

Association between Type D personality, illness perception, and coping strategies in patients undergoing open-heart surgery

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Abstract

Backgrounds: A combination of social inhibition and negative affectivity characterizes Type D personality. Type D, or distressed personality, is an established risk factor for the development and prognosis of coronary heart disease. It occurs in approximately 1 in 4 patients with coronary heart disease. This study aimed to investigate the relationship between Type D personality, illness perception, and coping strategies in patients undergoing open-heart surgery.

Methods: This retrospective and cross-sectional study was conducted in a university hospital psychiatry and cardiovascular surgery clinics between February 2022 and April 2022. Seventy-one volunteered patients over the age of 18 who underwent open-heart surgery in the cardiovascular surgery clinic were included in the study. Cardiovascular surgeons recorded the sociodemographic and clinical data of the patients and referred them to the psychiatry clinic for further evaluation. Subsequently, patients underwent psychiatric evaluation and were assessed using the Type D Personality Scale, Coping Attitudes Assessment Scale, Hospital Anxiety and Depression Scale, and Illness Perception Questionnaire.

Results: According to this study, individuals with Type D personality tended to have higher scores on the Hospital Anxiety and Depression Scale. Analysis of the subdimensions of the Stress Coping Styles Scale revealed that individuals with Type D personalities showed a significantly lower optimistic approach and a considerably higher helpless approach. In terms of the subdimensions of the Illness Perception Questionnaire, it was found that individuals with Type D personality had a statistically lower treatment control approach and a statistically higher emotional representations approach.

Conclusions: Identifying Type D personality traits in patients undergoing open-heart surgery can help manage negative illness perceptions through effective coping mechanisms.

Abbreviations: DS_14 = Type D Personality Scale, HADS = Hospital Anxiety and Depression Scale, IPQ = Illness Perception Questionnaire, NA = negative affectivity, SCSS = Stress Coping Styles Scale, SI = social inhibition.

Keywords: anxiety, coping, depression, heart surgery, illness perception, Type D personality

1. Introduction

Open-heart surgery is a medical procedure that is typically performed to treat various heart conditions, such as coronary artery valvular diseases, congenital lesions, and transplantation. Although open-heart surgery can have positive therapeutic effects, it can also result in physical, emotional, and social changes in patients during the postoperative period. Studies have shown that patients who undergo open-heart surgery are likely to experience problems, such as anxiety, depression, sexual dysfunction, and loss of productivity.^[1]

It has been reported that female sex, age >35 years, low socioeconomic status, and low educational level can increase the risk of anxiety disorders in surgical patients. Additionally, low education levels and hospitalization for more than a week can be considered risk factors for depression.^[2] When patients are hospitalized, they may feel isolated from their relatives and work lives, which can lead to increased anxiety and depression if they fail to adapt to their situation. A patient's perception of their illness is important for helping them adapt to the situation.^[3]

Informed consent was obtained from all the participants.

The authors have no funding and conflicts of interest to disclose.

The datasets generated during and/or analyzed during the current study are publicly available.

This study complied with the ethical standards of the relevant national and institutional committees on human experimentation and the 1975 Declaration of Helsinki, as revised in 2008. This study was approved by the Clinical Research Ethics Committee of the Balikesir University (protocol number: 2022/26). This study was approved by the Balikesir University Medical Faculty Clinical Research Ethics Committee (Approval Date: February 23, 2022; Approval Number: 2022/26).

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How to cite this article: Dolapoglu N, Dolapoglu A, Tug T. Association between Type D personality, illness perception, and coping strategies in patients undergoing open-heart surgery. *Medicine* 2024;103:39(e39941).

Received: 25 June 2024 / Received in final form: 4 September 2024 / Accepted: 13 September 2024

<http://dx.doi.org/10.1097/MD.00000000000039941>

Illness perceptions are beliefs that patients develop when they experience an illness. This concept is based on the common-sense model, which suggests that individuals perceive the impact of their illness through 5 components: consequences (effects on life including emotional representation), timeline (duration of illness), control/cure (controllability and potential effects of treatment), identity (associated symptoms), and cause. This understanding leads to the perception that the disease is either manageable or threatening, which can affect a patient's ability to cope with the illness.^[4]

Patients who undergo open cardiac surgery can typically return home after approximately a week and resume all daily activities within 2 months at most. However, some patients may experience physical, emotional, or social changes postoperatively. Therefore, after discharge, patients must learn to balance the new postsurgery regulations with their activities of daily living. Coping strategies are essential to achieving this balance.^[5]

Coping refers to the cognitive and behavioral strategies used by a person to reduce or tolerate internal and external demands or conflicts between them. It is an essential skill that helps individuals handle stress, maintain psychological and physical well-being, and improve their overall quality of life.^[6]

Personality traits play a crucial role in determining an individual's stress levels and ability to cope with stress. People with Type D personalities are more prone to anxiety than the general population, tend to worry about insignificant things, and are more susceptible to depression. Furthermore, studies have revealed a link between Type D personality traits and cardiovascular diseases. Type D personality is 3 times more prevalent in patients with cardiovascular disease and is associated with a poorer prognosis.^[7] The study aimed to investigate the correlation between Type D personality traits, illness perceptions, and coping strategies in patients who underwent open-heart surgery.

2. Materials and methods

2.1. Study design and participants

This retrospective and cross-sectional study was conducted in a university hospital psychiatry and cardiovascular surgery clinics between February 2022 and April 2022. Seventy-one volunteered patients over the age of 18 who underwent open-heart surgery in the cardiovascular surgery clinic were included in the study. The sample size was calculated as a minimum of 71 patients using the Epi Info 7.2 program, assuming the prevalence was 22%, with a 5% margin of error ($P = .05$), and a 95% confidence interval.^[8] A random sampling method was used. Patients with mental retardation, delirium, dementia, and psychotic disorders that could affect cognitive abilities, patients who could not communicate verbally, and patients with previously diagnosed chronic psychiatric diseases were excluded from the study.

2.2. Ethical considerations

All procedures followed the ethical standards of the responsible committee on human experimentation (institutional and national) and the 1975 Helsinki Declaration, revised in 2008. Ethics committee approval was obtained from Balikesir University Clinical Research Ethics Committee on February 23, 2022 with the decision number 2022/26. Informed consent was obtained from all participants.

2.3. Clinical evaluation

Cardiovascular surgeons recorded the sociodemographic and clinical data of the patients and referred them to the psychiatry clinic for further evaluation. Subsequently, patients

underwent psychiatric evaluation and were assessed using the Type D Personality Scale (DS₁₄), Coping Attitudes Assessment Scale, Hospital Anxiety and Depression Scale (HADS), and Illness Perception Questionnaire (IPQ). The data on patients was collected in a face-to-face manner by the researchers. The gathered data were used to compare patients with and without Type D personality in terms of demographics, surgical data, subjective evaluations, coping methods, and illness perceptions.

2.4. Measures

2.4.1. Sociodemographic variables. Sociodemographic information was obtained from medical records or patient interviews. These included sex, age, educational level, marital status, and living conditions (living alone or with family). The clinical characteristics included comorbidities and length of hospital stay.

2.4.2. Type D Personality Scale (DS₁₄). The DS₁₄ was used to assess Type D personality and measure 2 stable personality traits: negative affectivity (NA) and social inhibition (SI). The questionnaire consisted of 14 items, with 7 items dedicated to each trait. Participants rated their personality on a 5-point Likert scale (0 = false, 1 = rather false, 2 = neutral, 3 = rather true, and 4 = true). The NA and SI scales were scored as continuous variables with a range of 0 to 28. To classify individuals as Type D, a cutoff of 10 on both scales was used (NA \geq 10 and SI \geq 10). The DS₁₄ is internally consistent (Cronbach alpha: NA/SI = 0.88/0.86) and stable (3-month test-retest reliability: NA/SI = 0.72/0.82).^[9] In a study on hemodialysis patients, the internal consistency coefficient of the Type D personality scale was found to be 0.82 and 0.81 for the 2 sub-assessment groups, respectively. It was concluded that the Type D personality scale is appropriate, valid, and reliable for determining Type D personality in Turkey.^[10]

2.4.3. The Hospital Anxiety and Depression Scale (HADS). The HADS was used to examine the discriminant validity of DS₁₄. It comprises 14 items, with 7 focused on anxiety and 7 on depression. Each item is rated on a 4-point scale, and the total score ranges from 0 to 21 for both anxiety and depression. A higher score indicates a more intense negative affect. Aydemir et al validated the Turkish version of the HAD, which has been used in various studies.^[11]

2.4.4. Illness Perception Questionnaire (IPQ). This questionnaire was originally developed by Weinman et al and revised by Moss-Morris et al. The IPQ-R consists of 3 dimensions: identity, illness representation, and causal representation. It includes 70 items.^[12] A reliability, and validity study of the Turkish adaptation was conducted by Kocaman et al. Identity dimension: this section contains 14 illness symptoms, and patients are asked to answer the questions "whether or not they have experienced the relevant symptom since their illness" and "whether or not they believe the symptom to be related to their illness." The Illness Representation Dimension consists of 7 subscales: timeline acute/chronic, consequences, personal control, treatment control, illness coherence, and timeline cyclical and emotional. It contained 38 items. Responses to each item were evaluated on a 5-point Likert-type scale ranging from "1 (strongly disagree) to "5 (strongly agree). The dimension scores were calculated by summing each subscale score and dividing this score by the number of items in that subscale.^[13]

2.4.5. Stress Coping Styles Scale (SCSS). Şahin et al tested the validity and reliability of the Turkish version. This self-report scale comprises 30 items and 4 options, with 5 subscales categorized as self-confident, optimistic, helpless, submissive, and social support-seeking. Self-confidence, optimism, and

social support-seeking approaches are positive coping styles, whereas helplessness and submissiveness are negative coping styles.^[14]

2.5. Analysis

Patient data were analyzed using IBM Statistical Package for the Social Sciences for Windows 23.0 (IBM Corp., Armonk, NY). Categorical data were expressed as frequencies and percentages, whereas continuous data were expressed as medians. The Mann–Whitney *U* test was used to compare groups, and the chi-square or Fisher exact test was used to compare categorical variables. Spearman correlation coefficient was used to examine the relationship between the scale scores. Results were considered statistically significant when the *P*-value was <.05.

3. Results

This study included 71 patients, of whom 60.6% (n = 43) were male and 39.4% (n = 28) were female. The median age of the patients was 61 years (range: 27–80 years). It was found that 32.3% of participants had a Type D personality structure. The demographic characteristics of the patients were analyzed based on their Type D personality trait status, and the results are presented in Table 1. No significant differences were observed in the demographic characteristics or Type D personality traits between the groups (*P* > .05).

The distribution of various factors, such as Type D personality traits, anxiety, depression, coping with stress, and illness perception questionnaire scores, among the patients is presented in Table 2.

In this study, individuals with Type D personality tended to score higher on the HADS as well as on all dimensions of the SCSS, except for optimistic approaches. Additionally, all subscale

scores on the IPQ, except for treatment control, were higher among individuals with Type D personality traits (*P* < .05). The correlations of the HADS, DS_14, SCSS, and IPQ subscores are presented in Table 3.

4. Discussion

According to this study, individuals with Type D personalities tended to score higher on the HADS. Upon examining the sub-dimensions of the SCSS, it was discovered that patients with Type D personalities exhibited a statistically lower optimistic approach and a statistically higher helpless approach. When the IPQ subdimensions are examined, individuals with Type D personality treatment control approaches were found to be statistically lower, while the emotional representations approach was found to be statistically higher.

Depression and anxiety are observed before and after the open-heart surgery. Anxiety symptoms may appear before surgery, whereas disability or loss of function can lead to depression and anxiety in the postoperative period.^[15] It is interesting to note that depression and anxiety disorders can also cause cardiovascular diseases and may complicate the postoperative period.^[16] A study conducted by Okamoto and Motomura used the HADS method 1 to 5 years after Coronary Artery Bypass Graft and found that 15.9% of individuals had anxiety and 20.2% had depression.^[17] However, these findings are not conclusive, as some studies reported that anxiety improved 3 to 6 months after surgery, while depression persisted for a longer period.^[18] This may be due to negative events and daily life problems as well as the influence of personality traits. Multiple studies have demonstrated that Type D personality can pose a significant risk for cardiovascular diseases and poor health status. Specifically, it is linked to heightened neuroendocrine function, which can increase the risk of coronary heart disease. Additionally, it was discovered that a Type D personality in

Table 1
Demographic and clinical characteristics of patients based on Type D personality scale scores.

Characteristics	Total (n = 71)	No-Type D personality (n = 48)	Having Type D personality (n = 23)	<i>P</i> -value
	n (%) Median (Min–Max)	n (%) Median (Min–Max)	n (%) Median (Min–Max)	
Age	61 (27–80)	60.5 (27–77)	63 (42–80)	.274
Gender				1.000
Male	43 (60.6)	29 (60.4)	14 (60.9)	
Woman	28 (39.4)	19 (39.6)	9 (39.1)	
Marital status				.051
Single	9 (12.7)	3 (6.3)	6 (26.1)	
Married	62 (87.3)	45 (93.8)	17 (73.9)	
Educational status				.739
Literate	7 (9.9)	6 (12.5)	1 (4.3)	
Primary school	42 (59.2)	28 (58.3)	14 (60.9)	
High school	16 (22.5)	10 (20.8)	6 (26.1)	
University	6 (8.5)	4 (8.3)	2 (8.7)	
Day after surgery	23 (10–480)	21.5 (10–480)	25 (12–150)	.966
Other chronic disease	36 (50.7)	20 (41.7)	16 (69.6)	.052
Diabetes mellitus	13 (18.3)	6 (12.5)	7 (30.4)	.100
Hypertension	9 (12.7)	6 (12.5)	3 (13)	1.000
Chronic obstructive pulmonary disease	2 (2.8)	0 (0)	2 (8.7)	.102
Colon CA	1 (1.4)	0 (0)	1 (4.3)	.324
Asthma	3 (4.2)	2 (4.2)	1 (4.3)	1.000
Hypothyroidism	1 (1.4)	0 (0)	1 (4.3)	.324
Other surgical experience	39 (54.9)	25 (52.1)	14 (60.9)	.659
Intensive care monitoring day	4 (2–30)	4 (2–30)	4 (2–14)	.990
Inpatient follow-up day	6 (1–30)	6 (1–30)	7 (2–25)	.467
Total follow-up time in hospital	10 (5–40)	10 (5–40)	11 (5–30)	.566

n = number of patients.

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Table 2
Distribution of HADS, SCSS, and IPQ subscores according to patients' Type D personality scale scores.

Characteristics	Total (n = 71)	No-Type D personality (n = 48)	Having Type D personality (n = 23)	P-value
	Median (Min–Max)	Median (Min–Max)	Median (Min–Max)	
HADS – Anxiety	4 (0–15)	2 (0–10)	8 (1–15)	<.001*
HADS – Depression	4 (0–17)	3 (0–17)	7 (0–15)	<.001*
DS_14 – Negative Affectivity	10 (0–28)	7.5 (0–19)	16 (10–28)	<.001*
DS_14 – Social Inhibition	8 (0–23)	7 (0–21)	16 (10–23)	<.001*
DS_14 – Total Score	19 (0–44)	15 (0–30)	30 (21–44)	<.001*
SCSS – Optimistic Approach	15 (5–20)	16 (5–20)	14 (9–20)	.044*
SCSS – Self-Confident Approach	21 (7–28)	21 (7–28)	19 (16–24)	.065
SCSS – Helpless Approach	20 (8–30)	18 (8–28)	22 (14–30)	.022*
SCSS – Submissive Approach	17 (6–22)	17 (6–22)	17 (11–22)	.526
SCSS – Social Support-Seeking approach	11 (4–16)	10.5 (4–16)	11 (7–14)	.075
IPQ – Timeline (Acute/Chronic)	17 (12–24)	17 (12–23)	17 (14–24)	.736
IPQ – Consequences	19 (6–25)	19 (6–25)	20 (16–25)	.058
IPQ – Personal Control	19 (6–29)	19.5 (6–29)	18 (14–24)	.090
IPQ – Treatment Control	17 (5–21)	17 (5–21)	16 (14–20)	.009*
IPQ – Illness Coherence	14 (5–23)	13.5 (5–23)	15 (10–20)	.079
IPQ – Timeline Cyclical	12 (4–20)	12 (4–20)	12 (8–17)	.809
IPQ – Emotional Representations	15 (6–28)	14 (6–28)	18 (10–25)	.018*

DS_14 = Type D Personality Scale, HADS = Hospital Anxiety and Depression Scale, IPQ = Illness Perception Questionnaire, n = number of patients, SCSS = Stress Coping Styles Scale.

*Indicates statistically significant ($P < .05$).

patients with myocardial infarction was significantly associated with illness perception and could potentially lead to adverse health outcomes.^[19] In our study, 32.3% of the participants exhibited a Type D personality structure. Individuals with Type D personalities tended to score higher on the HADS, consistent with existing literature.

It has been suggested that, when patients are asked about their perceptions of their illness, they may begin to believe that they have control over it. This can increase their knowledge, reduce the need for repeated hospitalizations, help them adapt better to lifestyle changes, and improve their quality of life. It is crucial to assess how patients with chronic cardiovascular disease perceive their illnesses. Adopting health-promoting behaviors is vital for managing chronic diseases and maintaining good health.^[20] In studies exploring the relationship between disease perception and disease progression, individuals with a high sense of internal control coped better with the disease and adhered to treatment.^[21] In our study, the IPQ subdimensions are examined, and individuals with Type D personality treatment control approaches were found to be statistically lower. In a multicenter study, significant differences in patients' perceptions of illness were observed between countries. Patients from Japan had the highest scores in treatment control, while patients from Taiwan had the lowest scores in treatment control.^[22] Considering the data from this study, it can be assumed that, in addition to patient characteristics, national culture, and general health system performance may also have a significant impact on the low treatment control approach, possibly through differences in illness perception in our study.

In another study describing illness perceptions in patients with Type D personality after myocardial infarction, Type D personality was positively associated with the “emotional representation” subscales.^[23] In our study, in line with this study, it was found that the Emotional Representations approach was statistically higher in patients with Type D personality disorder.

It is interesting to note that coping behaviors can significantly affect patients with myocardial infarction. Healthy psychological functions such as adaptive coping mechanisms can prevent atherogenic development.^[24] On the other hand, maladaptive coping strategies, like emotion and avoidance, may be linked to risk factors for cardiovascular disease, such as high blood

pressure, an unhealthy lifestyle, alcohol consumption, and a higher waist-to-hip ratio.^[25] In a study conducted on patients with chronic ischemic heart disease, there was a clear correlation between acute coronary incidents and maladaptive coping mechanisms.^[26] In our study, patients with Type D personalities exhibited a statistically lower optimistic approach and a statistically higher helpless approach.

However, it is important to consider the limitations of this study when interpreting these results. First, we used Type D personality as the measurement method to define personality types, without considering other personality types. Second, the functional status of patients included in the study was self-reported. Finally, patients with different degrees of operational risks were included in the study.

5. Conclusion

This study highlights how important it is to take into account patients' subjective experiences of their illnesses in addition to objective measures. Our study is among the few that have explored the correlation between Type D personality traits, illness perceptions, and coping mechanisms in patients who undergo open cardiac surgery. According to our findings, it is vital to focus on psychosocial research to identify effective coping mechanisms that can help manage personality traits resulting in negative perceptions of illness.

Acknowledgments

We thank the participants of this study.

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Table 3
The correlation between HADS, DS_14, SCSS, and IPQ Subscales.

Spearman rho*	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	
1. DS_14 – Negative Affectivity	ρ	1.000															
2. DS_14 – Social Inhibition	P	0.571	1.000														
3. HADS – Anxiety	ρ	<.001*	0.423	1.000													
4. HADS – Depression	P	<.001*	<.001*	0.706	1.000												
5. SCSS – Optimistic Approach	ρ	0.647	0.352	0.706	<.001*	1.000											
6. SCSS – Self-Confident Approach	P	<.001*	<.001*	<.001*	<.001*	0.756	1.000										
7. SCSS – Helpless Approach	ρ	0.473	0.25	0.255	0.216	0.352	0.003*	1.000									
8. SCSS – Submissive Approach	P	<.001*	0.036*	0.032*	0.070	0.032*	0.026	0.003*	1.000								
9. SCSS – Social Support-Seeking approach	ρ	0.096	0.027	0.034	-0.015	0.068	-0.183	0.49	1.000								
10. IPQ – Timeline (Acute/Chronic)	P	.426	.824	.778	.903	.573	.127	<.001*	0.110	-0.050	1.000						
11. IPQ – Consequences	ρ	0.044	0.242	0.030	-0.029	0.200	0.296	0.110	0.362	.681	0.328	1.000					
12. IPQ – Personal Control	P	.715	0.042*	.806	.810	.095	0.012*	0.101	-0.034	0.093	0.005*	0.005*	1.000				
13. IPQ – Illness Coherence	ρ	.375	.365	.640	.387	.122	.403	.778	.922	.443	0.328	0.328	0.328	1.000			
14. IPQ – Timeline Cyclical	P	0.191	0.105	0.091	0.037	-0.039	-0.022	0.37	0.257	0.210	0.031*	0.031*	0.031*	0.031*	1.000		
15. IPQ – Emotional Representations	P	.111	.383	.448	.758	.748	.853	0.001*	0.001*	.079	0.001*	0.001*	0.001*	0.001*	0.001*	1.000	
16. IPQ – Emotional Representations	ρ	-0.167	-0.203	-0.061	-0.107	0.201	0.174	0.038	-0.036	0.067	0.117	0.131	0.131	0.131	0.131	0.131	1.000
	P	.163	.089	.615	.374	.092	.148	.753	.767	.581	.330	.277	.277	.277	.277	.277	.277
	ρ	-0.255	-0.297	-0.096	-0.108	0.138	0.140	-0.212	-0.039	0.063	-0.124	-0.182	-0.182	-0.182	-0.182	-0.182	-0.182
	P	0.032*	0.012*	.424	.369	.252	.246	.076	.750	.604	.304	.129	.129	.129	.129	.129	.129
	ρ	0.059	0.167	0.070	0.013	-0.148	-0.100	0.149	0.178	0.061	0.107	0.236	0.236	0.236	0.236	0.236	0.236
	P	.627	.163	.564	.915	.217	.405	.214	.137	.616	.376	.995	.995	.995	.995	.995	.995
	ρ	0.081	-0.064	0.088	0.157	0.133	0.164	0.175	0.125	0.061	0.218	0.348	0.348	0.348	0.348	0.348	0.348
	P	.502	.596	.464	.191	.270	.171	.145	.297	.614	.068	.003*	.003*	.003*	.003*	.003*	.003*
	ρ	0.456	0.051	0.575	0.599	-0.262	-0.254	0.175	0.081	-0.034	-0.181	0.226	0.226	0.226	0.226	0.226	0.226
	P	<.001*	.673	<.001*	<.001*	0.028*	0.033*	.504	.504	.778	.131	.643	.643	.643	.643	.643	.643

DS_14 = Type D Personality Scale, HAD = Hospital Anxiety and Depression Scale, IPQ = Illness Perception Questionnaire, n = number of patients, SCSS = Stress Coping Styles Scale.
*Indicates statistically significant (P < .05), p = Spearman rho value.

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