Research Article

Validation of the Persian Version of the Adherence to a Healthy Lifestyle Questionnaire in Patients with Cardiac Syndrome X

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Abstract

Aims and objectives: The objective of the present study is to assess the reliability and validity of the Persian version of the Adherence to a Healthy Lifestyle Questionnaire (AHLQ) between Iranian patients with Cardiac Syndrome X (CSX).

Background: The burden of cardiac heart disease and related conditions remains high, with rates of hospitalization disability and cost on the rise. In addition, angina without coronary artery disease (CAD) has substantial morbidity and is present in 20% to 30% of patients undergoing angiography Adherence to a combination of healthy lifestyle factors has been shown to be related to a considerable reduction of cardiovascular risk.

Design: A Cross -sectional survey was used.

Methods: 100 Iranian patients, who referred to the Tehran Heart Center hospital, were recruited by randomized sampling. All the patients fulfilled the AHL questionnaire. Responses were analysed via exploratory factor analysis using primary elements analysis with varimax orthogonal rotation. The internal conformity reliabilities of the overall scale and its subscales were estimated via Cronbach's alpha coefficient. The reliability of the AHLQ was assessed for internal consistency and test-retest reliability.

Result: The AHLQ variables are classified into six domains. Cronbach's alpha coefficient for each subscale was used to check the reliability of each scope. The reliability of each subscale was confirmed by Cronbach's alpha. The level of significance was evaluated at $P < 0.05$. The tool has shown satisfactory validity.

Conclusions: The Persian version of the AHL questionnaire is suitable to be used for Iranian patients with CSX disease or atherosclerosis. In addition, the AHLQ is a reliable and valid tool and could be used for evaluation of adherence to a healthy lifestyle in clinical research for Iranian patients with cardiovascular diseases.

Keywords: Healthy lifestyle questionnaire; Cardiac Syndrome X; Validation; Adherence

Introduction

Cardiovascular disease (CVD) is a major cause of morbidity, disability and mortality, and is still the leading contributor to the overall burden of disease worldwide [1]. According to the World Health Organization (WHO), the leading cause of non-communicable disease is CVD. It is estimated that 17.7 million people died from CVDs in 2015, which represents 31% of all global deaths. Cardiac diseases are associated with high mortality, frequent hospitalization, and economic strain on the healthcare system. Moreover, angina without coronary artery disease (CAD) has substantial morbidity and is present in 20% to 30% of patients undergoing angiography [2].

Cardiac Syndrome X (CSX) is a condition that causes the symptoms of angina, such as chest pain or tightness that increased sensitivity to pain and myocardial ischemia, as a result of microvascular dysfunction [3,4]. It has the highest prevalence in pre or post-menopausal in women. CSX have high morbidity and health care expenditure and is comparable to patients with obstructive coronary artery disease (CAD) [5,6]. Whereas CSX is not associated with an increased risk of death, but it often severely impairs quality of life and represents a substantial cost burden to the health care system.

Although CSX is not associated with an increased risk of death[2],it often severely impairs quality of life and adherence to a healthy lifestyle. It is represented as a substantial cost burden to the health care system. Moreover, some studies have shown that substantially high incidence rates exist for almost all CVDs and CSX among Iranian patients [7]. Many researchers have demonstrated that the most common reason for cardiac heart diseases is an unhealthy lifestyle and that maintenance of health levels depends on adherence to a healthy lifestyle. They have pointed out that the risk factors of CAD or CSX included an unhealthy diet, irregular physical activity, and exercise, immobility, stress, and obesity [8]. Therefore, for evaluating the benefits of behaviour modification for adherence to a healthy lifestyle and educational interventions in persons with CSX risk factors an instrument is needed. Following a heart-healthy lifestyle is a life-long effort and sometimes it may seem difficult to keep at iteven when patients know it is worth the effort [9].

Hence, it is important to assess and improve the lifestyle of these patients through educational intervention in order to encourage them to adherence to a healthy lifestyle and thus achieve their goal of a longer, healthier life.

Background

Cardiac Syndrome X remains a major diagnostic and therapeutic challenge causing significant deterioration in a patient's

functioning and quality of life.Coronary artery disease (CAD) is the leading cause of mortality in women with differing patterns of coronary atherosclerosis and extensive comorbidities [9]. As many as 50% of women presenting with symptoms of angina have minimal or no angiographic CAD [10]. Many study have suggested the non-pharmacological treatments include cognitive behavioural therapy and lifestyle modifications have an important role for CSX patients [6]. Hence, adherence to a healthy lifestyle among CSX patients is necessary [11].

Non-adherence to lifestyle modifications and medication is an emerging problem worldwide. It is essential for medical health professionals to attend these predictors and address them individually [12]. Health status and predictive of various health outcomes including cardiovascular events, hospitalizations, and healthcare costs are essential nowadays [13]. Recent concepts of value in health care and the educational interventions have focused on improving patients' health and experience with health care while reducing costs of hospitalizations, which reinforced the significance of evaluating the impact of disease and medical treatment on patients' functional status and adherence a healthy lifestyle. However, the guidelines for the management of CSX worldwide, recommend cardiac rehabilitation(CR) as an integral component of patient care [14]. Despite, these recommendations those decades of effort to improve participation, CR programs continue to be underused [2]. Reasons for suboptimal adherence to a healthy lifestyle have been attributed to numerous factors that can be categorized into the patient, health care providers, and health system barriers. Many of these are challenging to overcome, such as patient factors e.g., age, gender, and poor health literacy. Therefore, Patient-reported health status, which includes symptom burden, functional status, and HRQL, is an important measure of health [13]. Essentially, the presence of educational interventions by the health providers, nurses, and clinicians is a necessity and has potential in order to improve the continuum of health care and adherence a healthy lifestyle.Hence, validated patient health status survey, including disease-specific instruments for patients with Cardiac Syndrome X, allow for the quantification of this critical, patient- centered outcome[14]. Although pharmacological treatment has shown considerable effectiveness in improving the therapy of these diseases, it is costly and may have side effects. In contrast, adherence to a healthy lifestyle has become a mainstream approach to lower cardiovascular burden through primary prevention. Hence, Cardiac educational programs are advocated for all those patients who present with CSX [15].

Whereas measuring the adherence to a healthy lifestyle has significant among CSX patients, therefore for this important, was needed an instrument. Since the AHLQ questionnaire that originally was in the English language, thus for our study has translated the questionnaire to the Persian language according to the WHO recommendations (2016). In the final stage, the instrument has shown satisfactory validity for evaluate the Adherence to a Healthy Lifestyle.

Aim

To assess the reliability and validity of the Persian version of the Adherence to a Healthy Lifestyle Questionnaire (AHLQ) between Iranian patients with Cardiac Syndrome X (CSX).

Research Method

A Cross sectional survey was conducted among one hundred (100) CSX Iranian patients who were qualified for this study and were referred to the heart clinic of Heart Center Hospital for treatment with evidence of CSX risk factors have selected via randomized sampling. These patients for the current study have recruited based on the diagnosis of the Cardiologist Specialist through the clinical examination, coronary angiography, and physical exercise test. All questionnaires were completed and returned to researcher. The psychometric attributes of the instrument, including its construct validity and reliability, were determined via confirmatory factor analysis.

Instrument

The AHL is a specific questionnaire for evaluation of adherence to a healthy lifestyle developed by Sanofi Aventis [16]. It measures adherence to a healthy lifestyle (such as diet, exercise, motivation, barriers, results, satisfaction, and adherence to lifestyle changes). The AHRQ has been used in a number of studies, particularly for CSX. The AHLQ has been translated to and validated various languages such as English, French, Spanish, and German [16]. The AHL questionnaire has also been translated into Farsi and has been validated in Iranian patients with arteriosclerosis and CSX disease.

The questionnaire has 41 items that cover five subscales including:

Motivation (5 items)

Barriers (9 items)

Results (7 items)

Satisfaction (8 items)

Adherence to Lifestyle Change (7 items)

The 5 domains are scored Likert-style, using a score from 1 to 5

Further questions are about patient characteristics ('About yourself').

Translation process

A pilot study was started by performing the translation process of instrument guided by the World Health Organization (WHO, 2016) recommendation since the first language of proposed participants is Iranian Farsi [17]. The aim of this process was to produce a Persian version of the AHLQ which would be equivalent to the English version and acceptable by ten Iranian nursing experts and one cardiologist.The translation has conducted by an expert translator with more than ten years' teaching experience in English and Farsi.The second step was to form an expert panel to review the translation. The input was sought from ten experts to validate the questionnaire and all information via a validating tool. Among the ten experts that were a cardiologist specialist with more than five years' experience in a teaching hospital as a Professor assistant and Seven senior lecturers, as well as two nurses with more than 18 years' experience. The expert panel also advised on the technical term appropriate to Iranian nursing. After the agreement was reached among the experts a complete translated version resulted. The instrument was then back-translated from Persian to English. This was done by a health professional translator and a professional translator (AHLQ). No significant discrepancies

were found thus a satisfactory version was achieved.

The translated version was pre-tested and post-tested. They suggested shortening the items and ensuring that the meaning remained the same by using terms usually used within Iranian nursing practice. Final changes were made based on this input and a final version was produced.

The reliability of the AHLQ was evaluated by internal consistency and test-retest reliability. Internal consistency was assessed by Cronbach's alpha and test-retest reliability by the intra-class correlation coefficient (ICC) and Kappa (Table 1).

Since the second to sixth items were assessed via Likert scales, an ICC test (Inter class correlation coefficient) for each domain was used to check the reliability. The results of this analysis for each domain are shown in Table 2.The table indicates that all subdomains had acceptable reliability and that the ICC also has acceptable values for all sub domains (Table 2).

Convergent validity

Convergent validity is assessing the degree to which a measure is associated positively with alternative measures of the same construct [18]. Convergent validity can be measured at the construct level through the average variance extracted (AVE). This measure is defined as the grand mean value of the squared loadings of the items related to the construct. The Average Variance Extracted (AVE) should be higher than 0.5. However, following Fornell and Larcker1981, an AVE of 0.4 can be accepted if the composite reliability is higher than 0.6. In this case, the convergent validity of the construct is considered adequate. The usual method for measuring internal consistency is Cronbach's alpha, which provides an estimate of reliability based on the inter-correlations of the observed indicator variables. However, this measure is sensitive to the number of items in the scale and leads to the underestimation of the internal consistency reliability. Therefore, it is recommended to use a different measure of internal consistency reliability, one referred to as composite reliability (CR). Composite Reliability (CR) values of greater than 0.7 are acceptable. Improvement of the reliability of a questionnaire is possible by removing items that increase error. High loadings on a construct show that the items of each construct have much in common with related constructs. This characteristic is also commonly called indicator reliability. It can be evaluated by outer loadings and significance levels.

Because a significant outer loading could still be fairly weak, a common rule of thumb is that the (standardized) outer loadings should be 0.708 or higher. Indicators with very low outer loadings (below 0.50) should be removed from the scale [18].

The Cronbach's alpha test for the internal reliability of a questionnaire is a statistical test that results in a coefficient called Cronbach's alpha. It is used to test the reliability of a Likert spectrum questionnaire whose answers are multi-choice. Table 3, shows the result of the Convergent Validity test of the translated AHLQ (Table 3).

The AVE for each construct is more than each of the squared correlations between the constructs. In addition, the HTMT values were below 0.9. This indicates that there are no issues related to discriminant validity. Therefore, discriminant validity is adequate for all of the constructs.

Table 1: Test- Re-test reliability for the first part of AHLQ questionnaire.

Variables	Kappa index	p-value
Motivation	0.621	<0.001
Barriers	0.806	<0.001
Results	0.896	<0.001
Satisfaction	0.902	<0.001
Lifestyle Change	0.956	<0.001

Table 2: ICC for the second to sixth scopes.

Domain	ICC
Motivation	0.76
Barriers	0.91
Results	0.99
Satisfaction	0.94
Lifestyle Change	0.96

Design

A cross sectional survey was used in this study.

Participants

The target population in this study were CSX patients who referred to a cardiac clinic and visited by a cardiologist specialist in this teaching hospital for a visit and follow-up care. Randomize sampling was used to select the participants from the population. 100 Iranian patients were recruited by randomized sampling.

Data collection

The data was collected from 100 participants in a cardiac clinic of a teaching Hospital. The patients who were considered qualified and referred to the Heart Center Hospital for visit and treatment with evidence of CSX disease as diagnosed by a cardiologist via the coronary angiography and physical activity test.

Ethical considerations

This study was approved by the University of Malaya medical cnetre in 2018. The approval number was 201839-6110. In addition, the study protocol was accepted by the Ethics Committee of the Tehran University of Medical Science. In addition, informed

Table 3: The result of Convergent Validity of AHLQ.

Construct	Item	Outer Loading	Cronbach's Alpha	CR	AVE
	Initial			Modified	
Motivation	b6.1	0.821	0.821	0.894	0.922	0.704
Barriers	b11.1	0.676	0.676	0.885	0.907	0.523
Results	b20.1	0.554	0.554	0.892	0.919	0.659
Satisfaction	b27.1	0.758	0.762	0.834	0.882	0.601
Lifestyle Change	b35.1	0.823	0.823	0.941	0.952	0.74
CR= Composite Reliability	AVE = Average Variance Extracted					

written consent was received from the participants. The goal of the study was described to all participants, who gave informed consent and were notified of their responsibilities and rights to withdraw at any time during the course of the study.

Data analysis

Data analysis was done using SPSS, Version 23, and the level of significance was estimated at $P < 0.05$. The calculation was done using Microsoft Excel using a formula derived fromPolit and Beck [19].In this study, content validity was assessed via a Content Validity Index (CVI, while face validity and construct validity were assessed by CFA using partial least squares equation modelling (PLS-SEM) to evaluate the validity and reliability of the instruments. Structural Equation Modelling (SEM) is a second-generation multivariate data analysis technique. Descriptive analysis was used to assess the demographic data. The internal consistency of the AHLQ was calculated via Cronbach's α coefficient. Composite reliability (CR) was analysed. After the Exploratory Factor Analysis (EFA) Confirmatory Factor Analysis (CFA) was conducted in order to test the structural model's suitability for the AHLQ. Convergent validity was estimated using the average variance extracted (AVE) and CR. The relationship among the constructs was tested using the relationship statistic.

Results

Demographics

The demographic profile of the participants is displayed in the Table. Most participants were female (%56), while the remainder were male (%44). All participants were aged between 18 and 75 years, with a standard deviation of 12.10 years (SD=12.10). 46%of the respondents had a degree from a university, %34 had a diploma, and the remaining 24%were literate (Table 4).

Discriminant validity

Discriminant validity a method of ensuring that a construct is actually different from other constructs by empirical standards [18]. Discriminant validity can be tested by evaluating the squared AVE for each construct against correlations (shared variance) between the construct and all other constructs in the model. A construct will have adequate discriminant validity if the squared AVE exceeds the correlation among the constructs. Discriminant validity of reflective constructs was also evaluated using the Heterotrait- Monotrait ratio of correlations. If the HTMT value is more than .9 there is an issue of discriminant validity.AVE for each construct is more than each of the squared correlation between constructs and also HTMT values were below 0.9 and indicate there is no any issue related to discriminant validity. Therefore, discriminant validity is adequate for all of the constructs (Table 5).

Table 4: Participant demographics (N=100).

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	female	56	56.0	56.0	56.0
	male	44	44.0	44.0	100.0
	Total	100	100.0	100.0	
	Frequency	Percent	Valid Percent		Cumulative Percent
married	6	6.0	6.0		6.0
widow	75	75.0	75.0		81.0
widow2	11	11.0	11.0		92.0
single	8	8.0	8.0		100.0
Total	100	100.0	100.0		
		Frequency	Percent	Valid Percent	Cumulative Percent
Diploma		41	41.0	41.0	41.0
university		34	34.0	34.0	75.0
Literate		25	25.0	25.0	100.0
Total		100	100.0	100.0	

Content validity ratio

To determine the numerical value of the content validity ratio (CVR), Table 4 specifies that the CVR minimum value table is called. The CVR calculation product is compared with the number of specialists using the criteria specified in the Lawasheh table. If the number in the table is larger, it indicates the existence of the corresponding term with a meaningful level of acceptability (P>1.0). This tool is highly important. In this case, the numerical value of the CVRs, based on evaluations by panel members, is higher than the numbers in the table above. Thus, the validity of the content of the instrument is significant at the level of P <0.05.

Content validity index

The Content Validity Index (CVI) was calculated based on the assessment of the panel experts (ten experts). The CVI is widely used and reported among nursing researchers, who compute two types of CVIs that involve the content validity of individual items (I-CVI) and the overall scale (S-CVI). I-CVI is calculated from the number of experts giving a rating of either 3 or 4 (relevant) divided by the total number of experts. This calculation is usually used by researchers as guidance to revise, delete or substitute items. Researchers usually report S-CVI of two types; S-CVI/UA, which refers to the 'proportion of items on a scale that achieve a relevance rating of 3 or 4 by all experts', and the S-CVI/Ave, which is the 'average of the I-CVIs for all items on the scale.

According to Lynn's criteria as cited in Grove, Polit and Beck [20] recommend that have excellent content validity, instruments should attain a minimum I-CVI of .78 for 6 to 10 experts and a S-CVI/Ave of .90 or higher. The content validity index is calculated based on the Waltz and Basel formula, which indicates that items with a CVI score of more than 0.79 are appropriate. items with a CVI score between 0.70 and 0.79 are questionable and need to be modified and revised, and items with a CVI of less than 0.70 are unacceptable and should be deleted. The calculation was done using Microsoft Excel using a formula derived from Polit and Beck [19].

The results of the Content Validity Ratio (CVI) index for all items of AHLQ shown in Table 5 indicate that 3 items including "In your opinion, do you think that you are …"," How satisfied are

Table 5. HTMT discriminant Validity of AHLQ components.

	Lifestyle Change	Barriers	Motivation	Results	Satisfaction
Lifestyle Change					
Barriers	0.457				
Motivation	0.476	0.634			
Results	0.667	0.457	0.482		
Satisfaction	0.72	0.484	0.443	0.819	

you with the way you look?" and "How much self-confidence do you have?" did not meet the cut-off point of 0.6. Further, one item, "Did not meet the cut-off point of 0.8 for the CVI. Therefore, these 3 items were dropped from the questionnaire in pilot study for construct validity (Table 6).

Confirmatory factor analysisof AHLQ

Confirmatory factor analysis (CFA) was performed to assess the validity of measurement of the AHLQ as related to the theory underlying the measurement by testing the hypothesized relationships [21]. The English version of the AHLQ has been

Table 6. Results of content validity review for Adherence to a Healthy Lifestyle questionnaire (AHLQ).

Item	CVR	CVI				Overall	Result
		Relevance	Simplicity	Clarity	Represent		
1. When did you first become overweight?	0.8	0.9	0.9	0.9	0.9	0.90	Validated
2.In your opinion, do you think that you are	0.2	0.7	0.8	0.6	0.7	0.70	Excluded
3. What methods have you tried to lose weight?	0.8	0.9	0.9	0.8	0.8	0.85	Validated
4. Overall, what were the results of your previous attempts to lose weight?	0.8	0.8	1	1	0.8	0.90	Validated
5. How often do you exercise?	1	0.9	1	0.9	0.9	0.93	Validated
Motivation (5 items)							
1. Being able to look good in your clothes	0.6	0.7	0.7	0.8	0.7	0.73	Validated
2. Reducing the risk or severity of high blood pressure, high cholesterol, diabetes, or heart disease	1	0.9	0.8	0.9	1	0.90	Validated
3. Having more energy	0.6	0.9	0.8	0.8	0.8	0.83	Validated
4. Living an active life	1	0.8	0.9	1	0.9	0.90	Validated
5. Feeling attractive	0.6	0.8	0.9	0.8	0.8	0.83	Validated
Barriers (9 items)							
1. Cravings for unhealthy foods	0.6	0.9	0.8	0.8	0.8	0.83	Validated
2. Taste of unhealthy foods compared to healthy foods	0.6	0.8	0.8	0.8	0.8	0.80	Validated
3. Difficulty of preparing healthy meals	1	0.9	1	1	1	0.98	Validated
4. Difficulty of changing my eating habits because of my family	1	0.9	1	0.9	1	0.95	Validated
5. Difficulty of finding healthy meals when I go out to eat	1	1	0.9	0.9	0.9	0.93	Validated
6. Stress associated with sticking to any diet and exercise program	0.8	0.9	0.9	0.8	0.9	0.88	Validated
7. The need to eat when I am frustrated, stressed, anxious, or sad	1	1	1	0.9	0.9	0.95	Validated
8. Fitting diet and exercise in my schedule	0.8	0.9	0.9	0.9	0.9	0.90	Validated
9. Fitting diet and exercise in my life because of my other health conditions	0.6	0.9	0.9	0.9	0.9	0.90	Validated
Results (7 items)							
1. I am able to put on clothes I haven't worn for a long time	0.8	0.8	0.8	0.8	0.8	0.80	Validated
2. I feel healthier	1	0.9	1	1	0.9	0.95	Validated
3. My blood pressure is better	1	0.9	0.9	1	0.9	0.93	Validated
4. I am able to perform as much physical activity as I want or need	1	0.9	0.9	1	1	0.95	Validated
5. I have more energy	1	0.9	0.8	0.9	1	0.90	Validated
6. I feel more attractive	0.6	0.7	0.8	0.7	0.8	0.75	Validated
7. I feel more confident	0.8	0.8	0.9	0.8	0.9	0.85	Validated
Satisfaction (8 items)							
1. How satisfied are you with your weight when looking at the scale?	0.8	0.8	0.9	0.8	0.8	0.83	Validated
2. How satisfied are you with the way you look?	0.4	0.9	0.8	0.8	0.7	0.80	Excluded
3. How satisfied are you with how much you eat?	0.6	0.7	0.9	0.8	0.7	0.78	Validated
4. How satisfied are you with the taste of what you eat?	0.8	0.8	0.9	0.9	0.7	0.83	Validated
5. How satisfied are you with your program (counselling from nurse, dietician or physician)?	1	0.9	1	0.9	0.9	0.93	Validated
6. How satisfied are you with your level of physical activity (walking, exercise)?	1	0.9	0.9	1	0.9	0.93	Validated
7. How confident are you that you will achieve your goals?	1	0.9	0.9	1	0.9	0.93	Validated
8. How much self-confidence do you have?	0.4	0.7	0.8	0.8	0.7	0.75	Excluded
Adherence to Lifestyle Change (7 items)							
1. How easy was it for you to adhere to your diet and exercise program?	1	1	1	1	1	1.00	Validated
2. How confident did your diet and exercise program make you feel?	0.6	0.9	0.9	0.9	0.8	0.88	Validated
3. How much self-control did you have over your diet and exercise program?	1	1	1	0.9	1	0.98	Validated
4. How much did the positive feedback and support you received from others help you in maintaining your diet and exercise program?	1	1	1	1	1	1.00	Validated
5. How much did your blood test results help you continue your diet and exercise program?	1	0.7	0.9	0.8	1	0.85	Validated
6. How realistic are the diet and exercise goals that you set for yourself?	0.8	0.9	1	1	0.9	0.95	Validated
7. How confident are you that the diet and exercise changes you made in your lifestyle will be permanent changes?	1	0.9	0.9	1	0.9	0.93	Validated

evaluated on the basis of psychometric properties and found satisfactory [22]. However, the Persian version of the instrument had not been evaluated for its validity and reliability in Iran prior to this study. Thus, a pilot study was conducted before distributing the final version of the translated instruments to 100 Iranian CSX patients who were referred to the heart clinic of the hospital. CFA requires the use of special purpose software packages such as Amos, Smart-PLS. Smart-PLS is a software program used to fit structural equation models (SEM).

After reviewing the literature, it was found that for this class of model, i.e. models with two to four factors; the investigator should plan on collecting at least 100 cases, with 200 being better (if possible). The measurement model (CFA) consists of both reflective and formative measurement models. In this case, reflective measurement was used to assess validity and reliability in order to achieve consistency. Convergent validity and discriminant validity are focus of the reflective measurement model [18,23].

In the case of the Adherence to a Healthy Lifestyle (AHL) questionnaire, structural equation modelling was used. Due to the small sample size (<300), Smart-PLS software Ver 3.1 was used. The measurement model (CFA) has to follow rules governing how the latent variables are measured based on the observed variables, and it explains the measurement of the items (observed variables). To define the individual item reliabilities, the investigator analysed the loading factors of the respective constructs. According to China, standardized loadings should be more than 0.707. Moreover, to be consistent with the choice of multivariate analysis used in this study, confirmatory factor analysis (CFA) for all reflective constructs was done using Smart PLS software [18].

Regarding this study, Composite Reliability (CR) was found to be between 0.901 and 0.940. In addition, in this study, AVE is above 0.5. Thus, the results show that convergent validity (AVE) and Composite Reliability (CR) exist for the constructs of this study. Based on these results, it can be concluded that all items had acceptable loading values. Therefore, all the items were retained in the model (Figure 1).

The output of the cross-loading between variables (latent variables) and items (indicators) is shown in Tables 4-7. According to these results, it can be seen that all items loaded higher against their respective intended latent variable compared to other latent variables. Therefore, it is concluded that the measurement model has been confirmedin relation to discriminant validity (Table 7).

Discussion

This study aimed to ascertain the reliability and validity of a questionnaire designed to evaluate the Persian version of the Adherence to a Healthy Lifestyle Questionnaire (AHLQ) between Iranian patients with Cardiac Syndrome X (CSX). The results indicated that the mentioned questionnaire had acceptable reliability and validity; accordingly, it can be used in studies related to Cardiac disease patients. Regarding this study, Composite Reliability (CR) was found to be between the

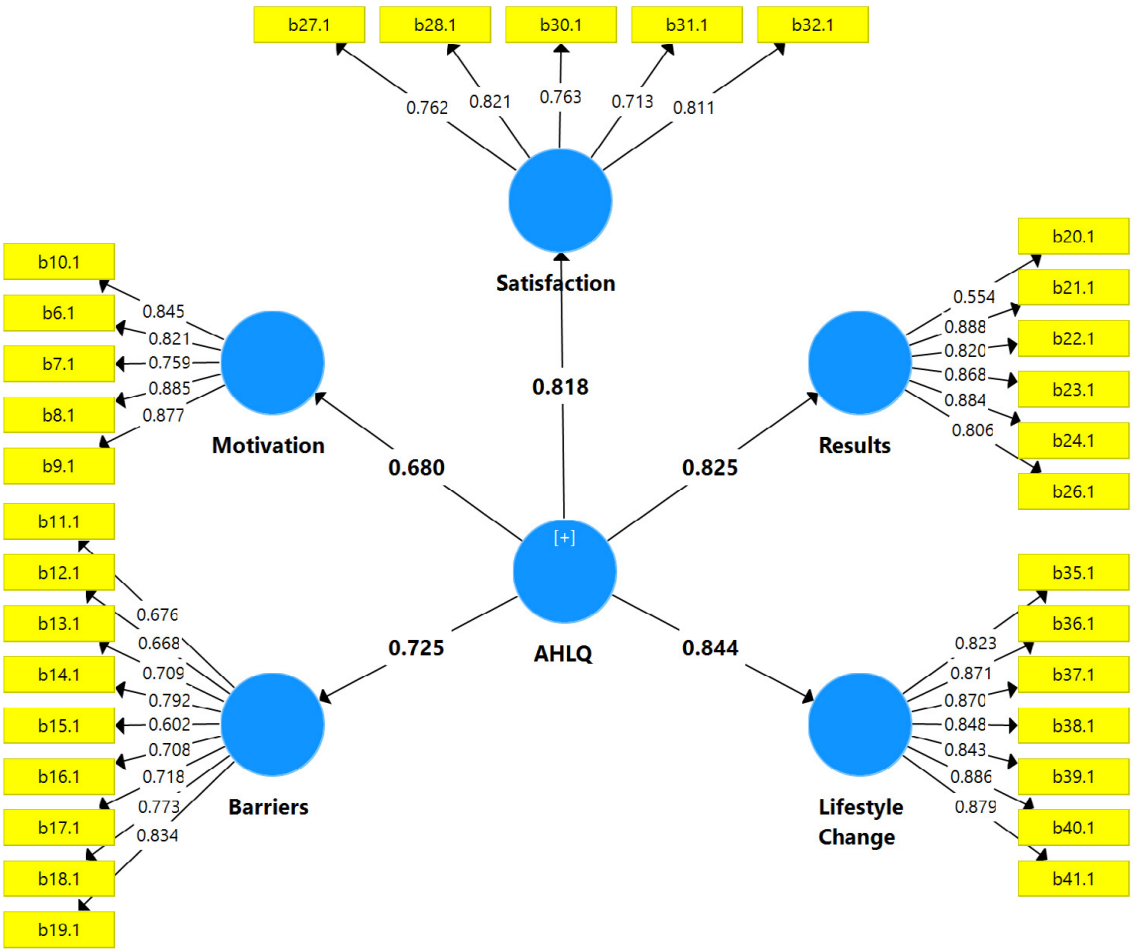

Figure 1: Measurement model of Adherence to a Healthy Lifestyle questionnaire.

Table 7. Assessment of Constructs Cross-loadings and Factor Loadings of AHLQ components.

	Motivation	Barriers	Results	Satisfaction	Lifestyle Change
b6.1	0.82	0.51	0.42	0.35	0.40
b7.1	0.76	0.52	0.41	0.36	0.37
b8.1	0.89	0.46	0.31	0.30	0.35
b9.1	0.88	0.49	0.35	0.31	0.40
b10.1	0.85	0.44	0.36	0.35	0.31
b11.1	0.36	0.68	0.21	0.17	0.19
b12.1	0.34	0.67	0.25	0.21	0.20
b13.1	0.44	0.71	0.36	0.38	0.28
b14.1	0.41	0.79	0.29	0.29	0.23
b15.1	0.33	0.60	0.27	0.26	0.31
b16.1	0.38	0.71	0.17	0.31	0.31
b17.1	0.37	0.72	0.23	0.24	0.28
b18.1	0.49	0.77	0.36	0.40	0.39
b19.1	0.58	0.83	0.48	0.48	0.53
b20.1	0.16	0.27	0.55	0.33	0.29
b21.1	0.34	0.39	0.89	0.61	0.55
b22.1	0.42	0.39	0.82	0.69	0.51
b23.1	0.38	0.34	0.87	0.68	0.55
b24.1	0.40	0.34	0.88	0.61	0.49
b26.1	0.38	0.32	0.81	0.56	0.56
b27.1	0.18	0.25	0.50	0.76	0.50
b28.1	0.44	0.39	0.65	0.82	0.57
b30.1	0.38	0.42	0.56	0.76	0.47
b31.1	0.16	0.27	0.41	0.71	0.37
b32.1	0.32	0.35	0.66	0.81	0.57
b35.1	0.30	0.28	0.47	0.54	0.82
b36.1	0.42	0.38	0.63	0.59	0.87
b37.1	0.31	0.38	0.55	0.52	0.87
b38.1	0.37	0.38	0.49	0.51	0.85
b39.1	0.46	0.42	0.50	0.57	0.84
b40.1	0.42	0.37	0.52	0.55	0.89
b41.1	0.37	0.42	0.56	0.62	0.88

lowest 0.901 and the highest 0.940. Associations between the questions and total score indicated that each of the items was highly correlated with the total score. Convergent validity can be measured at the construct level through the Average Variance Extracted (AVE). This measure is determined as the grand mean value of the squared loadings of the items related to the construct. The AVE for each construct is more than each of the squared correlations between the constructs. In addition, the HTMT values (Table 3) were below 0.9. This indicated that there are no issues related to discriminant validity. Therefore, discriminant validity is adequate for all of the constructs. Furthermore, the common method for measuring the internal consistency is Cronbach's alpha, which provides an estimate of the reliability based on the inter-correlations of the observed indicator variables. Hence, the result of Cronbach's alpha for each subscale were: Motivation= 0.894 & Barriers= 0.885 & Results= 0.892 & Satisfaction= 0.834 & Lifestyle Change= 0.941.

In the current study, the output of cross loading between variable (latent variable) and items (indicators), According to these results, it can be found that all items loaded higher against their respective intended latent variable compared to other latent variables and therefore concluded that the measurement model has confirmed its discriminant validity. In addition, in this study, AVE is nearly above 0.5. Thus, the results demonstrate that convergent validity (AVE) and Composite Reliability (CR) exist for the constructs of this study. Based on the results it can be concluded all items had an acceptable value for loading.

In this study, to be consistent with the choice of multivariate analysis used in this study, confirmatory factor analysis CFA for all reflective constructs was done using Smart PLS software (40). Confirmatory Factor Analysis was conducted to investigate the internal consistency and construct validity of the questionnaire. CFA was used to examine the internal consistency and construct validity of the questionnaire. Psychometric experts believe that the correlation between subscales of a test is an indication of internal consistency and construct validity of a test(Test MA, Greenberg JS, et al, 2005).In this study, the obtained correlation coefficients showed that the subscales were more or less interacting with each other. Regarding shared values and factor loadings, the findings of this study suggested that the questions' factor loadings were high. In addition, accepting of 0.4 as a threshold for factor loading [19]. It was specified that all questions had acceptable factor loading. This indicated that based on factor analysis, every one item in the questionnaire was equally important [19]. Similar to other related studies, to determine the content validity of the questionnaires, a panel of experts was used. In some studies, quantitative criteria are used to validate a questionnaire; in the prospect of that, experts are asked to quantitatively represent their ideas about each item, and finally, a number is reported as a CVI [20]. The results of the Content Validity Ratio (CVI) index for all items of AHLQ indicated that 3 items have excluded (Table 3). According to the 10 specializes viewpoint on the cut-off point, these 3 items were not valid. These 3 Items were the lowest score of I-CVI as six experts estimated it. The experts suggested being adjusted the questionnaires according to the Iranian culture and with attention to the "administering the prescriptive to the patients. Therefore these 3 items were dropped from the questionnaire in a pilot study for construct validity.Among the limitations of this study was that the diagnosis of CSX disease by a cardiologist still is a big challenge and complicated and the samples are limited. On the other hand, random sampling that has been frequently suggested as a way to improve generalizability was one of the powers of this study [24,25]. In sum, employing this instrument for CSX patients is recommended in order to improve the quality of life and adhere to a healthy lifestyle [26-32].

Conclusion

Based on the findings of this study, Composite Reliability (CR) is between 0.901 and 0.940. In addition, in this study, AVE is above 0.5. Thus, the results show that convergent validity (AVE) and Composite Reliability (CR) exist for the constructs of this study. Based on these results, it can be concluded that all items had acceptable loading values. Hence, the Persian version of the AHL questionnaire can be used for Iranian patients. In addition, the AHLQ, as a reliable and valid tool, may be used for evaluation of adherence to a healthy lifestyle in clinical research relating to Iranian patients with cardiovascular diseases and CSX.

Limitations

The limitations of this study were as follows:

Firstly, it is the First study regarding CSX and the evidence was limited

Secondly, the data were collected through self-report methods; thus, bias may have occurred.

Thirdly, the sample size was limited because diagnosis of Cardiac Syndrome X by a cardiologist still is big challenge and complicated.

Fourthly, there was some difficulty in the collaboration process between the hospital staff and the researcher at times, because the clinic was very crowded.

Relevance to clinical practice

The Iranian version of the AHLQ tool produces reliable and valid measures that can be used to assess the lifestyle of patients with CSX. The tool can assist in ensuring the effectiveness of planned education for nursing care and training programs designed for the community's healthy lifestyle. Finally, it may be used to evaluate the benefits of behaviour modification for a healthy lifestyle and educational interventions in persons with CSX risk factors.

Acknowledgements

The authors are grateful to all the lecturers that help us for translation process. We are also thankful to Dr. Saeid Sadeghiyan, Cardiologist and Head of the Research Council. Also, our appreciated are expressed to Professor Dr, Mohammad Ali Nafisi, Surgical Cardiologist from the George Washington University in the USA, for approving the translation of the AHLQ and for offering guidance throughout the process of research.

Conflicts of Interest

The authors of this article declare that they have no conflicts of interest.

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Submitted: September 04, 2020; Accepted: April 15, 2021; Published: April 22, 2021