ACHSM Asia-Pacific Journal of Health Management

RESEARCH ARTICLE

DEVELOPMENT OF A HEART HEALTH ATTITUDE SCALE FOR ADULTS IN TURKEY: A SCALE DEVELOPMENT STUDY

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ABSTRACT

BACKGROUND:

Examining adults' attitudes toward heart health can be effective in identifying and preventing cardiovascular disease risk, educating, and treating individuals.

AIM:

This study was designed to develop a valid and reliable measurement tool for assessing adult individuals' attitudes toward heart health.

METHODS:

The sample for this methodological study consisted of 445 patients admitted to two university hospitals in the provinces of Eskişehir and Kocaeli, Türkiye for cardiological disorders. The research data were collected using a Personal Information Form and Adult Heart Health Attitude Scale (AHHAS). For the validity and reliability of the scale, test-retest analysis, content validity analysis, and item analyses were used, and exploratory and confirmatory factor analyses were performed, and structural equation modeling was used for internal consistency and construct validity.

RESULTS:

Based on expert opinion, the content validity index of the scale was calculated as 0.86. In the exploratory factor analysis, the Kaiser-Meyer-Olkin (KMO) coefficient was 0.643, and Bartlett's Test of Significance was $\chi^2=953.841$, $p<0.001$. As a result of the factor analysis, the number of items was reduced from 45 to 28. The item-total correlation coefficients ranged from 0.430 to 0.864, leading to a 6-factor scale with 29 items, explaining 54.4% of the total variance. The factor loadings of the items ranged between 0.453 and 0.851, and Cronbach's alpha value was between 0.446 and 0.718 for the sub-factors, and 0.834 for the total scale.

CONCLUSION:

As a result of the analyses, it was determined that AHHAS is a valid and reliable scale that can be used for the Turkish adult population. Healthcare providers can use AHHAS to determine adults' attitudes toward heart health.

KEYWORDS

Cardiovascular diseases, risk factors, adults, attitude, patients, nurses, reliability, and validity

INTRODUCTION

Chronic diseases are increasing due to the aging population and changing lifestyles worldwide and in Türkiye [1]. Among these chronic diseases, cardiovascular diseases (CVDs) are globally the leading cause of death. It was reported that approximately 17.9 million people died due to CVDs in 2019, accounting for 32% of all global deaths [2]. In Türkiye, circulatory system diseases were the leading cause of death in 2023, accounting for 33.4% of all deaths. Of these, ischemic and other heart diseases made up 66.5% of the deaths related to circulatory system diseases [3]. More than 75% of cardiovascular diseases (CVDs), which are among the leading causes of death worldwide and in Turkey, are preventable and improving risk factors can help reduce the increasing burden of CVD on both individuals and healthcare providers [3,4]. The most important risk factors affecting the development of CVDs include behavioral risk factors such as an unhealthy diet, physical inactivity, and tobacco and alcohol use. The effects of behavioral risk factors may manifest in individuals as increased blood pressure, blood sugar, blood lipid levels, and obesity [5]. The risk of CVD increases in the early stages of life, especially in young adults aged 35-64, due to behavioral risk factors such as obesity, high blood pressure, and smoking [6].

The most important approach to preventing CVDs is to adopt a healthy lifestyle throughout life [7]. It was shown that healthy lifestyle behaviors, namely healthy eating, regular physical activity, effective stress management, non-smoking, and taking responsibility for one's health, reduce the risk of CVDs [5]. Health professionals, especially nurses, have important roles in the adoption of healthy lifestyle behaviors and the management of preventable risk factors [8]. In preventing the development of CVD risk factors, nurses can contribute to early diagnosis of risk factors by identifying risky individuals, training and following these individuals, and guiding them to treatment, if necessary, by using their educator and counselor roles [9,10]. Previous studies showed that nurse-led interventions to prevent CVDs are effective in primary and secondary prevention of CVDs [8,9,11–13].

Having sufficient information and exhibiting a preventive attitude can enable one to be protected from diseases and take the necessary measures [14]. Robinson et al. examined whether positive health attitudes were associated with healthy behaviors in individuals with CVD or moderate risk of coronary heart disease (n=15,794) and reported that participants with positive health attitudes were more likely to exercise regularly and maintain the desired weight compared to participants with negative health attitudes and that they requested health services from their physicians more frequently [15]. Identifying cardiovascular risk factors in adults, determining their attitudes toward risk factors, and taking measures are crucial in improving heart health. To address this need, a comprehensive, valid, and reliable measurement tool is required to objectively assess adults' attitudes toward cardiovascular risk factors. To the best of our knowledge, no study has evaluated the knowledge, attitudes, and practices related to CVD risk factors and symptoms in the Turkish population using such a tool. This study aimed to develop the Adult Heart Health Attitude Scale (AHHAS) and evaluate its validity and reliability.

METHODS

STUDY DESIGN AND SETTING

The study was designed as a methodological type. It was conducted with patients with heart disease who applied to two university hospitals in Kocaeli and Eskişehir for diagnosis and treatment between 2 August 2021 and 31 January 2023. According to the literature, the sample size should be at least 5 times the number of items on the scale to develop one and 10 times the number of items to increase its reliability [16]. In the power analysis, alpha=0.05, 1-Beta=0.99 and effect size=0.2" were taken and the total number of patients was determined as n=443 as a result of the analysis. Based on this suggestion, patients who came to the cardiology outpatient clinics of two university hospitals for examination during the date of the study and 445 patients who received inpatient treatment in the cardiology service due to surgical intervention constituted the sample of the study. Patients who volunteered to participate in the study, were over 18 years old, and completed the data collection forms completely were included in the sample. Those who did not meet these criteria were excluded from the study. Sample selection was made using the random sampling method.

MEASURES

A Patient Information Form, Short Form-36 (SF-36, Quality of Life Scale), and AHHAS were used for data collection.

Patient information form: The personal information form consists of a total of 15 questions: 10 questions regarding the sociodemographic characteristics of the patients

participating in the study, such as age, gender, marital status, and 5 questions regarding the risk factors for cardiac diseases, chronic disease status, and continuously used medication.

The SF-36: The scale was developed by Ware in 1987 to evaluate an individual's health status and quality of life [17]. The Turkish adaptation, validity, and reliability study of the scale was performed by Pınar [18]. The multi-title scale includes 36 statements, 3 main headings, and 8 health areas under these headings. The functional status subheading includes quality of life, physical activity limitations for health problems, social activity limitations due to emotional and social problems, and limitation of daily living activities due to physical and emotional health problems. Well-being, including mental health, pain, and vitality, is another subheading. The last subheading is general health perception, which includes the assessment of health as a whole and the evaluation of changes in health compared to the past year. These three subheadings constitute the global quality of life, which includes functional status, well-being, and general health perception. The scale evaluates the state of health in the past four weeks. The score on SF-36 quality of life scale ranges from 0 to 100.17 SF-36 has a positive scoring system, and an increase in the score of each health area of SF-36 indicates good quality of life [17].

AHHAS: The scale was developed by the researchers by reviewing the literature and aims to determine the individual's attitude toward improving heart health. It consists of 28 items and 6 subdimensions: "Weight Control (8 questions)", "Psychosocial Status (6 questions)," "Healthy Eating (6 questions)," "Harmful Habits (3 questions)," "Processed Foods (2 questions)," and "Health Management (3 questions)." Items are scored on a 5-point Likert scale with response options of (5) Always, (4) Often, (3) Sometimes, (2) Rarely, (1) Never. In this scale, it is understood that the individual exhibits a positive attitude toward improving heart health as the scale score increases.

SUB-FACTORS OF THE SCALE

Weight Control (Factor 1) includes consuming products such as rice, pasta, and bread in the meals, adding salt to the food, doing physical activity, using stairs, and doing sports regularly.

Psychosocial Status (Factor 2) includes feeling happy, active, and sociable, taking responsibility in daily life, staying away from stress, anxiety, and anger, and sleep status.

Healthy Eating (Factor 3) includes eating vegetables-fruits, nuts, fish, chicken, vegetable oils, fibrous foods, and avoiding consuming packaged foods.

Harmful Habits (Factor 4) includes avoiding smoking, not being involved in smoking environments, and avoiding excessive alcohol consumption.

Processed Food (Factor 5) includes avoiding sugar-sweetened beverages and processed meat products at meals.

Health Management (Factor 6) includes regular use of medication, regular check-ups, and regular blood pressure measurement.

DEVELOPMENT PROCESS OF AHHAS

Step 1. Literature review and creation of an item pool: The literature was reviewed using the words "cardiovascular disease," "heart health," "risk factors," "attitude," and "scale development" [5–7,18-25].

During the literature review, statements that might be suitable for the item pool were noted. A 45-item draft scale was created by paying attention to the clarity of the items and not including more than one judgment.

Step 2. Receiving expert opinions (content validity): The item pool for the scale was reviewed by a panel of experts, including 5 cardiology specialists, 2 nursing faculty members, 1 faculty member from statistics, 1 from educational measurement and evaluation, and 1 from the Turkish language department. The experts rated each item on a scale of '1 = not appropriate,' '2 = needs major revision,' '3 = needs minor revision,' and '4 = appropriate' to assess item suitability. These scores were analyzed using the Davis technique [26]. Based on the evaluation, 16 items were removed from the scale—11 items with a Content Validity Index (CVI) below 0.80 and 5 items due to redundancy. After these revisions, the draft scale was reduced to 29 items, with CVI values for the remaining items ranging between 0.82 and 1.00.

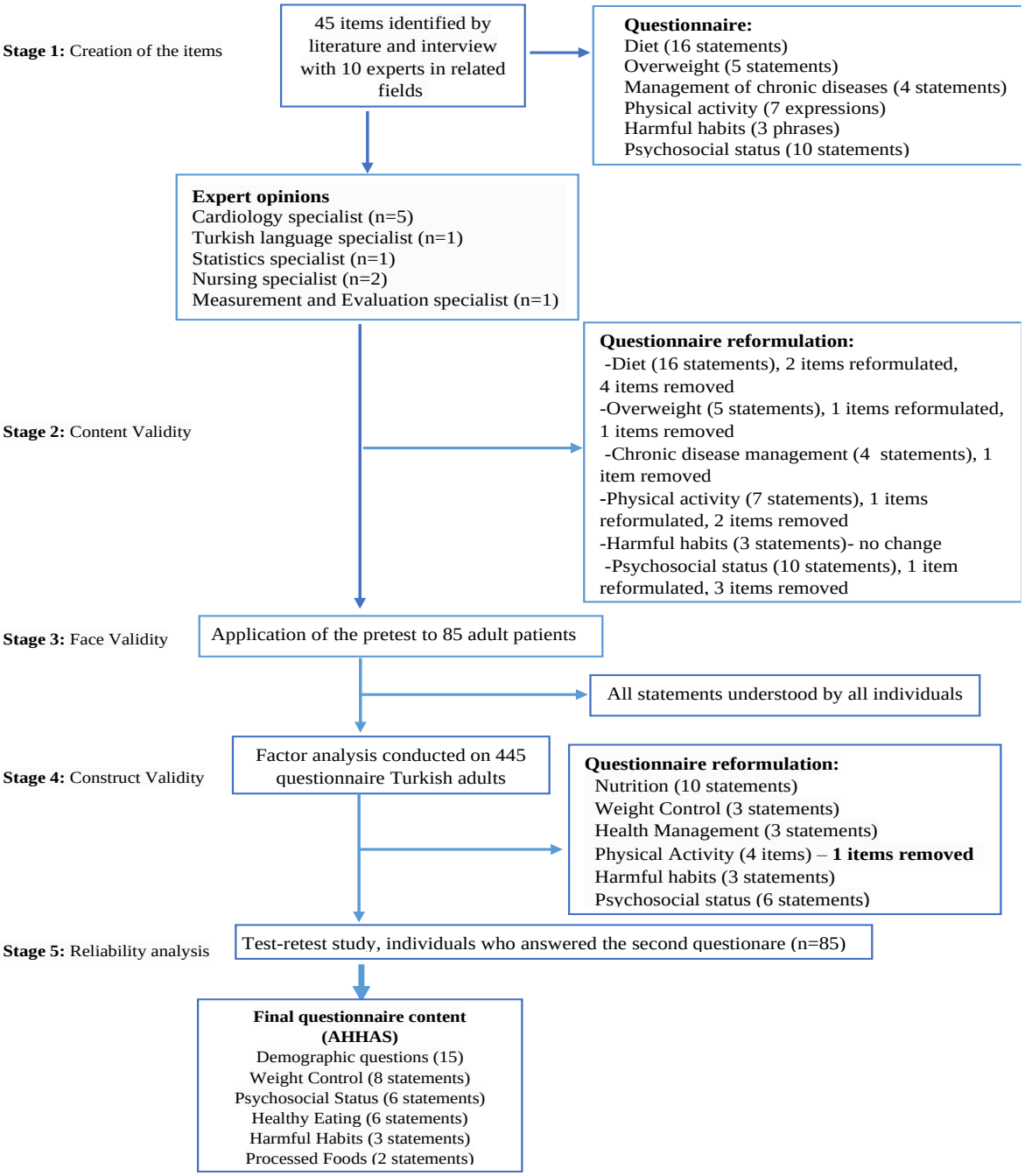
Step 3. Pilot application: After the scale was evaluated by the experts, necessary adjustments were made, and a pilot application was performed with the draft scale. For the pilot application, the scale was implemented on 85 people

selected from the determined population. The intelligibility of the questions and their language suitability were evaluated with the pilot application, and it was determined that there was no incomprehensible item on the scale. Then, for test-retest reliability, the scale was re-applied to 85 patients two weeks after the first application.

Step 4. Data collection: It was planned to implement data collection tools on at least 290-300 patients between 2 August 2021 and 31 January 2023. During data collection, the purpose, method, and expected benefits of the study were explained to the participants who agreed to participate in the study using the Informed Consent Form. Data were collected from the sample of Kocaeli Research and Application Hospital in face-to-face interviews. Since data collection in face-to-face interviews was not allowed at Eskişehir Health, Research, and Application Hospital due to the risk of COVID-19 transmission, researchers created Google forms and sent them to patients via WhatsApp, and the patients filled in the form online. It took an average of 15-20 minutes to fill the survey forms.

Step 5. Psychometric tests: Exploratory factor analysis, confirmatory factor analysis, and reliability and normality analysis were performed for the validity and reliability of the scale. AHHAS development steps are shown in Figure 1.

FIGURE 1. FLOW CHART OF THE QUESTIONNAIRE DEVELOPMENT PROCESS



STATISTICAL ANALYSIS

Statistical analysis was performed using IBM SPSS 20.0 (IBM Corp., Armonk, NY, USA) and LISREL v8.8 (SSI Inc., IL, USA) package programs. The fitness of the numerical variables to the normal distribution was evaluated with the Kolmogorov-Smirnov Test. Numerical variables were given as median (25th - 75th percentile) and frequency (percentages). To test the comprehensibility of the questions, the Pearson correlation coefficient was calculated for the test-retest reliability, which was performed at two-week intervals. The Cronbach a coefficient was calculated separately for the internal consistency of AHHAS and its sub-factors. Exploratory Factor Analysis (EFA) was performed to test the validity of the scale structure in Turkish culture. The main components method was used to determine the factors, and the varimax factor rotation method was used to determine the suitable factors. The suitability of the sample was tested with the Kaiser-Meyer-Olkin coefficient. The suitability of the data for factor analysis was tested with Bartlett's Sphericity Test. The fitness of the sub-factors to the original variables was measured by Confirmatory Factor Analysis (CFA). Structural Equation Modeling (SEM) was used to control the structural model created. The relationship between the sub-factors of AHHAS was determined using the Pearson correlation coefficient. A p-value of <0.05 was considered sufficient for statistical significance in two-way tests.

RESEARCH ETHICS

Ethics committee approval with the decision number of KU GOKAEK-2021/14.17 and project number 2021/240 was taken from KU Non-Interventional Clinical Research Ethics Committee on 07/29/2021. Written permission was obtained from the chief physician of the hospitals where the research was conducted, and informed consent was obtained from the patients participating in the research.

RESULTS

The median age of the patients was 55.29, the median BMI was 26.71, 70.1% were hospitalized in the cardiology ward, 53.5% were male, 81.1% were married, 42% were primary school graduates, 28.5% were retired, and 96.6% had social security. 59.5% of the patients' income was equal to their expenses, 38.7% did not smoke, 79.8% did not drink alcohol, 45.2% exercised occasionally, 91% had a chronic disease, and 90.6% had medication that they used constantly (Supplementary Table 1).

RELIABILITY ANALYSIS

The Cronbach's a coefficient was evaluated to examine the reliability of AHHAS. Cronbach's a coefficient of the subscales was found to be 0.704 for "Weight control," 0.718 for "Psychosocial Status," 0.705 for "Healthy Eating," 0.446 for "Harmful Habits," 0.653 for "Processed Foods," and 0.586 for "Health Management." Cronbach's a=0.834, which measures the internal consistency value of the scale. Considering this internal consistency value, it was determined that the scale questions were sufficient for the measurement of adults' attitudes toward heart health, and the internal consistency of the scale was ensured. Test-retest analysis was performed to ensure that the scale does not change over time, and there was a strong positive correlation between the total scores of the first test and the last test ($r=0.821$; $p<0.001$).

VALIDITY ANALYSIS

EFA was performed to test the validity of AHHAS. As a result of EFA, a structure that explains 54.4% of the total variance of the data structure used in the scale consisting of six factors and 29 items was reached. In EFA performed for the validity of the scale, the smallest and largest factor loads were 0.453 and 0.851. The Kaiser-Meyer-Olkin index was 0.643, suggesting that the data were suitable for factor analysis. Bartlett's sphericity test was significant ($\chi2=953.841$, $p<0.001$). The scale is divided into 6 sub-factors to explain the attitudes of adult patients toward heart health. The rotated factor loading matrix is shown in Table 1.

CONFIRMATORY FACTOR ANALYSIS (CFA)

CFA was conducted to test the suitability of the structure revealed by exploratory factor analysis. The scale item "I give importance to maintaining my sexual life regularly for my heart health." had a negative value (-0.564) as a result of EFA and thus, confused the results of CFA. Therefore, it was excluded from CFA. A structural equation model with 28 items and 6 sub-factors was created according to the results of CFA (Graphic 1). The fit measures used to evaluate of the validity of the structural equation modeling were RMSEA=0.075 (CI=0.071; 0.080), AGFI=0.81, and GFI=0.84. These results show that the created model is valid.

SUPPLEMENTARY TABLE 1. SOCIODEMOGRAPHIC CHARACTERISTICS OF THE PATIENTS (N=445)

Characteristics		Mean (SD)	
Age		55.29 (15.59)	
BMI		26.71 (4.54)	
		n	%
Patient admission	Cardiology outpatient clinic	133	29.9
	Cardiology service	312	70.1
Gender	Female	207	46.5
	Male	238	53.5
Marital status	Married	361	81.1
	Single	84	18.9
Education level	Illiterate	19	4.3
	Primary school	187	42.0
	High school	104	23.4
	Bachelor's degree	107	24.0
	Graduate degree	28	6.3
Occupation	Housewife	111	25.0
	Retired	127	28.5
	Self-employed	67	15.1
	Government officer	45	10.1
	Other	95	21.3
Social security	Yes	430	96.6
	No	15	3.4
Income level	Income < expenses	108	24.3
	Income = expenses	265	59.5
	Income > expenses	72	16.2
Smoking	Yes, I smoke	106	23.8
	No, I do not smoke	172	38.7
	I used to smoke but I quit	167	37.5
Alcohol consumption	Yes, I consume regularly	18	4.0
	No, I do not consume	355	79.8
	I consume occasionally	72	16.2
Exercising	Yes, I exercise regularly	73	16.4
	No, I do not exercise	171	38.4
	I sometimes exercise	201	45.2
Chronic disease	Yes	405	91.0
	No	40	9.0
Continuous medication	Yes	403	90.6
	No	42	9.4
Total		**445**	**100.0**

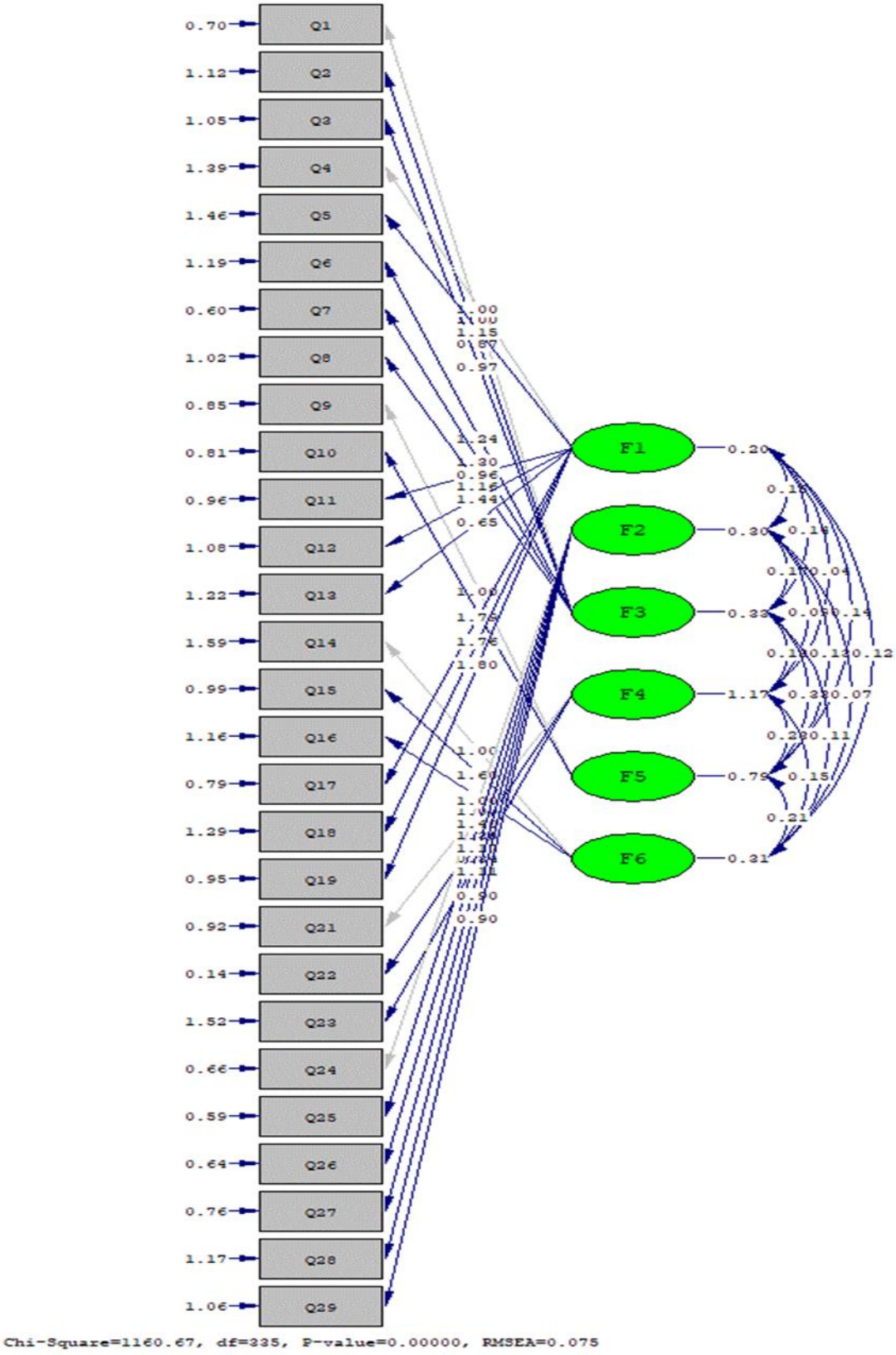
SD: Standard Deviation; BMI: Body Mass Index

TABLE 1. FACTOR MATRIX LOADINGS (EFA) FOUND WITH THE VARIMAX ROTATION METHOD

	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6
Item 4	0.458					
Item 5	0.536					
Item 11	0.453					
Item 12	0.621					
Item 13	0.460					
Item 17	0.746					
Item 18	0.536					
Item 19	0.694					
Item 24		0.529				
Item 25		0.663				
Item 26		0.695				
Item 27		0.677				
Item 28		0.689				
Item 29		0.552				
Item 1			0.585			
Item 2			0.598			
Item 3			0.518			
Item 6			0.575			
Item 7			0.458			
Item 8			0.453			
Item 20				-0.564		
Item 21				0.669		
Item 22				0.518		
Item 23				0.738		
Item 9					0.737	
Item 10					0.851	
Item 14						0.575
Item 15						0.761
Item 16						0.794
Explanatory Percentage (%)	11.21	9.69	8.96	8.48	8.11	7.96

EFA: Exploratory Factor Analysis

GRAPHIC 1. STRUCTURAL EQUATION MODEL OF AHHAS (N=445)



Sub-factors: F1-WC: Weight Control; F2-PS: Psychosocial Status; F3-HE: Healthy Eating; F4-HH: Harmful Habits; F5-PF: Processed Foods; F6-HM: Health Management

TABLE 2. AHHAS ITEMS AND ITEM STATISTICS

Sub-Factors	Items	Mean	SD	Item Correlation	
				TSS	SFS
Weight Control (Factor 1)	4. I avoid consuming products such as rice, pasta, and bread in my meals.	3.07	1.26	0.419	0.485
	5. I do not add extra salt to my food, and I pay attention to the salt rate in my meals.	3.68	1.31	0.498	0.550
	11. I know that excess weight/obesity is harmful to heart health, so I take care not to gain weight.	3.95	1.07	0.419	0.548
	12. I weigh myself regularly to keep my weight under control.	3.30	1.22	0.495	0.624
	13. I stop eating when I am full.	4.07	1.14	0.341	0.430
	17. Instead of sitting most of the day, I do physical activities such as walking, swimming, and exercising.	3.30	1.20	0.488	0.648
	18. I prefer to use the stairs rather than the elevator.	3.08	1.38	0.433	0.629
	19. I do sports regularly.	2.65	1.27	0.446	0.645
Psychosocial Status (Factor 2)	24. I usually feel happy.	3.79	0.98	0.409	0.633
	25. I am generally an active and social person.	3.90	1.08	0.465	0.714
	26. In general, I take responsibility in my daily life (at home, at work, etc.).	4.18	1.02	0.422	0.675
	27. I try to solve my problems by myself. When I cannot, I get support from my circle.	4.07	1.06	0.457	0.655
	28. I stay away from stress, anxiety, and anger as much as possible in my daily life (at home, at work, etc.).	3.44	1.18	0.467	0.590
	29. I sleep an average of 7-8 hours a day.	3.95	1.14	0.390	0.612
Healthy Eating (Factor 3)	1. I pay attention to including vegetables and fruits in my meals.	3.82	1.01	0.462	0.685
	2. I pay attention to eating nuts with hard shells and oily dried fruits (walnuts, hazelnuts, peanuts, etc.) in my meals.	3.21	1.16	0.410	0.576
	3. I prefer to consume fish and chicken meat instead of red meat.	3.26	1.16	0.446	0.610
	6. I prefer vegetable oils (olive oil) instead of animal fats (tail fat) in my meals.	3.68	1.29	0.481	0.649
	7. I prefer to consume fibrous foods (apple, citrus fruits, spinach, legumes, oats, rye, etc.).	3.74	1.07	0.555	0.717
	8. I pay attention to the fact that my food is natural and additive-free, and I avoid consuming packaged foods.	3.70	1.20	0.523	0.601
Harmful Habits (Factor 4)	21. I avoid smoking because I know its harmful effects on heart health.	3.98	1.44	0.343	0.774
	22. I prefer not to be in smoking areas.	3.61	1.45	0.390	0.812
	23. I avoid drinking excessive amounts of alcohol.	4.25	1.28	0.285	0.553
Processed Foods (Factor 5)	9. I avoid consuming sugar-sweetened beverages (coke, energy drinks, etc.) in my meals.	3.67	1.27	0.474	0.864
	10. I avoid consuming processed meat products (salami, fermented sausage, sausage, etc.) in my meals.	3.47	1.26	0.507	0.859
Health Management (Factor 6)	14. I regularly use my medication/medications (such as medications for anticoagulation, blood pressure, blood sugar, and cholesterol).	4.00	1.37	0.313	0.694
	15. Even though I do not have any health problems, I have regular check-ups (basic health checks).	2.63	1.33	0.465	0.732
	16. I regularly measure my blood pressure.	3.10	1.40	0.425	0.792

TSS: Total Scale Score; SFS: Sub-Factor Score; SD: Standard Deviation

SUPPLEMENTARY TABLE 2. CORRELATIONS AND CRONBACH A VALUES FOR SUB-FACTORS OF AHHAS

r (p)*		Weight Control (Factor 1)	Psychosocial Status (Factor 2)	Healthy Eating (Factor 3)	Harmful Habits (Factor 4)	Processed Foods (Factor 5)	Health Management (Factor 6)	Total AHHAS Score	Cronbach a
Factor 1	r	-	0.435	0.456	0.255	0.339	0.314	0.680	0.704
	p		<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	
Factor 2	r		-	0.419	0.281	0.221	0.173	0.596	0.718
	p			<0.001	<0.001	<0.001	<0.001	<0.001	
Factor 3	r			-	0.265	0.433	0.268	0.702	0.705
	p				<0.001	<0.001	<0.001	<0.001	
Factor 4	r				-	0.248	0.247	0.587	0.446
	p					<0.001	<0.001	<0.001	
Factor 5	r					-	0.283	0.697	0.653
	p						<0.001	<0.001	
Factor 6	r						-	0.627	0.586
	p							<0.001	

*: Pearson correlation analysis

AHHAS: Adult Heart Health Attitude Scale

SUPPLEMENTARY TABLE 3. CORRELATIONS BETWEEN THE SUB-FACTORS OF AHHAS AND SF-36

AHHAS Sub-factors		SF-36 Sub-dimensions							
		Physical Functioning	Role Physical	Role Emotional	Vitality	Mental Health	Social Functioning	Pain	General Health Perception
Weight Control	r	0.305	0.299	0.271	0.276	0.178	0.252	0.252	0.336
	p	p<0.001	p<0.001	p<0.001	p<0.001	p<0.001	p<0.001	p<0.001	p<0.001
Psychosocial Status	r	0.275	0.227	0.233	0.274	0.310	0.206	0.254	0.364
	p	p<0.001	p<0.001	p<0.001	p<0.001	p<0.001	p<0.001	p<0.001	p<0.001
Healthy Eating	r	0.149	0.200	0.197	0.150	0.190	0.13	0.188	0.221
	p	0.005	p<0.001	p<0.001	0.005	p<0.001	p<0.001	p<0.001	p<0.001
Harmful Habits	r	-0.028	-0.011	0.078	-0.006	0.070	0.012	0.014	0.034
	p	0.595	0.834	0.143	0.918	0.190	0.825	0.787	0.525
Processed Foods	r	-0.071	0.041	0.030	0.049	0.094	0.107	0.179	0.042
	p	0.187	0.440	0.579	0.359	0.079	0.046	0.001	0.432
Health Management	r	-0.156	-0.002	-0.027	0.039	0.009	0.029	0.026	-0.031
	p	0.003	0.966	0.611	0.471	0.870	0.589	0.631	0.562
Total AHHAS Score	r	0.079	0.166	0.173	0.177	0.197	0.175	0.219	0.211
	p	0.139	0.002	0.001	0.001	p<0.001	0.001	p<0.001	p<0.001

AHHAS: Adult Heart Health Attitude Scale; SF-36:Short Form-36

In Supplementary Table 2, it was found that there was a positive and statistically significant correlation between the AHHAS subscales and the total scale score (p<0.001). The Cronbach a values indicating the contribution of sub-factors to the scale are also given in Supplementary Table 2. The a values are between 0.446 and 0.718. It was determined that the harmful habits sub-factor contributed less to the scale than the other sub-factors.

In Supplementary Table 3, a strong, significant positive relationship was found between weight control, psychosocial status and healthy eating, which are sub-factors of AHHAS, and all sub-factors of the SF-36 Scale (p<0.001). The correlation between the total AHHAS score and the subdimensions of SF-36 was examined, and no significant correlation was determined between the total AHHAS score and physical functioning (r=0.079, p=0.139).

DISCUSSION

A series of steps were taken in the study which was carried out to examine the attitudes of Turkish adults toward heart health, evaluate the validity and reliability of the newly developed scale, and bring it into the nursing literature. The results confirmed the validity and reliability of this 28-item measurement tool. The results were compared with those of the scale developed by Koohi et al. (2021), which also measures knowledge, attitudes, and practices related to heart health in adults and shares similarities with the scale we developed.

DISCUSSION OF THE RESULTS REGARDING THE RELIABILITY OF AHHAS

The findings of the test-retest, which assessed the reliability of the scale, were examined, and it was observed that there was a strong positive correlation between the total scores of the first test and the last test (r=0.821 p<0.001). In Koohi et al.'s study, this value was r = 0.57, and a positive moderate relationship was determined [27]. In our study, the reliability of AHHAS was found to be Cronbach a=0.834. In Koohi et al.'s study, the Cronbach a value of the entire scale was not given, but the values for the subscales were given separately [27]. These results show that this tool, which was developed to measure adults' attitudes toward heart health, is quite reliable.

In the study of Koohi et al., in which the reliability of the subscales was examined, the Cronbach alpha coefficients were 0.856 for "knowledge," 0.915 for "attitude," 0.711 for "physical activity-related behaviors," and 0.509 for "nutrition and smoking behaviors" [27]. In this study, for the sub-factors of AHHAS, the Cronbach a value was 0.704 for "Weight Control," 0.718 for "Psychosocial Status," 0.705 for "Healthy Eating," 0.446 for "Harmful Habits," 0.653 for "Processed Foods," and 0.586 for "Health Management." Cronbach's a values were found to be quite reliable for weight control, psychosocial status, healthy eating, processed foods, and low reliability for harmful habits and health management. Koohi et al. reported that the contribution of "nutrition and smoking behaviors" to the scale was the lowest compared to other sub-factors while the contribution of the "attitude" sub-factor to the scale was the highest [27]. However, Koohi et al. argued that "excessive alcohol consumption" is an important risk factor for cardiovascular diseases; however, it is not acceptable to question such sensitive information, since such information is associated with stigmatization and social embarrassment in the culture of Islamic countries [27]. Similarly, our study showed that the "psychosocial status" subfactor had the highest contribution to the scale. The "harmful habits" sub-factor was found to have the lowest contribution to the scale compared to the other sub-factors. However, it was not found appropriate to be removed from the scale since it has a contribution even if it was low. The reason for the low contribution of the "harmful habits" sub-factor to the scale can be explained by the fact that individuals have lower attitudes toward heart health as they do not behave appropriately or do not respond correctly to the situations in this subfactor.

DISCUSSION OF THE RESULTS REGARDING THE VALIDITY OF AHHAS

As a result of the EFA, which was applied to determine the structural validity of AHHAS, it was seen that the scale structure explained 54.4% of the total variance of the scale. In the EFA performed in the study, the scale was divided into 6 sub-factors named "Weight Control," "Psychosocial Status," "Healthy Eating," "Harmful Habits," "Processed Foods," and "Health Management." In our study, since Factor 1 includes questions about consuming carbohydrates in meals, adding salt to food, paying attention to weight gain, weighing ourselves regularly, doing physical activity, using stairs, and doing sports regularly, this factor is named "Weight control". Since Factor 2 includes questions about the person's mental state, initiative in daily life, taking responsibility, anger, anxiety and stress management, this factor was named "Psychosocial situation." Since Factor 3 includes questions about healthy nutrition, such as eating vegetables and fruits, nuts, fish and chicken, vegetable oils and fiber foods,

this factor was named "Healthy nutrition." Since Factor 4 includes questions about avoiding smoking, not being in smoking environments, and avoiding consuming excessive amounts of alcohol, this factor was named "Harmful habits." Since Factor 5 includes questions about avoiding consuming sugar-sweetened beverages and processed meat products at meals, this factor was named "Processed foods." Since Factor 6 includes questions about medication use, check-ups and blood pressure measurement, this factor was named "Health management." The exploratory percentages of the variances of the sub-factors were found to be 11.21%, 9.69%, 8.96%, 8.48%, 8.11%, and 7.10%, respectively. In the factor analysis of the 20th item, the analysis gave a result in the negative direction (-0.564). Except for item 20, all the questions contribute significantly to the entire scale, showing that the data structure is suitable for factor analysis. In the study of Koohi et al., the scale was divided into 4 sub-factors named "knowledge," "attitude," "physical activity-related behaviors," and "nutrition and smoking behaviors." In general, the percentage of the total variance of the scale was 48.43% and the exploratory percentages of the variances of the sub-factors were 17.049%, 19.519%, 5.527%, and 6.334%, respectively [27].

For the construct validity of the scale, EFA analysis was performed on the data of the adult patient group. As a result of the analysis, it was seen that the scale was divided into 6 sub-factors. In the first version of the scale with 6 sub-factors, the items that constitute the "Nutrition" sub-factor (items 1, 2, 3, 4, 5, 6, 7, 8, 9, 10) changed as a result of EFA and constituted the "Healthy Nutrition" sub-factor consisting of 6 items (items 1, 2, 3, 6, 7, 8). The 9th and 10th items in the "Nutrition" sub-factor created a new sub-factor named "Processed Foods" as a result of EFA. The 4th and 5th items in the "Nutrition" sub-factor were included in the "Weight control" sub-factor. In the first version of the scale, the items (11, 12, 13) in the "Weight Control" sub-factor did not change as a result of EFA but were included in the same sub-factor. Items 17, 18, and 19 were included in the "Physical Activity" sub-factor in the first version of the scale but then were included in the "Weight Control" sub-factor as a result of EFA. The 20th item, "I give importance to maintaining my sexual life regularly for my heart health." had a negative value (-0.564) in EFA and it was excluded from the scale because it confused the CFA results. Regular sexual activity increases the dilatation capacity of blood vessels, improves vascular wall function, delivers oxygen to muscles more efficiently, and, accordingly, improves cardiovascular health [28]. Liu et al. reported that men and women who have sexual intercourse at moderate frequency will have a lower cardiovascular risk than those who are not sexually active [29]. The 20th item excluded from the scale in our study is related to sexuality. In X, where the majority of people whose religion is Islam, sexuality is a sensitive issue related to social embarrassment. In the study, considering the sensitive nature of this information about sexuality in Turkish culture, it can be said that the item had a negative value since the participants did not report the truth. Fowler stated that one of the five basic features required to increase the measurement quality of a question is that participants should always be willing to give the correct answers to the question [30]. The result obtained in our study supports this information.

As a result of EFA, considering the items in the "Weight Control" sub-factor (items 4, 5, 11, 12, 13, 17, 18, 19), it was not surprising that besides direct weight-related items, items that are related to each other, such as eating carbohydrate-containing foods, adding salt to meals, doing physical activity, and doing sports, were loaded on the "Weight Control" sub-factor, suggesting that these sub-factor items are interrelated and consistent.

In the first version of the scale, the items in the "Health Management" sub-factor (14,15,16), the items in the "Harmful Habits" sub-factor (21,22,23), and the items in the "Psychosocial status" sub-factor, (24, 25, 26, 27, 28, 29) did not undergo any changes as a result of EFA.

Structural Equation Modeling is an analysis that examines the contribution of the sub-factors created by CFA to the model and confirms the results [31,32]. When the validity of the model created for AHHAS was tested with fit criteria, it was determined that the factor structure obtained in the structural equation model was consistent according to the factor analysis. The fit values of the Structural Equation Model of AHHAS were RMSEA=0.075 (CI=0.071; 0.080), AGFI=0.81, and GFI=0.84. These results show that the model is valid and can be used to determine adults' attitudes toward heart health [33]. In the study by Koohi et al., according to the results of the 29-item CFA model consisting of four subscales, the root mean square error of approximation (RMSEA) was 0.068; comparative fit index (CFI) was 0.94; goodness-of-fit index (GFI) was 0.83; normed fit index (NFI) was 0.90; incremental fit index (IFI) was 0.9, indicating acceptable model fit indices [27].

There was a positive and significant correlation between the sub-factors of AHHAS and the total scale score

(p<0.001). These results showed that all items of AHHAS were sufficiently correlated with the score of the relevant sub-factor and that the item reliability of the sub-factors was high, proving the reliability of the newly developed scale.

No significant correlation was found between the total AHHAS score and the physical functioning subdimension, one of the subdimensions of SF-36 (p>0.05); however, there was a significant correlation between the other sub-dimensions (p<0.001).

STUDY LIMITATIONS

The main limitation of the research is that the study was carried out with adult patients who applied to the cardiology outpatient clinic and cardiology service of two university hospitals in two provinces. Another limitation of the study was that data were collected online using Google Forms, as face-to-face interviews were not permitted due to the risk of COVID-19 transmission among the patient group from Eskişehir province, which formed part of the sample. The study was conducted with patients admitted to university hospitals in urban areas, which may limit its representation of patients from rural settings. As a result, the findings cannot be generalized beyond this group. Additionally, due to sociocultural factors, patients' views on sensitive topics such as sexuality and alcohol consumption were not fully explored. These limitations restrict the generalizability of the study's findings to other populations.

CONCLUSION

The study determined that the Adult Heart Health Attitude Scale (AHHAS) is a valid and reliable tool for assessing heart health attitudes in adults in X. The findings are expected to contribute to the nursing and medical literature, supporting the development of future programs to improve heart health in adults. It is recommended that the scale be used in studies focused on adult heart health to assess attitudes toward risk factors, guide the development of educational activities for preventing these risks, and be applied in larger sample groups across different countries and urban and rural populations.

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