

# The relationship of perceived social support and locus of control subscales with illness perception in myocardial infarction patients, using Structural Equation Modeling

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## Summary

**Background:** Psychological factors are important both as predisposing to and precipitating coronary artery diseases (CAD). These factors can also be a consequence of CAD, which may create a vicious circle. This paper presents a study on myocardial infarction (MI) patients, considering the relationship between perceived locus of control, social support and illness perception.

**Materials and Methods:** 241 consecutive MI patients from Isfahan, Iran, participated in this study in 2016-17. Comprehensive questionnaires along with a medical interview were used to collect demographic and cardiological data during the first week of hospitalization. 3 to 4 months later information concerning perceived social support, perceived locus of control, and illness perception was collected at participants' houses. The data were analyzed by structural equation modeling to verify the interrelationships between the investigated variables.

**Results:** The mean age of participants (83% of males) was  $54.53 \pm 9.76$  years. The participants with better illness perception regarding MI may have had better perceived social support and/or may have had less chance locus of control and were more prone to be diagnosed as Diabetic. A positive correlation was found between powerful others locus of control and chance locus of control.

**Discussion:** Our findings indicate a significant relationship between illness perception, perceived social support and perceived locus of control in MI patients. Conclusion: This study findings provide an overview of some of the psychological factors in MI patients. Consideration of these important factors could help physicians to provide better post MI care.

**myocardial infarctions, perception, social support, locus of control, Structural Equation Modeling**

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## INTRODUCTION

Cardiovascular diseases (CVDs) constitute the most prevalent cause of death globally. Every year, 17.7 million people worldwide die because of CVDs, which is 31% of all global deaths, out of which 13% are due to coronary heart disease. 80% of all CVD deaths are due to heart at-

tacks and strokes [1]. In Iran, CVDs form a major part of underlying causes of death and disability, and the leading cause of death (39.3%) is due to CVDs, out of which 19.5% are due to myocardial infarction (MI) [2]. Patients' illness perception or their cognitive representation of illness is formed based on their beliefs about their situation, which can affect their mental health and the way they deal with their illness [3]. In cardiovascular diseases and other physical illnesses, illness perception considerably affects illness outcomes [4], such as patients' cooperation, adherence to physician recommendations regarding health behaviors, response to therapy and coping strategies [5, 6, 7]. Also, some studies on patients with heart attack suggest that patients' feelings and attitudes towards heart disease (illness perception) strongly impact their recovery [8]. Illness perception is a psychological idea that has its roots in Leventhal's common sense model [9]. In this model, each patient creates a separate representation of their illness. The dimensions of this representation are: identity, timeline, cure/control and causation of the illness [5].

Perceived control significantly affects health and well-being across the life span [10]. It was originally described in research on locus of control as either internal or external [10]. Perceived control of one's own destiny is linked to greater life satisfaction, a more optimistic view of adulthood, and fewer depressive symptoms compared to a belief that the outcomes of events in one's life remain beyond their control [10].

Locus of Control refers to an individual's perception concerning the underlying main causes of events in his/her life, considering them to derive primarily from their own actions, or be controlled by external forces such as fate, luck, God, or powerful others [11].

Social support refers to a social network's provision of psychological and material resources intended to benefit an individual's ability to cope with stress [12]. Those with high quality or quantity of social networks have a decreased risk of mortality compared to those who have low quantity or quality of social relationships [13]. Decades of research have found that social networks and interpersonal relationships have a substantial impact on physical health and psychological well-being [14-20]. Social support has a great effect on maintaining physical and men-

tal health. High quality social support can enhance stress resilience, somewhat protect against psychopathology and disorders due to trauma, like posttraumatic stress disorder (PTSD), and reduce mortality and morbidity [21]. Studies have shown that individual differences exist in the ability to mobilize and use sources of support. Social support seems to be positively related to psychological well-being [22]. In this study we tried to explore the relationship of perceived locus of control and perceived social support with illness perception in myocardial infarction patients, by means of structural equation modeling.

## AIMS

The overall aim of the present study was to examine the relationship of perceived social support and locus of control with illness perception in myocardial infarction patients. The specific aims were to identify relationships between the following factors in MI patients:

- I – Demographic, clinical and cardiological variables with perceived social support and perceived locus of control
- II – Demographic, clinical and cardiological variables with illness perception
- III – Perceived social support and perceived locus of control with illness perception.

## MATERIALS AND METHODS/DESIGN

This cross-sectional study was conducted on a sample of 241 MI patients (200 males and 41 females) in 2016-17, in Isfahan, Iran. The inclusion criteria were as follows: definite diagnosis of MI, 20 to 65 years, ability to read and write, willingness to participate, no severe psychological or systemic physical illness. The exclusion criteria were: lack of willingness to continue participation, inability to provide information, past history of MI, severe illness affecting cognition and fatigue, having a second MI or surgical procedures during the study.

The design of the study was approved by the Ethics Committee of Isfahan University of Medical Sciences. The first stage of the study was conducted at two main cardiac care units in Isfa-

han, Iran, namely Shahid Chamran hospital (the main academic referral heart center in the Isfahan province) and Shariati hospital (the main cardiac care unit of the Social Security Insurance Organization in Isfahan). During the first week of hospitalization in either coronary care unit (CCU) or cardiology ward, two questionnaires collecting demographic, clinical and cardiological information were completed by the researcher for 350 consecutive MI patients who met the inclusion criteria. Face-to-face interviews and questionnaires were completed when the patients were ready. Some information was collected from the patients' hospital files.

Three months after the initial stage (time necessary for illness perception formation), 3 questionnaires (perceived social support, perceived locus of control and illness perception) were completed by 241 patients. By this stage, out of 350 patients, 109 were excluded from the study due to reasons such as occurrence of another MI, death, changed address or having a surgical procedure. This part of the research was conducted at patients' houses, located in different districts of the province (Shahreza, Shahinshar, Mobarekeh, etc.).

## RESEARCH TOOLS

### Brief Illness Perception Questionnaire

A short form of the Illness Perception Questionnaire (i.e. Brief Illness Perception Questionnaire, BIPQ) was used for basic and follow-up evaluations of illness perception. This questionnaire has been reported as a reliable and valid instrument to measure the illness perception in various conditions. The Brief IPQ has good test-retest reliability [23]. All of the items of the nine subscales (except the causal question) have a 10-point (1 to 10) response scale. Each subscale has been designed to assess one component of illness perception: consequences, timeline, personal control, treatment control, identity, emotional representations (concern and emotional response) and illness understanding. Because the cause of this disease was not considered in this study, question 9, which is an open-ended question that assesses the cause of the illness [24], was excluded. Reliability coefficient of

the Brief IPQ for each of the subscales measured by test-retest method ranged from  $r = 0.48$  (understanding) to  $r = 0.70$  (consequences) [23]. For the Persian version of this questionnaire, Cronbach's alpha was 0.84. Also, its correlation with the Persian version of the R-IPQ was 0.71. Overall, the Persian version of this questionnaire has been reported to have good and satisfactory validity [25].

### Multidimensional Scale of Perceived Social Support (MSPSS)

The first version of this 12-item scale, developed by Zimet et al., is related to the perceived support from family, friends and significant others [26]. Janie Canty-Mitchell and Gregory D. Zimet have shown that the MSPSS has high internal consistency [27].

To verify the psychometric properties of the Persian version of the MSPSS in Iran, Bagherian Sararoudi et al. [28] carried out a study on 176 MI patients admitted to the coronary care unit (CCU) and 71 patients from the general population. Factor analysis of the scores of the patient and healthy samples provided a three-factor structure: family, friends and significant others. In their study, the variance percentage related to the three factors were 77.87% and 78.55% in the patient and healthy samples, respectively. The Cronbach's  $\alpha$  coefficient of the scale was 0.84. Bagherian Sararoudi et al. concluded that the MSPSS Persian version is a reliable and valid scale to measure the sources of perceived social support (family, friends and significant others) among MI patients and healthy samples [28].

### Levenson Multidimensional Locus of Control (IPC)

Levenson's Internal, Powerful others, Chance (IPC) scale, which is a six-point Likert-type scale, includes twenty-four items. Validity of the IPC was determined with Rotter's I-E scale (1996). Levenson reported Kuder-Richardson's reliability coefficients of 0.50, 0.61 and 0.77 for the three IPC scales, respectively. Farahani, Cooper, and Jin (1996) presented the validity and reliability of the Farsi version of this scale [29]. Among college students, reliability coefficients

for I, P and C were 0.76, 0.56 and 0.67, respectively [30]. Internal consistency estimates were moderately high and mean differences between scores were non-significant on the first and second administration. Differences among diagnostic categories and between healthy and hospitalized subjects supported the construct validity of the scales [31].

**Data collection, entry, handling and quality assurance**

Data collection process was monitored continuously by the researcher over the entire data collection period (12 months). The validity of the data was examined at different time points, and the questionnaires were regularly verified to ensure data accuracy. The data were then entered into the electronic sheets and rechecked to identify missing values and outlier items.

**RESULTS**

This article is part of the corresponding author’s PhD thesis entitled: Investigating factors related with Illness Perception and Fatigue in post MI patients (by means of Structural Equation Modeling) and the effect of intervention on Illness Perception in Fatigue control.

**Demographics:** The sample included 241 MI patients, 173(72%) from Chamran hospital and 68(28%) from Shariati hospital, out of whom 200 (83%) were males and 41 (17%) were females. The mean age of the participants was 54.53± 9.76 years. A total of 30 participants (12.5%) had college degrees, 63 subjects (26%) had secondary education, while the remaining 47 (61%) did not graduate high school. 231 patients (96%) were married. 101 (42%) had non-governmental jobs and 33 (14%) were government employees.

Cardiological characteristics of the participants are presented in Table 1.:

**Table 1.** Cardiologic characteristics of the sample.

Characteristics	Number	% of Total sample
Hospitalized within 1 hour after symptom onset	84	35%
Hospitalized within 1 to 2 hours after symptom onset	29	12%
Hospitalized after 12 hours of symptom onset	83	34%
family history of CHD	155	65%
past history of CHD	61	25%
Had some intervention for CHD (66% medical, 30% percutaneous coronary intervention, 4% surgery)	51	22%
Had a physician appointment prior to hospitalization	125	52%
Was under regular supervision of a physician before MI	53	22.5%
Transported to hospital by ambulance	72	30%
Transported to hospital by a taxi or a private car	165	70%
Cigarette smoker before MI	103	43%
High blood cholesterol before MI	100	43.5%
High blood pressure before MI	87	37%
Diabetes	55	23%
Sedentary lifestyle before MI	72	30%
Obesity	49	21%
Used to have fatty (greasy) foods before MI	156	65%
Used to take medicine regularly before MI	124	52%

**Measurement Model:** The Information Criteria of the applied Structural Equation Modeling were as follows: Akaike (AIC): 7383.745, Bayesian (BIC): 7653.024, Sample-Size Adjusted BIC: 7399.523, Probability of RMSEA (Root Mean Square Error Of Approximation): p-value < 0.001, CFI: 1.000, TLI: 1.000, Probability of SRMR (Standardized Root Mean Square Residual): p-value < 0.001.

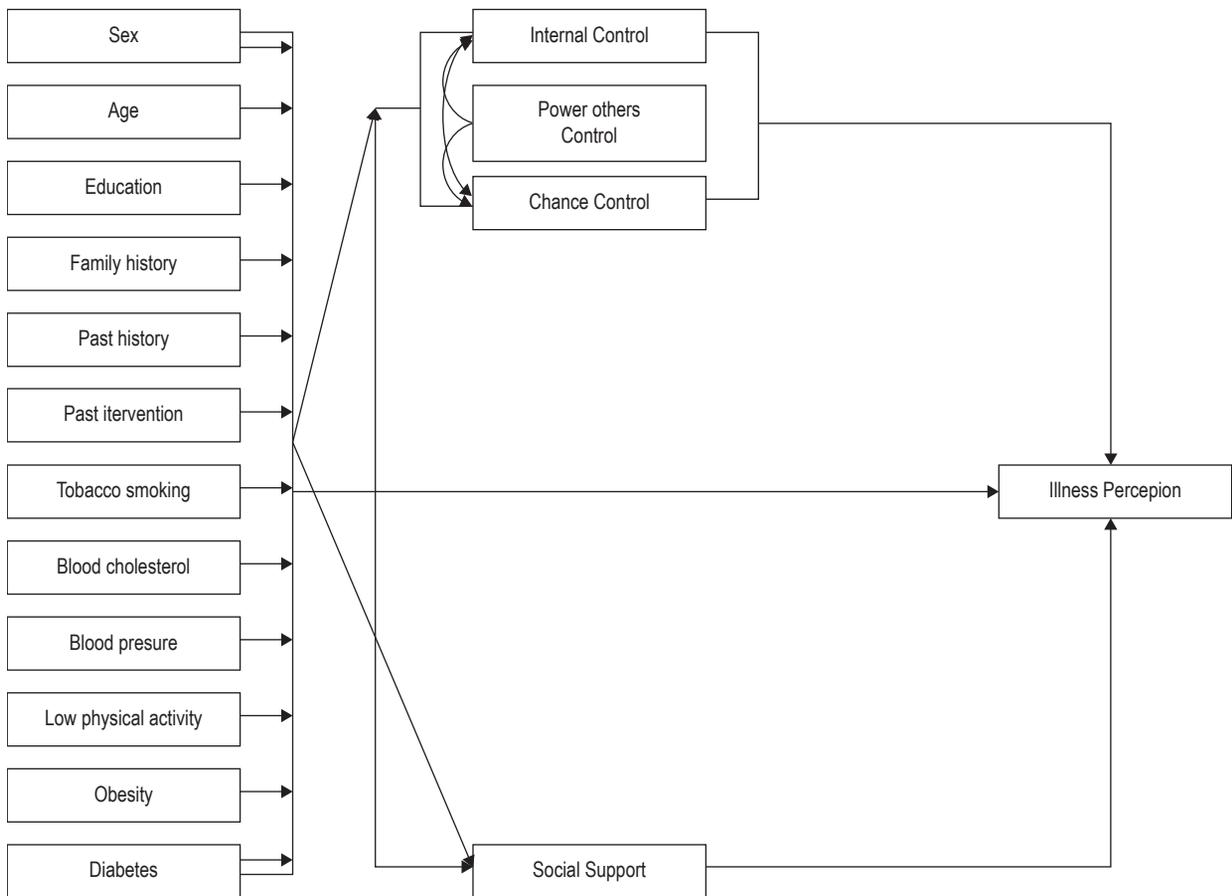


Figure 1. Schematic representation of the model

Table 2. The relationship between demographic and clinical variables with perceived locus of control, perceived social support and illness perception parameters.

Perceived Social Support		Powerful Others Locus of Control		Chance Locus of Control		Internal Locus of Control		Illness Perception		
P-Value	Estimate(S.E)	P-Value	Estimate(S.E)	P-Value	Estimate(S.E)	P-Value	Estimate(S.E)	P-Value	Estimate(S.E)	
0.455	-0.03 (0.04)	0.130	-0.09(0.06)	0.055	-0.14(0.07)	0.090	-0.11(0.06)	0.067	-0.09 (0.05)	Sex
0.780	0.01(0.03)	0.751	-0.02 ( 0.06)	0.451	-0.05(0.07)	0.720	0.02(0.06)	0.424	0.04(0.04)	Age
0.252	0.04(0.04)	0.028	-0.13( 0.06)	0.001 >	-0.24(0.07)	0.059	-1.12( 0.64)	0.204	0.06(0.05)	Education
0.965	-0.00(0.03)	0.168	0.07(0.05)	0.119	0.10(0.06)	0.413	-0.46( 0.06)	0.483	0.03(0.04)	Family History
0.077	-0.11(0.06)	0.141	0.15(0.10 )	0.875	0.02(0.13)	0.156	0.15(0.11)	0.162	-0.11(0.08)	Past Illness History
0.687	0.02(0.06)	0.185	-0.13(0.10)	0.852	-0.02(0.12)	0.343	-0.10(0.11)	0.642	-0.04(0.08)	Past Intervention History
0.408	0.03( 0.03)	0.444	0.04(0.06)	0.985	-0.00(0.07)	0.492	-0.04(0.06)	0.327	-0.04 (0.05)	Tobacco Smoking
0.201	- 0.04(0.03)	0.535	0.03(0.05)	0.237	0.08(0.07)	0.508	-0.04(0.06)	0.363	-0.04(0.04)	High Blood Cholesterol
0.506	0.02(0.04)	0.271	0.07( 0.06)	0.984	0.00(0.07)	0.585	0.03(0.06)	0.130	0.07(0.05)	High Blood Pressure

<0.000	0.19 (0.04)	<0.000	-0.33(0.07 )	0.004	0.23(0.08)	< 0.001	-0.28(0.07)	0.207	-0.08(0.06)	Low Physical Activity
<0.000	-0.23(0.04)	<0.000	0.39(0.07)	0.040	-0.17(0.08)	0.135	0.11(0.07)	0.190	0.08(0.06)	Obesity
<0.000	0.88 ( 0.02)	<0.000	-0.58(0.05)	0.566	0.04(0.07)	0.001>	-0.51(0.05)	0.005	-0.27(0.09)	Diabetes
							1	0.569	-0.03(0.05)	Internal Locus of Control
					1	0.839	0.01( 0.07)	0.054	0.09(0.05)	Chance Locus of Control
			1	<0.000	0.46(0.05)	0.644	-0.03( 0.07)	0.805	0.01(0.06)	Powerful Others Locus of Control
	1	0.359	-0.06(0.07)	0.128	0.10 (0.07)	0.332	-0.07(0.07)	< 0.001	-0.58(0.09)	Social Support

Our findings indicate the following significant relationships between the investigated parameters in MI patients:

- A negative relationship of low physical activity with internal locus of control and powerful others locus of control and a positive relationship of low physical activity with chance locus of control and perceived social support.
- A negative relationship of education with chance locus of control and powerful others locus of control.
- A negative relationship of obesity with chance locus of control and perceived social support; and a positive relationship between obesity and powerful others locus of control.
- A negative relationship of diabetes with illness perception score, internal locus of control and powerful others locus of control; and a positive relationship between diabetes and perceived social support (NB. in the Brief IPQ a higher score indicates worse illness perception and vice versa).
- A positive relationship between powerful others locus of control and chance locus of control.
- As far as illness perception itself is concerned, there was a negative relationship between illness perception, diabetes and perceived social support; and a positive borderline significant relationship (P-value= 0.054) between illness perception and chance locus of control.

### DISCUSSION

A growing body of evidence demonstrates the independent importance of previously underestimated factors for coronary artery disease (CAD), such as psychosocial parameters [33]. Psychological risk factors (PRFs) are important, both as predisposing to and precipitating CAD and acute ischemic events. PRFs can also be a consequence of CAD, which may create a vicious circle [33].

Our findings suggest that patients with diagnosed diabetes may have a better illness perception regarding MI and/or may have high social support, but probably do not have internal or powerful others locus of control.

Morishita et al. studied the ability for self-care among 173 elderly patients with diabetes mellitus in Japan and concluded that the health locus of control and social support are important considerations when providing health guidance or counseling to improve the self-care ability among elderly patients with diabetes mellitus [34].

In this study, participants with low physical activity probably do not have internal locus of control and/or powerful others locus of control, but they may have chance locus of control and/or high social support.

In general, an internal locus of control is a belief that an individual can use their behavior and personality to influence everyday life events.

A study on health and personality carried out on a sample of 240 college students showed that individuals with an internal locus of control reported having more social support than individuals with an external locus of control [22]. So-

cial support was also particularly related to the psychological well-being of individuals (mainly women) with an external locus of control. For men, no moderating effect of locus of control was found [22]. In a study on a group of 85 elderly patients with major depression, it was shown that increasing subjective and instrumental social support and non-family interaction were associated with greater adherence to antidepressant medication among patients high in internal LOC but not among patients low in internal LOC [32]. A study on a group of 46 patients 3–5 years after a traumatic brain injury (TBI) evaluated their social rehabilitation. High rehabilitation patients exhibited greater satisfaction in terms of social support. Patients with TBI were associated with a weaker internal LOC than non-patients. In patients exhibiting a high level of rehabilitation, the LOC was less frequently attributed to ‘chance’ or ‘powerful others.’ Patients with a low level of rehabilitation explained their difficulties in terms of external factors [35]. In the current study, participants with lower education may exhibit chance locus of control and/or powerful others locus of control. Those who are obese probably have powerful others locus of control but not chance locus of control and/or perceived high social support. In a sense, participants with powerful others locus of control are prone to be obese.

Participants with powerful others locus of control probably have chance locus of control and vice versa.

In a study on 208 Iranian pregnant women, Moshki et al. found that internal health locus of control had a significant association with social support ( $p < .01$ ) and powerful others health locus of control ( $p < .05$ ). In addition, a significant relationship was found between powerful others health locus of control and friend support ( $p < .05$ ) [36].

Seixas et al. conducted a study regarding comorbid posttraumatic stress and depressive symptoms among 701 Jamaican university participants. It was shown that external locus of control partially mediated the relationship between posttraumatic stress and depressive symptoms. External locus of control had a greater mediation magnitude than social support in the posttraumatic stress-depressive symptoms association. The sub-sample of highly traumatized in-

dividuals reported higher levels of depression, posttraumatic stress symptoms, external LOC, lower levels of social support and internal LOC than individuals with lower levels of trauma [37]. In another study, Blagojevic-Damasek et al. examined 60 men with chronic alcoholism. They found that the participants with higher internal locus of control report longer abstinence. Participants who experienced more support from their friends managed to abstain for shorter periods of time. External locus of control and social support from friends significantly explained abstinence duration. Higher external locus of control and higher social support from friends predicted shorter abstinence duration [38]. In the current study, considering illness perception itself, those participants with better illness perception regarding MI were more prone to be diagnosed as diabetic than those with poorer illness perception. They also have high perceived social support and low chance locus of control. In a study carried out on women incarcerated in the United States, Asberg and Renk found that female inmates’ perceptions of higher stress, a higher degree of external LOC, and inadequate social support correlated with more severe symptoms of depression and hopelessness as well as lower self-esteem [39].

## CONCLUSION

This study findings the importance of illness perception, locus of control and social support in myocardial infarction patients and provide an overview of their relationship. This could help caregiver teams to provide better post MI care by considering these important psychological factors.

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