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Development and Validation of the Healthy Lifestyles Knowledge Questionnaire for Elderly at Risk of Heart Disease

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ABSTRACT

Introduction: Coronary heart disease (CHD) is a leading cause of mortality among the elderly. Promoting healthy lifestyles through balanced diets and regular physical activity is essential for prevention programs. However, the availability of standardized and validated instruments to measure knowledge of healthy lifestyles among elderly individuals is still limited, particularly in Indonesia. This study aimed to develop and validate a knowledge questionnaire focusing on diet and physical activity for elderly individuals at risk of CVD.

Methods: A mixed-method validation was conducted, involving qualitative and quantitative approaches. First, content validity was assessed by experts in community nutrition, clinical nutrition, and sport nutrition (n = 8) using the Content Validity Index (CVI) and multi-rates Kappa statistics. Second, face validity was tested with elderly participants (n = 10) to ensure clarity and comprehension. Finally, item validity and reliability testing were examined with elderly participants (n = 30) using the Pearson correlation test between item-total score and Cronbach's Alpha to determine internal consistency.

Results: The I-CVI values for all items ranged from 0,75 to 1,00, and Kappa statistics from 0,72 to 1,00, indicating good to excellent agreement among experts. Face validation confirmed that most items were relevant and understandable, with brief wording adjustments required for clarity. The Cronbach's alpha of 0,742 reflected good internal consistency. Overall, the validation process demonstrated that 19 of 28 items met the statistical criteria.

Conclusion: The healthy lifestyle knowledge questionnaire demonstrated strong validity and reliability in assessing knowledge among elderly individuals at risk of CHD. This instrument is practical and applicable for supporting health promotion and prevention programs focusing on diet and physical activity.

INTRODUCTION

Coronary heart disease (CHD) remains one of the leading causes of mortality worldwide, particularly among the elderly population (1). The global population aged ≥60 years is projected to increase substantially in the coming decades, expanding the number of older adults at risk of CHD (2). In Indonesia, existing evidence indicates that cardiovascular disease in the elderly is strongly associated with hypertension, hypercholesterolemia, diabetes mellitus, low physical activity, and obesity (3). Lifestyle modification, especially related to dietary habits and physical activity, plays a crucial role in reducing these risk factors and promoting cardiovascular health (4,5).

Knowledge of healthy lifestyles is a key determinant of behaviour change. Adequate knowledge of dietary habits and physical activity among older adults is essential for preventing chronic disease and maintaining functional independence in later life. However, elderly individuals often face barriers to accessing and applying this information (6,7). This highlights the need for an instrument capable of assessing whether older adults truly understand healthy lifestyle information, so that educational intervention can be appropriately tailored.

Although various instruments measuring nutrition knowledge have been developed, most were designed for the general adult population or for specific contexts such as low-protein diet (8–10). Even among tools intended for older adults, empirical evidence supporting their validity and reliability remains limited, suggesting the absence of a consistently dependable assessment instrument. Moreover, several existing questionnaires were developed many years ago, raising concerns about their alignment with update dietary guidelines and current nutrition issues (11). Validating such an instrument is therefore essential to ensure reliable assessment and to support the design of appropriate interventions (12). In response to this gap, the present study developed and validated a healthy lifestyle knowledge questionnaire, specifically designed to assess knowledge of heart-healthy diets and physical activity among older adults at risk of coronary heart disease.

METHOD

Study Design

This study employed a mixed-method validation approach combining qualitative and quantitative designs. Qualitative validation assessed content validity and face validity, while quantitative validation used a descriptive study design to evaluate item validity and questionnaire reliability. The validation process focused on the healthy lifestyle knowledge questionnaire, emphasizing heart-healthy diet and physical activity among the elderly. The overall validation procedure is illustrated in Figure 1. Data collection was conducted from December 2024 to February 2025.
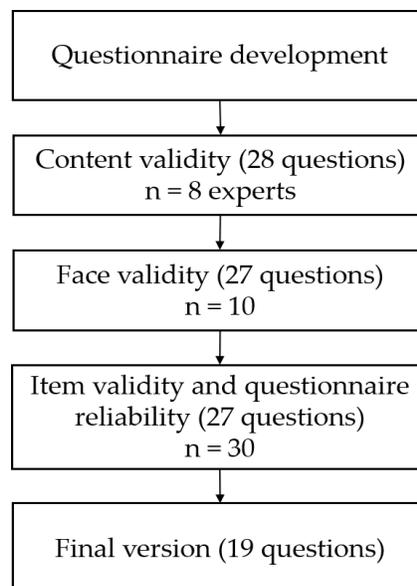
Figure 1. Procedure of Questionnaire Development and Validation

Participants

Content validity was evaluated by a panel of eight experts with professional backgrounds in community nutrition, clinical nutrition, and sport nutrition. The number of panelists exceeded the minimum recommended to enhance the evaluation and reduce the possibility of chance agreement (13). Panelists were asked to evaluate the clarity of each questionnaire item and its relevance in measuring the healthy lifestyles knowledge questionnaire. Inclusion criteria for panelists were an academic or professional background in health sciences with at least five years of work experience.

Face validity was assessed with 10 elderly participants, while item validity and reliability testing were conducted with 30 elderly participants. This sample size adheres to the common practice in questionnaire validation studies (14–17). Participants were selected purposively to meet the inclusion criteria (aged 60-75 years and willing to complete the questionnaire after signing informed consent). This approach helps achieve a homogeneous sample and ensures that it is representative of the target population, adequate for evaluating item validity and questionnaire reliability.

Research Location

The study was conducted in a community-based elderly health service (Posyandu Lansia) in Palopo City, South Sulawesi, Indonesia. This setting was selected as the research site because it provides regular health services and educational activities for older adults, making it an appropriate location for data collection related to face validity, item validity, and reliability testing of the questionnaire.

Questionnaire Development

The healthy lifestyles knowledge questionnaire was developed by adapting several previously validated instruments, including the Questionnaire on Knowledge of Cardiovascular Risk Factors (Q-FARCS), the Knowledge of Cardiovascular Risk Factors (CVRFs) and Lifestyle after Coronary Event, and the Healthy Lifestyle Questionnaire for Elderly (HEAL), which cover domains of nutrition knowledge, physical activity, heart-healthy dietary pattern, and understanding of cardiovascular risk factors (18–21). The development process also referred to the Indonesian Balanced Nutrition Guidelines and physical activity recommendations for older adults (22–24). The initial draft was prepared by translating and adapting relevant items to ensure suitability for the target population of older adults.

The adaptation resulted in four main domains: general knowledge of balanced nutrition, risk factors for heart disease, a heart-healthy diet, and physical activity. All items were formulated using simple language to ensure clarity and comprehensibility among older adults. The questionnaire employed a true/false response format, with scores reflecting participants' level of knowledge. Higher scores indicate a better understanding of heart-healthy lifestyles. The number of items and the specific theme of the questionnaire are summarized in Table 1.

Table 1. Distribution of Questionnaire Items by Domain and Theme

No	Domain	Number of items	Specific theme
1	General knowledge of balanced nutrition	4	Balanced diet composition, dietary fiber, and salt use
2	Risk factors of heart disease	5	Cholesterol, hypertension, and overweight
3	Heart-healthy diet	12	Fruit and vegetables, saturated vs healthy fats, food choices, and cooking methods
4	Physical activity	7	Exercise type, frequency, duration, and benefits.

Data Collection

Content validity was assessed by eight experts who were asked to evaluate each item in terms of clarity and relevance, using a 4-point scale ranging from 1 (unclear and irrelevant) to 4 (very clear and very relevant). The Content Validity Index (CVI) was calculated at both the item and scale levels, and subsequently adjusted using a multi-rater Kappa statistic. The combined use of CVI and Kappa is necessary, as CVI provides an initial estimate of expert agreement, while Kappa accounts for chance agreement and identifies additional problematic items, thereby providing a more accurate and comprehensive assessment of content validity (13,14). To compute the Kappa value,

the probability of chance agreement (Pc) was first determined using the formula Pc = [N! / A! (N-A)!] * $0,5^N$. Where N is the total number of experts, and A is the number of experts who rated the item as clear or relevant. The Kappa value (K) was then calculated using the formula K = (I-CVI – Pc) / (1 – Pc), which adjusts the item-level CVI by accounting for chance agreement. This calculation enables a more reliable assessment of whether the items are truly valid and not merely agreed upon by chance.

A qualitative assessment was conducted through interviews with ten older adults to explore their comprehension of each item and identify any potentially complex wording. This approach, known as cognitive interviewing, is commonly used to determine how s interpret and understand questionnaire item, and the feedback obtained was used to revise items that were considered difficult to understand (25). Meanwhile, in the quantitative assessment, respondents rate the importance of each item on a scale from 1 (not important) to 5 (very important). The average scores were used to determine the impact of each item, and those with low importance or unclear wording were revised before inclusion in the final version.

The revised questionnaire was administered to thirty participants aged above 60 years for item analysis and reliability testing. The questionnaire employed a true or false format, with correct responses scored as 1 and incorrect responses scored as 0. Scores were calculated at both the domain and overall levels. Internal consistency was assessed using Cronbach's alpha coefficient, which can also be applied to dichotomous items (26).

Data Analysis

All analyses were conducted using IBM SPSS version 24. Descriptive statistics summarized the participants' characteristics. Content validity was evaluated with a minimum I-CVI of $\geq 0,83$ and Kappa ≥ 0.75 as an acceptable value, given that the number of experts was eight (13,14). Face validity was assessed using the impact score to determine the importance of each item according to respondents, with items scoring above 1,5 considered important and acceptable (14). Item validity was further examined by calculating the item-total correlation (r-item), which evaluates how well each item reflects the overall construct of the questionnaire. Reliability was assessed using Cronbach's alpha, with values $\geq 0,70$ indicating satisfactory internal consistency (27).

Ethical Approval

This study was approved by the Ethics Committee of the Faculty of Public Health, Hasanuddin University, with number: 3525/UN4.14.1/TP.01.02/2024. Written informed consent was obtained from all participants prior to data collection.

RESULTS

Characteristics of Participants

Content validity was assessed by eight panelists, consisting of four community nutritionists, two dietitians, and two experts in nutrition education and sports nutrition. Face validity was examined through interviews with ten older adults. Most participants were female (80%) and aged 60 – 65 years (60%), while the others were in the 66 – 70 years age group. Half were unemployed, while the remainder were self-employed (30%) or retired civil servants (20%).

An item validity and reliability analysis was conducted with 30 older adults who completed the revised questionnaire. More participants were female and within the age group of 60 – 65 years. Educational backgrounds were diverse, ranging from no formal schooling to a college education, with the majority having completed secondary and high school education. Employment status was fairly evenly distributed among unemployed, self-employed, and retired civil servants. In terms of health history, a larger group reported having at least one risk factor for heart disease, while a smaller group did not. Their detailed characteristics are presented in Table 2.

Table 2. Participant Characteristics (n=30)

	Variable	Frequency	%
Gender	Male	7	23,3
	Female	23	76,7
Age (year)	60 – 65	18	60,0
	66 – 70	7	23,3
	71 – 75	5	16,7
Highest level of education	No formal schooling	4	13,3
	Primary school	7	23,3
	Secondary and high school	12	40,0
	College degree	7	23,3
Employment status	Unemployed	11	36,7
	Self-employed	9	30,0
	Retired civil servant	10	33,3
History of heart disease risk	Yes	20	66,7
	No	10	33,3

Source: Primary Data

Content Validity

Eight experts assessed the clarity and relevance of each item using a four-point scale. The result of the content validity showed that most items in the questionnaire obtained high I-CVI values, ranging from 0,75 to 1,00, indicating that the majority of panelists agreed that the items were clear and relevant. Further analysis using the Kappa statistic revealed that most items fell into good to excellent categories, with Kappa values ranging from 0,72 to 1,00. According to widely accepted interpretation guidelines, values below 0,40 are considered poor, 0,41 – 0,60 indicate fair to moderate agreement, 0,61 – 0,80 reflect good agreement, and values above 0,80 indicate excellent or almost perfect agreement (28). This finding confirms a strong level of agreement among the experts regarding the clarity and relevance of the items. However, one item (item 6 for clarity) received an I-CVI of 0,5 and a Kappa value of 0,31, which falls under the poor category. This indicates that the item was not well understood by the experts and should be removed. Overall, the questionnaire can be considered to have good content validity. The content validity assessment identified one item with low clarity, which was removed, leaving 27 items for subsequent face validity and reliability testing. The detailed results are presented in Table 3.

Table 3. Content Validity Indices and Kappa Statistic Score of the Questionnaire Items (n= 9 experts)

Item	Number of clarity item agreement	I-CVI	Pc	Kappa statistic	Number of relevant item agreement	I-CVI	Pc	Kappa statistic	Interpretation
General knowledge of balanced nutrition									
1	8	1	0,00391	1	7	0,88	0,03125	0,87	Excellent
2	8	1	0,00391	1	7	0,88	0,03125	0,87	Excellent
3	8	1	0,00391	1	8	1	0,00391	1	Excellent
4	7	0,88	0,03125	0,87	6	0,75	0,10938	0,72	Good
Risk factor of heart disease									
5	6	0,75	0,10938	0,72	7	0,88	0,03125	0,87	Good
6	4	0,5	0,27344	0,31	6	0,75	0,10938	0,72	Poor
7	7	0,88	0,03125	0,87	8	1	0,00391	1	Excellent
8	7	0,88	0,03125	0,87	8	1	0,00391	1	Excellent
9	7	0,88	0,03125	0,87	6	0,75	0,10938	0,72	Good
Heart-healthy diet									
10	8	1	0,00391	1	7	0,88	0,03125	0,87	Excellent
11	7	0,88	0,03125	0,87	7	0,88	0,03125	0,87	Excellent
12	8	1	0,00391	1	8	1	0,00391	1	Excellent
13	6	0,75	0,10938	0,72	7	0,88	0,03125	0,87	Good
14	7	0,88	0,03125	0,87	7	0,88	0,03125	0,87	Excellent

Item	Number of clarity item agreement	I-CVI	Pc	Kappa statistic	Number of relevant item agreement	I-CVI	Pc	Kappa statistic	Interpretation
15	8	1	0,00391	1	7	0,88	0,03125	0,87	Excellent
16	7	0,88	0,03125	0,87	7	0,88	0,03125	0,87	Excellent
17	8	1	0,00391	1	8	1	0,00391	1	Excellent
18	8	1	0,00391r	1	8	1	0,00391	1	Excellent
19	7	0,88	0,03125	0,87	7	0,88	0,03125	0,87	Excellent
20	8	1	0,00391	1	7	0,88	0,03125	0,87	Excellent
21	8	1	0,00391	1	7	0,88	0,03125	0,87	Excellent
Physical activity									
22	8	1	0,00391	1	8	1	0,00391	1	Excellent
23	7	0,88	0,03125	0,87	7	0,88	0,03125	0,87	Excellent
24	8	1	0,00391	1	7	0,88	0,03125	0,87	Excellent
25	8	1	0,00391	1	7	0,88	0,03125	0,87	Excellent
26	6	0,75	0,10938	0,72	7	0,88	0,03125	0,87	Good
27	8	1	0,00391	1	7	0,88	0,03125	0,87	Excellent
28	8	1	0,00391	1	8	1	0,03906	1	Excellent

Face Validity

Qualitative face validity was assessed through interviews with ten older adults to evaluate their comprehension of the statements and complexity of the language used. Several items were considered difficult to understand due to sentence structure or the use of less familiar terms such as "*carbohydrates* and *fats*", "*lipid profile*", "*risk factor*", "*saturated and trans fats*", and "*physical activity*". These statements were subsequently rephrased using simpler and more familiar wording to ensure better comprehension. A summary of the editorial revisions is provided in Table 4.

Quantitative face validity was also conducted by asking respondents to rate the importance of each statement based on their personal experiences. The analysis showed that all items obtained scores ranging from 1,8 to 4,7, with an impact score above 1,5, indicating that the items could be retained. Overall, the face validity test confirmed that after several wording refinements, all 27 items were well understood and considered appropriate for use. Subsequently, the instrument underwent validity and reliability testing.

Table 4. Revision of the Healthy Lifestyles Knowledge Questionnaire Based on Face Validity by Older Adults

No.	Statements	Identification of comprehension easiness and language simplicity	Statements revision
General knowledge of balanced nutrition			
1	A balanced diet consists only of carbohydrates and fats.	*The terms "carbohydrates" and "fats" were hard to understand without being given examples of food.*	A balanced diet is enough with just eating rice and side dishes.
4	Foods rich in fiber are essential for health. A good source of fiber-rich foods is green vegetables.	*The statement was not simple and was unclear.*	Green vegetables are rich in fiber, a nutrient that is beneficial for the body.
Risk factor of heart disease			
5	High lipid profile levels are one of the main risk factors for heart disease.	The terms "*lipid profile*" and "*risk factor*" were not familiar.	High cholesterol is a cause of heart disease
7	High blood pressure is considered a leading cause of heart disease because it increases the heart's workload.	*The statement was not simple and was unclear.*	High blood pressure makes the heart work harder.
8	Regular physical activity can help reduce the progression of heart disease.	*The term "physical activity" was not familiar.*	Regular exercise can help reduce the causes of heart disease

Heart-healthy diet

12	Eating fruit and vegetables every day is recommended to maintain heart health.	*The statement was not simple.*	Fruits and vegetables are good for heart health
13	Types of fat that don't need to be restricted are saturated fat and trans fat	*The terms "saturated fat" and "trans-fat" were not familiar*	Fats from fried foods and junk food are not harmful to the heart.
15	Protein sources that are better for heart health include fish and nuts	*The statement was not simple*	Fish is a good source of protein for heart health.
18	The best way to serve fish in a heart-healthy diet is frying it with bread crumbs rather than grilling it with little oil	*The statement was not simple*	Crispy fried fish is better than grilled fish for people with heart disease

Physical activity

23	Older adults should do at least 30 minutes per week of moderate-intensity physical activity	*The statement was not simple, and the term "physical activity" was unfamiliar.*	Older adults are recommended to exercise for at least 30 minutes per week
24	Physical activity, such as walking, has no benefit for heart health in older adults.	*The statement was not simple*	Walking does not affect the heart health of the elderly.
25	The best time for the elderly to engage in light physical activity is in the morning or afternoon.	*The statement was not simple.*	The best time for light exercise is in the morning
26	Elderly exercise and yoga are physical activities for older adults that focus on body balance	*The statement was not simple*	Elderly exercise can help maintain body balance.

Item validity and reliability

The validity and reliability tests were conducted on 27 questionnaire items with 30 respondents. Three items (9, 21, and 22) could not be computed because all respondents provided identical answers. In addition, the Pearson correlation test between item scores and total scores showed that four items (10, 19, 20, and 27) demonstrated non-significant correlation ($p > 0,05$) and were therefore excluded from further analysis. The 19 remaining items demonstrated acceptable validity, with significant correlations ($p < 0,05$) and item-total correlation coefficients ($r = 0,381 – 0,891$). These valid items were subsequently tested for reliability, resulting in a Cronbach's alpha 0,742, indicating good internal consistency. At the item level, Cronbach's alpha if item deleted ranged from 0,697 to 0,756. Detailed results of the item validity and reliability analysis are presented in Table 5.

Table 5. Item Validity and Reliability (Cronbach's Alpha) of the Healthy Lifestyles Knowledge Questionnaire for Older Adults

No.	r-item*	Significance (two tailed)	Cronbach's alpha	Cronbach's alpha if item is deleted	Reliability
General knowledge of balanced nutrition					
1	0,745	0,000	0,742	0,721	Reliable
2	0,775	0,000	0,742	0,719	Reliable
3	0,793	0,000	0,742	0,727	Reliable
4	0,427	0,019	0,742	0,740	Reliable
Risk factor of heart disease					
5	0,422	0,020	0,742	0,756	Reliability increased if item is deleted
7	0,891	0,000	0,742	0,739	Reliable
8	0,891	0,000	0,742	0,739	Reliable
Heart-healthy diet					
10	0,175	0,355	-	-	-
11	0,616	0,000	0,742	0,723	Reliable
12	0,545	0,002	0,742	0,726	Reliable
13	0,558	0,001	0,742	0,735	Reliable
14	0,214	0,255	-	-	-
15	0,545	0,002	0,742	0,726	Reliable

No.	r-item*	Significance (two tailed)	Cronbach's alpha	Cronbach's alpha if item is deleted	Reliability
16	0,448	0,013	0,742	0,728	Reliable
17	0,381	0,038	0,742	0,738	Reliable
18	0,381	0,038	0,742	0,725	Reliable
19	0,336	0,069	-	-	-
20	0,296	0,112	-	-	-
Physical activity					
23	0,455	0,012	0,742	0,716	Reliable
24	0,708	0,000	0,742	0,697	Reliable
25	0,455	0,012	0,742	0,740	Reliable
26	0,550	0,002	0,742	0,746	Reliability increased if item is deleted
27	0,335	0,070	-	-	-
28	0,550	0,002	0,742	0,749	Reliability increased if item is deleted

*Pearson correlation

DISCUSSION

This study developed and tested the validity and reliability of the healthy lifestyle knowledge questionnaire for older adults. Establishing instrument validity in this population is important because age-related differences in comprehension, health literacy, and response interpretation may impact how items are understood and answered (29,30). In this study, many elderly participants had low to moderate educational backgrounds. Such characteristics can shape how questionnaire items are interpreted, reinforcing the importance of validating the instrument for this target group. A valid instrument ensures that the responses accurately reflect the knowledge of older adults, thereby providing meaningful results to guide the design of educational interventions and research (31). This is consistent with the general principles of health instrument development, in which validity serves as a fundamental foundation to ensure that measurements are trustworthy, relevant, and appropriate for the needs of the target population (32).

The development of knowledge questionnaires should follow systematic procedures, including a clear definition of the construct, expert review, item analysis, and modern psychometric testing to ensure that the instrument is valid, reliable, and relevant (33). In this study, the initial step was content validity testing, which showed satisfactory values for the Item-level Content Validity Index (I-CVI: 0,75 – 1,00). Most items were judged as relevant and clear by the eight experts. An I-CVI value ≥ 0,78 is generally considered acceptable when using a panel of five to ten experts (34). These results indicate that the questionnaire items adequately represent knowledge of healthy lifestyles among older adults. Similar findings have been reported in previous validation studies of health assessment instruments for older adults, where experts consistently emphasized the importance of item clarity and relevance in achieving accurate measurement (20,35–37). Studies on the development and validation of nutrition and physical activity knowledge questionnaires also highlight that I-CVI values above the recommended level are associated with more consistent responses across populations with diverse health conditions (8,10). These findings reaffirm that expert involvement is a crucial step in establishing the content validity of instruments designed for older adults. After content validity was confirmed, a face validity test was conducted to examine whether the instrument was understandable for the target population.

The face validity results showed that several technical terms and sentence structures required simplification to improve comprehension among older adults. This revisions helped reduce potential misinterpretations and ensured that the questions were accessible for this population, who have varied educational and cognitive backgrounds (38). These findings highlight that questionnaire items must be interpreted by respondents as intended by the researchers to ensure meaningful results (39). Consistent with previous studies, the active participation of older adults in the face validity testing provides valuable input for improving questionnaires. This has been demonstrated in tools measuring quality of life, care needs, health-related behaviour, active aging awareness, and planning for aging and frailty (17,36,38,40–43). Thus, face validity not only complements content validity but also provides a strong foundation for subsequent construct validity and reliability testing (33). Once content and face validity were established, item validity testing was performed to assess whether each question contributed meaningfully to the overall construct.

The item validity test indicated that most questionnaire items consistently reflected differences in respondents' knowledge. This was indicated by significant positive correlations ($p < 0,05$) between each item score and the total score (r-item = 0,381 – 0,891) within the relevant domains. Item-total correlations above 0,3 are generally considered acceptable for establishing validity in health research (27,44). However, some items showed similar response patterns, which reflect relatively homogeneous knowledge among respondents. A previous validation study on a knowledge questionnaire showed that items with redundant or unclear responses often require revision or removal (45). Consistent with a common practice in instrument development, items with low item-total correlations should be revised or deleted to improve scale consistency (27). In this step, several revisions were therefore required, including the removal of items with low item-total correlations and those demonstrating response homogeneity, to ensure that the final instrument achieved acceptable item validity.

In addition to assessing validity, another equally important aspect in the evaluation of an instrument is reliability. The result showed a Cronbach's alpha value 0,745, indicating adequate internal consistency. This value meets standard criteria for knowledge instruments, which generally require reliability above 0,70 (46). Reliability testing ensures that the questionnaire consistently measures the same construct, thereby increasing confidence in the results. This finding is consistent with previous studies, such as the HEAL and Q-FARCS, which also reported good reliability in elderly and cardiac populations (18,20). Reliability plays a crucial role in demonstrating the internal consistency of items, supporting the refinement of the scale, and strengthening the credibility of the instrument for use in both research and practice (47). Therefore, integrating validity and reliability testing plays an essential role in ensuring the overall quality of instruments developed to assess health-related knowledge in geriatric populations.

The findings of this study have practical implications for health education and the promotion of target older adults at risk of coronary heart disease. The validated and reliable questionnaire can help identify knowledge gaps in diet and physical activity, two critical areas for managing cardiovascular health. Beyond its applied use, the instrument also provides a methodological contribution by combining knowledge domains of heart-healthy diets and physical activity within a single tool specifically designed for older adults. This combined approach has not been addressed concurrently in previous instruments. Additionally, the validation process, which involves expert review, face validation, and psychometric assessment, supports its potential use as a model for developing similar instruments for older populations in other settings. Nevertheless, this study has some limitations. The sample was relatively small and limited to a single community setting, which may restrict the generalizability of the findings. In addition, test-retest reliability and advanced psychometric validation, such as confirmatory factor analysis, were not conducted. Future studies should address these limitations by involving a larger and more diverse population of older adults, thereby enhancing the instrument's utility and applicability for broader use in cardiovascular health promotion.

CONCLUSIONS

This study developed and evaluated the validity and reliability of a healthy lifestyle knowledge questionnaire focusing on diet and physical activity, among older adults. The instrument demonstrated acceptable content validity, face validity, and item validity. In addition, it showed good internal consistency, with a Cronbach's alpha value above 0,70, confirming its reliability in measuring knowledge among older populations. Several revisions were required, including the removal of items that did not meet validity criteria, leading to a final instrument consisting of 19 clearer and more focused items.

These findings underscore the importance of integrating validity and reliability testing to ensure the quality of knowledge assessment tools. Although this study makes an essential contribution to the development of tools for healthy lifestyle education in older adults, further research with larger and more diverse samples is recommended. A test-retest evaluation is also necessary to enhance the instrument's applicability and support its use in broader health promotion efforts.

AUTHOR'S CONTRIBUTION STATEMENT

HP, AK, SAM, and MD conceived and designed the study. HP collected, analyzed the data and drafted the manuscripts. AK, SAM, MD revised the manuscript and supervised the research process. All authors read and approved the final manuscript.

CONFLICTS OF INTEREST

DECLARATION OF GENERATIVE AI AND AI-ASSISTED TECHNOLOGIES IN THE WRITING PROCESS

SOURCE OF FUNDING STATEMENTS

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