



Research Article

## Problem-Solving Styles Based on Cognitive, Emotional, and Spiritual Intelligence among Iranian Adults

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### Abstract

This study aimed to investigate the contribution of Cognitive, Emotional, and Spiritual intelligence (IQ, EQ, and SQ respectively) in explaining Problem-solving styles. To do this, 544 Iranian adults (14-80 years; 261 females and 283 males) participated in this study and were asked to answer the Problem-solving Questionnaire, Raven's Progressive Matrices IQ Test, Bradbury-Greaves' Emotional Intelligence Questionnaire, and the Spiritual Intelligence Questionnaire. Considering that the growth and formation of spiritual intelligence start in adolescence and will accompany a person until the end of his life, the sample of this research was selected from adolescence to adulthood. For data analysis, simultaneous multivariate regression was used, and the results showed that EQ (Emotional intelligence) and SQ (Spiritual intelligence) were able to significantly predict the adaptive Problem-solving style (including creative Problem solving, confidence, and approach), IQ, EQ, and SQ were able to predict substantially the non-adaptive Problem-solving style (including helplessness, control, and avoidance) each person seems to be more successful in solving some problems due to the extent to which he/she uses different intelligence.

**Keywords:** Cognitive intelligence; Emotional intelligence; Spiritual intelligence; problem-solving styles

### Introduction

Presently, experiencing various problems in daily activities is inevitable for any individual which requires effective problem-solving skills. Effective problem-solving has been correlated with increasing self-efficacy and hope ([Cam et al., 2020](#)), productive failure ([Sinha & Kapur, 2021](#)), promoting critical thinking ([Xu et al., 2023](#)), and managing emotions ([Jordan & Troth, 2004](#)). Problem-solving is defined as a method in which a person recognizes and resolves a gap between a current situation and a preferred goal, with the course to the goal blocked by identified or unidentified obstacles ([Ghodrati et al., 2014](#)). Based on [Gusau and Mohammad \(2020\)](#) problem-solving has five steps derived from the abbreviation IDEAL: 1) Identifying the problem, 2) Defining and representing the problem, 3) Exploring the solution to the problem, 4) Acting on the explored solution and 5) Looking back. Meyer and Wittrock (2006) believe that problem-solving is a cognitive process focused on a purpose, and the problem's complexity and difficulty depend on the person's current

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knowledge and skills. The key to solving the problem is applying previously learned knowledge and skills to new situations.

However, the performance of people in solving problems depends on the adoption of various Problem-solving styles ([Córdova et al., 2015](#)). Problem-solving styles refer to a person's preferred styles for planning, brainstorming, and preparing for action while facing problems and having flexibility ([Isaksen et al., 2011](#)). [Cassidy and Long \(1996\)](#) introduced six styles: creative problem-solving, confidence, approach, helplessness, control, and avoidance. These researchers define creative Problem-solving style as an indicator of planning and considering various solutions according to the problematic situation. They believe that a style of confidence indicates confidence in a person's ability to solve his /her problems, and the style of approach indicates a positive approach towards problems and a willingness to face them. In contrast, the style of helplessness indicates general helplessness in problematic situations. The control style reflects the internal-external control dimension in problematic situations, and the avoidance style indicates a tendency to deny and ignore problems instead of addressing them. The researchers note that adaptive practices are associated with constructs such as life satisfaction, positive emotion, personal well-being, development motivation, and social support, while non-adaptive practices are associated with the variables of anxiety, depression, frustration, hostility, and job stress. [Mohammadi and Sahebi \(2001\)](#) considered the first three styles as the adaptive problem-solving methods and the other three styles as the non-adaptive problem-solving methods. Since problem-solving is an extremely complex cognitive skill that requires higher levels of information processing than other cognitive processes such as concept formation, it represents one of the most intelligent human activities. Problem-solving causes attention, perception, memory, and other information-processing procedures to be stimulated in a coordinated way to achieve the goal ([Simon, 2007](#)). Therefore, intelligence is an essential factor for this skill. [Rowe \(2024\)](#) highlighted the overlap between intelligence and problem-solving and believed that they are intersecting branches of cognition. Therefore, intelligence influences problem-solving ability; conversely, problem-solving requires and reflects intelligence.

Intelligence is one of the early concepts in psychology that is as old as human existence and has engaged the minds of philosophers and scientists over time. Everyone has defined, interpreted, and analyzed intelligence from their point of view. Nevertheless, scientists have agreed on some principles that consider a particular ability as intelligence. For example, [Gardner \(2000\)](#) believed that the ability to be considered as intelligence competency, it should be based on the mental and intellectual capacities and be useful for adaptation to the environment that is adjusting to new situations, and the capacity to tolerate and cope with different situations. In the early stages, the traditional view of these criteria considered intelligence merely a cognitive ability. Today, thanks to the wide range of research and studies (both about mental and intellectual capacity and the range of issues and problems people face throughout life), psychologists have defined several domains of intelligence that are somewhat different from cognitive intelligence (IQ), but all of them are indicators of an individual's adaptation to society (Strenberg, 2021; [Setti et al., 2022](#); [Jimoh, 2007](#); [Animasahun, 2010](#)). One such concept is emotional intelligence. Emotional intelligence (EQ) is a comprehensive concept of capacities and skills that encompass the ability to receive and express emotion and understand and manage emotional information ([Mayer et al., 1999](#)). It helps a person recognize, utilize, comprehend, and manage emotions and emotional information and deal with environmental needs and pressures more effectively ([Singh et al., 2022](#)). Emotional intelligence is the ability to use emotions and manage them effectively, and it has a positive effect on relationships with others so far so many scholars consider it effective in achieving success and adaptation to the environment ([Goleman, 1996](#); [Singh et al., 2022](#)). However, the limitations of cognitive and emotional intelligence in explaining human performance in daily life, the expansion of research on the dimensions of human existence, and the addition of spiritual dimension to physical, psychological, and social dimensions in the scope of the World Health Organization ([Grad, 2002](#)) have all led to the emergence of a new type of intelligence in the literature of psychology known as spiritual intelligence (SQ). [Wolman \(2001\)](#) defines spiritual intelligence as the human capacity to ask ultimate questions about the meaning of life. He considers this type of intelligence to be more than a set of mental abilities and believes that it goes beyond all of the previously accepted criteria for intelligence. [Berman \(2001\)](#) argued that spiritual intelligence facilitates the dialogue between thought and emotion, and

soul and body, and can help people achieve transcendence more easily. [Zohar and Marshall \(2000\)](#) also consider spiritual intelligence as the ultimate form of intelligence that emerges after cognitive and emotional intelligence, combining logical and emotional processes to reconstruct or re-conceptualize one's experiences. This type of intelligence completes a person and helps its integrity and cohesion. [Emmons \(2000\)](#) defines spiritual intelligence as the consistent use of spiritual information to facilitate the solution of everyday problems and the achievement of goals. [Nasal \(2004\)](#) also stated that people use spiritual intelligence when they use their abilities and spiritual resources to make meaningful decisions, explore their existential problems, or try to solve their daily problems.

As it is clear from various definitions of different types of intelligence such as cognitive, emotional, and spiritual intelligence, intelligence has been used to solve issues and problems, and this feature is one of the essential criteria to consider ability as intelligence. Research evidence supports the role of multiple intelligences in solving complex daily life problems. For example, [Maker \(2016\)](#) as well as [Asgari and Poursharifi \(2016\)](#) highlighted the role of spiritual intelligence in managing daily life problems. [Sholehah et al. \(2022\)](#) as well as [Kim and Sohn \(2019\)](#) believed that Emotional intelligence is one of the factors that influence one's problem-solving abilities. [Rowe \(2024\)](#), and [Kyllonen et al. \(2017\)](#) also discussed the role of cognitive intelligence, especially fluid intelligence, in problem-solving.

Note that the types of the mentioned intelligence are not mutually exclusive and all individuals have a certain portion of all defined areas of intelligence that enable them to adapt to their environment. Life, on the other hand, presents a continuous chain of problems and conflicts that constantly impose pressure on individuals and require intervention. Therefore, perhaps examining the contribution of each type of intelligence in problem-solving and clarifying the role of each type of intelligence in explaining adaptive and non-adaptive Problem-solving styles would be significant in broadening our sights to the different types of intelligence, and creating a more comprehensive view of these intelligence. Therefore, this study aimed to investigate the predictive role of cognitive, emotional, and spiritual intelligence in a group of adults in predicting adaptive and non-adaptive Problem-solving styles.

## Method

This study is a descriptive correlation alone. The participants included 544 citizens of Arak in the 14-80 age range (261 females and 283 males) who were asked to answer the questionnaires. In the first step, 600 people were selected as the sample, and 544 remained due to the dropout of the sample. Since one of the variables of this research was spiritual intelligence, and the development and formation of this intelligence starts from adolescence and will be with the person until the end of his life, the sample was selected from people in adulthood. The sample group was selected based on Vaillant's life adaptation theory ([Beardslee & Vaillant, 2015](#)). Of course, due to the difficulty of sampling and the small number of samples collected from people over 50 years old, people of this age group were merged into one group. In this way, based on the geographical map of Arak City, which was divided into 5 regions, 2-4 main streets were selected from each region, and sampling was done from all the houses on those streets. The age distribution of the sample group based on Vaillant's theory was as follows: the first group: was 14-19 years (115 people), the second group: was 20-29 years (152 people), the third group: was 30-39 years (170 people), the fourth group: 40-49 years old (75 people) and the fifth group: 50 years and older (32 people).

## Instruments

The following instruments were used to collect data:

*Problem-Solving Questionnaire* ([Cassidy & Long, 1996](#))

This questionnaire includes 24 items in which every four questions represent a factor, and in total, it measures six factors helplessness, problem-solving control, creativity, confidence in problem-solving, avoidance, and approach. The helplessness, control, and avoidance subscales represent non-adaptive factors of problem-solving, and the other subscales represent adaptive factors of problem-solving. This scale is scored on three-option multiple-choice questions: yes (2), no (0), and to some extent (1). The sum of scores represents the total score of each of the six factors. Each factor with the highest score indicates that the

person uses that style while facing problems. [Gheyassi \(2015\)](#) reported the Cronbach's alpha coefficient for the questionnaire to be 0.74.

#### *Raven's Progressive Matrices IQ Test*

Adult versions of Raven's Progressive Matrices Test were used to assess cognitive intelligence. Pen Rose and Raven developed this test in 1937. The test is applicable both individually and in groups. It includes 60 black-and-white images, which are divided into 12 series with increasing difficulty, and its execution time is 45 minutes. The reliability of this test, using the retest method, was 0.91, and its validity was 0.73 in a sample of the Iranian population ([Rahmani, 2007](#)).

#### *Bradbury-Greaves' Emotional Intelligence Questionnaire*

[Bradbury-Greaves' Emotional Intelligence Questionnaire \(2005\)](#) includes 28 items divided into four subscales: self-awareness, self-management, social awareness, and relationship management. The questionnaire was scored using a 6-point scale from 1 to 6. The sum of the subjects' scores for each question constitutes the total score of the questionnaire. The reliability coefficients for the four skills that constitute emotional intelligence and the total scores for self-awareness, self-management, social awareness, relationship management, and total emotional intelligence scores were 0.73, 0.87, 0.78, 0.76, and 0.90, respectively. The convergent validity of this questionnaire, along with Bar-On's (1997) Emotional Intelligence Test was reported at 0.68. In another study, the reliability coefficient of this questionnaire for a group of 540 individuals was 0.83 ([Ganji et al., 2006](#)).

#### *Spiritual intelligence questionnaire (Sohrabi & Naseri, 2012)*

The spiritual intelligence questionnaire comprises 97 items and is designed based on the effect of culture on the concept of spirituality in Iranian society. This questionnaire measures four factors: transcendent self-awareness, spiritual experiences, patience, and forgiveness. The Likert scale was used to score the questions and each question includes four options usually (4), often (3), rarely (2), and never (1). The sum of the scores of all the questions shows the total score of spiritual intelligence, and the sum of the scores of the questions related to each factor gives a separate score for each factor. Higher scores indicate high spiritual intelligence. Cronbach's alpha coefficient for the whole questionnaire was 0.95, and for transcendent self-awareness, spiritual experiences, patience, and forgiveness were reported at 0.96, 0.90, 0.86, and 0.83, respectively. Construct validity was examined through the Varimax rotation method, and the four factors together determined 48.39% of the variance ([Sohrabi & Naseri, 2012](#)). The Simultaneous multiple regression method was used in SPSS software to analyze the data.

## Results

The descriptive data and correlation coefficients of the studied variables are presented in Table 1.

**Table 1.** Descriptive data and correlation coefficients among adaptive and non-adaptive problem-solving styles with IQ, EQ, and SQ

variable	Mean (SD)	correlation coefficients			
		IQ	SQ	EQ	non-adaptive
adaptive problem solving	16.24 (3.8)	0.049	0.345**	0.486**	-0.315**
non-adaptive problem solving	4.9 (3.48)	-0.161**	-0.10*	-0.296**	
EQ	109.6 (16.1)	0.108*	0.397**		
SQ	293.8 (28.17)	0.013			
IQ	42.6 (5.34)				

\* $p < 0.05$  \*\*  $p < 0.01$ , Note. Cognitive (IQ), Emotional (EQ), and Spiritual intelligence (SQ)

The simultaneous multiple regressions were used to predict the problem-solving style on emotional intelligence (EQ), spiritual intelligence (SQ), and cognitive intelligence (IQ). Before applying the regression,



its presumptions were tested; the Kolmogorov-Smirnov test data revealed that the distribution of most variables was normal at  $P < 0.01$ . An analysis of standard residuals revealed that the data contained no outliers. Tests to determine whether the data met the assumption of collinearity indicated that multicollinearity was not a concern (IQ Scores, Tolerance = .98, VIF = 1.01; SQ, Tolerance = .82, VIF = 1.21; EQ, Tolerance = .81, VIF = 1.22). The data satisfy the assumption of independent errors (Durbin-Watson value = 1.85). Accordingly, given the existence of these assumptions and the possibility of using regression, the results showed the multiple correlation coefficients of the emotional, spiritual, and cognitive intelligence variables in the adaptive and non-adaptive problem-solving style are 0.479 and 0.306 respectively. They predicted 24.7% of changes in adaptive and 9.4% of changes in the non-adaptive problem-solving style.

The results of the multivariate regression analysis for the adaptive problem-solving style ( $F = 58.34$ ,  $p < 0.0001$ ), and the non-adaptive style ( $F = 18.58$ ,  $p < 0.0001$ ) were significant. Therefore, it could be concluded that emotional, spiritual, and cognitive intelligence variables could predict adaptive and non-adaptive problem-solving styles. Table 2 shows the standard regression coefficients.

**Table 2.** Regression of Association between Problem-Solving Style and Three Types of Intelligence: IQ, EQ, and SQ

Variable	problem-solving style									
	adaptive					non-adaptive				
	$\beta$	SE	t	P	95%CI	$\beta$	SE	t	P	95%CI
EQ	0.39	0.01	9.95	0.0001	[0.077,0.12]	-0.268	0.011	-5.99	0.0001	[0.088,0.045]
SQ	0.19	0.005	4.58	0.0001	[0.016,0.038]	0.011	0.006	0.253	0.801	[-0.011,0.012]
IQ	0.007	0.027	0.199	0.824	[-0.054,0.057]	-0.135	0.028	-3.28	0.001	[-0.163,0.05]

According to Table 2, the effect of emotional intelligence on adaptive problem-solving style ( $\beta = 0.39$ ,  $p < 0.0001$ ) was positive and significant, and on non-adaptive style ( $\beta = -0.268$ ,  $p < 0.0001$ ) was negative and significant. The effect of spiritual intelligence on the adaptive problem-solving style ( $\beta = 0.19$ ,  $p < 0.0001$ ) was positive and significant, and on the non-adaptive style ( $\beta = 0.011$ ,  $p > 0.05$ ) was not statistically significant. The effect of cognitive intelligence on the adaptive problem-solving style ( $\beta = 0.007$ ,  $p > 0.05$ ) was not significant, but on the non-adaptive style ( $\beta = -0.135$ ,  $p < 0.001$ ) was negative and significant.

In the regression analysis conducted to assess the impact of the three intelligences on Problem-solving styles, age and gender were included as independent variables. The results indicated that neither age nor gender had a statistically significant effect.

Therefore, according to the results presented in Table 2, among the variables of spiritual, emotional, and cognitive intelligence, emotional and spiritual intelligence significantly predict the adaptive problem-solving style. However, the cognitive intelligence variable cannot predict the adaptive problem-solving style. In addition, emotional and cognitive intelligence significantly predict non-adaptive problem-solving style but spiritual intelligence is not able to predict this style of problem-solving.

## Discussion

The results of the present study revealed that emotional intelligence and spiritual intelligence had a significant and positive relationship with the adaptive problem-solving style. The relationship between cognitive intelligence and adaptive problem-solving style was not significant. All three types of intelligence had a significant negative relationship with the non-adaptive problem-solving styles. Moreover, the results of the multiple regression analysis revealed that all three variables of emotional, spiritual, and cognitive intelligence were able to significantly predict the adaptive problem-solving style and explain 24% of the variance of this variable. However, when considering the contribution of each predictor variable in the adaptive style prediction, the contribution of IQ in this prediction is not significant, and the standard regression coefficients for EQ and SQ are 0.39 and 0.19, respectively. On the other hand, all three variables of IQ, EQ, and SQ were able to significantly predict the non-adaptive problem-solving style and explain 9% of the variance of this variable. However, SQ alone did not play a significant role in predicting the non-adaptive style and the standard regression coefficients for EQ and IQ were -0.26 and -0.13, respectively.

The results of this study are in line with the results of previous studies, such as [Effendi et al. \(2016\)](#), [Marhani and Usman \(2021\)](#), [Haji et al. \(2013\)](#), [Suppiah Nachiappan and Veeran, \(2012\)](#), and [Animasahun \(2010\)](#). [Effendi et al. \(2016\)](#) investigated the relationship between Adversity Quotient (AQ) and dominant intelligence Quotients such as IQ, EQ, and SQ among students in polytechnics. AQ enables students to become more resilient toward the challenges in everyday life. These researchers showed a moderate positive correlation between IQ and EQ and IQ with SQ, but there was a very weak positive correlation between AQ and the IQ of polytechnic students in Malaysia. [Marhani and Usman \(2021\)](#) investigated whether there is an influence between emotional, intellectual, and Spiritual Intelligence on the Ethical Attitudes of Students and revealed that there is a significant positive effect of Emotional Intelligence (EQ) and Spiritual Intelligence (SQ) variables on students' ethical attitudes. However, intellectual intelligence (IQ) does not influence students' ethical attitudes. [Haji et al. \(2013\)](#) perused the relationship between Intelligence, emotional, and spiritual quotients and the quality of corporate managers and confirmed a significant positive direct relationship between the harmonies of Intelligence, emotional, and spiritual quotients to personal quality. [Suppiah Nachiappan and Veeran \(2012\)](#) described the importance of three types of intelligence in transforming themselves into ideal teachers. Their results showed that the combination of these three elements will ensure the success of a teacher to become a capable educator, not only in the classroom and the school environment but also wherever the teacher is being situated and interacting. [Animasahun \(2010\)](#) also stated that among the three intelligences, emotional intelligence is the most powerful factor in predicting adaptation, and spiritual and cognitive intelligence are in the next stages, respectively.

As mentioned previously, experts consider all the mentioned three intelligences to be important in adapting to the environment. Of course, the results of the discriminate effects of the three types of intelligence in explaining the adaptive problem-solving style demonstrated the powerful role of EQ and then SQ in this explanation, and the insignificance of the IQ portion. [Sternberg \(2021\)](#) considered cognitive intelligence as adaptive intelligence. He defines adaptive intelligence as intelligence whereby human beings promoting one's ability to survive and thrive in real-world environments. Perhaps because the purpose of problem-solving in the Problem-solving styles questionnaire is to solve social problems, interpersonal communication is important in it and issues related to survival are less mentioned in it, cognitive intelligence in which issues related to survival are more prominent (elements such as creative skills and analytical skills are discussed in it), has a lesser role in predicting constructive problem-solving style than emotional intelligence and spiritual intelligence. It should also be noted that IQ usually plays a major role in solving well-defined problems, such as mathematical problems, in which the goal is clearly stated. The information required to solve the problem is available and there is only one right solution to the problem. Although the problems that people face in the real world are mostly poorly defined problems, they are complex and have a variety of solutions. In addition, IQ (especially the IQ which was measured in this study through the Raven test) mainly expresses convergent thinking and helps in solving mathematical problems in which there is a correct answer. Solving social problems in everyday life, in which there may be several correct answers to the problem, requires more divergent thinking, and therefore IQ plays a lesser role in solving such problems.

Emotional intelligence also creates a positive attitude toward all aspects of life because it creates the ability to control others and protect and motivate oneself by strengthening the skills of managing positive and negative emotions ([Goleman, 1996](#)). Generally, it creates a positive attitude in all aspects of life and has a positive effect on relationships with others, and this is the basis for adaptation to different people and situations in life. In the field of spiritual intelligence, it is also mentioned that spiritual intelligence emphasizes independence, holism, questioning, and strengthening the ability to reorganize perception. Furthermore, learning from mistakes and failures increases the power to deal with the problems of everyday life and gives the person more ability to adapt. Emotional intelligence, which has the strongest contribution to predicting adaptive problem-solving styles, is defined as an ability that helps individuals recognize, understand, and manage their emotional information ([Goleman, 1996](#)) and includes three categories emotion evaluation, emotion regulation, and using emotions in problem-solving. Using emotions to solve problems involves flexible planning, creative thinking, refocusing, and motivation ([Jordan & Troth, 2004](#)). As can be seen, emotional intelligence in this model has social and emotional functions and can lead to improving one's

relationships with others and improving one's coping styles in problematic situations ([Fteiha, & Awwad, 2020](#)).

Regarding spiritual intelligence, despite emphasizing its role in adapting to the environment, researchers have emphasized its role in solving existential and philosophical problems and finding meaning and purpose in life activities and events ([Bhullar, 2015](#)). Another point to note is that since one of the steps to solve a problem is to identify and determine the problematic situation, having a level of intelligence (of all three types of cognitive, emotional, and spiritual intelligence) can help individuals avoid conflict in non-adaptive problem-solving styles by quickly identifying the situation. Again, because social issues are poorly defined regarding these styles, the contribution of emotional intelligence is more prominent than spiritual and cognitive intelligence.

Finally, note that human intelligence is very complex, and different types of intelligence in combination work better to explain the very essence of humans. All individuals make definite and, of course, heterogeneous contributions to all defined areas of intelligence, which is based on the principle of individual differences. Therefore, we can expect that even though their combination is the best predictor of adaptive and successful problem-solving strategies for people, each person is more successful in solving some problems than others due to the extent to which she/he uses different intelligence. It can be said in line with [Mishra and Pimpri \(2022\)](#) that "IQ is the intelligence that seeks to understand the "what", EQ is the intelligence that seeks to understand the "how", and SQ is the intelligence that seeks to understand the "why" of things.

Limitation: It should be mentioned that there were some limitations in this study, such as the use of the instrument of self-report to measure spiritual and emotional intelligence which may cause people to exaggerate their abilities. Perhaps this problem can be solved to some extent by taking help from others' judgments about people; another limitation is related to the nature of the descriptive nature of the design which makes difficult causal inferences from the findings.

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