

A Systematic Review of the Instruments Used for Evaluating Causal Beliefs and Perceived Heart Risk Factors

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Abstract

Background: The etiologies and causal beliefs of heart disease are considered one of the 5 dimensions of health self-regulatory model. Thus, the present study aimed to review the literature and screen the appropriate tools for evaluating the causal beliefs and perceived heart risk factors (PHRFs).

Methods: The review samples encompassed all published articles from 1992 to March 2017. A systematic search was conducted across 6 databases: the Web of Science, Scopus, Medline, EBSCO, ProQuest, PsycINFO, and Google Scholar. The qualitative evaluation of the articles was examined using the checklists of the Critical Appraisal Skills Programme (CASP) by 2 independent investigators. After the application of the criteria for inclusion in the study, 22 studies were obtained according to the PRISMA guidelines.

Results: A total of 10 504 (50.5% male) patients at an average age of 57.85 ± 10.75 years participated in 22 studies under review. The results of the systematic review showed that 22 tools were available to measure PHRFs. The instruments were categorized into 4 groups of valid scales (6 studies), invalid questionnaires (6 studies), checklists (3 studies), and open-ended single items (7 studies). Only 23.2% of the measuring instruments were sufficiently valid.

Conclusion: The results of this systematic review showed that a limited number of valid tools were available to measure PHRFs. Considering the importance of studying cardiac patients' perception of the etiology of disease and the paucity of standards and valid grading scales, it seems necessary to design and provide tools with broader content that can cover all aspects of patients' beliefs.

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Introduction

Cardiovascular diseases (CVDs) are deemed a prevalent chronic disease and the main cause of mortality worldwide. The incidence of these diseases is on the rise dramatically, placing millions of people at risk.¹ Cardiac risk factors are classed as modifiable such as aging and genetics and non-modifiable such as unhealthy nutrition, obesity, hyperlipidemia, hypertension, diabetes, smoking, substance abuse, and stress.¹ Recent reports suggest that an individual's beliefs regarding the possibility of facing a health threat and perception of risk factors of the disease are effective in adopting a healthy lifestyle.^{2, 3} Misconceptions about CVDs and its risk factors increase the incidence of negative outcomes and re-admission.⁴

Patients' cognitions, including their perception of all the phases of the disease, have an undeniable effect on change in individualized behaviors and the progression of the disease.⁵ According to the health belief model, patients' cognitions and attitudes are regarded as the independent predictors of health behaviors.⁶ Perceived heart risk factors (PHRFs) constitute a component of the psychological representation of the disease and have a major role in the future lifestyle of patients.^{7, 8} Although it appears that there is a relationship between patients' perception and actual risk factors,⁷ between 55% and 99% of them lack a comprehensive perception of risk factors,¹ leading to poor perceptions and lack of proportion between perceived and actual risk factors. This issue increases the rate of the possible negative outcomes of the disease.^{2, 8}

The aforementioned issues can be organized concerning causal beliefs and perceived risk factors in the framework of a self-regulatory model.⁹ According to the health-related model, patients form cognitive impressions relating to their symptoms and treatment through processing information about their past and present experiences in their social context.¹⁰ Based on this model, the perception of the disease comprises 5 dimensions: identification, cause or etiology (patients' beliefs about the causes of the disease), timeline, consequences, and cure-control.⁴ The second dimension incorporates the perceived etiology of the disease and assesses the etiological beliefs and perceived risk factors. Although all the dimensions of this model can be evaluated by various formats of the Illness Perception Questionnaire,^{11, 12} it appears that more comprehensive independent instruments are needed to measure the etiological dimension. In recent years, some researchers have made an effort to fill this gap and design instruments relevant to cardiac etiological beliefs. Given the effect of patients' perception of the etiologies of CVDs in the control of symptoms,⁸ the present study aimed to systematically review the literature and screen the instruments used for evaluating PHRFs.

Methods

Data Sources

The statistical population of this study was comprised of all published articles from January 1992 to March 2017. A systematic search was conducted across 6 databases: the Web of Science, Scopus, Medline, EBSCO, ProQuest, PsycINFO, and Google Scholar.

Search Strategy

All the electronic databases were searched using specific search terms. The search terms selected were based on the mentioned keywords in previous related systematic reviews.¹³ The search in title/abstract was carried out using the keywords of ["Assess" OR "measure" OR "scale" OR "questionnaire" OR "inventory" OR "checklist" OR "list" OR "single item" OR "open-ended question"] (AND) ["Cause" OR "etiology" OR "belief" OR "attribution" OR "attitude" OR "percept" OR "explanation" OR "knowledge" OR "cognition"] (AND) ["Heart illness" OR "cardiac condition" OR "cardiovascular disease" OR "coronary artery disease" OR "coronary heart disease" OR "myocardial infarction" OR "percutaneous coronary intervention" OR "coronary artery bypass graft" OR "acute coronary syndrome" OR "cardiac disorder" OR "cardiac rehabilitation" OR "heart patients"] (AND) ["Adult" OR "adults" OR "men" OR "women" OR "male" OR "female" OR "population"]. The inclusion criteria consisted of studies in the English language on at least 1 of the PHRFs conducted between 1992 and 2017, review studies, meta-analyses, and studies incorporating only cardiac causal attributions. Qualitative studies, unstructured interviews, abstracts, and articles that we did not have access to their full text were excluded. Flow Diagram 1 summarizes the study inclusion process based on the PRISMA guideline.

Quality Assessment

The evaluation of the quality of the studies was done using checklists of the Critical Appraisal Skills Programme (CASP). The checklists examined the quality of study types, including cross-sectional, case-control, causal-comparative, correlation, and clinical trials.¹⁴ The qualitative evaluation of the articles was carried out by 2 independent investigators from the research team members separately. In the case of disagreement between the 2 researchers, the disagreement was resolved through a joint discussion between them.

Data Extraction

Initially, a data extraction table was designed to record the obtained information. After the qualitative evaluation of the studies, the findings of each study were entered

into the data entry form. The procedure of data synthesis in the current study was as follows: precise tabulation and description of each study results, organization of the studies based on the use of an original instrument, exploration of the

difference between the studies on the used tools (standard or nonstandard questionnaires, checklists, and open-ended single items).

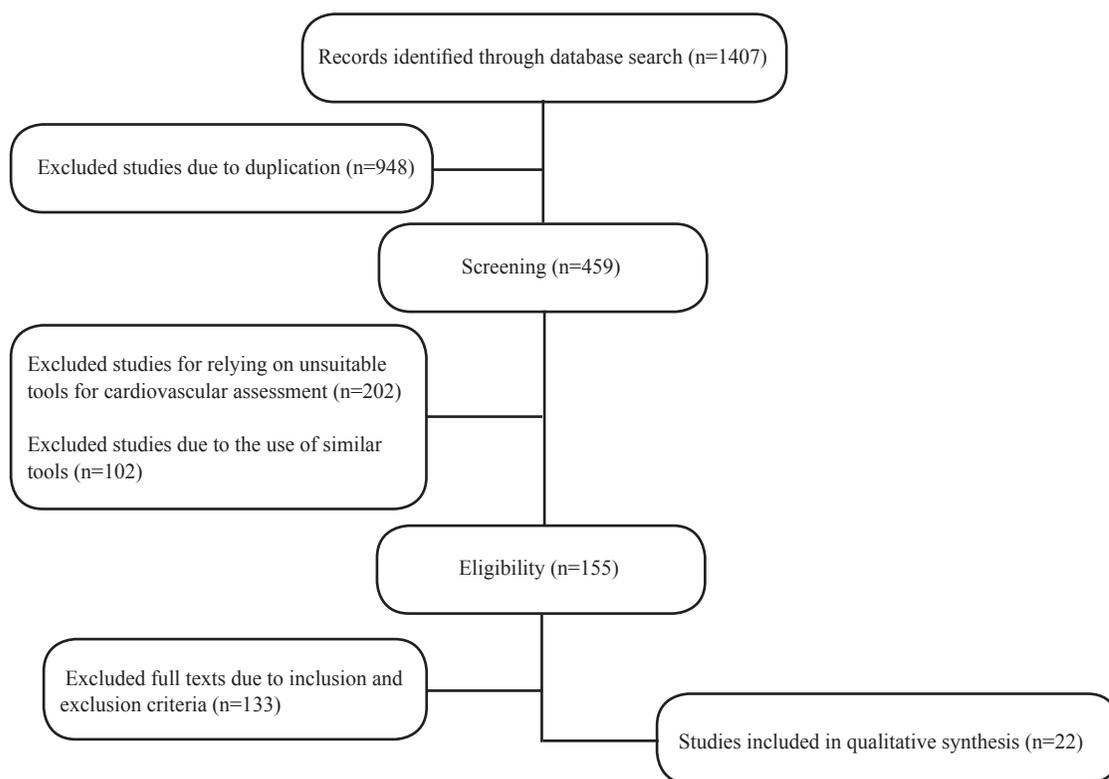


Figure 1. Flow diagram of the selection process of the studies based on the PRISMA

Table 1. Scales related to perceived heart risk factors (PHRFs)

Authors (Date), Location	Sample (Sex)	Age (mean±SD)	Instrument	Items (subscales)	Scoring	Reliability	Validity
Saeidi & Komasi (2017), Iran ¹⁵	121 cardiac patients (85 male)	58.8±9.7	Perceived Heart Risk Factors Scale (PHRFS)	Total: 25 items a) Biological (3) b) Environmental (5) c) Behavioral (6) d) Psychological (7) e) Physiological (4)	never=0 little=1 somewhat=2 a lot=3 extreme=4	Cronbach's alpha	a) Content validity b) Principal factors analysis
Perkins-Porras et al (2008), England ²¹	177 patients with acute coronary syndrome (138 male)	59.6±11.3	Causal Beliefs Questionnaire	Total: 13 items a) Stress and emotional state (5) b) Behavioral and clinical risk factors (6) c) Heredity (2)	no=0 maybe=1 yes=2	Cronbach's alpha	a) Content validity b) Principal components analysis
Gholizadeh et al (2013), Iran & Australia ¹⁶	121 cardiac patients (All female)	54.0±14.3	CHD Causal Attributions Questionnaire	11 possible CHD risk factors	a 10-point Likert type scale ranging from 1 (very unlikely) to 10 (very likely)	Cronbach's alpha	Content validity
Bowlin et al (1996), USA ³⁰	628 population-based probability samples (282 male)	45.5	Behavioral Risk Factor Surveillance System (BRFSS)	6 risk factors for CVD	No=0 Yes=1	Retest reliability	a) Concordance validity b) contrast validity



Stafford et al (2008), Australia ¹⁷	193 patients with coronary artery disease (156 male)	64.1±10.4	Revised Illness Perception Questionnaire (IPQ-R)	18-item causal attribution subscale of IPQ-R a) stress b) heredity or biological factors c) lifestyle factors	Uncertain/ disagree and strongly disagree=0 Strongly agree/ agree=1	a) Cronbach's alpha b) Retest reliability*	a) Discriminate validity b) Principal components analyses*
Claassen et al (2010), Netherlands ²²	81 people diagnosed with Familial Hypercholesterolemia (39 male)	48.0±16.0	CVD Causal Beliefs Questionnaire	A list of 20 possible causes of CVD based on the IPQ-R: a) Heredity b) Unhealthy lifestyle	The scale ranging from definitely not (1) to definitely (5)	a) Cronbach's alpha b) Retest reliability	a) Discriminate validity b) Principal components analyses
Low et al (1993), USA ³¹	73 post-myocardial infarction patients (All female)	53.7±8.5	Single Item of CHD Causal Attributions	An open-ended question about the cause of illness: a) personal behavior b) stress c) blaming spouse or family d) luck e) heredity	low=1 moderate=2 high rating=3	Inter-rater agreement	Not reported
Arefjord et al (2002), Norway ²³	37 wives of cardiac patients (All female)	53.3±7.5	MI Causal Attribution Checklist	12 specified causes: a) Medical cause B) Lifestyle cause C) Stress cause	Not present=0 Present=1	Inter-rater agreement	Not reported
Fukuoka et al (2004), Japan ¹⁸	155 patients with acute myocardial infarction (134 male)	62.0±11.0	A semi-structured interview toward Causal attribution of AMI	2 open-ended questions: a) The attitude of the individual about the underlying cause of the disease b) A list of 3 possible causes from most to least likely	Not reported	Not reported	Not reported
Reges et al (2011), Israel ²⁴	178 patients with acute myocardial infarction (155 male)	55.6±11.0	AMI Causal Attribution Checklist	A list of 13 possible contributing factors a) Conventional risk factors (8) b) Psychosocial risk factors (5)	Yes or no, Other or don't know	Not reported	Not reported
Naea de Valle & Norman (1992), UK ²⁵	81 male pre-operative coronary artery bypass graft (All male)	59.0	Causal Beliefs Questionnaire	A list of 21 possible causes of CHD	no=1 might have=2 Yes=3	Not reported	Not reported
Bennett et al (2016), USA ³²	209 cardiac rehabilitation patients (137 male)	62.5±11.1	Single Item of Cardiac Attributions	An open-ended question: The attitude of the individual about the underlying cause of the disease	Not reported	Not reported	Not reported
French et al (2002), England ²⁶	107 adults and 134 medical students Group 1: The ratio of men to women is 2 to 1. Group 2: Unspecified	Group 1: 40 to 60 years Group 2: none (Unreported mean age)	MI Causal Beliefs Questionnaire	9 factors in the causation of MI	The scale ranging from Disagree (1) to strongly agree (5)	Not reported	Not reported

Palmquist et al (2012), USA ³³	497 adults (225 male)	18 to 75 years (Unreported mean age)	Folk Illness Beliefs Scale	a) A list of 7 widely-accepted risk factors b) Six folk illness concepts as risk factors	The scale ranging from not important (1) to very important (4)	Not reported	Not reported
Day et al (2005), USA ³⁴	69 patients with ischemic heart disease (43 male)	63.0±10.0	Heart Disease Attributions Checklist	A multiple-choice checklist of 23 possible causes: a) biomedical attribution b) behavioral attribution c) negative emotions attribution	Yes or no	Not reported	Not reported
Dunkel et al (2011), Germany ²⁷	971 patients scheduled for bypass surgery (778 male)	66.8±9.0	Self-report Measure of Causal Attributions	Seven items adapted from the IPQ: (a) stress/mental load (b) my genes (c) health behavior (d) my personality (e) destiny or fate (f) environment (g) other causes	A 4-point scale with response options ranging from not true (1) to exactly true (4)	Not reported	Not reported
Murphy et al (2005), USA ²	260 acute myocardial infarction and coronary artery bypass graft patients (All female)	68.6±10.4	Single Item of CHD Causal Attributions	An open-ended question about the cause of illness: 9 factors in the causation of CHD	Not reported	Not reported	Not reported
Nguyen et al (2015), USA ³⁵	3407 adults participating in a nationally representative population-based survey (1384 male)	18 years and older (Unreported mean age)	Single Item of Casual Beliefs for Chronic Conditions	Two items regarding causal beliefs: a) behavioral attribution b) genetics and familial attribution	Not at all (%) A little (%) Somewhat (%) A lot (%)	Not reported	Not reported
Sanderson et al (2011), UK ²⁸	1,747 adults (826 male)	16 to 75 years (Unreported mean age)	Single Item of Causal Beliefs	An open question about The cause of develop heart disease or increase their chances of developing	Encode responses in 20 defined categories	Not reported	Not reported ^{±±}
Senior et al (2005), England ²⁹	340 adults with an inherited predisposition to premature coronary heart disease (156 male)	55.0±12.5	Causal attributions Scale for Heart Attack	Total: 9 items a) Controllability b) Stability c) Globality	7-point scale ranging from not at all important (0) to extremely important (6)	Not reported	Not reported
Saeidi et al (2015), Iran ¹⁹	775 Cardiac rehabilitation patients (519 male)	57.9±9.5	Open Single Item of Perceived Risk Factors	An open-ended question: The attitude of the individual about the cause of CVDs	Encode responses in 4 defined categories	Not reported	Not reported
Weinman et al (2000), New Zealand ²⁰	143 first-time MI patients (124 male)	53.2±8.4	Causal Attributions Scale	A list of 24 possible causes of MI	A 5-point scale from strongly disagree (1) to strongly agree (5)	Not reported	Not reported



Results

Search Output

According to the PRISMA guidelines, in the first step, a total of 1407 papers were identified. After the removal of duplicate records, unusable tools for cardiovascular assessment, and similar tools, 155 articles remained. In the next step, 133 reports were dropped due to the inclusion and exclusion criteria and finally, 22 articles remained in the study (Table 1).

A total of 10 504 (50.5% male) patients at an average age of 57.85 ± 10.75 years participated in these 22 studies. Six studies¹⁵⁻²⁰ were conducted in the Asia-Pacific region, 9 studies in Europe,²¹⁻²⁹ and 7 studies in the United States.^{2, 30-35} The target community in 14 studies was comprised of cardiac patients and in 8 studies consisted of nonclinical adults. Standard questionnaires were used in 6 studies and nonstandard instruments were used in another 6 studies. Additionally, 3 studies utilized a checklist and another 7 studies employed a single open-ended item to evaluate the samples. A summary of the studies and their findings are presented in Table 1.

Valid Questionnaires

Valid tools are standardized questionnaires with validity and reliability in a clinical population. The instruments used in the 6 studies were standard, and they had the required reliability and validity. These studies and instruments are listed below:

- I. *Perceived Heart Risk Factors Scale (PHRFS)*: The PHRFS is a 25-item self-report scale recently developed by Saeidi and Komasi.¹⁵ It consists of 5 subscales: biological (3 items), environmental (5 items), behavioral (6 items), psychological (7 items), and physiological risk factors (4 items). Each item is rated on a 5-point Likert-type scale (0= never to 4= very great), with higher scores indicating higher perceived risk factors. Standardization was done on a sample of Iranian patients. The PHRFS showed a moderate-to-good internal consistency (Cronbach's alpha for the total scale and subscales was 0.93, 0.63, 0.83, 0.82, 0.83, and 0.97, respectively), as well as good content and construct validity.
- II. *Causal Beliefs Questionnaire*: This 13-item questionnaire was designed by Perkins-Porras et al.²³ Earlier items were adapted from related studies based on the major categories described. Each item is rated on a 3-point scale: yes (=2), maybe (=1), and no (=0). It consists of 3 subscales: stress and emotional state (5 items: stress, state of mind, tiredness, working too hard, and overexertion), behavioral and clinical risk factors (6 items: overweight, poor diet, lack of exercise, high blood pressure, bad luck/chance, smoking), and heredity (2 items: inheritance and genetic factors). Cronbach's alpha for the subscales

is 0.77, 0.59, and 0.76, respectively. The validity of the questionnaire has been previously confirmed via principal component analysis.²¹

- III. *Coronary Heart Disease (CHD) Causal Attributions Questionnaire*: The questionnaire, which was designed by Gholizadeh et al,¹⁸ encompasses 11 possible CHD risk factors. The instrument rates each possible cause of CHD on a 10-point Likert type scale ranging from 1 (=very unlikely) to 10 (=very likely). The questionnaire shows good internal consistency ($\alpha=0.78$). The content validity of the questionnaire has been previously confirmed via the Lawsheh method.¹⁶
- IV. *Behavioral Risk Factor Surveillance System (BRFSS)*: The BRFSS questionnaire was prepared by Bowlin et al.³⁰ It measures 6 factors: hypertension, exercise, weight, height, tobacco use, blood cholesterol, and diabetes. The BRFSS items were taken from national surveys such as The National Health Interview Survey, The National Health and Nutrition Examination Survey, and The Centers for Disease Control. The reliability of self-reported cardiovascular disease risk factors has been previously confirmed (between 0.57 and 0.92) except for hypertension control status among individuals with hypertension ($k=0.44$). Furthermore, the value for cardiovascular risk factors has been previously approved by the method of combining telephone and clinic interviews. Thus, concordance and contrast validity have been confirmed for the instrument.
- V. *18-Item Causal Attribution Subscale of IPQ-R*: The scale, which was prepared by Stafford et al,¹⁷ was adapted from the Illness Perception Questionnaire-Revised (IPQ-R). The items consist of heredity, aging, stress or worry, diet or eating habits, my unhealthy behavior, smoking, overwork, family problems, my emotional state, alcohol, chance or bad luck, my mental attitude, poor medical care in the past, my personality, pollution in the environment, accident or injury, altered immunity, and a germ or virus. Responses to the 18-item causal attribution subscale are rated on a 3-point scale: strongly agree/agree (=1), uncertain/disagree (=0), and strongly disagree (=0). The instrument subscales consist of stress, heredity or biological factors, and lifestyle factors. The IPQ-R validity has been previously checked using principal component analyses, which verified the factorial structure of the questionnaire. Cronbach's alpha for the 18 items ranges between 0.23 and 0.86, and the retest reliability of the tool has also been previously confirmed.³⁶
- VI. *CVD Causal Beliefs Questionnaire*: Claassen et al²² adopted a list of 20 possible causes of CVDs based on the IPQ-R. The tool has 2 subscales relating to causal beliefs: heredity (2 items relating to heredity and predisposition) and unhealthy lifestyle (3 items relating to unhealthy diet, lack of exercise, and smoking). The scale ranges as definitely not (=1) to definitely (=5). The

internal consistency and retest reliability and validity of the instrument have been previously confirmed.³⁶

Invalid Questionnaires

These are tools for which no standardization has been reported. The instruments used in the 6 studies are listed below:

- I. *Causal Beliefs Questionnaire*: Naea de Valle and Norman²⁵ prepared a list of 21 possible causes of CHD. The content of the items in this checklist was adapted from previous studies. Patients' responses are graded on a 3-point response scale as no (=1), might have (=2), and yes (=3). Additionally, patients are allowed to point out factors outside the list.
- II. *Myocardial Infarction Causal Beliefs Questionnaire*: The questionnaire was devised by French et al.²⁶ The questionnaire encompasses 9 possible causes of myocardial infarction: stress or worry, eating fatty foods, chance or bad luck, high levels of cholesterol, smoking, lack of exercise, the type of work a person does or did, high blood pressure, and heredity. Responses are rated based on a 5-point scale: strongly agree (=5), agree (=4), neither agree nor disagree (=3), disagree (=2), strongly disagree (=1).
- III. *Folk Illness Beliefs Scale*: The scale was designed by Palmquist et al.³³ The scale presents a list of 7 widely-accepted risk factors, namely stress, age, alcohol use, smoking, diet, physical inactivity, and genetics, and 6 folk illness concepts as risk factors, namely fate, witchcraft, intestinal/bowel obstruction, fright, nerves, and evil eye. Responses are rated based on a 4-point scale and range from not important (=1) to very important (=4).
- IV. *Self-report Measure of Causal Attributions*: This self-report measure was prepared by Dunkel et al.²⁷ for assessing causal attributions. This 7-item measure was adopted from the IPQ. The evaluated causal attributions consist of stress/mental load, destiny or fate, my genes, my personality, health behavior (smoking, nutrition, and alcohol), environment (noise and pollution), and other causes. The items are completed on a 4-point scale with response options ranging from not true (=1) to exactly true (=4).
- V. *Causal Attributions Scale for Heart Attack*: Senior et al.²⁹ provided a 9-item scale to measure the causal attributions for a heart attack. The attributions comprise stress, my diet, smoking, genetics, lack of exercise, high blood pressure, my cholesterol level, fate, and chance. The scale consists of 3 dimensions: controllability, stability, and globality. Responses are recorded on a 7-point scale ranging from not at all important (=0) to extremely important (=6).
- VI. *Causal Attributions Scale*: The Weinman et al.²⁰ scale consists of a list of 24 possible causes of myocardial

infarction. The attributes are stress or worry, high levels of cholesterol, eating fatty foods, lack of exercise, heredity, high blood pressure, smoking, type of work, being overweight, overwork, family problems or worries, poor diet, overexertion, depression, arguing with people, my mental attitude, pollution in the environment, chance or bad luck, drinking too much alcohol, fate, listening to other people's problems, the way other people treat me, poor medical care in the past, and a germ or virus. Finally, responses are recorded on a 5-point scale ranging from strongly disagree (=1) to strongly agree (=5).

Checklists

The checklists used in the 3 studies are as follows:

- I. *Myocardial Infarction Causal Attribution Checklist*: This checklist is the only valid instrument among the checklists. Designed by Arefjord et al.,²³ the list incorporates 12 specified causes relating to myocardial infarction. Responses are encoded in 3 categories: medical causes (ie, angina, high blood pressure, previous myocardial infarction, age, and heredity), lifestyle causes (ie, smoking, diet, and lack of exercise), and stress causes (ie, general stress, being under tension at work, and time-limited strain). The answers are recorded as not present (=0) or present (=1). According to a previous study, the inter-rater agreement ($r=0.81$) of this checklist was good based on the rating done by 1 interviewer and 1 independent rater.
- II. *Acute Myocardial Infarction Causal Attribution Checklist*: The checklist was devised by Reges et al.²⁴ It is a list of 13 possible contributing factors to acute myocardial infarction. The checklist takes into account causal attributions, well-established conventional risk factors (ie, smoking, hyperlipidemia, diabetes, hypertension, overweight, lack of exercise, hereditary factors, and old age), and psychosocial risk factors (ie, stress/problems at home, stress/problems at work, general stress, traumatic life events, and strenuous physical work). Answers are recorded as no or yes. Additional options include "other" or "don't know".
- III. *Heart Disease Attributions Checklist*: The checklist, which was designed by Day et al.,³⁴ is a multiple-choice checklist of 23 possible causes. The instrument categories are comprised of biomedical (ie, genes, hyperlipidemia, hypertension, diabetes, aging, obesity, and other medical problems), behavioral (ie, lack of exercise, diet or eating habits, smoking, drug abuse, alcohol, nonadherence to medications, and surgery), and negative emotions attribution (ie, stress, anger, sadness, nervousness, fear, or loneliness, and social isolation). All responses are recorded as "no" or "yes".



Open-Ended Single Items

The open-ended questions and single items used in the 7 studies are as follows:

- I. *Single Item of CHD Causal Attributions*: It is an open-ended question about the causes of the illness designed by Low et al.³¹ The question is: "What do you think caused your heart attack?" First, responses are divided into 5 categories: personal behavior, stress, blaming the spouse or family, luck, and heredity. The inter-rater agreement for these ratings is 80%. In the next step, the grading is done based on a 3-point spectrum (low endorsement=1, moderate endorsement=2, and strong endorsement=3). At this stage, the inter-rater agreement for each category is between 0.79 and 0.87.
- II. *Open-ended Questions Related to Causal Attribution of Acute Myocardial Infarction*: Fukuoka et al¹⁸ provided this tool for assessing the causal attributions of acute myocardial infarction. The researchers assessed patients' causal attribution with 2 open-ended questions. The items were designed as "What do you think caused your heart attack?" and "Please list 3 possible causes of your heart attack from most to least likely." This tool has also been used in other studies.³⁷
- III. *Single Item of CHD Causal Attributions*: Murphy et al² prepared an open-ended question: "Why do you think you had these heart problems?" Responses are ticked off a checklist by the interviewer. The patients are also encouraged to give multiple etiologies: "Is there anything else?"
- IV. *Single Item of Casual Beliefs for Chronic Conditions*: Two items for assessing behavioral and genetics/familial attributions were prepared by Nguyen et al.³⁵ Patients are asked the question: "How much do you think health behaviors like diet, exercise, and smoking determine whether or not a person will develop heart disease?" Responses are encoded as not at all, a little, somewhat, and a lot. The researchers reported that behavioral causal beliefs for heart disease were significantly associated with attempted behavior change.
- V. *Single Item of Causal Beliefs*: Designed by Sanderson et al,²⁸ this tool asks patients "What do you think are the things that cause a person to develop heart disease or increase their chances of developing it?" Responses are then encoded on 20 defined categories.
- VI. *Single Item of Cardiac Attributions*: Bennett et al³² used an open-ended question ("If you had to pick 1 major cause for your heart condition, in your own words, what would that cause be?") to assess the attitude of individuals about the underlying cause of their disease.
- VII. *Open Single Item of Perceived Risk Factors*: Saeidi et al¹⁹ devised this tool to measure causal beliefs via an open single item of perceived risk factors. The item assesses the attitude of patients about the causes of CVDs

through the question: "What do you think is the main cause of your illness?" In the next step, patients' beliefs are grouped into 1 of 4 categories of CVD risk factors: biological, environmental, behavioral, and psychological. It is worthy of note that in subsequent studies by these researchers, a new class (physiological risk factors) was added to the previous classes.^{8,38}

Discussion

In the current study, we sought to systematically review the literature and screen appropriate instruments for the evaluation of PHRFs. The results of this systematic assessment indicated that 22 instruments were available to measure the etiological beliefs or PHRFs. Amongst them, we found only 6 valid questionnaires (23.2%).^{15-17, 21, 22, 30} One of the checklists²³ and 1 of the open-ended single items³¹ were relatively valid. The other instruments lacked adequate validation.

Valid questionnaires and instruments play an effective role in obtaining extracts of patients' information.³⁹ Valid instruments pose objective questions and scoring, save time via group performance, facilitate the evaluation process, control the researcher effect with their validated formats, and lower the possibility of error in the interpretation of data.³⁹ Despite their limitations, questionnaires help health specialists gain a better perception of patients' mental structure and cognition. Cardiac patients' perception of risk factors is considered to be the cognitive dimension of the etiology of CVDs.⁹ Various studies have assessed PHRFs; nonetheless, most of these investigations had limited access to a valid and appropriate instrument. One of the reasons that previous studies used open-ended questions is related to limited access to standard instruments. Moreover, most of the studies that have used checklists derived the risk factors from the previous related literature. The researchers who used checklists failed to present a report about standardization; in addition, the content of these checklists lack primary validity. In 2 studies,^{23,31} the evaluators agreed about a single item and 1 checklist, but they mentioned that the method failed to approve their validity absolutely. The validation of these instruments needs a scientific methodology in the field of measurement.³⁹

On the other hand, the invalid questionnaires used a wide range of items and scored responses.^{20, 25-27, 29, 33} The content of these items is generally derived from past studies, but their authors failed to present any report about the validity of these questionnaires. In contrast, the standard instruments covered this defect and reported the reliability and validity of the applied scales.^{15-17, 21, 22, 30} The reliability of 3 studies was concluded using Cronbach's alpha^{15, 16, 21} and in 1 study, the retest method.³⁰ Additionally, 2 studies reported Cronbach's alpha and the retest method simultaneously.^{17,22} Concerning

the validity, 1 study reported the validity of content16 and 2 studies reported the results of content validity and factor analysis simultaneously.^{15,21} Two other studies also reported the results of differential validity and factor analysis simultaneously.^{17,22} Finally, 1 study reported consistency and contrast validity of the applied instrument.³⁰

Conclusion

The results of this systematic review showed that a limited number of valid tools were available to measure PHRFs. The instruments were categorized into 4 classes: valid scales, invalid questionnaires, checklists, and open-ended single items. Considering the importance of studying cardiac patients' perception of the etiology of their disease and the dearth of standards and valid grading scales, it seems necessary to design and provide tools with broader content that can cover all aspects of patients' beliefs.

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References

1. Soroush A, Komasi S, Saeidi M, Heydarpour B, Carrozzino D, Fulcheri M, Marchettini P, Rabboni M, Compare A. Coronary artery bypass graft patients' perception about the risk factors of illness: educational necessities of second prevention. *Ann Card Anaesth* 2017;20:303-308.
2. Murphy B, Worcester M, Higgins R, Le Grande M, Larritt P, Goble A. Causal attributions for coronary heart disease among female cardiac patients. *J Cardiopulm Rehabil* 2005;25:135-143.
3. Emslie C. Women, men and coronary heart disease: a review of the qualitative literature. *J Adv Nurs* 2005;51:382-395.
4. Hagger MS, Koch S, Chatzisarantis NLD, Orbell S. The common sense model of self-regulation: meta-analysis and test of a process model. *Psychol Bull* 2017;143:1117-1154.
5. Hirani SP, Newman SP. Patients' beliefs about their cardiovascular disease. *Heart* 2005;91:1235-1239.
6. van der Wal MH, Jaarsma T, Moser DK, Veeger NJ, van Gilst WH, van Veldhuisen DJ. Compliance in heart failure patients: the importance of knowledge and beliefs. *Eur Heart J* 2006;27:434-440.
7. Perkins-Porras L, Whitehead DL, Steptoe A. Patients' beliefs about the causes of heart disease: relationships with risk factors, sex and socio-economic status. *Eur J Cardiovasc Prev Rehabil* 2006;13:724-730.
8. Saeidi M, Komasi S, Heydarpour B, Momeni K, Zakiei A. Those who perceive their disease as a physiological or psychological risk factor experience more anxiety at the beginning of the cardiac rehabilitation program. *Res Cardiovasc Med* 2016;5:e29291
9. Komasi S, Saeidi M. Presentation of new classification of perceived risk factors and etiologies of cardiovascular diseases. *ARYA Atheroscler* 2016;12:295-296.
10. Leventhal H, Meyer D, Nerenz D. The common sense representation of illness danger. In: Rachman S, ed. *Medical Psychology* New York: Pergamon. 1980. p. 7-30.
11. Broadbent E, Wilkes C, Koschwanez H, Weinman J, Norton S, Petrie KJ. A systematic review and meta-analysis of the Brief Illness Perception Questionnaire. *Psychol Health* 2015;30:1361-1385.
12. Leysen M, Nijs J, Meeus M, Paul van Wilgen C, Struyf F, Vermandel A, Kuppens K, Rousset NA. Clinimetric properties of illness perception questionnaire revised (IPQ-R) and brief illness perception questionnaire (Brief IPQ) in patients with musculoskeletal disorders: A systematic review. *Man Ther* 2015;20:10-17.
13. French DP, Senior V, Weinman J, Marteau TM. Causal attributions for heart disease: a systematic review. *Psychol Health* 2001;16:77-98.
14. Purssell E. Can the Critical Appraisal Skills Programme check-lists (CASP) be used alongside GRADE (Grading of Recommendations Assessment, Development and Evaluation) to improve transparency and decision-making? *J Adv Nurs* 2020;76:1082-1089.
15. Saeidi M, Komasi S. Reliability and validity of perceived heart risk factors scale. *Ann Card Anaesth* 2017;20:114-116.
16. Gholizadeh L, Salamonson Y, Heydari M, Davidson PM. Cardiac patients' causal attributions for coronary heart disease. *Int J Res Nurs* 2013;4:22-28.
17. Stafford L, Jackson HJ, Berk M. Illness beliefs about heart disease and adherence to secondary prevention regimens. *Psychosom Med* 2008;70:942-948.
18. Fukuoka Y, Dracup K, Kobayashi F, Ohno M, Froelicher ES, Hirayama H. Illness attribution among Japanese patients with acute myocardial infarction. *Heart Lung* 2004;33:146-153.
19. Saeidi M, Soroush A, Komasi S, Moemeni K, Heydarpour B. Attitudes toward cardiovascular disease risk factors among patients referred to a cardiac rehabilitation center: Importance of psychological attitudes. *Shiraz E-Med J* 2015;16:e22281.
20. Weinman J, Petrie KJ, Sharpe N, Walker S. Causal attributions in patients and spouses following first-time myocardial infarction and subsequent lifestyle changes. *British J Health Psychol* 2000;5:263-273.
21. Perkins-Porras L, Whitehead DL, Strike PC, Steptoe A. Causal beliefs, cardiac denial and pre-hospital delays following the onset of acute coronary syndromes. *J Behav Med* 2008;31:498-505.
22. Claassen L, Henneman L, Kindt I, Marteau TM, Timmermans DR. Perceived risk and representations of cardiovascular disease and preventive behaviour in people diagnosed with familial hypercholesterolemia: a cross-sectional questionnaire study. *J Health Psychol* 2010;15:33-43.
23. Arefjord K, Hallaråker E, Havik OE, Mæland JG. Illness understanding, causal attributions and emotional reactions in wives of myocardial infarction patients. *Psychol Psychother* 2002;75:101-114.
24. Reges O, Vilchinsky N, Leibowitz M, Manor D, Mosseri M, Kark JD. Perceptions of cause of illness in acute myocardial infarction patients: a longitudinal study. *Patient Educ Couns* 2011;85:e155-161.
25. Naea De Valle M, Norman P. Causal attributions, health locus of control beliefs and lifestyle changes among pre-operative coronary patients. *Psychol Health* 1992;7:201-211.
26. French DP, Marteau TM, Senior V, Weinman JA. Eliciting causal beliefs about heart attacks: a comparison of implicit and explicit methods. *J Health Psychol* 2002;7:433-444.
27. Dunkel A, Kendel F, Lehmkuhl E, Hetzer R, Regitz-Zagrosek V. Causal attributions among patients undergoing coronary artery bypass surgery: gender aspects and relation to depressive symptomatology. *J Behav Med* 2011;34:351-359.
28. Sanderson SC, Waller J, Humphries SE, Wardle J. Public awareness of genetic influence on chronic disease risk: are genetic and lifestyle causal beliefs compatible? *Public Health Genomics* 2011;14:290-297.



29. Senior V, Marteau T, Weinman J. Perceptions of control over heart disease in people with an inherited predisposition to raised cholesterol. *Psychol Health Med* 2005;10:16-30.
30. Bowlin SJ, Morrill BD, Nafziger AN, Lewis C, Pearson TA. Reliability and changes in validity of self-reported cardiovascular disease risk factors using dual response: the behavioral risk factor survey. *J Clinical Epidemiol* 1996;49:511-517.
31. Low KG, Thoresen CE, Pattillo JR, Fleischmann N. Causal attributions and coronary heart disease in women. *Psychol Rep* 1993;73:627-636.
32. Bennett KK, Clark JM, Harry K, Howarter AD. Causal attributions following a cardiac event: short-and long-term differences in health appraisals and outcomes. *Health Psychol Open* 2016;3:2055102916632669.
33. Palmquist AE, Wilkinson AV, Sandoval J-M, Koehly LM. Age-related differences in biomedical and folk beliefs as causes for diabetes and heart disease among Mexican origin adults. *J Immigr Minor Health* 2012;14:596-601.
34. Day RC, Freedland KE, Carney RM. Effects of anxiety and depression on heart disease attributions. *Int J Behav Med* 2005;12:24-29.
35. Nguyen AB, Oh A, Moser RP, Patrick H. Perceptions of the roles of behaviour and genetics in disease risk: are they associated with behaviour change attempts. *Psychol Health* 2015;30:336-353.
36. Moss-Morris R, Weinman J, Petrie KJ, Horne R, Cameron LD, Buick D. The Revised Illness Perception Questionnaire (IPQ-R). *Psychol Health* 2002;17:1-16.
37. Fukuoka Y, Dracup K, Froelicher ES, Ohno M, Hirayama H, Shiina H, Kobayashi F. Do Japanese workers who experience an acute myocardial infarction believe their prolonged working hours are a cause? *Int J Cardiol* 2005;100:29-35.
38. Soroush A, Shams-Alizadeh N, Vahdat A, Mohebi Z, Saeidi M, Komasi S. Role of perceived heart risk factors by outpatient population in predicting cardiovascular risk. *J Cardiovasc Thorac Res* 2019;11:100-108.
39. Boynton PM, Greenhalgh T. Selecting, designing, and developing your questionnaire. *BMJ* 2004;328:1312-1315.