Original Research

Investigating the Predictive Contribution of Cognitive Flexibility on Self-Satisfaction with the Mediation of Emotional Irritability in Patients with Coronary Artery Disease

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Abstract

Background: The purpose of the present study was to investigate the predictive contribution of cognitive flexibility on self-satisfaction with the mediation of emotional irritability in patients with Coronary artery disease in Isfahan city.

Methods: This research was a correlation research. The statistical population of the present study included patients with Coronary artery disease in Isfahan city. For this purpose, 150 men and women with Coronary artery disease with at least a diploma education were selected from Sina Hospital in Isfahan, as available sampling. The obtained data were analyzed using SPSS version 24 software by correlation matrix method, multiple regression analysis by simultaneous method and path analysis by hierarchical method.

Results: The findings showed that there is a significant relationship between the mediating role of emotional irritability in predicting self-satisfaction based on cognitive flexibility with an effect size of -0.422. Based on the results, it can be said that patients who have high cognitive flexibility will increase their self-satisfaction and vice versa, and in this regard, emotional irritability can play the role of a mediator.

Conclusion: It should be noted that cognitive flexibility is one of the dimensions of executive functions, which refers to the ability to change actions and thoughts according to an environmental demand. In fact, when a person uses cognitive strategies to change behavior and adapt to the environment, he benefits from flexible cognition.

Keywords: Coronary artery disease, Cognitive flexibility, Emotional irritability, Self-satisfaction.

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Introduction

The interaction between body and mind has been of interest since ancient times. Today, this interaction is known both in the emergence and development of various diseases. One of these interactions, which has long been known in different cultures, is the mutual reaction of the heart and mind. Today, heart diseases, especially coronary artery disease, which is one of the main causes of death in most countries of the world, accounts for more than 50% of heart deaths. The prevalence of cardiovascular disease is increasing rapidly among developing countries, and it is expected that this disease will be the main cause of death in the coming decades. Research in Iran shows that the rate of coronary artery disease has increased between 20 and 45 percent in recent years (1).

One of the factors that can protect against heart diseases such as coronary artery disease is cognitive flexibility. Cognitive flexibility refers to the ability of people to focus on the current situation and use the opportunities of that situation to take steps in line with the goals and internal values despite the presence of challenging or unwanted psychological events (2). Cognitive flexibility is a diagnostic construct in which it is believed that people have the ability to develop recognition skills and adapt to various demands, change their thinking and behaviors during individual and social experiences, and maintain in important areas of life and learning and they are aware of behaviors that match their values and are committed to them (3). The results of various researches show the low cognitive flexibility of heart patients compared to normal people (4). Cognitive flexibility is described as a basic set of processes that help patients manage stressful factors and engage in adaptive behaviors that promote performance-oriented (5). According to the mentioned research, it can be said that the existence of low levels of cognitive flexibility can have an effect on the occurrence of coronary artery disease. Due to the fact that several factors are known in the etiology of physical diseases, and the presence of psychological factors is also clearly visible in previous researches, investigating the psychological causes of physical diseases, especially coronary artery disease it can be important to better understand the psychological factors involved in this disease.

The evaluation of knowledge that people have about themselves and their lives is called self-satisfaction (6). The concept of self-satisfaction is a mental image of a person's well-being that a person can adapt well to different life conditions. Also, having this type of mental image leads to the well-being of a person, which is compatible with a great sense of happiness (7). Self-satisfaction has a close but complicated relationship with values, and people's criteria based on which they evaluate their own understanding of happiness are different. Self-satisfaction is one of the concepts that has attracted the attention of many psychologists and researchers in the last few decades. But in terms of historical antiquity, this issue is also visible in the discussions that scholars and philosophers have had in the past. Self-satisfaction can be considered as the amount of value we place on ourselves. Most of the experts consider self-satisfaction as the main factor in social-emotional adjustment. Social-emotional adequacy resulting from such positive self-knowledge can be a force that helps people to avoid serious problems in the future. Evidence of this claim can be seen in the diagnostic and statistical manual of mental diseases whose criteria are used in most psychiatric diagnoses. Poor self-satisfaction is considered as a characteristic of many childhood diseases (8). Self-satisfaction is related to quality of life. "Brief Culture of Sociology" defines "social satisfaction" as "a set of perceptions and evaluations of a person about the conditions of his social life and the quality of his life that is generalized in his mind". Self-satisfaction is a subjective assessment of self, environment and quality of life. It is worth mentioning that self-satisfaction and fulfillment is affected by the totality of objective and subjective factors (9). It seems that people's psychological

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characteristics have a significant relationship with people's request and satisfaction. Therefore, we decided to evaluate this relationship.

Emotional irritability includes the level of a person's response to strategies, sometimes unconsciously, which are used to increase, maintain or decrease the emotional, behavioral and cognitive components of a situation. The inability to regulate emotions causes the endocrine glands and the autonomic nervous system to become more active and lead to psychosomatic diseases or physical symptoms. Part of the reflex receptors of the spinal cord are regulated by emotions, so it is obvious that pleasant emotions can inhibit the receptors and reduce pain intensity. Physical symptoms and unpleasant emotions lead to an increase in the activity of this receptor and an increase in the intensity of the physical symptoms of pain (10). Based on the findings of Matthews et al. (2021) (11), individuals' decisions about how to regulate their emotions are determined by factors related to the individual regulating, the emotion being regulated, and both the immediate situation and the broader social context. According to McRae & Gross (2020) (12), emotion regulation is needed when people feel the need to use strategies against inconsistencies between their emotional state and their realities. Cognitive emotion regulation is the ability to balance limbic emotions with unconscious management. (13).

Emotional stimulation deals with new search, risk taking and unusual activities and is a personality trait. The pleasure of these people is in activities that involve physical and psychological risks. In these people, unusual work that they have very little information about and that brings maximum stimulation and excitement to them, is shown a lot of welcome and interest. They like to increase their heart rate and make bigger bets to make their heart rate faster. But at the same time, their risk-taking in various other fields, such as anti-social behavior, is revealed. Everyday life is full of efforts to control emotions, and a lot of research examines the strategies that people use and how effective these strategies are.

Cognitive flexibility is one of the most effective and studied strategies of emotion regulation that humans have. The relationship between emotional irritability and flexibility is mentioned in earlier studies, and these studies indicate a negative relationship between cognitive flexibility and high emotional irritability (14). Accordingly, it is assumed that Coronary artery patients may have experienced high emotional irritability in the past, which has reduced their cognitive flexibility levels. Research shows that long-term negative emotions inhibition leads to increased sympathetic activity of the cardiovascular system (15).

Salehi et al. (1401) in a study modeling the cognitive flexibility and self -distinction with successful marriage: The intermediary role of cognitive regulatory excitement. They found that cognitive flexibility makes people have compatible coping styles against negative events. People with high cognitive flexibility can consider difficult situations as controllable situations and are capable of justifying several options in the face of people's events and behavior and in these situations they can think of alternative solutions. Therefore, their capacity to adapt and tackle stress and difficulties of life increases. The cognitive regulation of emotion is used to manage emotions to enhance adaptation and adaptation and enables us to respond to different life challenges with greater flexibility (16). Klune et al. (2021) in a study examined the maturity of the front cortex maturity of the middle brain by regulating the growth of emotional memory and cognitive flexibility. They found that the front of the middle brain (MPFC) and its extensive relationships with other areas of the brain play a key role in memory, cognition, decision -making, social behaviors and mood. MPFC dysfunction is involved in psychiatric disorders in which these behaviors are incorrect. Long -term MPFC maturity is likely to enable complex behaviors, but also increases their vulnerability to disorder. They also focused on emotional memory and cognitive flexibility,

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highlighting a new task that lies MPFC circuit disorder to changes in these behaviors in disease models (17). Shabahang et al. (1) examined the role of cognitive flexibility and emotional regulation problems in predicting the worship of celebrities and students. According to the results of the research, by applying programs and interventions to increase cognitive flexibility and the ability to regulate emotional, the worship of celebrities who are associated with many physical and psychological disorders and negative social and cultural consequences can be reduced (18).

Other requirements for cardiac coronary patients, in addition to pharmaceutical therapies, are to provide their psychological needs and maintain their mental health, which is not done unless extensive research has been conducted on various psychological issues in this field. Improving the mental health levels of Coronary artery patients, along with a variety of pharmaceutical therapies, requires widespread research on different issues and subjects and variables; therefore, according to the studies in this field, no research background has been found in this field. And also due to the increased prevalence of cardiac disease and the importance that the effect of this disease has on all aspects of the lives of people and aims to determine the contribution of cognitive flexibility to self -satisfaction with Emotional Irritability in cardiac coronary patients And the need to investigate the present issue, to help improve and improve mental health in coronary cardiac patients, has been conducted.

Methods

The present study is one of the correlational research that uses structural equations. The study in this study includes all Coronary artery patients referred to Sina Hospital in Isfahan, from September 1, 2019 to the end of December 30, 2019. The sample size is 150 people, which was determined using Morgan's table. Available sampling method has been used in this research. After entering Sina Hospital in Isfahan city, 150 people who were eligible were selected by available and voluntary method. The entry criteria included receiving a diagnosis of Coronary artery disease by a specialist doctor, willingness to participate in the research and having at least a diploma education. The criteria for withdrawing from the research are: declaration of non-satisfaction to continue cooperation and failure to complete the questionnaires.

In this research, the collected data has been analyzed with SPSS software version 24, which is descriptive (mean and standard deviation) and inferential (correlation matrix, multiple regression analysis using simultaneous method and path analysis using Hierarchy) was investigated.

Results

In the current research, the findings of the collected research data are presented. The raw data obtained from the statistical population is analyzed using appropriate statistical techniques and SPSS software, and after processing, it is presented in the form of information. Descriptive statistical techniques have been used to investigate the demographic characteristics of the society. Data normality was tested using the Kolmogorov-Smirnov test. In order to test the hypotheses, the relationship between the variables was investigated using the correlation test, and finally, with multiple regression and path analysis, their impact was calculated.

Based on the data in Table 1, the average scores of cognitive flexibility variable is 87.47, emotional irritability variable is 45.66, and self-satisfaction variable is 51.55.

According to the results of the Kolmogorov-Smirnov test, the significance value of none of the variables is smaller than the error level (0.05). Therefore, the null hypothesis is rejected and the data distribution is generally normal. As a result, parametric tests are used to measure variables.

According to the results of the correlation test, it can be seen that:

1. The correlation coefficient between cognitive flexibility and emotional irritability is equal to -0.493. A significant value equal to 0.001 has been calculated, which is smaller than the error level of 0.05.

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Therefore, the observed correlation is significant. In other words, it can be said that there is a negative and significant relationship between cognitive flexibility and emotional irritability.

2. The correlation coefficient between cognitive flexibility and self-satisfaction is 0.503. A significant value equal to 0.001 has been calculated, which is smaller than the error level of 0.05. Therefore, the observed correlation is significant. In other words, it can be said that there is a positive and significant relationship between cognitive flexibility and self-satisfaction.

3. The correlation coefficient between self-satisfaction and emotional irritability is 0.600. A significant value equal to 0.001 has been calculated, which is smaller than the error level of 0.05. Therefore, the observed correlation is significant.

In other words, it can be said that there is a negative and significant relationship between self-satisfaction and emotional irritability.

After determining the existence of a relationship between variables, we use regression to calculate the impact of independent variables on dependent variables.

Impact rate

Multiple regression:

The results of the regression model to check the main hypothesis are as follows:

In Table 4, the value of R^2 (coefficient of determination) shows how much of the dependent variable can be explained by the independent variables. It is observed that the independent variable of cognitive flexibility can explain about 40.1% of the changes of the dependent variable of emotional irritability.

According to Table 5, it can be seen that in the model, the significance value of the F statistic is 0.001, which is smaller than the error level of 0.05, so the linearity of the relationship between the variables is accepted and the regression results can be cited.

In Table 6, the beta coefficient is the standardized value of the coefficients that shows the amount of change in the dependent variable for a change of one standard deviation in the variable, the larger the absolute value, the stronger the relationship between the dependent variable and the independent variable. (Momeni, 2012).

Main hypothesis: There is a significant relationship between the predictive contribution of cognitive flexibility on self-satisfaction with the mediation of emotional irritability in Coronary artery patients.

1. It can be seen in Table 6 that the coefficient of influence of the independent variable of cognitive flexibility on the dependent variable of emotional irritability is calculated as -0.422. And the t-test statistic is also 4.60, which is greater than the critical value of t at the 5% error level, i.e. 1.96, which shows that the observed beta coefficient is significant. And the significance value of 0.001 is smaller than the error level of 0.05, which shows the significance of the coefficient. Therefore, it can be said with a probability of 95% that cognitive flexibility has a negative and significant effect on emotional irritability.

Path analysis:

The following approach is to calculate the amount of total effect:

Therefore, in general, we can conclude: there is a significant relationship between the role of emotional irritability in predicting self-satisfaction based on cognitive flexibility, and the main hypothesis is confirmed.

Sub-hypotheses:

There is a significant relationship between cognitive flexibility and self-satisfaction in Coronary artery patients.

As seen in Table 6, the correlation coefficient between cognitive flexibility and self-satisfaction was 0.503. A significant value equal to 0.001 has been calculated, which is smaller than the error level of 0.05. Therefore, the observed correlation is significant. In other words, it can be said that there is a positive and significant relationship between cognitive flexibility and self-satisfaction. In other words, by increasing the amount of cognitive flexibility; The level of self-satisfaction will also increase.

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There is a significant relationship between cognitive flexibility and emotional irritability in Coronary artery patients.

As seen in Table 6, the correlation coefficient between cognitive flexibility and emotional irritability is equal to -0.493. A significant value equal to 0.001 has been calculated, which is smaller than the error level of 0.05. Therefore, the observed correlation is significant. In other words, it can be said that there is a negative and significant relationship between cognitive flexibility and emotional irritability. That is, with the increase in cognitive flexibility, the level of emotional irritability of people decreases and vice versa.

There is a significant relationship between self-satisfaction and emotional irritability in Coronary artery patients.

As seen in Table 6, the correlation coefficient between self-satisfaction and emotional irritability is equal to 0.600. A significant value equal to 0.001 has been calculated, which is smaller than the error level of 0.05. Therefore, the observed correlation is significant. In other words, it can be said that there is a negative and significant relationship between self-satisfaction and emotional irritability. That is, for increasing self-satisfaction; Emotional irritability decreases and vice versa.

Discussion

Main hypothesis: There is a significant relationship between the predictive contribution of cognitive flexibility on self-satisfaction with the mediation of emotional irritability in Coronary artery patients. The calculation and analysis of the fit indices of the research model in the previous section showed that self-satisfaction had a significant relationship with cognitive flexibility and this relationship was influenced by the mediating role of emotional irritability. Therefore, emotional irritability has an indirect and reverse (negative) effect on self-satisfaction in Coronary artery patients. That is, patients who have high cognitive flexibility, their level of self-satisfaction will increase and vice versa. In this regard, emotional irritability could play the role of a mediator. Therefore, the null hypothesis is rejected and the researcher's hypothesis is confirmed. According to the confirmation of the main hypothesis, the sub-hypotheses have been explained in the following.

Sub-hypotheses:

There is a significant relationship between cognitive flexibility and self-satisfaction in Coronary artery patients.

Explaining the relationship between cognitive flexibility and self-satisfaction using Pearson's correlation coefficient showed that cognitive flexibility had a direct and meaningful relationship with self-satisfaction. That is, patients who have high cognitive flexibility, their level of self-satisfaction will increase and vice versa. Therefore, the null hypothesis is rejected and the researcher's hypothesis is confirmed. This finding is implicitly consistent with research results (4) and (18).

There is a significant relationship between cognitive flexibility and emotional irritability in Coronary artery patients.

Explaining the relationship between cognitive flexibility and emotional irritability using Pearson's correlation coefficient showed that cognitive flexibility had a direct and significant relationship with emotional irritability. That is, patients who have high cognitive flexibility, their emotional irritability will decrease and vice versa. Therefore, the null hypothesis is rejected and the researcher's hypothesis is confirmed. This finding is implicitly consistent with the results of research (19). Therefore, having the ability to think flexibly makes a person use alternative justifications and accept challenging situations or stressful events and have more resilience than those who are not flexible. There is a significant relationship between self-satisfaction and emotional irritability in Coronary artery patients. Explaining the relationship between self-satisfaction and emotional irritability using Pearson's correlation coefficient showed that self-satisfaction had a direct and significant relationship with emotional

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irritability. That is, patients who have high self-satisfaction will decrease their emotional irritability and vice versa. Therefore, the null hypothesis is rejected and the researcher's hypothesis is confirmed.

Conclusion

According to Givert et al.'s view, cognitive flexibility is one of the dimensions of executive functions, which refers to the ability to change actions and thoughts according to an environmental demand. In fact, when a person uses cognitive strategies to change behavior and adapt to the environment, he benefits from flexible cognition. Life also contains various complex and challenging situations that require the use of a flexible cognitive model. It can be expected that when a person has cognitive flexibility, he can also have significant self-satisfaction.

People who are more self-satisfied, have a positive approach to life, have higher self-esteem, and have a high sense of self-sufficiency, and these people usually have good physical and mental health (20). All human beings have wishes, dreams and goals in life, and if the goals are fulfilled, they are satisfied with their lives. A person's level of satisfaction with his life is an inner feeling and mental perception that a person has of himself, the people around him, and the world around him. There are various aspects of self-satisfaction, so it includes speech, appearance, level of education, type of job and financial level, includes personal satisfaction. In terms of social aspects, it includes satisfaction, social position and relationship with other people (20). A person's self-satisfaction leads to peace, cheerfulness, happiness, and self-confidence, and self-satisfaction leads to anxiety, aggression, sadness, and depression. Therefore, it can be expected that by improving self-satisfaction, emotional irritability will also be reduced. This finding is implicitly consistent with the results of research (8).

Every research and researcher is faced with limitations and the results of that research should be considered according to these limitations. Therefore, the following limitations can be listed for the present research:

1. This research was conducted in Sina Hospital in Isfahan in 2020, so it is better to be cautious in generalizing its results to other similar hospitals, research institutes and cardiovascular clinics;
2. People's taste in choosing the time and hour to fill out the questionnaires is different, and for this reason, it is necessary to consider a time that is acceptable to the majority, and the coordination of this brought difficulties;
3. The budget limitation in conducting research similar to this research should be considered.

Suggestions for researchers and those who are interested in this topic and intend to in the future in the field of patients with Coronary artery disease and practical suggestions are suggestions in line with the results of the research so that the hospital examined in this research can use effective solutions in the process of its activities to improve the existing situation.

Cardiology clinics and research institutes are one of the important pillars of the societies that help them to reach the health of Coronary artery patients as much as possible. Conducting researches in the field of psychology and its effects can lead to the mental health of people and then provide the best services of cardiovascular centers and hospitals. In the following, suggestions for future research are provided.

1. In this research, the examined sample included patients of Sinai Hospital; It is possible to carry out the present research on other cardiovascular centers and clinics;
2. In this research, the contribution of predicting cognitive flexibility on self-satisfaction with the mediation of emotional irritability in patients with Coronary artery disease has been investigated; This research can be done from other aspects regarding patients with Coronary artery disease;
3. It is suggested that in future researches in the field of patients with Coronary artery disease, considering that only self-report measurement methods were used in the present study, for more accurate measurement in future researches,

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multiple measurement methods such as interviews and Observation is used and the resulting data is combined.

4. It is suggested to those involved in this matter, in order to increase the self-satisfaction of patients, to implement educational workshops with the concepts of the role of cognitive flexibility on self-satisfaction;

5. It is suggested to health professionals and practitioners to emphasize the cognitive flexibility of patients with Coronary artery disease in order to improve their self-satisfaction, so that by reducing the amount of drug consumption, the side effects of drugs will be less troublesome for these patients.

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Authors Contributions:

MLD conceptualized the study objectives and design. MLD are infectious disease specialists who contributed to data collection from patients along with

Ethical Consideration:

None

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Tables:

Table 1: Descriptive statistics of research variables

Variables	Number	Average	standard deviation
Cognitive flexibility	150	47.87	14.57
Emotional irritability	150	45.66	9.54
Self-satisfaction	150	51.55	10.70

Table 2: Data normality test (Kolmogorov-Smirnov)

Variable	Number	Kolmogorov-Smirnov	meaningful
Cognitive flexibility	150	0.070	0.176
Emotional irritability	150	0.064	0.109
Self-satisfaction	150	0.108	0.120

Table 3: Correlation coefficient of research variables

		Cognitive flexibility	Emotional irritability	Self-satisfaction
Cognitive flexibility	Pearson	1	-0.493	0.503
	meaningful	0	0.001	0.001
	Number	150	150	150
Emotional irritability	Pearson	-0.493	1	0.600
	meaningful	0.001	0	0.001
	Number	150	150	150
Self-satisfaction	Pearson	0.503	-0.600	1
	meaningful	0.001	0.001	0
	Number	150	150	150

Table 4: Regression and correlation coefficients

Route	The correlation coefficient (R)	The coefficient of determination (R^2)	Adjusted coefficient of determination	Standard error of estimation
Cognitive flexibility → emotional irritability	-0.493	0.434	0.401	0.40

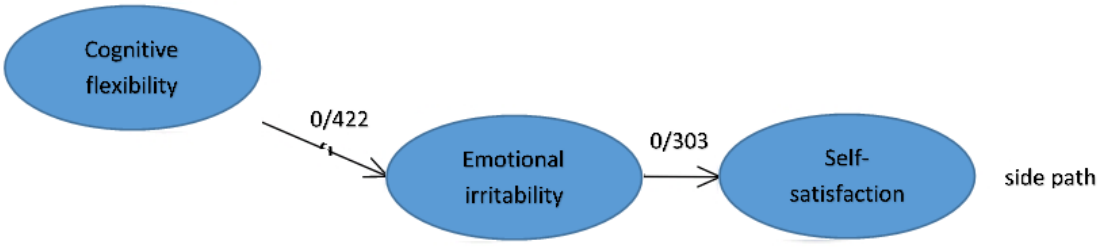
Table 5: ANOVA analysis of variance

Model	sum of squares	Degrees of freedom	mean square	F statistic	meaningful
Third	13.355	2	6.667	43.689	0.001

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Table 6: Regression and significance coefficients of the first model

The dependent variable	independent variable	Non-standard coefficients B	standard error	Standard coefficients Beta	t statistic	Significance level
Emotional irritability	Cognitive flexibility	-0.358	0.064	-0.422	4/600	0.001
Self-satisfaction	Emotional irritability	-0.283	0.067	-0.303	238/3	0.001



The effect of total cognitive flexibility on self-satisfaction through emotional irritability

=

(Effect of cognitive flexibility on emotional arousal) × (Effect of emotional arousal on self-satisfaction)

Figure 1: Overview of the overall effect

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