Original Article



Predicting creative problem solving by students of medical sciences based on components of emotional Intelligence and cognitive-behavioral readiness for change

Fatemeh Shaterian Mohammadi

Assistant Professor of Azad University, Department of Psychology, Saveh Branch, Islamic Azad University, Saveh , Iran.

Correspondence: Fatemeh Shaterian Mohammadi. Assistant Professor of Azad University, Department of Psychology, Saveh Branch, Islamic Azad University, Saveh , Iran ABSTRACT

The present research intended to study the share of emotional intelligence and cognitive-behavioral readiness for change in predicting creative problem-solving. The statistical population included all students at the Faculty of Medical Sciences of Qom Islamic Azad University. Multi-stage cluster sampling was employed to select 200 students. Robitschek's Personal Growth Initiative Scale (PGIS) for measuring cognitive-behavioral readiness for change, Salovey's Trait Meta-Mood Scale (TMMS) for measuring emotional intelligence, and Basadur's Creative Problem Solving Profile (CPSP) were distributed among the students to be completed by them. The data obtained from the questionnaires were analyzed using a regression model. Results indicated that emotional intelligence and readiness for change (personal growth) predict CPSP. In relation to subscales, results of regression analysis revealed that two components related to "cognitive-behavioral readiness for change" (readiness for change and intentional behavior) together with two of the scales belonging to "emotional intelligence" (emotional clarity and emotional repair) significantly predict "creative problem solving" by students. Moreover, emotion management and cognitive-behavioral readiness for change can influence the ability to solve problems creatively.

Keywords: Creative problem solving, Emotional intelligence, Cognitive-behavioral readiness for change

Introduction

Problem-solving (finding solutions and achieving the desired goal) has attracted the interest of many psychological theorists. Thorndike's Trial and Error Theory, Dewey's theory of problem-solving, the Gestalt Theory, the Information Processing Model, and the Exploratory Methods of problem-solving are the most important theories that have been introduced in relation to this topic ^[1]. For the past three decades, researchers have attempted to prove that the creative process is more than merely developing solutions for a problem (problem-solving). Guilford had already studied (1950) the

Access this article online

Website: www.japer.in

E-ISSN: 2249-3379

How to cite this article: Fatemeh Shaterian Mohammadi, Predicting Creative Problem Solving by Students of Medical Sciences Based on Components of Emotional Intelligence and Cognitive-Behavioral Readiness for Change. J Adv Pharm Edu Res 2019;9(S2):99-103. Source of Support: Nil, Conflict of Interest: None declared. subject of problem identification in the creative process. However, researchers have recently paid special attention to the importance of problem identification. Kabanoff and Rossiter (1994) stated that problem preparation is more important than solving it. Creativity mainly influences problem identification and not problem-solving. Therefore, the great majority of researchers now consider creativity a process ^[2].

The discussion on the cognitive model of creative problemsolving started with Wallace ^[3] who introduced four stages in creative problem-solving: preparation, incubation, illumination, and verification. Parnes, Noller, and Biondi (1977) presented a five-stage process for creative problemsolving: fact finding, problem finding, idea finding, solution finding, and acceptance finding. Amabile (1988) also proposed a five-stage process for creative problem-solving that included presentation, preparation, generation, validation, and assessment. Other researchers have proposed different models ^[4], but the most famous and valid one is the Basadur Creative Problem Solving Profile (CPSP).

Maturity, vitality, and the tendency to change in people considerably influence all their dimensions of personality as well as the flourishing of their creative problem-solving

This is an open access journal, and articles are distributed under the terms of the Creative Commons Attribution-Non Commercial-ShareAlike 4.0 License, which allows others to remix, tweak, and build upon the work non-commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms. methods. Research suggests that attempts at personal growth are directly related to gratification and problem-solving ^[5]. Actions taken for personal growth are defined as active, volitional, and informed participation of the individual in the process of change. This construct includes cognitive components such as the awareness of how change happens and commitment to the process of growth. Moreover, it includes behavioral components (that is, goal-directed planning) for change ^[6]. In general, personal development is a subjective experience of change affecting behavior, thoughts and feelings. Such a change may develop as more control over the environment and/or greater flexibility in confronting obstacles and challenges. It can be experienced in future in various life experiences. For example, some believe that attending a conference may lead to personal development. On the other hand, personal growth can include involvement in a dynamic activity like playing the piano or taking long walks. There are people that may knowingly follow "working on themselves" to reach higher levels of these abilities, skills, and features. Obviously, when people live through a damaging or stressful experience, they often report their emotional experiences ^[7]. The emotion experienced from a negative event is often referred to as a powerful emotion, and the way the individual adapts to this emotion is called personal development. The important point is that such a growth is completely subjective. At present, research on personal development is based on subjective evaluations. Since there are no alternative methods for presenting reports on personal growth, personal development is in fact a reflection of real developmental changes [8].

Research has shown that there is a positive relationship between attempts at personal development and the indicators of positive performance. For example, people who try harder to achieve personal growth have an internal locus of control, are daring and goal-centered, and are healthier psychologically. Moreover, they are open to experience, enjoy self-confidence, and have a realistic attitude towards their failures and successes [6,9].

In most cases, psychologists pay attention to the cognitive aspects and problem-solving abilities of intelligence when they study it. However, many researchers in the past put relatively greater emphasis on the non-cognitive aspects of people compared to their cognitive aspects. Salovey and Meyer (1990) who had reviewed research conducted on the non-cognitive aspects of intelligence, used the expression "emotional intelligence" [10]. Emotional intelligence, or the meta-mood, is the ability to evaluate and the skill to control, regulate, and express emotions related to oneself and to others, and the utilization of emotion in solving problems. Emotional intelligence is another type of intelligence, including knowledge of one's own feelings and use of this knowledge in making suitable decisions in life. Emotional intelligence is the ability to desirably manage mood and mental status and to control impulses. It is a factor that creates motives and hopes when the individual fails to achieve the determined goals. Empathy is an awareness of the feelings of other people. Social skill is successfully getting along with people, controlling one's emotions in relation to others, and being able to encourage and guide them ^[11]. People with a high emotional intelligence are different from others in that they are more satisfied with their lives, enjoy the family environment, show empathy to those around them, and are usually organized, genial, motivated, and optimistic ^[12]. Emotional intelligence attracts interest because of its advantages such as enhancing the levels of self-confidence, flexibility, empathy, and compatibility with others, and influence on creative problem-solving ^[10].

Since no independent research has been conducted on a community of university students, the researcher intended to study the shares of emotional intelligence and readiness for change in predicting creative problem-solving in the students of medical sciences in order to answer the question whether the variables of steps taken for personal development and emotional intelligence are able to predict creative problemsolving.

Method

In this correlational study, all students at the Faculty of Medical Sciences of Qom Islamic Azad University, Iran, formed the statistical population. Using multistage clustering sampling, 220 students (a suitable number of subjects in a correlational study) were selected. Two-hundred filled questionnaires were used for statistical analysis after the elimination of incomplete ones. A stepwise multivariate regression analysis was performed for statistical analysis.

The instruments used in the research were as follows:

The Personal Growth initiative Scale (PGIS)

This scale was designed by Robitschek (1998) to study the extent of people's tendency for change and contains 16 questions. Its components include readiness for change, planfulness, using resources, and intentional behavior. This questionnaire is scored on a 5-point Likert scale. The calculated Cronbach's alpha for it is 0.75^[6]. In the study by Joshanloo and Ghaedi (2009), Cronbach's alpha for the entire questionnaire was 0.87.

The Trait Meta-Mood Scale (TMMS)

This is a self-report scale with two forms (30- and 48-item) for measuring emotional intelligence. The short form was used in the present study. It is scored on a 5-point Likert scale from zero (mostly disagree) to 4 (mostly agree). In three consecutive studies, Salovey et al. (2003) obtained desirable values of Cronbach's alpha for this scale's components: emotional attention (0.78, 0.82, and 0.88), emotional repair (0.86, 0.64, and 0.85), and emotional clarity (0.86, 0.88, and 0.74). Ramazani and Abdollahi (2006) reported 0.63, 0.79, and 0.59 as the values of Cronbach's alpha for emotional attention, emotional clarity, and emotional repair, respectively, and 0.76 as the value of Cronbach's alpha for the entire questionnaire.

The Creative Problem Solving Profile (CPSP)

This test includes 16 questions scored on a 5-point Likert scale (never, very rarely, sometimes, often, and very frequently) and can be administered singly or in groups. The minimum score is 16 and the maximum is 80. The reliability of the test shown using the test-retest method (r=0.762) and by Cronbach's alpha (0.884) was acceptable. Values for Cronbach's alpha found by omitting items also revealed that no item had to be omitted. The correlation between this test and Torrance Tests of Creative Thinking (with the subscales of flexibility [r=0.603, p<0.01], fluidity [r=0.596, p<0.01], and originality [r=0.464, p<0.01]) suggested that the concurrent validity of Basadur Creative Problem Solving Profile is acceptable ^[3].

Zare et al. (2014) in their research entitled "Validation and Factor Structure in Basadur Creative Problem Solving Profile" found that the test reliability (using the test-retest method) was r=0.762 and the value of Cronbach's alpha was 0.884. The correlation between this test and Torrance Tests of Creative Thinking (with the subscales of flexibility [0.603], fluidity [0.596], and originality [0.464]) indicated that the concurrent validity of this test was acceptable.

Findings

The descriptive findings related to the variables are presented in Table 1.

Table 1. The descriptive indicators related to cognitive-
behavioral readiness for change, emotional intelligence,

and	creative	prob	lem-so	lving
-----	----------	------	--------	-------

Subscales	Means	Standard deviation	Minimum	Maximum
Readiness for change	3.78	0.52	2.25	5
Planfulness	3.71	0.56	1.60	5
Using resources	3.23	0.76	1	5
Intentional behavior	3.96	0.56	2.25	5
Total	3.70	0.43	2.38	4.69
Emotional attention	33.63	5.9	12	48
Emotional clarity	34.27	4.57	20	48
Emotional repair	36.09	4.8	25	46
Creative problem solving	57.04	7.8	39	80

Analysis of the data and examining the

research hypothesis

The assumptions in regression analysis were first examined in order to investigate the research hypothesis:

Cognitive-behavioral readiness for change has a significant share in creative problem-solving.

The first assumption of the regression model was the normality of the criterion variable. To test this assumption, the Shapiro-Wilk test was used.

Table 2. Summary of the Shapiro-Wilk test (n=200)					
Variable	Test statistic	Significance level			
Creative problem-solving	0.988	0.07			

The table shows that the significance level of the distribution is higher than 0.05. Therefore, one can say that the data related to "creative problem-solving" follow a normal distribution.

The second assumption was the independence of error terms. This hypothesis was investigated using the Durbin-Watson statistic which turned out to be 1.78. As a general rule, independence of the observations is proved if the observed value for the Durbin-Watson statistic is in the 1.5-2.5 range.

The third assumption was the linearity of the relationship between the variables. To test this assumption, the diagram showing normal probability density (the observed normal probability density against the expected normal probability density) was used. This diagram indicated that the data were well located on the diameter. In other words, the assumption that the relationship between the creative problem-solving variable and the linear combination of the predictor variables is linear is accepted due to the lack of considerable skewness and kurtosis. The fourth assumption was collinearity. Zeroorder correlation coefficients were employed to study multicollinearity. There were significant correlations between most of the predictor variables (emotional intelligence and cognitive-behavioral readiness for change). However, the correlations were not strong enough to confrim the hypothesis of multicollinearity.

Stepwise regression was used to study the research hypothesis. Results of this test are given in Table 3.

Table 3. Summary of the regression test to investigate							
the shares	the shares of cognitive-behavioral readiness for change						
and en	and emotional intelligence in predicting creative						
		problem	n-solving	3			
	R	R ² change	β	SE	t	р	
	First step						
Readiness for change			0.194	0.3	2.7	0.01	
Planfulness	0.490	0.240	0.128	0.25	1.6	0.12	
Using resources			0.07	0.22	1.2	0.24	
Intentional behavior			0.157	0.280	2.2	0.03	
Second step							
Emotional attention			0.105	0.08	1.8	0.07	
Emotional clarity	0.0617	0.380	0.240	0.12	3.8	0.01	
Emotional repair			0.184	0.11	2.9	0.01	

Criterion variable: Creative problem-solving

Based on the information in the above table, only the components related to "cognitive-behavioral readiness for change" entered the regression model, and the multiple correlations between these four components and "creative problem solving" had the value of 0.49. In other words, the variables of "readiness for change," "planfulness," "using the resources," and "intentional behavior" explained about 24% of the changes related to "creative problem-solving" by the students of medical sciences (R^2 =0.24).

In the second step, when the components of "emotional intelligence" were added to the regression model, the value of R^2 increased to 0.38. This means that 38% of the variance related to "creative problem-solving" in the subjects was influenced by "cognitive-behavioral readiness for change" and "emotional intelligence." The share of the "emotional intelligence" scales was 14%.

Beta coefficients also indicate that the significance levels for four of the seven predictor variables (that is, "readiness for change," "intentional behavior," "emotional clarity," and "emotional repair") were lower than 0.05. In other words, the two components related to "cognitive-behavioral readiness for change" (readiness for change and intentional behavior) together with two of the scales related to "emotional intelligence" (emotional clarity and emotional repair) significantly predicted "creative problem-solving" in the students. Nevertheless, the variables "planfulness," "using the resources," and "emotional attention" lost their roles in predicting "creative problem-solving." Therefore, one can write the regression equation as follows:

 $Y = 0.194 X_1 + 0.157 X_2 + 0.240 X_3 + 0.184 X_4$

Here, X_1 , X_2 , X_3 , and X_4 stand for readiness for change, intentional behavior, emotional clarity, and emotional repair, respectively.

Based on the regression model above, an increase of one standard deviation (SD) in "readiness for change" and in "intentional behavior" in the students led to 0.194 and 0.157 SD of increase in their "creative problem-solving," respectively. Moreover, an increase of 1 SD in "emotional clarity" and "emotional repair" in the subjects led to 0.24 and 0.184 SD of increase in "creative problem-solving," respectively.

Discussion and Conclusions

The present research intended to determine the shares of emotional intelligence and readiness for change in predicting creative problem-solving. Results indicated that the components of emotional intelligence ("emotional clarity" and "emotional repair") and of cognitive-behavioral readiness for change ("readiness for change" and "intentional behavior") were well able to predict creative problem-solving by the students of medical sciences.

Like other psychological phenomena, creative problem-solving is formulated by the macro culture of the society. Therefore, the cultural requirements of society for facilitating or inhibiting creativity can be influential in the formation and emergence of creativity. Consequently, it deals with educational experiences similar to those of subjects in various educational contexts with regard to how promoting creativity and the nature of the mentioned fields prepare the ground for the emergence of artistic and scientific creativity.

Research on the relationship between emotional intelligence and individual creativity by Salovey and Meyer [13] and by Bar-On and Parker (2000) showed that there is little evidence supporting this relationship. Moreover, results of the present study are not in agreement with those of the research by Higgs and Hender (2004). They attempted to find a relationship between features of creative managers and emotional intelligence. Results of their research revealed that there was no significant relationship between these two variables. However, results of the present research are consistent with those of the study by Batastini (2001) entitled "The Relationship between Emotional Intelligence, Creativity, and Leadership in Students," demonstrating the existence of a significant relationship between emotional intelligence and creativity. Furthermore, Petrides, Fredrickson, and Furnham ^[14] investigated the correlation between emotional intelligence, cognitive ability, and academic achievement in grade-11 students. They noticed that emotional intelligence influenced academic achievement and other cognitive abilities. Based on the few studies conducted in this area, one can claim that the components of emotional intelligence are one of the methods for accelerating the growth of creativity ^[13] and that emotions play an important role in facilitating creativity. Creativity is associated with imagination and thought, and when a person interacts with ideas, people, and the environment, this interaction leads to new significant relationships and outcomes [15]

Readiness for change (taking steps for personal growth) causes people to exhibit more flexibility and establish better relationships with others and, as Averill (1999) said, these flexible behaviors result in creative problem-solving and a better understanding of the conditions ^[16]. Many people are likely to be afraid of changes or avoid making them. They may become anxious, excited, or afraid and search for stability and predictability in their environment to control such feelings. People with chronic anxiety or excitement often develop a behavioral pattern that is characterized by great inflexibility. If such people want to become creative, they must let go of their inflexibility. In fact, taking steps for personal growth allows people to experience greater peace and be able to classify received information more extensively and with greater variety.

According to Averill's (1999) view, experiencing an emotion and a combination of contradictory emotions in presenting a dignified and suitable emotional response, without being accompanied by problem solution, can be considered a creative emotional response. It seems that attempts at understanding emotions and at expressing them deeply and truthfully, valuation of one's emotions and feelings and of attention and impact of one's and others' emotional responses can somehow be related to emotional self-awareness, self-esteem, and expression of one's feelings and opinions (which is one of the subscales of intrapersonal skill). In addition, these abilities and skills can be associated with the ability of the individual to adapt to situations. This finding is in agreement with the theoretical discussion of Averill, Thomas, and Noller (1991) on the role readiness and emotional awareness play in presenting effective and efficient responses to new situations and in coping with new conditions. According to Averill (1999), expressing emotions creatively to satisfy intrapersonal needs and adapting to situations at the highest level require changes in beliefs and rules that shape emotions. According to social constructivism, this creative expression is influenced by the social and cultural texture of the society. Therefore, considering the relative dominance that the culture of collectivism has in Iran, people do not often express their emotions and feelings, do not assert themselves in new ways and, in a way, consider adjustment and adaptation synonymous with conformity to rules and norms acceptable to the society.

References

- Zare, H., & Forouzandeh, L. (2011). Creativity, problemsolving, and strategic thinking (2nd ed.). Tehran, Iran: Payame Noor University Publication.
- Murdock, M. C. & Puccio, G. J. (1993). A contextual organizer for conducting creativity research. Nurturing and developing creativity: The emergence of a discipline .Ablex, Norwood, NJ.
- Basadur, M. S. (1998). The Basadur Simplex creative problem-solving profile inventory:Development, reliability and validity, Management of Innovation and New Technology Research Centre, Hamilton, Ontario: McMaster University
- Sternberg, R. J. (1997). Successful intelligence: How practical and creative intelligence determine success in life. New York: Simon & Schuster.
- Moradi, M., Jafari. E.,& Abedi, M. (2005). Happiness and Personality: A Review Study. *Advances in Cognitive Science*, 7 (2),60-71.

- Robitschek, C. (1998). Personal growth initiative: The construct and its measure. *Measurement and Evaluation in Counseling and Development*, 30, 183-198
- Kleim, B., & Ehlers, A. (2009)Evidence for a curvilinear relationship between posttraumatic growth and posttrauma depression and PTSD in assault survivors. *Journal of Traumatic Stress*, 22(1), 45-52.
- Park, C.L., Cohen, L. H., & Murch, R.L.(1996). Assessment and Prediction of Stress-Related Growth. Journal of personality. 64(1), 71-105.
- Robitschek, C., & Kashubeck, S. (1999). A structural model of parental alcoholism, family functioning, and psychological health: The mediating effects of hardiness and personal growth orientation. *Journal of Counseling Psychology*, 46, 159-172.
- Cherniss, C. (2000). Emotional intelligence: what it is and why it matters Paper presented at the Annual Meeting of the Society for Industrial and Organizational Psychology, New Orleans, LA.
- Goleman, D.(1998). Emotional Intelligence: Why It Can Matter More Than IQ, New York: Bantam Publishers.
- Meyer, J. D., & Salovey, P. (1997) 'What is emotional intelligence?' In P. Salovey & D. Sluyter (Eds.), Emotional development and emotional intelligence: Educational implications, New York: Basic Books.
- Higgs., M., & Hender, J. (2004). Characteristics of Creative Managers. *Journal of General Management*. 29, (4),1-20.
- Besharat, M. A., Shalchi, B., & Shamsipour, H. (2006). Study of the relationship between emotional intelligence and academic achievement. *The Quarterly Journal of New Thoughts on Education*, 2(3, 4), 73-84.
- Zika, S. & Chamberlain, K. (1992) . On the Relation Meaning in Life and Psychological Well-Being. *British Journal* of *Psychology*, 83, 133-145.
- Averill, J., R. (1999). Individual differences in emotional creativity: Structure and correlates. *Journal of personality*, 67(2), 331-371.