Personality Types, Illness Cognition and Health-Related Quality of Life in Myocardial Infarction

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Abstract
The illness cognition approach proposes that individuals try to make sense of changes in their somatic state. Through the process of sense-making, individuals develop their models of illness. These models influence their coping strategies as well as their quality of life. Illness cognition has been studied as an independent variable related to health-related outcomes. However, personality is a relatively understudied domain concerning illness cognition and patients' health-related quality of life (HRQoL). Some evidence in the literature indicates that personality can influence how patients cognize their Illness. The paper investigates whether personality types influence illness cognition and HRQoL in myocardial infarction (MI) patients. It also explores whether the illness cognition of the patients mediates the relationship between personality types and HRQoL. A sample of 212 MI patients responded to questionnaires related to personality type A and type D tests, illness cognition and HRQoL. Results demonstrated that type A and type D personalities differ on four dimensions of illness cognition: Identity, controllability (personal control), timeline (timeline cyclic) and illness coherence (coherent understanding of disease). Results revealed that type A and type D participants significantly differed on emotional, physical, social, and total HRQoL. Illness cognition partially mediates the relationship between personality types and HRQoL. The findings have important implications for the health management of MI patients, as personality types play a vital role in understanding illness, coping and HRQoL.

Keywords: Illness Cognition, Health-Related Quality of Life, Type D Personality

Introduction

The leading cause of death globally is cardiovascular disease (CVD). About three-quarters of CVD of deaths occur in low-and middle-income countries (WHO, 2021). In the Indian context, the incidence of cardiovascular disease is on the rise. According to Bhatia et al. (2021), "the prevalence of cardiovascular diseases is high in India, even among people who are slightly older than 45 years." (p. e-314). CVD is a broad category of diseases and hypertension, coronary heart disease, myocardial infarction (MI), heart attack, etc. are some of the examples of CVD. Apart from biological risk factors, several psychological risk factors have been identified concerning heart disease. Many psychological factors contribute to this risk, including stress, type-A and type-D personality types, and negative emotions like anger, hostility, depression, etc. These psychological factors may predispose an individual to heart disease (Davidson & Mostovsky, 2010; Neshatdioost et al., 2013; Kupper & Denollet, 2018).

It is important to study various psychological risk factors related to heart disease because it is chronic and requires proper management. Understanding the psychological aspects of heart disease is essential to its management. The present paper addresses three such psychological aspects: illness cognition, personality types, and health-related quality of life (HRQoL).

The self-regulation model of illness (Leventhal, Nerez & Steele, 1984, H. Leventhal, Breland, Mora & E. A. Leventhal, 2010) has been used to explore illness cognition in the present study. According to this framework, individuals based on their experiences develop their illness models that reflect the lay understanding of their Illness. These illness models are subjective in nature and guide coping and adaptation to Illness.

Based on extensive research, scholars have proposed five dimensions of illness cognition: identity, timeline, control, consequences, and causes (Diefenbach & Leventhal, 1996; Lobban, Barrowclough & Jones, 2003). Identity refers to the label an individual attaches to Illness; timeline refers to an individual's belief regarding the duration of Illness; control refers to the belief whether Illness is controllable or not; consequences refer to beliefs regarding the possible consequences of Illness and cause refers to an individual's perception regarding the possible causes of Illness.

Illness cognition has been studied as an independent variable in coping and the outcome of an illness. However, personality is a relatively unexplored domain concerning illness cognition and HRQoL of patients. In the context of heart disease, it has now been established that certain personality characteristics operate as causal factors. These personality characteristics may predispose an individual to heart disease through certain behavioral patterns. Concerning heart disease, two personality types are prone to it: type A and type D. Interestingly, research on type A personality has used categories of type A and non-type A. Similarly, type D personality research has used categories of type D and non-type D. Researchers have also not studied both personality types together.

The type A behaviour pattern concept has been widely acknowledged (Friedman & Rosenman, 1959). As noted by Shahidi, Henley, Willows and Furnham (1991), the common characteristics that go with type A are "competitiveness, time-urgency, aggressiveness, drive and achievement striving" (p.1277). Amir, Gatab, and Shayan (2010) found that type A personality had lower levels of mental health. Mohan and Singh (2016) reported that type A behavior patterns positively correlated with anger and hostility among CHD patients. Sahoo,

Padhy, Padhee, Singla and Sarkar (2018) suggested that two of the dimensions of type A personality; anger and hostility, are the significant predictors of cardiovascular diseases.

Type D personality (Denollet, 1997) is another personality type that has been found to associated with cardiovascular diseases. According to Denollet and Conraads (2011), type D personality is associate with three time more increased risk for cardiovascular diseases. Negative affectivity and social inhibition have been identified as stable traits and they serve as a basis of type D personality or 'distressed personality' (Pedersen & Denollet, 2003, Kupper & Denollet, 2018). Experiencing negative emotions across time and situations is known as negative affectivity, while social inhibition rfers to inhibit emotions and behaviors in social situations. (Denollet, Pedersen, Vrints & Conraads, 2006; Pederson et al., 2006). Clinical picture of negative affectivity suggests that individuals high on this trait are generally worrisome, irritable, depressed, anxious, and low in assertiveness and self-esteem. The trait of social inhibition is characterized by feelings of insecurity in social interaction, tendency to distance oneself from others, reserved behavior and perception of low social support (Denollet, Vaes & Brutsaert, 2000).

The examination of the quality of life from the viewpoint of health is known as health-related quality of life (HRQoL). Scholars have recognized that clinical or objective indicators are insufficient to understand patients' health status. According to Karimi & Brazier, (2016), HRQoL emphasizes health aspects associated with quality of life. The introduction of HRQoL emphasizes the inclusion of subjective indicators while evaluating a treatment process.

Thus, the present study aims to explore whether people with different personality types differ in terms of cognizing their Illness and perceiving their HRQoL. The impact of personality types on illness cognition and HRQoL has been less explored. Personality types could play an important role in understanding illness, coping, and HRQoL. The findings may have important implications for patients with MI and their health management.

Method

Participants

The participants in the present study were male MI patients. The data was collected from one of the cardiology hospitals in Kanpur, India from patients who were admitted in the hospital for a minimum of seven days.

The sample consisted of 212 male MI patients. All the participants of the study were medically managed. The average age of the patients was 52.86 yrs and the majority of participants were married (91.98%) and were self-employed (43.86%) or in service (39.62%). The medical history of participants revealed that 22.17% of patients had a history of diabetes, whereas 11.79% of patients had a history of hypertension and the majority of participants (67.92%) had experienced heart attacks for the first time. The educational qualification of the participants ranged from High school to post-graduation.

Measures

Type A

Type A personality was measured by ERCTA scale (Sutil, Corbacho, Arias, Alvarez, & Requero, 1998). This scale consists of eight items. A Five point rating scale ranging from very low (1) to very high (5) was used. The cut-off score for screening type A was based on mean and median scores as suggested by the authors of the scale. The mean score for the present sample was 28.26 and the median score was 28. The standard deviation (SD) score was 5.36. A cut-off score of 28 was used. It was reasoned based on other research (Miller et al., 1991) that the distribution of Type A in the total population is around 50%, a score of 28 was considered as a type A orientation. Thus, only those patients were labeled as having a type A personality who scored above 28.

Type D

Type D personality was measured by DS14 developed by Denollet (2005). Using 14 items, this scale measures two traits: negative affectivity and social inhibition. Seven items were used to measure each trait on a five-point Likert scale ranging from false = 0 to true = 4) was used for the rating of items. The possible range of scores on each subscale was 0 to 28.

A cutoff score of 10 (as suggested by Denollet, 2005) was used for the screening of type D participants. Patients who scored greater than or equal to 10 on negative affectivity and social inhibition subscales were classified as having type D personalities.

Illness Cognition

The revised illness perception questionnaire (IPQ-R) by Moss-Morris et al. (2002) was used to measure the illness cognition of patients. This scale consists of eight cognitive dimensions: Identity, consequences, timeline acute, timeline cyclic, treatment control, personal control, illness coherence, and causes. All the original items of IPQ-R were retained except for the items of identity subscale. The items of identity subscales were replaced with 10 new specific symptoms related to MI such as, congestion, anxiety, gastric problem, nausea etc. Participants were asked to answer in either 'yes' or 'no' if they experienced the mentioned symptoms and if they believed that a particular symptom was related to their Illness. Timeline acute, timeline cyclic, consequence, personal control, treatment control, and illness coherence subscales consisted of six, four, six, six and five items respectively. The cause subscale of IPQ-R consisted of 18 items reflecting possible causes of the disease. For all these subscales original items of IPQ-R were used. Five-point rating scale ranging from strongly disagree (1) to strongly agree (5) was employed.

Health Related Quality of Life (HRQoL)

MacNew heart disease health related quality of life questionnaire was used to measure HRQoL of patients (Hofer et al, 2004). It is a disease-specific measure of HRQoL. It assesses the HRQoL of heart patients pertaining to three major areas: physical HRQoL, emotional HRQoL, and social HRQoL. It also provides an overall score. The items are rated on seven point rating scale where 'one' indicates poor HRQoL and 'seven' indicates good HRQoL.

Results

The data was collected using specific questionnaires related to type A personality, type D personality, illness cognition, and HRQoL. The data was analyzed with the use of SPSS (version 13.0).

First of all, scores of personality tests (type A and type D) were obtained and participants were classified based on the scores. All the participants completed both type A and type D personality tests along with the measures of illness cognition and HRQoL. Based on type A and type D personality tests, 66 participants were classified as type A and 80 participants were classified as type D. Thus, data obtained from type A and type D participants were analyzed as per the aim of the present paper.

Personality Types and Illness Cognition

To examine the relationship between personality types and illness cognition *t*-test was employed. Mean and standard deviation (SD) were calculated for different dimensions of illness cognition and HRQoL. The mean and SD scores of type A and type D participants on different dimensions of illness cognition have been presented in Table 1. Results demonstrated that the mean scores of type D Participants are relatively higher than that of type A participants on significant dimensions of illness cognition except for the dimensions of personal control and illness coherence.

Table 1: Mean and SD scores of type A and type D personality types on different dimensions of illness cognition

	ID	TA	TCy	Cons	PC	TC	IC	Gen	Beh	Stress
Type A	.40	2.47	2.86	2.79	4.00	4.09	2.46	1.81	2.35	3.30
	(1.48)	(4.59)	(3.08)	(4.09)	(3.70)	(3.09)	(3.17)	(4.21)	(3.88)	(2.68)
Type D	.45	2.61	3.30	2.91	3.33	4.19	2.23	1.94	2.55	3.17
	(1.71)	(4.97)	(3.10)	(4.07)	(3.73)	(2.63)	(3.26)	(4.27)	(5.53)	(2.49)

ID: Identity, TA: Timeline Acute, TCy: Timeline Cyclic, Cons: Consequence, PC: Personal Control, TC: Treatment Control, IC.: Illness Coherence, Gen: General Risks, Beh: Behavioural Factor
Note. SD scores have been presented in parenthesis.

The mean scores obtained on the different dimensions of Illness cognition revealed that type A and type D participants cognized their illness condition (MI) differently. The next step was to examine whether these two personality types significantly differ in terms of their illness cognition. Results obtained from *t*-tests demonstrated that type A's significantly perceived higher personal control over Illness: t (144) = 6.49, $p<.01$, d = 1.07 and have a coherent understanding of Illness: t (144) = 2.11, $p<.05$, d = .35 as compared to type D's. On the other hand, type D's significantly scored higher on identity: t (144) = 2.13, $p<.05$, d =.36 and timeline cyclic: t (144) = 3.42, $p<.01$, d = .57 than type A participants. Results suggested that in comparison to type A participants, type D participants tended to attach more symptoms to their illness condition and perceived their Illness as recurring in nature.

Personality Types and HRQoL

Type A and type D personality types were also compared regarding the perceived level of HRQoL. Results obtained from mean scores demonstrated that type A's scored high on all the domains of HRQoL than type D's. The mean and SD scores of type A and type D participants have been presented in Table 2.

Table 2: Mean and SD scores of type A and type D personality types on different domains of HRQoL and total HRQoL

	Emo HRQoL	Phy HRQoL	Soc HRQoL	Tot HRQoL
Type A	64.69 (11.63)	50.36 (10.17)	51.38 (9.73)	114.09 (19.83)
Type D	58.37 (10.68)	46.73 (9.14)	46.10 (8.98)	104.82 (18.12)

Emo: Emotional, Phy: Physical, Soc: Social, Tot: Total
Note. SD scores have been presented in parenthesis.

Further, *t*-tests were computed to examine whether type A and type D participants were significantly different in emotional, physical, social and total HRQoL. Results obtained from t-tests demonstrated that type A's significantly scored higher on all the dimensions of HRQoL i.e., emotional HRQoL: t (144) = 3.42, $p<.01$, d = .57; physical HRQoL: t (144) = 2.27, $p<.05$, d = .38; social HRQoL: t (144) = 3.41, $p<.01$, d = .56; and total HRQoL: t (144) = 2.95, $p<.01$, d = .49 as compared to type D participants.

Personality Types, Illness Cognition, and HRQoL

The remaining analyses tested the possibility of whether illness cognition could mediate or moderate the relationship between personality types and HRQoL. Baron and Kenny's (1986) procedures were followed for mediation analysis.

There was a partially mediated relationship between personality types and emotional HRQoL mediated by personal control; illness coherence partially mediated the relationship between personality types and emotional HRQoL; and timeline cyclic partially mediated the link between personality types and emotional HRQoL. Timeline cyclic was also found to be a partial mediator between personality types, social HRQoL, personality types and total HRQOL. Timeline cyclic fully mediated the relationship between personality types and physical HRQoL. Thus, overall results demonstrated that illness cognition is a partial mediator between personality types and HRQoL.

Table 3: Results obtained from the third condition of mediation

Variables 1) DV 2) IV 3) MV	B	SEB	β	β without mediator	R^2	F	Change in F
1) E HRQoL							
2) P Types	-.37	.18	-.18*	-.27**			
3) P Control	.19	.09	.19*				
					.10	8.21**	8.21**
1) E HRQoL							
2) P Types	-.60	.16	-.17**	-.27**			
3) I Coherence	-.16	.08	-.19*				
					.10	7.91**	7.91**
1) E HRQoL							
2) P Types	-.36	.16	-.20*	-.27**			
3) T Cyclic	-.28	.08	-.28**				
					.12	12.43**	12.43**
1) P HRQoL							
2) P Types	-.25	.17	-.12	-.19**			
3) T Cyclic	-.23	.08	-.23**				
					.08	6.40**	6.40**
1) S HRQoL							
2) P Types	-.44	.16	-.22**	-.27**			
3) T Cyclic	-.20	.08	-.20*				
					.11	8.99**	8.99 **
1) T HRQoL							
2) P Types	-.34	.16	-.17*	.24**			
3) T Cyclic	-.26	.08	-.26**				
					.12	9.62**	9.62**

*****p<.01, *p<.05***

DV: Dependent Variable, IV: Independent Variable, MV: Mediator Variable, E HRQoL: Emotional HRQoL: P Types: Personality Types, P Control: Personal Control, I coherence: Illness Coherence, T Cyclic: Timeline Cyclic, P HRQoL: Physical HRQoL, S HRQoL: Social HRQoL, T HRQoL: Total HRQoL

Discussion and Conclusion

The present study's results demonstrated that type A and type D personality types significantly differed on four dimensions of illness cognition: identity, perceived personal control over Illness, duration of the Illness (timeline cyclic), and perceived understanding of Illness (illness coherence). Participants with type A personality significantly scored higher on personal control and illness coherence dimensions than type D participants. Thus, type A personality participants perceived more personal control over their Illness as well as a better and more coherent understanding of Illness. Type D personality participants on the other hand scored low on these two dimensions. The possible explanation of this difference may be

attributed to the traits or characteristics that underlie type A and type D personality types. According to Smith and Gallo (2001), individuals with a particular personality type have a distinct and stable pattern of personality traits.

It has been reported that people with type A personality tend to exert control over their environment. As noted by Smith and Gallo (2001), overt behaviours of type A personality people exhibit a high motivation to exert control over the events occurring in the environment they live aggressively and assertively. Along with this, type A people have an exaggerated belief that they can control situations. They also believe that exerting control over the situation and others is the only coping strategy through which distress and problems in their life can be reduced. As discussed by Powell (1992), people with type A personality tend to exhibit a greater desire for control and the anger component in type A personality serves as a means to achieve this control. The other characteristics of type A personality such as, time urgency, impatience etc. also reflect their desire to control a challenging and uncontrollable situation. Thus, it can be concluded that a higher need for control among type A participants leads them to believe that they have higher personal control over Illness. Moreover, type A's tendency for a higher need for control over Illness might be an important factor in shaping the belief that they have a coherent understanding regarding their Illness. Thus, their illness coherence scores were higher than type D participants.

The present study results demonstrated that type D patients significantly perceived their Illness as highly cyclical compared to patients with type A personality. The clinical picture of type D personality shows that they lack assertiveness, are low in self-esteem, and feel insecure in social interactions (Denollet, Vaes & Brutsaert, 2001). Type D patients significantly scored low on the personal control dimension of illness cognition than type A personality, patients. This may be a reason why Type D patients perceived their Illness as cyclical or recurrent and attached more symptoms to their Illness than type A participants.

Type A and type D participants also differed regarding their perceived level of HRQoL. Type A participants were significantly high on all the dimensions of HRQoL i.e., emotional, physical, social, and total HRQoL as compared to type D participants. The difference in the perceived level of HRQoL between type A and type D participants may be attributed to Illness cognition. Results demonstrated that both personality types had different cognitions about their Illness. Type A participants perceived that they have more personal control over Illness as compared to type D participants. Along with this, type A's also perceived that they have a coherent understanding of Illness as compared to type D participants. This could be why type A participants reported better emotional, physical, social and total HRQoL than type D participants. Type D participants were high on the identity dimension of illness cognition and perceived their Illness as more cyclical as compared to type A participants. Thus, the difference in Illness cognition of type A and type D participants could have led to the difference in perception of HRQoL.

The results obtained from the present study imply that higher personal control and illness coherence is very important for perceiving better HRQoL. Belief in oneself to control the illness condition and a coherent understanding of Illness might give confidence to type A MI patients regarding what to do and what not to do in illness. It might also help type A patients maintain their confidence and deals with various adversities related to illness.

In general, it has been observed in many studies that type D personality is related to poorer HRQoL. Pedersen and Denollet (2003) suggest that type D personality may be crucial in

determining patients' quality of life. As noted by Pedersen and Denollet, in a follow-up study conducted after 5 years, the likelihood of perceiving poor health was two-fold higher among type D patients as compared to non-type D patients. Depression and type D personality were found as independent predictors of patients' poor quality of life (Denollet, Vaes & Brutsaert, 2000). Al-Ruzzeh et al. (2005) studied the HRQoL of patients who went through primarily isolated coronary artery bypass grafting after a year. They found that type D was an independent predictor of patients' physical and mental HRQoL along with other biomedical indicators. In the case of heart transplant patients, Pedersen et al. (2006) found that type D participants were more vulnerable to impaired quality of life than non-type D patients. Aquarius et al., (2007) conducted a follow-up study on patients with peripheral arterial disease with a gap of one year. They reported that type D participants' HRQoL was found poorer than other participants.

Illness cognition dimensions also mediated the relationship between personality types and perceived levels of HRQoL. The results demonstrated that individual differences in personality types impacted illness cognition and HRQoL perception in MI patients.

The present study was conducted on patients who were undergoing the treatment during their hospitalization. The present study could not test the long-term stability of type A and type D personality of participants during the post MI period and its influence on how they perceive their Illness and appraise their HRQoL. Some researchers have examined the stability of type D personality during eighteen months post-MI (Martens et al., 2007). Thus, future research can be carried out in this area where the assessment of personality and other variables can be assessed in a follow-up study after a specified period.

The present study's findings have important implications for the health management of MI patients. According to Donker (2000), patients of heart disease belong to a relatively heterogeneous group. Patients differ not only in terms of demographic factors (age and gender) but also in terms of psychological factors (perceived social support, perceived experience of Illness etc.), socio-economic status and biological factors (precision of diagnosis, type of coronary disease etc.). All these factors may be considered while designing any health management programme. The knowledge of personality type (type A and type D) can be considered as one of the potential psychological factors which may influence patients' attitudes towards health management programmes. Patients' attitudes towards health management programs may largely depend upon how they perceive their Illness and appraise different domains of life affected by illness. Generally, it has been reported that patients' illness models differ from those of health professionals' models. For example, Donker (2000) suggested that if cardiac rehabilitation considers only a 'medical model' then patients would perceive that they have no control over the causes of Illness and its cure. Research has also shown that patients' illness models play a very important role in influencing coping with illness, adaptation to illness and other aspects related to Illness (Gassner, Dunn, & Piller, 2002). The results of the present study suggest that health management programs for MI patients must take into account the psychological aspect associated with the disease such as, personality types and patients' cognition regarding their Illness along with other aspects. Individual personality differences can provide relevant guidelines for behaviour modification leading to effective health management of MI patients. The cognitive-behavioural intervention has been found effective in cardiac rehabilitation (Bennett and Carroll, 1994). The results of the present study imply that cognitive-behavioural intervention among MI patients can consider the fact that different personality types would understand their disease differently. However, this implication needs to be further investigated in intervention studies.

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