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## Development of Healthcare Providers Perception of Heart Disease (HPPHD) Instrument and Assessment of Its Psychometric Properties

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### ABSTRACT

**Background:** People's perception of heart disease risk is effective in their response to disease, potential risks, decision making, and reduction of heart disease and is an important predictor of adopting healthy lifestyle behaviors. However, no tool is available to assess the risk of heart disease in Iran.

**Objectives:** This study aimed to develop an instrument for healthcare providers' perception of heart disease to be used in Iran.

**Materials and Methods:** This mixed-method study was conducted in three stages. In the first stage, the concept of healthcare providers' perception of the risk of heart disease was explained using the hybrid concept analysis method. In the second stage, the items of the instrument were developed using the results of the qualitative part, including eight interviews with healthcare providers and a review of the literature on the research problem. In the third stage, using a methodological study, the psychometric properties of the instrument were assessed using face validity, content validity (content validity ratio and content validity index), and exploratory factor analysis. Its reliability was also determined using Cronbach's alpha and test-retest methods. All data analyses were performed using the SPSS 21 software.

**Results:** After defining heart disease risk perception, a pool containing 30 items was extracted. After assessing the face validity and quantitative and qualitative content validity, the number of items was reduced to 28. The instrument was then distributed among 300 medical staff and the results of exploratory factor analysis showed that the instrument consisted of 27 items divided into four factors, namely "warning to avoid the risk", "risk of unhealthy lifestyle", "perceiving the risk of heart disease", and "perceiving the power to control the risk factors". These four factors explained 70.028% of the total variance of the instrument. The reliability of the instrument was confirmed using internal consistency ( $\alpha = 0.931$ ) and its stability was approved by the test-retest method ( $ICC = 0.8$ ).

**Conclusions:** Given the acceptable validity and reliability of the 27-item Healthcare Providers Perception of Heart Disease (HPPHD) instrument, it is recommended to be used.

### 1. Background

Heart disease is the leading cause of death and disability in the world (1). Heart disease is a class of diseases characterized by vascular or heart muscle involvement that is closely related to a person's lifestyle (2). A high prevalence of risk factors for heart disease has been reported in West Asian countries, including Iran (3). According to the Global

Burden of Disease Study (GBD), heart disease has been the cause of mortality in 40% of people and pathogenicity in 20 - 23% of Iranians (4). Reducing risk factors can reduce the risk of death from heart disease by up to 90% (4).

As heart disease progresses, treatment becomes almost impossible and patients will be at risk of sudden death from a heart attack. Therefore, having an understanding of the heart disease risk is important to adopt appropriate care behaviors to increase the chance of living without a heart disease risk (5, 6). As long as people do not perceive that they are exposed to heart disease, they will not engage in

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care and preventive behaviors (7). Perception of risk refers to an individual's belief about the probability of health threats (8) and is influenced by health information (5) and the individual's cultural attitudes and beliefs (9).

Up to now, few studies have been conducted on the relationship between choosing the right health behavior and perceiving the risk of heart disease (10-12). According to Mason et al. (2008), the way people interpret and respond to perceptions of risk in real life is different (13). This difference is greater in the case of heart disease and requires a greater awareness of the risk and understanding of the reality of the disease than people's perception of the risk in every moment of daily life (14). According to Aalto et al., people with higher levels of education have a lower understanding of the risk of heart disease compared to those with lower education levels (15). Moreover, it is important to promote risk perception in healthcare providers who are the key players in the provision of health services. The World Health Organization (WHO) has regarded healthcare providers as the most important input, the most strategic resource, and the backbone of the health system (16).

Given the significance of understanding the risk of heart disease for engaging in appropriate care behaviors in healthcare providers, access to tools with adequate psychometric properties to measure people's perception of the risk of heart disease is essential. Several instruments have already been developed in other countries to assess the risk of heart disease. Nonetheless, the available risk perception tools focus mainly on risk perception domains (high to low risk) or perceived concerns, self-efficacy, perceived sensitivity, and perceived health status (9, 15, 17-19). Since the perception of heart disease risk is influenced by cultural and indigenous issues of the society (9), the existing instruments are not much useful for assessing the perception of heart disease risk in Iranian healthcare providers. Furthermore, most of these instruments have not been developed and validated based on qualitative studies. Hence, many aspects of people's insights and experiences in natural real-life settings have remained undiscovered.

## 2. Objectives

This study aims to develop the Healthcare Providers Perception of Heart Disease (HPPHD) Instrument and to assess its psychometric properties.

## 3. Patients and Methods

This exploratory sequential mixed-method study was conducted in 2019. Qualitative data were collected through in-depth semi-structured interviews with eight healthcare providers at Tehran University of Medical Sciences. The items for the initial draft of the instrument were developed using the results obtained from the qualitative stage and based on two related scales; i.e., the Perception of Risk of Heart Disease Scale (PRHDS) (17) and the Perceptions of Coronary Heart Disease Scale (PCS) (9).

To qualitatively assess the validity of the instrument, the correct use of Persian grammar, word choice, item placement, proper scoring, time required to complete the developed instrument, and the appropriateness of the selected domain were reviewed several times by 10 experts

and the necessary modifications were made.

To assess the quantitative face validity of the instrument, the item impact index was calculated with the help of 10 members of the target group using a five-point Likert scale (very important, important, moderately important, slightly important, and not important). The items with an impact score above 1.5 were acceptable and were retained for the next steps (20).

To calculate the Content Validity Ratio (CVR), 10 experts (cardiologists and nurses) were requested to assess each item on a three-point scale (necessary, useful but necessary, and not necessary) and the CVR was calculated using the following equation:

$$CVR = \left[ \frac{ne - N/2}{N/2} \right]$$

Where *ne* denoted the number of the reviewers who considered an item to be necessary and *N* showed the total number of reviewers (21). The items with  $CVR < 0.62$  were removed.

To measure the Content Validity Index (CVI), 10 experts were asked to assess each item using a four-point scale ranging from one (not relevant) to four (very relevant). The CVI was calculated as the ratio of the items that were assigned three or four scores by the experts. The items with a score above 0.79 were retained in the instrument (22).

The initial questionnaire was developed with 30 items and was evaluated based on a five-point Likert scale (strongly agree, agree, neither agree nor disagree, disagree, and strongly disagree). For qualitative face validity, most of the items were revised and edited through discussions and exchange of ideas. Based on the results, all items were suitable for assessing the content validity of the instrument. In the psychometric properties assessment stage, two items were modified and three items with impact scores  $< 1.5$ , two items with  $CVR < 0.62$ , and two items with  $CVI < 0.75$  were removed. Therefore, 28 terms were retained in the questionnaire.

### 3.1. Statistical Section

To assess the construct validity of the instrument, Principal Component Analysis (PCA) by varimax rotation was used among 300 medical staff. A factor load of at least 0.4 was set as the cut-off point for accepting the items. Cronbach's alpha was used to evaluate the internal consistency of the instrument. Accordingly, alpha values greater than 0.7 represented the good reliability of the instrument. The external consistency was measured using the test-retest method with a two-week interval (with 50 medical staff). The scores obtained in the two administrations of the instrument were compared using the Intra-class Correlation Coefficient (ICC) as a measure of an instrument's degree of stability. ICCs  $> 0.80$  indicated acceptable consistency (23). It should be noted that a total of 5-10 participants were recommended for analysis of each item in the instrument (24). All data analyses were performed using the SPSS 21 software and the significance level was set at 0.05.

This study was approved by the Ethics Committee of Tehran University of Medical Sciences. Before conducting the study, the participants were informed about the objectives and significance of the study and their informed consent forms were obtained. Besides, the participants were

assured that their information would be used solely in line with the objectives of the study. They were also told that they could withdraw from the study at any stage.

#### 4. Results

The instrument was distributed among 300 medical staff, including nurses (n = 234), midwives (n = 26), and physicians (n = 40). The mean age of the participants was  $39.24 \pm 8.06$  years. Besides, 162 participants (52.9%) were female and 138 ones (45.1%) were male.

To assess the construct validity of the instrument, exploratory factor analysis was performed on 28 items. The Kaiser-Meyer-Olkin (KMO) value was 0.925, indicating the adequacy of sampling for factor analysis. Moreover, Bartlett's test of sphericity showed the acceptable performance of factor analysis according to the significant correlation matrix value ( $P = 0.001$ ), as shown in Table 1.

Factor analysis was performed on the 28-item questionnaire. Considering a factor load of greater than 0.4, four factors related to 27 items were extracted after performing the PCA by varimax rotation (Figure 1).

After assessing the internal consistency of the items, four factors that had high eigenvalues and explained 70.028% of the total variance were identified (Table 2).

The Cronbach's alpha value for the whole instrument was 0.931. The Cronbach's alpha values for all subscales have been presented in Table 3.

The external consistency of the instrument was assessed using the test-retest method with a two-week interval. The ICC was equal to 0.8, indicating the optimal consistency of the scale. There was also a significant agreement ( $P > 0.001$ ) between the two sets of scores obtained from the two administrations of the questionnaire, confirming the repeatability of the instrument and its subscales and supporting the high consistency of the instrument in assessing the perception of the risk of heart disease from the perspective of healthcare providers.

**Table 1.** Factor Analysis: Kaiser-Meyer-Olkin (KMO) and Bartlett's Test of Sphericity

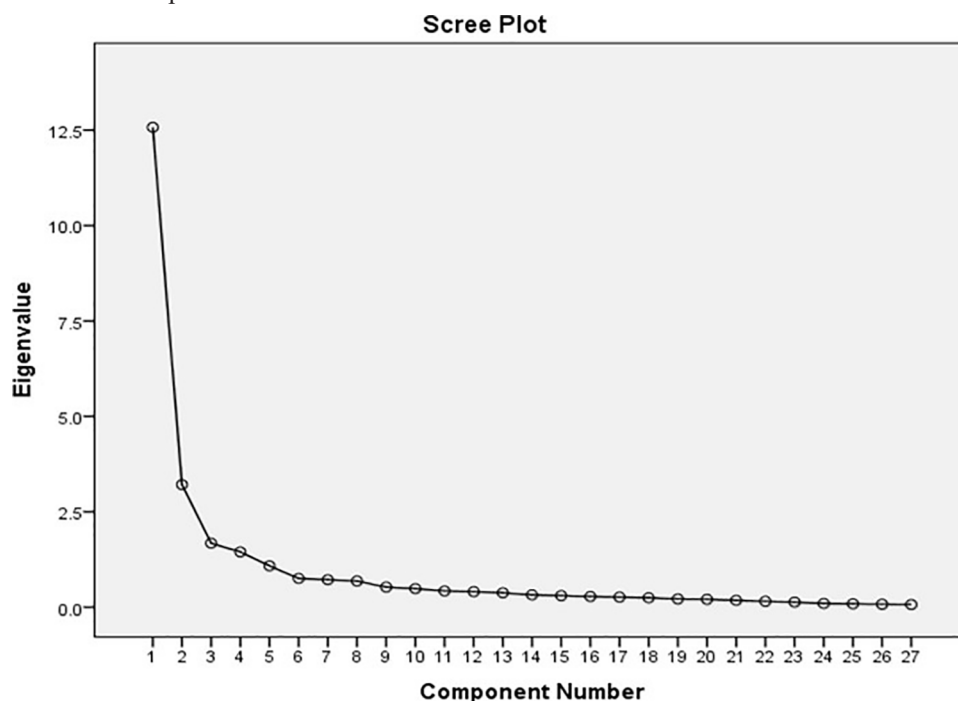
KMO Value	0.925
Chi-square approximation	7371.912
Sig.	0.001

#### 5. Discussion

The present study focused on item development using the hybrid concept analysis method, which consisted of two deductive and inductive methods. However, the PCS (Chan, 2014) was developed based on a purely inductive method (9). Given that the perception of risk of heart disease is influenced by cultural and local issues of any society, in addition to reviewing the literature, in-depth review of lived experiences of healthcare providers via a qualitative approach is essential to develop a questionnaire.

In the present study, the first subscale of the instrument was "warning to avoid the risk", which had the highest load factor. The risk factors that predispose a person to different types of heart disease include a set of factors related to lifestyle and situations that threaten the heart's health, and not paying attention to them endangers a person's health (25, 26). Therefore, in the recent decades, identifying and avoiding the situations that threaten the heart's health have become one of the important topics in the management and prevention of cardiovascular diseases.

The second subscale was "risk of an unhealthy lifestyle", which addressed the important role of activity, environmental stress, and diet in the development and progression of heart disease. Numerous studies have pointed to the role of environmental and occupational stressors in the incidence and exacerbation of heart disease (27, 28). Ekelund et al. also conducted a systematic review and reported the key role of inadequate activity and sedentary lifestyle in the development of heart disease, especially in young people (29). In addition, various studies have revealed unhealthy



**Figure 1.** The Scree Plot for Exploratory Factor Analysis

**Table 2.** The Factors Identified through the Rotated Matrix of the Instrument Components

Number	Item	Factor Load	Factor (Variance)	
1	Any risk that threatens the health of the heart can threaten the health of the whole body.	0.795	Factor 1: Warning to avoid the risk Variance: 46.56	
6	I need more resources to access information about heart disease.	0.575		
10	I am at risk of heart disease because of my stressful environment.	0.577		
11	I am at risk of heart disease because I am exposed to pollutants and cigarette smoke.	0.531		
14	I know the situations that threaten the heart's health.	0.766		
15	I avoid the situations that threaten my heart's health.	0.898		
18	I reduce the risk of heart disease by improving my lifestyle.	0.797		
19	My body is strong enough to fight heart disease.	0.506		
20	Excessive salt intake in the diet puts me at risk of heart disease.	0.873		
21	Excessive consumption of solid oils puts me at risk of heart disease.	0.873		
22	Excessive consumption of red meat puts me at risk of heart disease.	0.895		
23	Using canned food in my diet puts me at risk of heart disease.	0.650		
24	I am not at risk of heart disease because I take regular medical checkups.	0.749	Factor 2: Risk of an unhealthy lifestyle Variance: 11.89	
25	Not eating fruits and vegetables puts me at risk of heart disease.	0.915		
26	Eating too much sugar exposes me to heart disease.	0.928		
27	Having a sedentary lifestyle puts me at risk of heart disease.	0.955		
28	I am not at risk of heart disease because I do not have underlying diseases, such as diabetes and hypertension.	0.819		
7	I'm worried about developing heart disease because I cannot control the environmental stress.	0.820		
8	I am at risk of heart disease because I am not active enough.	0.703		
9	I am at risk of heart disease because I do not have a healthy diet.	0.757		
2	I am not at risk of heart disease because I have no signs or symptoms.	0.624		
3	I have a healthy body and I am not at risk of heart disease.	0.790		
4	Because no one in my family has heart disease, I am not at risk.	0.874		
5	The reasons for the risk of heart disease are unknown to me.	0.749	Factor 3: Perceiving the risk of developing heart disease Variance: 6.21	
12	I can prevent heart disease.	0.810		
13	I can reduce the risk of heart disease.	0.501		
17	I can control many of the risk factors for heart disease.	0.708		
				Factor 4: Perceiving the power to control the risk factors Variance: 5.36

**Table 3.** Cronbach's Alpha Values for the Instrument Subscales

No.	Subscale	Items and Their Number	Cronbach's Alpha	ICC
1	Warning to avoid the risk	17 items (1, 6, 10, 11, 14, 15, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28)	0.963	0.8
2	Risk of an unhealthy lifestyle	3 items (7, 8, 9)	0.752	
3	Perceiving the risk of developing heart disease	4 items (2, 3, 4, 5)	0.789	
4	Perceiving the power to control the risk factors	3 items (12, 13, 17)	0.539	
<b>Total</b>		27 items	0.931	

Abbreviations: ICC, intra-class correlation coefficient.

diet as a factor affecting the incidence and exacerbation of heart disease, especially atherosclerosis (30-32).

The third subscale was "perceiving the risk of developing heart disease", which addressed misconceptions about the risk of heart disease. Although hereditary factors play a critical role in the development of heart disease, all people are at risk of this disease. Thus, lack of a family history of heart disease is not a reliable factor in this regard.

The fourth subscale was "perceiving the power to control the risk factors", which suggested that many situations that threaten the heart's health can be identified and avoided. Khan et al. demonstrated that knowledge about the modifiable risk factors for heart disease was an important factor in reducing the incidence of this group of diseases

(33). Furthermore, Hajar found that recognizing the cardiac risk factors could enhance individuals' ability to assess heart disease risk-inducing situations (34). High blood cholesterol, overweight, obesity, poor diet, hypertension, high blood sugar, smoking, dietary misconceptions, lack of physical activity, and stress were some of the controllable factors that could expose a person to cardiovascular diseases (35).

In conclusion, the HPPHD Instrument was developed in the present study. It contained 27 items that were developed and validated by exploring the lived experiences of healthcare providers through in-depth and qualitative investigations. The instrument showed good reliability and validity and, consequently, could be used easily by nurses, physicians, and midwives.



### 5.1. Informed Consent

The participants were informed about the objectives and significance of the study and their informed consent forms were obtained. Besides, the participants were assured that their information would be used solely in line with the objectives of the study. They were also told that they could withdraw from the study at any stage. The original file has been attached.

### 5.2. Ethical Approval

IR.TUMS.FNM.REC.1396.3237

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### Authors' Contribution

M.Z. and A.E. designed the study and collected the data. N.S. and M.Sh. analyzed the data. M.Sh. wrote the article. The manuscript was read and approved by all the authors.

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The authors have no financial interests related to the material in the manuscript.

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