Research Article

Relationship Between Type D Personality Subscales, Coping Strategies, Illness Perception, and Fatigue in Myocardial Infarction Patients Using Structural Equation Modeling, in Isfahan, Iran 2016 - 17

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Abstract

Background: Psychological factors play an important role as predisposing precipitating factors for coronary heart disease (CHD). Coping strategies, type D personality, illness perception (IP), and fatigue are among major psychological factors in myocardial infarction (MI) patients.

Objectives: The study aimed to investigate relationships between coping strategies, type D personality subscales, illness perception, and fatigue in MI patients.

Methods: In this cross-sectional study, we collected the demographic and clinical information of 241 consecutive MI patients (mean age: 54.53 ± 9.76 years) in the first week of hospitalization. After four months, we used questionnaires to collect information on type D personality subscales, coping strategies, illness perception, and fatigue at patients' houses. To verify relationships between the variables, the collected data were analyzed by structural equation modeling.

Results: The participants with more positive illness perception regarding MI were less likely to be fatigued and/or less probably used emotion coping. Patients who experienced fatigue as a symptom after MI were probably inhibited socially. Social inhibition, negative affectivity, and emotion coping were seen more in women than in men and younger participants used task coping strategy more than older ones.

Conclusions: Improving psychological factors such as illness perception, coping strategies, and type D personality may promote the health condition of patients in the post-MI period although these factors may influence the process of MI prevention.

Keywords: Myocardial Infarction, Perception, Coping Behaviors, Fatigue, Structural Equation Modeling

1. Background

Cardiovascular diseases (CVDs) are the most important causes of death all around the world. About 31% (17.7 million) of annual deaths in the world are due to CVDs of these, 13% are because of coronary heart disease. Heart attacks and strokes comprise 80% of CVD deaths (1). In Iran, CVDs constitute a major cause of death and disability; they are the most important cause of death (39.3%), 19.5% of which are because of Myocardial Infarction (MI) (2).

Patients' cognitive representation of illness or illness perception is formed by their beliefs and understanding of their situation. These factors might affect the individual's mental health and the way the patient deals with illness (3). In physical illnesses and CVDs, disease outcomes are affected considerably by illness perception (4). Illness per-

ception affects the patients' participation of care, compliance, health behaviors, reactions, and strategies for illness (5-7). The results of some studies on patients with a heart attack have shown that their attitudes and feelings of heart disease (illness perception) strongly affect the recovery process (8). Illness perception is a psychological mindset that has grown as a basic construct of the common-sense model of Leventhal (9). In this model, the patient creates a separate representation of his/her illness. The dimensions of this model include identity, timeline, cure/control, causation, and consequences of the illness (5). An important aspect of a disease is its symptoms. A symptom is a subjective experience (10). Fatigue is a very bothersome symptom after MI (11). Fatigue is a subjective, unpleasant symptom that interferes with body feelings from tiredness to exhaustion and causes a strong overall condition reducing

the persons' ability to function normally ([12]).

Patients suffering from heart disease in the recovery period commonly have symptoms such as breathlessness and chest pain that could be associated with fatigue after MI ([13]). In nearly half of patients, fatigue remains for four months ([13]) and two years after MI ([14]) and it is lowest two months postmyocardial infarction ([15]). It is a condition with endpoints of tiredness and exhaustion ([16]). Tiredness is an adaptive type of response to stressors and fatigue shows a decrease in the ability to adapt to stressors; when there is an inability to respond to stressors, the result is exhaustion ([17]). Negative understandings of illness after MI are associated with fatigue in such a way that fatigued patients can expect to have a longer duration of illness, have more negative emotional attitudes, and realize more serious consequences. More severe fatigue is related to limited personal control and having doubt about being cured ([13], [18]).

An important notable event in the illness process is coping, which is the way of dealing with the disease. The concept of coping has been known as the construct of a stress model and a strategy for managing life ([19], [20]). As described by Lazarus and Folkman ([19]), it consists of strategies used to confront a threat. Coping strategies are specific skills used by a stressed person to deal with stress ([21]) and they are closely related to the concept of survival ([22]). On the other hand, they are psychological ways that people use to manage actions, feelings, and thoughts, during illness, health, and treatment ([23]).

Added to the above-mentioned variables, we also considered type D personality or personality of distress that consists of two features that are relatively stable, i.e. social inhibition and negative affectivity ([24], [25]). A tendency toward strong negative emotions such as irritation, anger, anxiety, and hostility is defined as negative affectivity and a propensity to avoid contact with others and show negative emotions and behaviors is referred to as social inhibition ([24-29]). Studies have shown the relationship of type D personality with the incidence of CVD and increased risk of mortality ([24-29]). People with type D personality traits are four times more at risk of developing ischemic heart disease than those with low characteristics of this personality ([26]). Type D personality trait and depression are different phenomena which are interrelated despite the same characteristics. Compared to depressive symptoms, type D personality is more important in coronary artery disease (CAD) development and social inhibition plays a more important role in the increased risk of CVD incidence. Individuals who inhibit emotions are characterized by the release of stress hormones, mainly catecholamines and cortisol, and increased blood pressure and heart rate. Type D personality could be one of the causes of disease development by physiological mechanisms and unhealthy lifestyle-related behaviors ([28], [29]).

Since coping strategies, type D personality subscales, illness perception, and fatigue play an important role in CVDs and there are a few studies on their relationships in Iran, the present study was designed to investigate the relationship between these variables.

2. Objectives

The main objective of the study was to assess the relationships between type D personality subscales, coping strategies, illness perception, and fatigue in MI patients. The specific objectives were to identify the relationships between the following variables in MI patients:

I- The relationship of clinical and demographic features with type D personality subscales and coping strategies.

II- The relationship of clinical and demographic features with illness perception and fatigue.

III- The relationship of coping strategies and type D personality subscales with illness perception and fatigue.

3. Methods

3.1. Patients and Settings

This cross-sectional study was conducted on 241 consecutive patients who experienced their first MI in Isfahan, Iran, in 2016 - 17. The early phase was conducted at two hospitals in Isfahan province including Chamran (a university heart center) and Shariati (The Social Security Insurance Organization Heart Center). The inclusion criteria included an explicit diagnosis of MI, 20 - 65 years of age, reading and writing skills, and readiness to take part in the study. The exclusion criteria were inability to communicate, a history of previous MI, second MI, surgical operation during the study, and severe physical or psychological illness causing disability or affecting cognition. It is worth mentioning that systemic illnesses such as diabetes and high blood pressure were taken into consideration as exclusion criteria only if they affected the cognition or caused obvious disability; however, if they were under control, they would not be the exclusion criteria.

3.2. Sample Size

For calculating the sample size, we used the formula of $n = (z_1 + z_2)^2 \, {}^*s^2/d^2$ based on the confidence coefficient (Z_1) of 95% (= 1.96), study power of 80% (= 0.84), and sampling error (d) of 2.5. The estimated sample size was 181 patients but as a safety factor, more participants were recruited.

3.3. Procedure

Phase I: During hospitalization, in the first week, we completed demographic and clinical questionnaires after taking the patients' written consent. In this phase, 350 consecutive MI patients were recruited in the study. Briefing and questioning were conducted by the researcher only if the patient was ready for that and met the inclusion criteria. Also, some information such as past intervention for illness and location of MI was collected from the patients' hospital records.

Phase II: Four months after phase I, four questionnaires of type D personality, coping strategies, fatigue, and illness perception were completed for 241 patients who had participated in phase I. In this phase, 109 patients could not continue the study due to causes such as happening of another MI, change of address, undergoing a surgery, or death. This phase was conducted at the houses of the patients located in different places all over Isfahan province. Figure 1 shows the diagram of data collection phases.
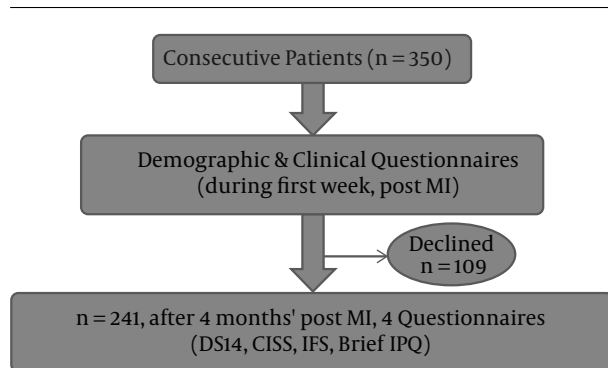

Figure 1. Data collection phases

3.4. Study Instruments

According to the native language of the participants, the Persian versions of the questionnaires were used in the study. The necessary information regarding the reliability and validity of the Persian versions of the questionnaires is given as follows.

3.4.1. Demographic Characteristics

They included sex, marital status, education, and occupation.

3.4.2. Clinical Characteristics

The required clinical information of patients was collected through history taking and completion of the clinical questionnaire although some data were collected from the patients' files. Some of the important clinical data

are as follows: time between the onset of symptoms and hospitalization, family history, past history and intervention history (medical, surgical or percutaneous coronary intervention) for CHD, cigarette smoking, elevated blood cholesterol (> 240 mg/dL) and/or elevated blood triglyceride (> 200 mg/dL), high blood pressure (systolic $\geq$ 140 mmHg and/or diastolic $\geq$ 90 mmHg), diabetes (fasting blood sugar $\geq$ 120 mg/dL and/or Hb A1C $\geq$ 6.5%), obesity (BMI $\geq$ 30 or more), and physical inactivity (less than half an hour of regular physical activity per day, five days per week).

3.4.3. Brief Illness Perception Questionnaire

It is a valid and reliable scale to take the measurements of illness perception in various situations. It also has satisfactory test-retest reliability (30). It consists of eight items rated on a scale of 10 points and a casual, open-ended question (30). The Persian version of this scale had good and satisfactory validity (31) and its Cronbach's alpha was 0.84.

3.4.4. Type D Personality

People with this type of personality present tendencies for social inhibition (SI) and negative affectivity (NA). There is a relationship between this type of personality and poor cardiac prognosis (25). The type D personality (DS14) scale consists of two subscales, each of which contains seven items answered on a five-point Likert scale (25, 32). The subscales of NA and SI are internally consistent and constant over a three-month period. In a two-month period, the SI and NA subscales had satisfactory test–retest consistency for the 14-item Persian version and good Cronbach's alpha coefficient in patient and healthy groups (internal consistency). Factor analysis confirmed the structural validity of NA and SI items in the Persian version of DS14 (33).

3.4.5. Iowa Fatigue Scale

An 11-item scale was developed by Hartza, Bentler, and Watson (34). This scale synthesizes information from several fatigue instruments. There were positive correlations (0.82 - 0.96) between the overall measures. Each of the 11 items is answered on a five-point scale. Scores 11 to 29 indicate no fatigue and scores 30 or above indicate the presence of fatigue (34). The Persian version of this scale was translated by the forward-backward method at the Shiraz University of Medical Sciences. The validity of the scale was approved and its Cronbach alpha was 0.84 (35).

3.4.6. Coping Inventory for Stressful Situations (CISS)

The reliable and valid scale of multidimensional coping was developed by Endler and Parker (36, 37). Task, emotion, and avoidance are the three dimensions of this

scale. Participants would grade 48 items of coping inventory for stressful situations (CISS) on a Likert-type scale (36-38). Considering the basic coping styles, the results of four studies showed that CISS is a reliable and valid scale (39). The results of a study showed that the validity and reliability of the Persian version of this scale and its subscales were acceptable (40).

3.5. Data Collection, Entry, Handling, and Quality Assurance

Over the data collection period (April 2016 to March 2017), the interview process was checked continuously by the researcher. In the hospital phase of the study, in each session, there were only a few patients who met the inclusion criteria. Also, the second phase at the participants' houses took a lot of time. To ensure the accuracy of data, their validity was checked in different steps and questionnaires were regularly verified. In a computerized process, the data were entered into electronic pages. The computerized data were rechecked to identify missing and outlier data.

3.6. Statistical Method

The mean and standard deviation were used to describe the quantitative data while frequency and percentage were used to do the same for qualitative data. The structural equational modeling was used for analyzing the relationships between the variables by Mplus software (version 6.12). To test the goodness of fit of the model, we used the following indicators: the probability of standardized root mean square residual (SRMR), probability of root mean square error of approximation (RMSEA), Bayesian (BIC), CFI, TLI, and Akaike (AIC). The P values of less than 0.05 were treated as statistically significant. The mean $\pm$ standard deviation (SD) represented the average values. Figure 2 presents a diagram of the relationships between the variables of the study.

3.7. Ethical Considerations

The Ethics Committee of the Isfahan University of Medical Sciences accredited the design of the study (IR.MUI.REC.1395.3.045).

4. Results

4.1. Demographic

Totally, 241 MI patients from Chamran and Shariati hospitals (n = 173; 72% and n = 68; 28%, respectively) were recruited in this study. The mean age of the participants was 54.53 (SD = 9.76) years. Table 1 shows the demographic features of the participants.

Table 1. Demographic Features of the Participants

Features	No. (% of Total)
Sex	
Male	200 (83)
Female	41 (17)
Marital status	
Married	231 (96)
Education	
Completed high school	63 (26)
Below high school	147 (61)
University degrees	30 (12.5)
Missing	1
Occupation	
Non-governmental	101 (41.9)
Government employee	33 (13.7)
Unemployed	5 (2.1)
Retired	63 (26.1)
Housewife	39 (16.2)

4.2. Clinical Findings

The clinical findings of the participants are seen in Table 2.

4.3. Fitting Model

The structural equation modeling (SEM) was used that showed the following information criteria: probability of RMSEA P value of < 0.001, probability of SRMR P value of 0.053, Akaikel (AIC) of 11346.278, sample size adjusted BIC of 11362.786, CFI of 0.815, Bayesian (BIC) of 11600.459, and TLI of 0. These criteria showed the goodness of fit of the model.

4.4. Exploring Relationships Between Variables

The relationship between independent variables and social inhibition, negative affectivity, task coping, emotion coping, and avoidance coping can be seen in Table 3.

The significant findings of the model seen in Table 3 are presented in the following.

The mean scores of social inhibition, negative affectivity, and emotion coping were significantly higher in women than in men (P = 0.006, P = 0.018, and P < 0.001, respectively). Social inhibition, negative affectivity, and emotion coping were seen more in women than in men. There was a negative relationship between task coping and age (P = 0.051) so that older participants used task coping strategies less than younger participants did.
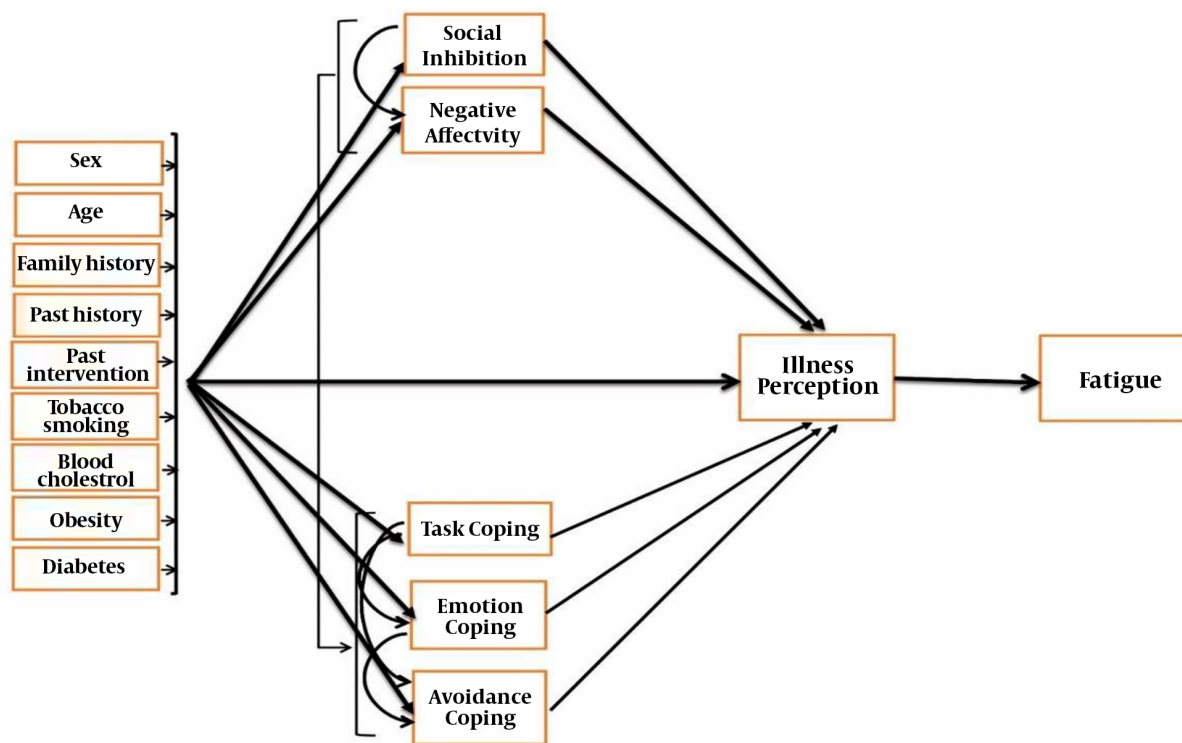
Figure 2. The schematic representation of the study model

There was a positive relationship between social inhibition and family history of CAD (P = 0.013). Participants with a positive family history of CAD were probably inhibited socially. There was a positive relationship between negative affectivity and past history of intervention for CAD (P = 0.034). The participants with a history of intervention for CAD probably had negative affectivity. The relationships of negative affectivity and social inhibition with diabetes were significantly positive (P < 0.001 for both). The participants who suffered from diabetes probably had the characteristics of social inhibition and/or negative affectivity.

The correlations between dependent variables can be seen in Table 4. Based on the model, the significant findings are as follows.

There were positive relationships between the scores of illness perception (IP) and fatigue (P < 0.001), as well as between the IP and emotion coping scores (P < 0.001). Therefore, participants who had more positive illness perception regarding MI were less prone to experience fatigue (P < 0.001) and/or less probably used emotion coping (P < 0.001). It is noticeable that in the brief illness perception questionnaire, a lower score indicated a more positive perception of illness and vice versa. There was a positive relationship between fatigue and social inhibition (P < 0.001).

Seemingly, those who experienced fatigue as a symptom after MI were probably inhibited socially.

5. Discussion

This study demonstrated the relationships between some psychological parameters that play an important role in patients with myocardial infarction, namely type D personality subscales, coping strategies, illness perception, and fatigue. It was found that participants with more positive illness perception regarding MI were less prone to fatigue and/or less probably used emotion coping. In this regard, a study on 103 acute MI patients showed that interventions focusing on illness perception could change the perception and elevate the rate of return to work (41). Consistent with our findings, the results of a study on 100 chronic obstructive lung disease patients showed that patients with a better understanding of the illness utilized more proactive (task) coping strategies; moreover, more intense emotional response was related to less proactive coping (42). Likewise, a meta-analysis study documented that illness perception and coping strategies are important in the explanation of outcomes of distress in many

Table 2. Clinical Findings of Patients

Features	No. (% of Total)
Hospitalized in less than one hour of symptoms onset	84 (35)
Hospitalized in one to two hours of symptoms onset	29 (12)
Hospitalized after 12 hours of symptoms onset	83 (34)
Family history of coronary heart disease	155 (65)
Past history of coronary heart disease	61 (25)
Intervention for coronary heart disease (66% medical, 30% percutaneous coronary intervention, 4% surgery)	51 (22)
Doctor's visit before hospitalization	125 (52)
Regular care by a doctor before MI	53 (22.5)
Ambulance transfer to the hospital	72 (30)
Using a taxi or private car for transferring to the hospital	165 (70)
Cigarette smoking	103 (43)
High blood cholesterol/triglyceride	100 (43.5)
High blood pressure	87 (37)
Diabetes mellitus	55 (23)
Inactivity	72 (30)
Obesity	49 (21)
Fatty (greasy) diet	156 (65)
Taking medicines regularly (before MI)	124 (52)

physical health problems and coping mechanisms, compared to the illness perception variables, are stronger predictors of outcomes (43). In general, psychological risk factors (PRFs) are considered important facilitating and precipitating factors for CAD and acute MI. Moreover, PRFs may be the outcomes of CAD. Hence, it can produce a vicious cycle (44). In the present research, those participants who had a family history of CAD and those who experienced fatigue as a symptom after MI were probably inhibited socially.

Type D personality has two elements including social inhibition and negative affectivity. Studies have proven the relationship between type D personality and CVD incidence (24-29). The results of a study on 86 MI patients showed that social inhibition, one of the two elements of type D personality trait, was presented as a prognosticator of the low quality of life (45). Also, it was found that social inhibition, negative affectivity, and/or emotion coping were seen more in women than in men. Additionally, participants who suffered from diabetes probably had social inhibition and/or negative affectivity. Our findings also indicated that those participants who had negative affectivity were more likely to have a past history of intervention for CAD, that is they were already a CAD patient. Consis-

tent with this finding, a study on 131 MI patients revealed that negative affectivity is a significant predictor of both disability and quality of life (46). In addition, our results showed an inverse relationship between age and task coping; that is younger participants used the task coping strategy more than older ones.

It is interesting to know that coping behaviors play an important role in MI patients. Even, atherogenesis development can be averted by healthy psychological functions such as adaptive (task) coping mechanisms (47). There could be an association between maladaptive coping strategies (emotion and avoidance) and risk factors of cardiovascular disease, for instance, high blood pressure (48), more alcohol consumption, unhealthy lifestyle, and higher waist-to-hip ratio (49). The relationship between acute coronary accidents and maladaptive coping mechanisms has been shown in chronic ischemic heart disease (IHD) patients (50). Finally, it is of note that several factors presenting psychosocial stress are associated with an increased risk of acute myocardial infarction (51).

5.1. Conclusion

Since coping strategies, type D personality subscales, illness perception, and fatigue play an important role in myocardial infarction patients, improving these factors should be considered by MI patients' care providers to provide better care. Moreover, improving these elements can modify the course of MI prevention. However, there is little research in this area.

5.2. Limitations

First, information regarding the socioeconomic status of the participants was not available. Second, the participants were followed up only for up to four months due to time limitations. Third, the number of female participants was small.

5.3. Recommendations for Future Studies

We recommend (1) studying the relationships between socioeconomic status and variables of the present study in MI patients, (2) conducting a similar work for longer duration (a few years), (3) assessing the main variables of this study in special groups with MI such as diabetic patients or women around menopause ages, and (4) investigating the main variables of the study for the prevention of MI.

Footnotes

Table 3. The Analysis of Data in the Model of the Relationship Between Independent Variables and Social Inhibition, Negative Affectivity, Task Coping, Emotion Coping, and Avoidance Coping

	Social Inhibition		Negative Affectivity		Task Coping		Emotion Coping		Avoidance Coping	
	Estimate (S.E)	P Value	Estimate (S.E)	P Value	Estimate (S.E)	P Value	Estimate (S.E)	P Value	Estimate (S.E)	P Value
Sex	-0.18 (0.07)	0.006	-0.12 (0.05)	0.018	0.06 (0.07)	0.384	-0.26 (0.07)	< 0.001	0.07 (0.06)	0.265
Age	0.01 (0.06)	0.892	0.03 (0.05)	0.565	-0.14 (0.07)	0.051	-0.08 (0.07)	0.217	0.04 (0.06)	0.557
Family history	0.15 (0.06)	0.013	0.04 (0.047)	0.410	0.03 (0.07)	0.705	0.07 (0.07)	0.269	0.03 (0.06)	0.578
Past illness history	-0.18 (0.12)	0.119	-0.16 (0.09)	0.074	-0.09 (0.13)	0.463	-0.01 (0.12)	0.898	-0.16 (0.12)	0.164
Past intervention history	0.14 (0.11)	0.215	0.18 (0.09)	0.034	0.07 (0.13)	0.560	0.05 (0.12)	0.655	0.19 (0.11)	0.100
Tobacco smoking	-0.11 (0.07)	0.086	-0.13 (0.05)	0.011	0.04 (0.07)	0.550	-0.16 (0.07)	0.025	-0.03 (0.06)	0.582
High blood cholesterol	-0.07 (0.11)	0.521	-0.06 (0.08)	0.461	-0.03 (0.12)	0.782	-0.01 (0.12)	0.929	-0.11 (0.11)	0.318
Obesity	-0.02 (0.12)	0.862	-0.57 (0.09)	< 0.001	0.14 (0.13)	0.314	0.09 (0.13)	0.468	-0.45 (0.12)	< 0.001
Diabetes	0.39 (0.09)	< 0.001	0.97 (0.06)	< 0.001	-0.19 (0.10)	0.048	-0.19 (0.10)	0.048	0.46 (0.09)	< 0.001

Table 4. Correlations Between Dependent Variables

	Illness Perception		Fatigue	
	Correlation	P Value	Correlation	P Value
Fatigue	0.45	< 0.000		
Social inhibition	0.11	0.116	0.566	< 0.000
Negative affectivity	-0.32	< 0.000	0.130	0.055
Task coping	0.03	0.686	0.481	< 0.000
Emotion coping	0.29	< 0.000	0.743	< 0.000
Avoidance coping	-0.02	0.733	-0.427	< 0.000

provided psychological scientific instructions and procedure guidance. Mohammadreza Maracy (Professor of Epidemiology and Biostatic) contributed to methodology and statistical analysis, prepared the models, and provided procedure guidance. Hamid Sanei (Cardiology Professor) provided cardiologic scientific instructions. Mansoor Shiri (Ph.D. Candidate of Health Psychology) participated in research consecutive management, data collection management, questioning, data analysis, manuscript writing, and overall responsibility of the project.

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