The Role of Mindfulness on Problem Solving in Students

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Abstract

This study aimed to investigate the role of mindfulness on problem-solving styles of secondary school students of Garmsar. The statistical population of this research included all Senior high school students of Garmsar in the academic year 2022-2023. The sample comprised 341 students selected by random cluster sampling. The research instruments included a standard questionnaire on mindfulness (Bauer, 2006) and a questionnaire on problem-solving styles (Cassidy & Long, 1996). The data were analyzed by Lisrel and SPSS software. Considering the effect of the mediator variable, structural equation modeling was used for data analysis. The results showed that the five components of observation, description, action, awareness, non-judgment, and non-reaction affected the problem-solving styles (P<0.05). Based on the obtained results, mindfulness can influence problem-solving styles. Therefore, the results of this study can have important implications in the field of education and promote the problem solving in students.

Keywords: Mindfulness, Problem solving styles, Second secondary school, Students

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Introduction

Students, as an important group in society, need to present their capabilities. Some new variables such as mindfulness are investigated as effective factors in educational progress. Mindfulness is usually defined as a state of being aware of what is happening in the moment. In other words, mindfulness is a person's clear awareness of what happens inside and in interaction with the external environment in successive moments of perception. Also, mindfulness has been defined as maintaining a person's awareness of the current reality(Carpenter at al., 2019; Tseng et al., 2023). In fact, the concept of mindfulness is distinct from such terms as alertness, awareness, attention, and self-awareness, and it is considered as enhanced attention and awareness to current experiences or current reality(Behan, 2020; Conversano et al., 2020).

On the other hand, problem solving can be defined as recognizing and applying knowledge and skills that lead to the correct response of the learner to the situation or reaching the desired goal (Abdu & Schwarz, 2020; Fairley et al., 2021; Korkmaz et al., 2020). Dewey starts the problem-solving process by finding the factors that caused the problem (Haataja et al., 2021; Wu et al., 2021). Problem solving skill is the ability to solve

problems in practical situations and everyday life problems while problem solving style is a type of underlying thinking that a person adopts regarding problems (Chevalier at al., 2020; Haataja et al., 2021; Weisberg, 2019). Problem solving is a person's innovative cognitive-behavioral process by which the person wants to determine, discover or invent effective and adaptive coping strategies for everyday problems. In other words, problem solving is an important coping strategy that increases personal and social ability and progress and reduces stress and psychological problems(Saputo at al., 2019; Verawati at al., 2022).

Students' weakness in problem solving skills has always been one of the concerns of psychology(Liana et al., 2020; Putra et al., 2020). One of the important goals of modern education systems is to educate people who are able to easily overcome their problems in everyday life and in the social environment(Simamora & Saragih, 2019). These educational systems try to help people acquire the necessary knowledge, skills and attitudes to overcome problems (SELÇUK et al., 2007). Poor problem solving can lead to the spread of many problems(Christensen & Bicknell, 2022; Setiawan et al., 2020).

Nowadays, the prevalence of mental health problems has increased significantly. Research has shown that the depressed mood is 16.2% in students who were bullied once or twice a month, and an increase in depressed mood with rates of 26% and 3.37% was seen in students who were bullied once or more a week (Herborn et al., 2020; Khalid et al., 2020). Research also showed that those who are defeated by problems have little problem-solving skills(Sakina et al. 2022). People who do not have the ability to solve problems, as soon as they encounter an obstacle, show impulsive behavior, feel frustrated, and become aggressive (Brown et al., 2020; Salvi et al., 2020). Repetition of such situations may lead to the creation and emergence of maladaptive behaviors(Gao et al., 2020; Shure et al., 2022).

One of the treatment methods that has attracted a lot of attention in recent years is mindfulness or awareness of emotions (Baer, 2019; Zhu et al., 2021). Notably, mindfulness is a unique method in helping to provide innovative and needed answers to solve problems, because mindfulness requires non-judgmental awareness that is based on observing the present moment instead of relying on previous knowledge (Britton, 2019; Creswell et al., 2019; Gagne et al., 2022). Therefore, strengthening problem solving skills can prevent many injuries in people, especially teenagers.

Considering the importance of problem solving and the space for research on the effects of increasing the level of alertness or person's awareness of themselves and the environment (mindfulness) to solve problems

$$n = \frac{Nz^2_{\alpha/2}\,p(1-p)}{(N-1)d^2 + z^2_{\alpha/2}\,p(1-p)}$$

more effectively, as well as considering the results of related research, it was determined that adolescence is the best episode to measure and improve problem-solving skills and mindfulness training as they are an important capital in the country. Thus, with the hope to reduce challenging and violent behaviors, the main motivation of this research was to see whether mindfulness has an effective role on problem-solving styles of high school students in Garmsar.

Method

Design
This research adopted an applied and survey method.

Participants

To determine the minimum required sample size, Cochran's formula was used for the limited population. Based on this, the statistical sample size was obtained using Cochran's formula of 340.69, which was considered 341. Also, cluster random sampling method was used. The entry criteria included willingness to participate in the research, being in high school and living in Garmsar. Exclusion criteria included failure to participate in the full implementation of the protocol and failure to complete the questionnaire.

Instruments

Standard Mindfulness Questionnaire
Mindfulness scale is a 39-item scale developed by Bauer et al. (2006). This scale has five subscales including observation, action with awareness, non-judgmental to inner experience, description and non-reactivity. The subjects must express their agreement or disagreement with each of the statements on a 5-point Likert scale from 1 (never or very rarely) to 5 (often or always). The range of scores in this scale is 39-195. A total score is obtained from the sum of the scores of each subscale, which shows that the higher the score, the more the mindfulness. For the action questions with awareness and non-judgment, they were scored in the opposite way.

Standard Questionnaire of Problem-Solving Styles
In this research, the scale of problem-solving styles is the scores of Cassidy and Long (1996) questionnaire (PSS), which has 24 questions and six components (three adaptive or constructive problem-solving strategies and three non-adaptive or incompatible strategies). Constructive strategies include creativity (questions 9 to 12), trust in problem solving (questions 13 to 16) and

orientation strategy (questions 21 to 24). Incompatible strategies include helplessness factor (questions 1 to 4), restraint factor (questions 5 to 8) and avoidance strategy (questions 17 to 20). The questions of this scale are answered with yes/no options and (I don't know).The internal consistency of helplessness, inhibition, avoidance, trust, tendency and creativity factors include 0.86, 0.66, 0.71, 0.52 and 0.65 respectively. The results of Cronbach's alpha for the variables of this research and their sub-components are 97.97.

Findings

The demographic characteristics of the participants in this research, including their gender, educational level, and GPA of their last year of study are described in Table 1.

Table 1
Demographic Characteristics of the Samples in the Research

		F	Percentage
Gender	Son	191	56
	Dauther	150	44
Academic grade	10th grade	111	33
	11th grade	120	45
	12th grade	110	32
GPA of the last academic year	17 and over	85	25
	16.99-14	210	62
	Less than 14	46	13

In Table 2, the mean and standard deviation of the variables and the sub-group components of each variable have been examined.

Table 2
Mean and Standard Deviation of Research Variables

	Variables	M	SD
Mindfulness	Observation	3.22	0.57
	Description	3.17	0.54
	Aware actions	3.04	0.50
	Non-judgmental inner experience	3.22	0.61
	Non-reactivity	3.14	0.55
Problem solving	exploratory	3.36	0.58
	group	2.80	0.66
	experience	3.12	0.61
	structural	3.04	0.55
	observational	3.17	0.65
	Learning methods	3.33	0.66

As can be seen in Table 2, in the variable of mindfulness, the average of all components was higher than the average, i.e. a score of 3, and also in the variable

of problem-solving styles other than the group component, all the components were higher than the average, i.e. a score of 3. Also, Pearson correlation between two variable was 0.89 was reported (P<0.0001).

In order to assess the fit of the measurement model, convergent validity, Cronbach's alpha coefficients and composite reliability were used. Cronbach's alpha is a classic indicator for reliability analysis and shows a strong tradition in structural equations that provides an estimate for reliability based on the internal correlation of indicators, and Cronbach's alpha value higher than 0.7 is an acceptable indicator of reliability. Since Cronbach's alpha criterion is a traditional criterion for determining the reliability of structures, the PLS method uses a more modern criterion than alpha called composite reliability (CR). The superiority of composite reliability over Cronbach's alpha is that the reliability of the structures is not calculated in absolute terms, but according to the correlation of its structures with each other. It should be noted that for the calculation of composite reliability, indicators with higher factor loading are very important. The criterion value for the appropriateness of composite reliability is above 0.7.

In this research, both of these criteria were used in order to better measure the reliability. Convergent validity (AVE) is another criterion that is used to fit the measurement model in the structural equation modeling method. Convergent validity shows the degree of correlation of a structure with its indicators, the higher the correlation, the better the fit. According to the criteria of Fornell and Larcker, the AVE criterion (average variance extracted) is considered to measure the convergent validity, and the value of AVE above 0.5 shows the acceptable convergent validity.

Table 3
Cronbach's Alpha Criteria, Composite Reliability and Convergent Validity in Research Variables

Variables	Cronbach alpha	CR	AVE
Mindfulness	0.931	0.948	0.785
Problem solving styles	0.890	0.910	.651

As shown in Table 3, both hidden variables of the research have Cronbach's alpha value and composite reliability above 0.7, and the suitability of the reliability situation can be considered acceptable. Also, the convergent validity above 0.5 for the variables of both variables of the research shows the confirmation of the convergent validity of the variables of the current research.

Table 4
The Results of the Divergent Validity Test of Research Variables

Variables	Mindfulness	Problem solving styles
Mindfulness	0.886	
Problem solving styles	0.746	0.807

The value of correlation between the indicators and their related structures is higher than the correlation between them and other structures, which proves the appropriate divergent validity of the model. In other words, the root mean value of the extracted variance of the variables in the present study, which are placed in the houses in the main diameter of the matrix, is higher than the correlation value between them, which are arranged in the lower houses of the main diameter.

After checking the results, the divergent validity was also confirmed, so according to the obtained values, it can be concluded that the measurement model has a good fit.

After examining the fit of measurement models, it is time to fit the structural model of the research. In this research, three criteria of significance coefficient (T-values), determination coefficient (R^2) and predictive power coefficient (Q^2) were used. The first and the most basic criterion of fitting the structural model is its path coefficient and its significance. The value of significant coefficients must be equal to or greater than the significance index of 1.96. If the value of these numbers exceeds 1.96, it indicates the correctness of the relationship between the constructs and as a result, the research hypotheses are confirmed

Figure 1
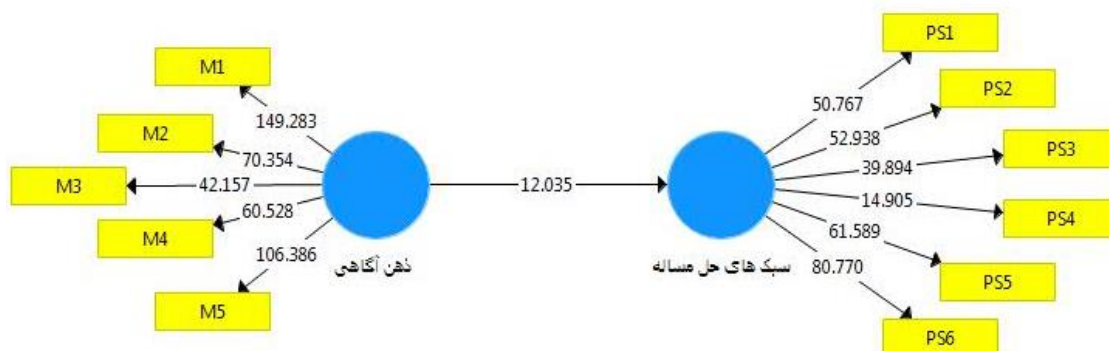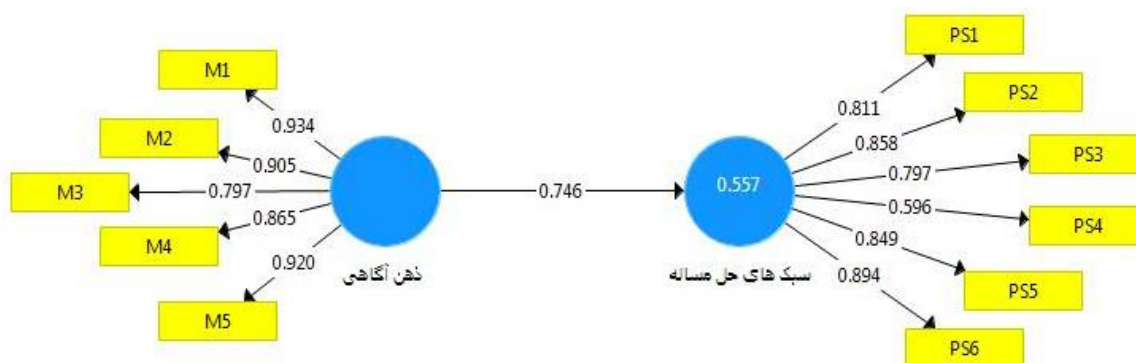*Structural Model Fitting Using Significant Coefficients (T-values)*

Figure 2
Structural Model Fit Using Path Coefficient and R2 Value

According to the results obtained from the significance coefficients (T-values) in Figure 1, it can be seen that the values (T-values) were greater than 1.96, hence it can be said that mindfulness has a significant effect on problem solving styles.

Also, after examining the path coefficient in Figure 2 and the effect of research variables, it was found that mindfulness has a positive and significant effect of 0.746 on problem solving styles.

R2 is a measure that shows the influence of an exogenous variable on an endogenous variable, and three values of 0.19, 0.33 and 0.67 are considered as criteria for weak, medium and strong values of R2 (Mohsenin & Esfidani, 2013). According to the research results, the value of R2 for the variable of problem solving styles has been calculated as 0.557, which shows that R2 for problem solving styles is at a strong level.

The Q2 criterion also determines the predictive power of the model, and if this criterion obtains three values of 0.02, 0.15, and 0.35 for an endogenous structure, it indicates the predictive power, respectively. Weak, medium and strong nose has its related exogenous variable (Mohsenin & Esfidani, 2013). The Q2 criterion for the variable of problem solving styles has been calculated as 0.333, which shows that Q2 for the variable of problem solving styles is indicative of a very strong predictive power.

Figure 3

Structural Model Using Path Coefficient and Significant Coefficients (T-values)
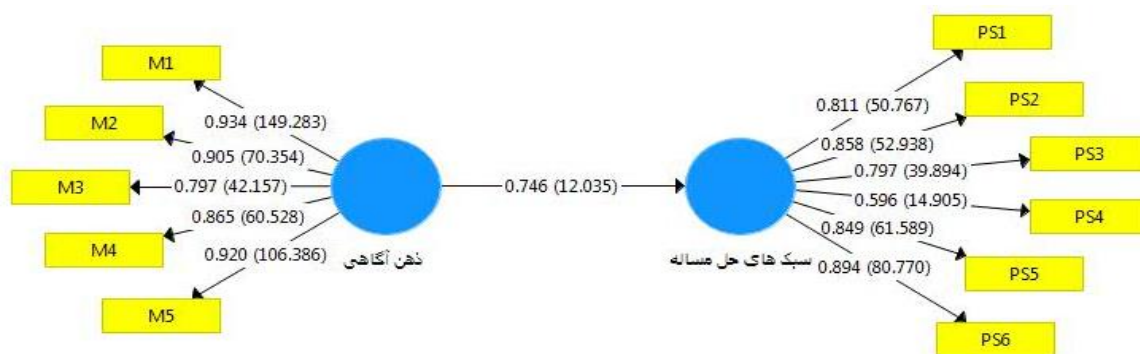
The results of the research model in Figure 3 show that according to the significance coefficient T obtained 12.035 and that this value is more than the confidence level of 1.96, it can be concluded that the variable of mindfulness and problem-solving styles had a significant and positive relationship, so mindfulness and problem-solving styles have a direct and significant relationship in the statistical population of this research. Therefore, this variable has the ability to predict changes in the variable of problem-solving styles. According to the results, with one-unit change in the variable of mindfulness, it changes by 0.746 units of the variable of problem-solving styles.

Discussion

The results showed that mindfulness had an effective role on problem-solving styles of high school students of Garmsar. The result obtained from this study is consistent with the results of previous research reporting that mindfulness increases the ability to solve problems (Abdu & Schwarz, 2020; Behan, 2020; Britton, 2019; Brown et al., 2020; Carpenter et al., 2019; Chevalier et al., 2020; Christensen & Bicknell, 2022; Conversano et al., 2020).

In explaining this hypothesis, it can be said that a person's vulnerability to problem solving is related to how much a person relies on only one aspect of the mind

and inadvertently stops other aspects. Their theory considers two main aspects of mindfulness, including doing and being(Gao et al., 2020). Paying money is also known as paying money. This aspect is very goal-oriented and is triggered when the mind sees a mismatch between what is and what is desired. The second aspect of the mind is the aspect of being, which is not focused on achieving a specific goal, but rather on accepting and allowing what is, without immediate pressure to change it (Fairley et al., 2021). The main component of this theoretical model is the metacognitive awareness of the conscious mind in problem solving. Metacognitive awareness means that a person can experience negative thoughts and feelings as events that are passing through the veil of the mind, instead of considering them as part of himself (Haataja et al., 2021).

When stressful life situations occur, people who have high metacognitive awareness can avoid depression and negative thinking patterns more easily and use better problem solving. Decentralization is also the ability to perceive thoughts and feelings as unstable and observable events in the mind(Creswell et al., 2019). Despite the fact that mindfulness is now known in the prestigious universities of the world as an efficient and unique method to recover damaged personalities and to heal and return the soul and mind to a normal state, it is an experiential, extremely simple and practical method that every person can easily experience it in their life

without needing special literacy and knowledge(Khalid et al., 2020).

In addition, since today's students are facing many problems in the field of problem solving, the prevailing opinion of educational and psychological experts is that to solve many of these existing problems, students need wise capabilities to be able to solve their problems and in an effective way and with a conscious mind.

Conclusion

many evidences show that a large number of students in today's schools have increasing problems in learning(Liana et al., 2020; Putra et al., 2020). These students need more effective strategies to deal with their problems in order to deal with the issues and challenges ahead (Sakinah et al., 2022). What actually improves the quality of learning of these students is encouraging them to learn mindfulness skills and use this method (Salvi et al., 2020). In this research, it was found that students who had mindfulness skills were able to overcome their emotions and use problem-oriented methods to solve their problems in the field of learning(Korkmaz et al., 2020).

This research also faced some limitations. This research was limited to the students of Garmsar in the academic year of 2022, so caution should be observed in generalizing the results to other students. Also, this research has only investigated the impact of mindfulness on problem solving styles with the mediating role of learning styles, and more variables may play a role in this outcome. Another limitation was related to students' unfamiliarity with the concept of conscious mind, which may have affected the process and accuracy of completing the questionnaires.

It is suggested that by doing mindful exercises, the level of students' engagement with uncomfortable thoughts be reduced; so that by reducing their mental preoccupation, they can establish a better relationship with their surroundings through more observation. Also, other possible influential variables should be used as mediating variables in future research. In the end, other evaluation methods should be used to measure the mentioned variables with students from other countries.

Conflicts of Interest

No conflicts of interest declared.

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