts and accept them without judgment or worry about the past or future (2). In other words, this skill can be effective in reducing anxiety and increasing concentration, and is a psychological method that emphasizes conscious and non-judgmental attention to the present moment. Mindfulness has been shown to significantly reduce anxiety, stress, and worry in children, while also improving cognitive functions such as working memory (3).

Working memory, as one of the important components of cognitive systems, refers to the ability to store and process information in the short term. Working memory is the ability to store and process information in the mind for a short period of time, which is very important in everyday tasks such as learning, decision-making, and problem solving (4). Working memory is described as a short-term cognitive system that allows information to be temporarily stored for simultaneous processing or near reference. Working memory refers to the ability of children to retain and

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process information, especially under stressful conditions. In fact, this ability plays a fundamental role in many everyday activities, including learning, decision-making, and problem-solving (5).

On the other hand, emotional intelligence, as an important factor in processing and managing emotions, can have a great impact on improving people's psychological and cognitive conditions. Emotional intelligence is a skill that allows its holder to control their emotions through self-awareness, improve them through self-regulation, understand their impact through empathy, and behave in a way that elevates their own and others' spirits through relationship management (6). Emotions, in addition to facilitating an individual's adaptation to the physical environment, also facilitate his adaptation to the social environment (7). Emotional intelligence refers to the ability to identify, understand, and manage one's own and others' emotions and, especially in stressful situations, can help individuals effectively face challenges (8). In this context, emotional intelligence can act as a mediating variable in the relationship between mindfulness training and working memory, because children who are able to better manage their emotions usually have a greater ability to focus and process information in stressful situations (9).

Soleimani-Davdeli et al. (2023) compared the effectiveness of mindfulness training and working memory on test anxiety in female junior high school students. The findings of the study showed that there is no difference between the effectiveness of mindfulness training and working memory on test anxiety in female junior high school students. Mindfulness and working memory training are separately effective on test anxiety in female first-year high school students in Bojnourd. The results showed that there is no difference between the effectiveness of mindfulness and working memory training on test anxiety. Therefore, it can be said that using these two training methods to reduce test anxiety can help counselors, psychologists, and other specialists (10).

Torabi Saein et al. (2022) conducted a study comparing the effects of life skills training and mindfulness-based stress reduction on the emotional intelligence of female students. The results showed that the average scores in the emotional intelligence variable and its components increased significantly in the mindfulness-based stress reduction training group compared to the life skills training group and in the life skills training group compared to the control group in the post-test. Overall, it can be concluded that mindfulness-based stress reduction training is more effective in increasing the emotional intelligence of female students than life skills training (11).

Gilani and Mirzazadeh (2021) conducted a study titled “Holding mindfulness sessions and measuring working memory capacity of students admitted to graduate schools.” The results suggest that enhanced attentional focus may be the key to unlocking skills that were until recently considered unchangeable. Finally, this study suggests that extensive practice on working memory capacity tests can be generalized to improve students' scores, IQ, and working memory capacity. These results could be used to screen students for admission to graduate programs, with a portion of the acceptance rate allocated to separate assessments of their cognitive ability throughout their education (12).

Shakib et al. (2020) conducted a study to examine the effect of mindfulness-based intervention on executive functions (sustained attention, processing speed, response inhibition, and working memory) in children with attention deficit/hyperactivity disorder. In this study, the components of executive functions in the experimental and control groups were examined and a hypothesis was designed in accordance with the research topic. After confirming the assumptions, the analysis of covariance statistical test was used to measure them. The Shapiro-Wilk test was used to examine the normality of the data distribution. According to the obtained significance levels, each of the research variables is greater than 0.05. The results showed that the mindfulness-based intervention improved sustained attention, processing speed, response inhibition, and working memory in the children of the experimental group. Therefore, mindfulness-based exercises seem essential as an appropriate treatment strategy, free of side effects, to improve executive functions in children with attention deficit/hyperactivity disorder (ADHD) (13).

Jha et al. (2022) presented a study titled “Effects of Mindfulness Training on Working Memory Performance in High-Demand Groups: A Multi-Study Investigation.” Working memory (WM) is critical for successful task performance and higher-order cognitive functions, such as planning and decision-making. Mindfulness training (MT) is also a potential method for enhancing cognitive resilience—the ability to maintain or recover cognitive capacities at risk of decline. US military groups were recruited from several military installations, and participants were assigned to receive MT or as active comparison participants or no training. Soldiers' performance on a delayed recognition working memory task was assessed with emotionally or neutral military-related distractors embedded before (T1) and after (T2) the MT interval. The findings support the hypothesis that MT protects soldiers' working memory performance relative to controls (14).

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Methods

The present study is a descriptive correlational study and is classified as applied research. The statistical population consists of children hospitalized in hospitals in Tehran. The sampling method was random and the sample size was estimated to be 384 people using the unlimited population formula. The following questionnaires were used to collect data and measure variables:

- Daniman and Carpenter Working Memory Test (1980): This test is a cognitive performance measurement task related to executive functions and was first introduced by Kirchner in (1958). In this test, the individual responds to a stimulus, such as a number, if it is similar to the stimulus before it. The presentation of stimuli and the individual's response are continuous until the number of stimuli, which in this case is one hundred, is exhausted. Since this task involves both the storage and manipulation of cognitive information, it is considered to be very suitable for measuring working memory performance. Reliability coefficients in the range of 0.54 to 0.84 showed high reliability of this test. The validity of this test is also very acceptable as an indicator of working memory performance (15).
- Emotional Intelligence Questionnaire: Schering Emotional Intelligence Test, which measures emotional intelligence, is based on the theory of emotional intelligence (Goleman, 1995). It was translated and standardized in Iran by Mansouri in 2001. This test has 33 questions related to the components of emotional intelligence, and each score is calculated separately. These components include: self-awareness, self-control, self-motivation, empathy, and social skills. The answers are in a 5-point ordinal format. In the present study, the first three components were examined and Cronbach's alpha coefficients for self-awareness, self-control, and self-motivation were calculated as 0.77, 0.74, and 0.78, respectively (16).
- Kentucky Mindfulness Skills Questionnaire: This questionnaire was developed by Bear, Smith and Allen (2004) and has 39 questions and includes four mindfulness components: observation, description without labels, action with awareness, and acceptance without judgment. Its internal consistency (alpha coefficient) was reported to be between 0.76 and 0.91 for four components by Beer et al. (2004). In Iranian norming, Dehghani et al. (2014) showed that this questionnaire has a good internal consistency (0.81 to 0.93) and the convergent validity of its components is between 0.67 and 0.78. The results of Bayer's (2003) psychometric analysis on participants showed that this questionnaire has high internal consistency (0.73) and the Cronbach's alpha coefficients of the observational, descriptive, focused, and accepting subscales are 0.91, 0.84, 0.83, and 0.87, respectively. Dehghan-Manshadi et al. (2012) reported the Cronbach's alpha characteristics of this questionnaire as 0.82 (17).

Descriptive statistics and inferential statistics were used to analyze the data.

Results

The research hypotheses are examined using the Pearson correlation coefficient.

Hypothesis (1): Mindfulness training has a positive effect on improving working memory in hospitalized children.

Given that both variables of this hypothesis (training and mindfulness and working memory improvement) are measured at the interval level and have a normal distribution, Pearson's correlation coefficient was used to examine this hypothesis, the output of which is shown in the table below:

Table 1. Output of the correlation coefficient for testing the relationship between training and mindfulness with working memory improvement

Variable	working memory improvement		
	r	P	Number
Education and mindfulness	0.675	0.000	384

As can be seen, there is a significant relationship between education and mindfulness with improving working memory in hospitalized children with a Pearson coefficient (r=0.675) and a significance level (p≤0.000). Therefore, hypothesis number 1 based on the intensity of the relationship; there is a positive and strong relationship between education and mindfulness with improving working memory in these children is confirmed.

Hypothesis number (2): Emotional intelligence has a positive effect on improving working memory in hospitalized children.

Given that both variables of this hypothesis (emotional intelligence and working memory improvement) are measured at an interval level and have a normal distribution, Pearson's correlation coefficient was used to examine this hypothesis, the output of which is shown in the table below:

Table 2. Correlation coefficient output for testing the relationship between emotional intelligence and working memory improvement

Variable	working memory improvement		
	r	P	Number
Emotional intelligence	0.322	0.009	384

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As can be seen, there is a significant relationship between emotional intelligence and the improvement of working memory in hospitalized children with a Pearson coefficient (r=0.322) and a significance level (p≤0.009). Therefore, hypothesis number 2 based on the intensity of the relationship; there is a positive and moderate relationship between emotional intelligence and the improvement of working memory in these children is confirmed.

Hypothesis number (3) Education and mindfulness have a positive effect on emotional intelligence in hospitalized children.

Given that both variables of this hypothesis (education and mindfulness and emotional intelligence) are measured at the interval level and have a normal distribution, the Pearson correlation coefficient was used to examine this hypothesis, the output of which is shown in the table below:

Table 3. Correlation coefficient output for testing the relationship between training and mindfulness with emotional intelligence

Variable	Emotional intelligence		
	r	P	Number
Education and mindfulness	0.392	0.001	384

As can be seen, there is a significant relationship between education and mindfulness and emotional intelligence in hospitalized children with a Pearson coefficient (r=0.392) and a significance level (p≤0.001). Therefore, hypothesis number 3 based on the intensity of the relationship; there is a positive and moderate relationship between education and mindfulness and emotional intelligence in these children is confirmed.

Discussion

This study was conducted to investigate the role of training and mindfulness in predicting working memory through the mediation of emotional intelligence in hospitalized children. The findings from testing the research hypotheses are presented as follows:

Hypothesis (1) Education and mindfulness have a positive effect on improving working memory in hospitalized children.

There is a strong positive relationship between education and mindfulness and improving working memory in hospitalized children, indicating that these factors can effectively strengthen working memory.

Hypothesis (2) Emotional intelligence has a positive effect on improving working memory in hospitalized children.

There is a positive and moderate relationship between emotional intelligence and improving working memory in hospitalized children, which means that emotional intelligence can have a positive effect on cognitive functions such as working memory.

Hypothesis (3) Mindfulness training has a positive effect on emotional intelligence in hospitalized children.

There is a positive and moderate relationship between mindfulness training and emotional intelligence, which indicates that mindfulness training can help improve working memory by strengthening emotional intelligence (16).

Conclusion

The first hypothesis showed that there is a strong positive relationship between mindfulness training and improving working memory in hospitalized children. This finding suggests that educational activities and mindfulness exercises can significantly help strengthen children's working memory. Training related to increasing attention and concentration, reducing stress and anxiety caused by hospitalization, and strengthening cognitive abilities can help improve children's working memory. Mindfulness is of particular importance as an effective method for improving attention and concentration, which can help reduce psychological stress and improve cognitive functions in stressful and anxiety-provoking conditions such as hospitalization (7).

The second hypothesis refers to a positive and moderate relationship between emotional intelligence and improving working memory. This finding indicates that emotional intelligence, especially the ability to understand and manage emotions, can play an important role in improving cognitive functions such as working memory. Children with higher emotional intelligence are better able to cope with the challenges of the hospital environment and use their cognitive resources better. Therefore, strengthening emotional intelligence in children can indirectly help improve their working memory and cognitive abilities (11).

The third hypothesis showed that there is a positive and moderate relationship between education, mindfulness, and emotional intelligence. This finding is evidence that mindfulness education and training can indirectly help improve working memory by strengthening emotional intelligence. In other words, children who benefit from effective education and mindfulness training usually have a greater ability to identify and manage their emotions. These skills not only help improve their mental state, but can also improve cognitive functions such as working memory.

This study shows that mindfulness training and exercises by strengthening emotional intelligence can significantly help improve the working memory of hospitalized children. Therefore, it is suggested that in support and treatment programs for hospitalized children, we pay special attention to training related to

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mindfulness and strengthening emotional intelligence. These measures can help improve the quality of life of children in hospital settings and facilitate their treatment process. The spatial limitation of the statistical population to children hospitalized in Tehran hospitals was one of the limitations of the study. For future research, it is suggested that a similar study be conducted in other statistical populations and different cities and its results be compared with the present study.

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Authors Contributions

The author contributed to the data analysis. Drafting, revising and approving the article, responsible for all aspects of this work.

Ethical Consideration

The research data and literature have not been copied from any worksauthor upon reasonable request.

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