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Development of the physical activity counseling practices scale in health professionals: a validity and reliability study

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Abstract

Objective The aim is to develop the scale of Physical Activity Counseling Practices (PACPS) in Turkish and validate it among health professionals.

Methods PACPS test-retest was applied to 162 health professionals (physician, physiotherapist, dietician, nurse) with a 1-week interval. Construct validity, correlations of PACPS with other scales were evaluated with the International Physical Activity Questionnaire short form (IPAQ), Conscious Behavioral Physical Activity Questionnaire (CBAPQ).

Results The content validity index value of the scale was found to be 0.76. The overall internal consistency of the scale (Cronbach α:0.917) was high. The item-total correlations of the scale are between 0.45 and 0.76.

Conclusion This study, it was determined that the PACPS scale has good internal consistency, test-retest validity and sufficient construct validity when compared with the IPAQ and CBAPQ.

Keywords Exercise, Counseling, Questionnaire, Scale, Psychometric testing

Introduction

Physical activity is any bodily movement that increases energy expenditure above resting levels, such as walking and gardening [1]. Physical activity is known to contribute positively to health and general well-being. Regular exercise reduces the risk of developing many chronic diseases such as type 2 diabetes mellitus, ischemic heart disease, and dementia by at least 30% [2, 3]. This generally offers a higher level of benefit than the improvement achieved with pharmacotherapy.

In the 2018–2023 action plan, the World Health Organization (WHO) announced a new global action plan for member states to reduce global physical inactivity levels in adults and adolescents by 15% by 2030 [4]. In global and international guidelines on physical activity, it is stated that plans should be made to increase the level of physical activity comprehensively and consistently within the public health action plan. WHO recommends that all countries establish national guidelines and set physical activity targets. To help populations reach the targets and maintain healthy physical activity levels, it has asked all countries to develop appropriate policies and programs to ensure that people of all ages and abilities are physically active and improve their health [3]. Given that more than one in four adults (27.5%) and more than three quarters (81%) of adolescents do not meet aerobic exercise recommendations as outlined in the global recommendations on Physical Activity, there is a need to

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increase practices that promote physical activity in both health and other key sectors [5].

While most clinical guidelines for physical activity counseling place the responsibility for physical activity counseling on physicians, the recent Making Every Contact Count Strategy places the responsibility for promoting positive behavioral change on all healthcare professionals [6]. Therefore, it should be kept in mind that physical activity counseling should be at the center of medical consultation. While there is some literature examining the practice of general practitioners regarding the use of brief interventions to increase patients' physical activity in primary care, there is a lack of evidence examining the physical activity counseling practice of hospital-based health professionals [6].

Health professionals have the opportunity to play an important role in encouraging patients to adopt and maintain an active lifestyle. In the literature, physical activity counseling by health professionals has been reported to have varying degrees of positive impact on increasing patients' physical activity levels. It has also been shown that physical activity counseling and referral strategies can help reduce healthcare utilization and costs. Research has indicated that health professionals' healthy lifestyle recommendations, including physical activity, provide better counseling and motivation for their patients to comply with and adopt these recommendations [7].

Although there are studies examining physical activity counseling practices in health professionals, the scales used in the evaluation are anonymous forms created by the individuals themselves. There is no valid and reliable evaluation scale on this subject. In addition, no form or evaluation scale can measure which occupational group performs physical activity counseling practices and to what extent. For this reason, the necessity of a scale that can jointly evaluate the physical activity counseling practices of health professionals has been foreseen. In this context, it is aimed to develop the physical activity counseling practices scale in Turkish and to bring it to the literature by performing validity and reliability analysis.

Materials and methods

This methodological study approved from Necmettin Erbakan University Pharmaceutical and Non-Medical Device Clinical Research Ethics Committee (Decision No: 2023/497 Application ID: 14890 Date: 05.07.2023). The study was conducted in accordance with the Declaration of Helsinki. Verbal and written informed consent was obtained from the participants.

Participants

Sample of the study

In the development of the scale, validity, and reliability analyses in our research, it is necessary to establish a sufficient sample size for factor analysis. Krieglstein et al. stated that the sample size should align with the principle of taking 10 times the number of scale items [8]. Kennedy stated that the sample size for validity studies should be at least 100 [9]. This study, since the number of items was 15, 10 times the number of health professionals were included in the study.

A total of 162 health professionals working at Necmettin Erbakan University Faculty of Medicine were included in this study between September 2023 and June 2024. Voluntary face-to-face interviews, online Google forms and forms to be printed out were collected from the participants [10]. They were also given verbal information about the study. The inclusion criteria were being between the ages of 18–64, being Turkish literacy, being a health professional (physician, physiotherapist, dietician, nurse) for at least 2 years, and voluntarily agreeing to participate after being informed about the study verbally and in writing [11]. Participant Exclusion Criteria; those on leave, foreign nationals, those who are not actively treating patients (radiologists, anesthesiologists, etc.), and other healthcare professionals (operating room technicians) [12].

Participants' sociodemographic characteristics such as age, gender, height (cm), weight (kg), body mass index (BMI), professional employment status, marital status, educational status, income and expenditure balance, duration of employment (days), medical history and diagnosed musculoskeletal diseases, and title of employment in the health field were recorded.

Study design

The basic stages followed for the scale development process in our research are given below (Fig. 1). STROBE guidelines have been followed.

Review of related literature

To determine the characteristics to be measured, "Physical Activity Counselling Practices" was written in Turkish and English, and a literature search was made in Google Scholar, PubMed, Scopus, Science Direct, and Medline search engines. Related articles, scales, thesis studies, printed books, and e-books were analyzed. The most frequently and least frequently mentioned features in the studies were determined [10, 13].

Conducting the interviews

After reviewing the relevant literature on the subject, a semi-structured interview form was prepared by the researcher. This form, 24 questions were asked about the

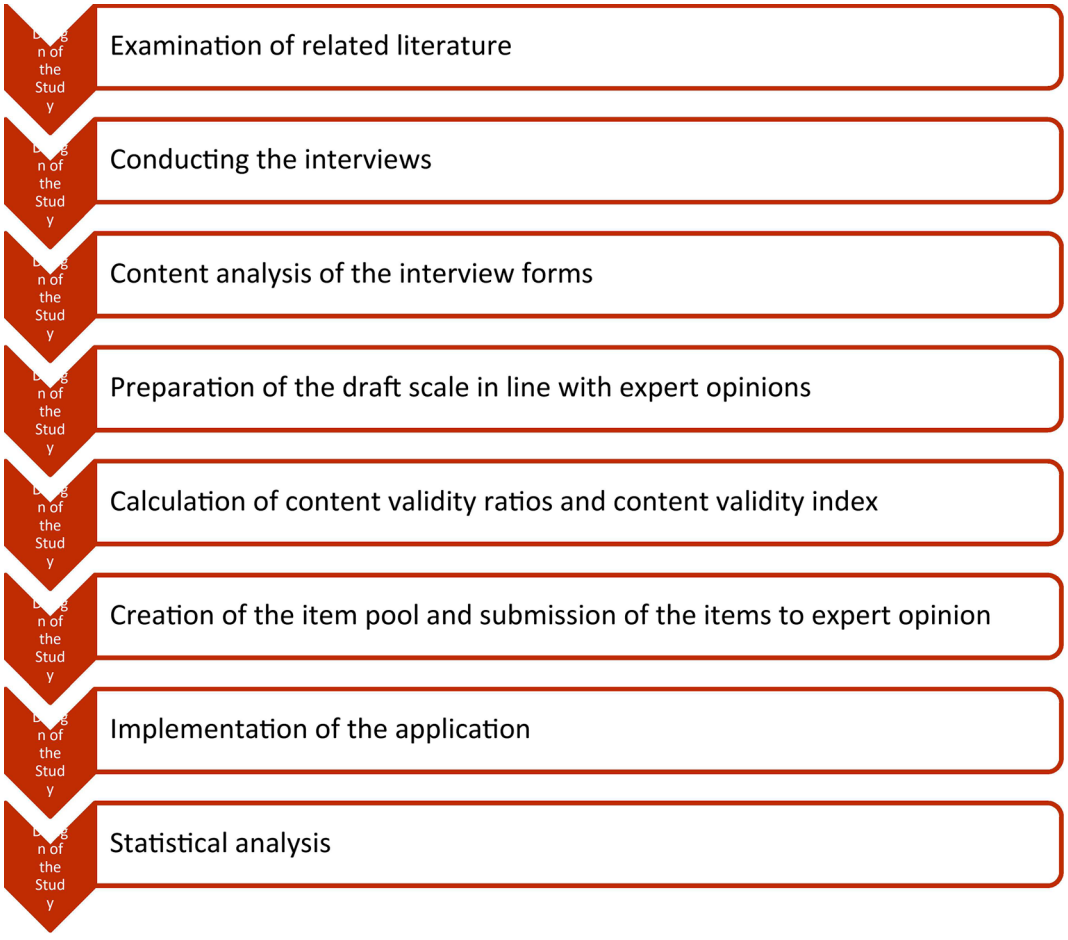

Fig. 1 Design of the study

development of Physical Activity Counseling Practices of health professionals. In addition, their opinions about the planned scale, what the scale should cover and their expectations about the planned scale were asked [12, 13]. According to the distribution in the field, 20 health professionals (physicians, physiotherapists, dieticians, nurses) were interviewed. Interviews were conducted face-to-face in a quiet and calm environment to eliminate factors that may affect the results such as distraction and difficulty in concentration [14].

Content analysis of interview forms

Researchers read and analyzed the statements in the date recorded after the interview with health professionals on Physical Activity Counseling Practices. The data were scanned and organized according to their similarities [15].

Creating the item pool and presenting the items for expert opinion

As a result of the analysis of the data obtained and the information obtained after the research on the subject, a new 23-item pool was created. The draft scale was submitted to expert opinions for content validity [10]. A team of 10 experts, consisting of faculty members who have worked in the field of physical activity was formed [16]. The experts were asked to express their opinions on each item as "the item is appropriate", "the item is not appropriate", or "correction is necessary". In this way, the experts evaluated the appropriateness of the items on the draft scale [12]. The expert assessment included opinions on the characteristics of the items to be measured, whether the items were expressed simply and clearly enough, and whether the items were understood by the target audience.

With the feedback received from the experts, the comprehensibility, usefulness, and fitness of the items were reviewed by the researchers and necessary arrangements were made. Form consisting of 23 questions, the validity index was calculated with the Lawshe content validity technique based on expert opinions (Content Validity Index: 0.76). It showed that there was a high agreement rate among the participants on 15 items [17].

Creating the draft scale based on expert opinions

After statistical analysis of expert opinions, eight items with a Content Validity Ratio < 0.60 were removed. The Physical Activity Counseling Practices scale form was created with the remaining 15 items. The final version of the 15-item scale was evaluated by a linguist who is an academic at the university. Small corrections were made. In addition, the form was administered to a group of 10 people. At this stage, the scale was applied one to one. After the application, experts re-evaluated it. The rating form of the scale developed in the study was defined as a 5-point Likert-type scale scoring system that provides a rating between 1 and 5 for each item. The rating of the scale items was prepared as "1: Strongly Disagree", "2: Disagree", "3: Partially Agree", "4: Agree" and "5: Strongly Agree" [18].

Implementation of the application

The scale, which was created and piloted after content validity and expert opinions, was applied to 162 health professionals. Physical Activity Counseling Practices Scale (PACPS) candidate form, the International Physical Activity Questionnaire (IPAQ) to determine the level of physical activity, and the Cognitive Behavioral Physical Activity Questionnaire (CBPAQ) to assess attitudes and behaviors towards physical activity were applied. To re-test the reliability of the scale, the scale was re-administered 1 week after administration [19]. The flow diagram of the participants is shown (Fig. 2).

PACPS is the scale planned to be developed in this study. Scoring of the scale is a scale consisting of 13 questions formed according to a 5-point Likert scale. The ratings given to the scale questions are as follows: 1: Never,

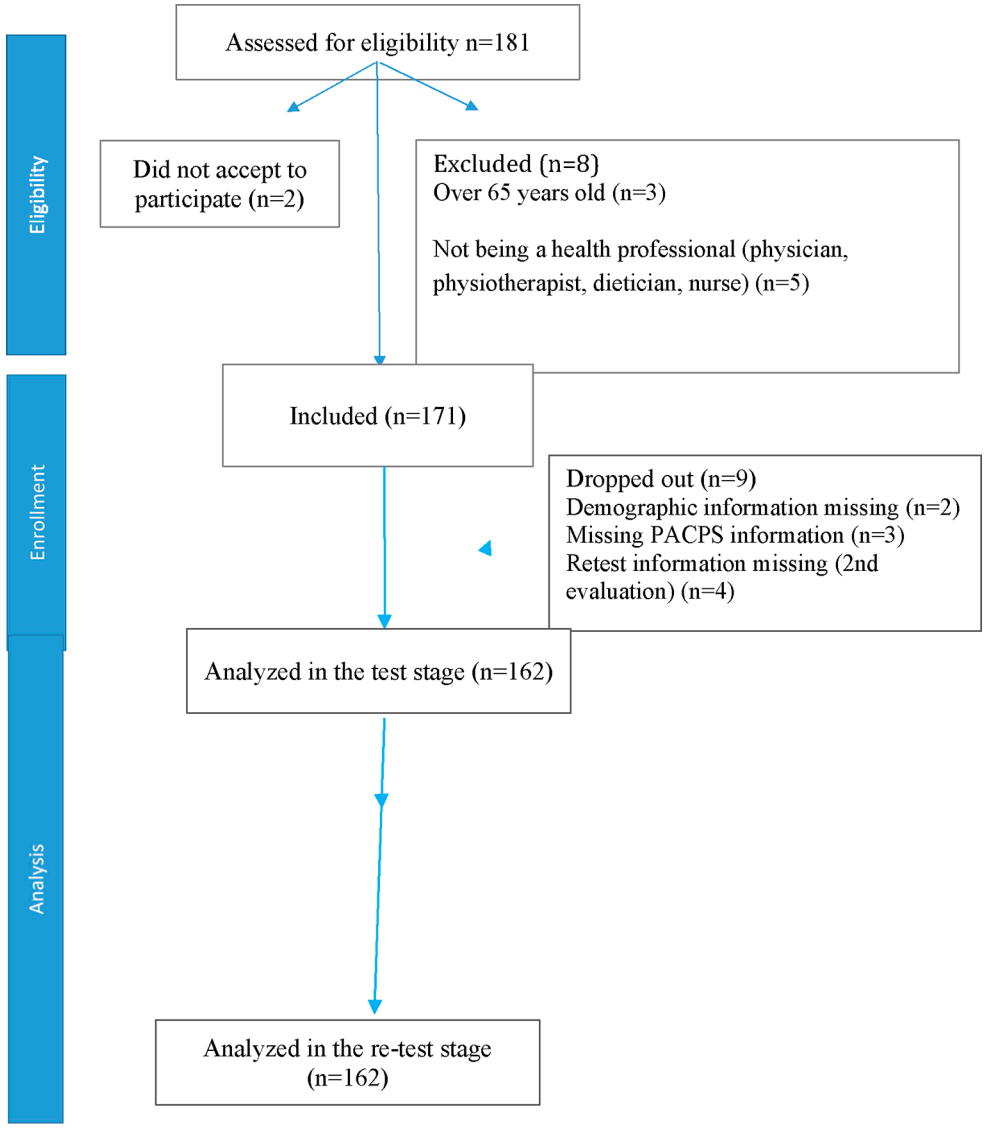

Fig. 2 Flow chart of participants. Note: It shows why the participants could not continue the research during the period

2: Rarely, 3: Occasionally, 4: Most of the time, 5: Always. The minimum score is 13 points, and the maximum score is 65 points.

Kaiser-Meyer-Olkin coefficient and Bartlett Sphericity test were used to assess the construct validity of PACPS and to determine whether it was suitable for factor analysis. Eigenvalues in the scree plot were used for factor analysis. Factors with eigenvalues ≥ 1 were considered significant (Fig. 3) [20].

The convergent validity of PACPS was evaluated by analyzing its correlations with the International Physical Activity Questionnaire short form (IPAQ). Since there is no scale measuring physical activity practices in the literature, the amount of physical activity was evaluated with the IPAQ, which is widely used in the literature. IPAQ is widely used in the literature and our results can be compared with other research data in this way. IPAQ is a standardized tool for measuring physical activity developed by researchers from various countries with the support of WHO [21]. The validity and reliability of the Turkish version of the questionnaire were evaluated by Sağlam et al. [20]. The short form was preferred because it is easy to administer. The scale consists of 7 items. It covers four domains of physical activity; work, transportation, housework/gardening, and leisure time activities, and also includes questions about time spent sitting as an indicator of inactivity. In each of the four domains, energy expenditure in moderate to vigorous activities over the past 7 days, the number of days the activities were performed, and the duration of activities during the day are recorded. The times are multiplied by the metabolic equivalent of task (MET) per activity and the results of all items are summed to produce an overall physical activity score [21]. The high IPAQ category includes individuals who perform vigorous activity for 3 days and achieve at least 1500 MET-min/week, or any combination of walking and moderate or vigorous activity for at least 7 days and achieve ≥ 3000 MET-min/week [22].

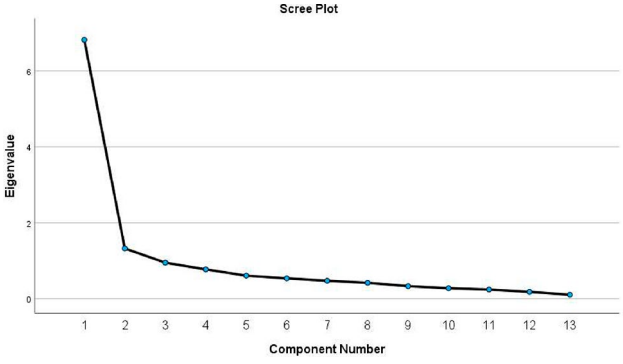

Fig. 3 Chart showing factors with an eigenvalue of ≥ 1. Note: It is a graph that shows a value greater than 1 to determine the number of factors

The concurrent validity of the PACPS was assessed by analyzing correlations with the CBPAQ. CBPAQ is a 15-item questionnaire that evaluates individuals' attitudes and behaviors toward physical activity. The original form of the scale consists of three sub-dimensions. It consists of 15 statements in total. All statements in the scale are scored with a five-point Likert-type rating as "1. Strongly disagree, 5. Strongly agree". For the first dimension, outcome expectation, items 1, 2, 9, 13, and 14 are added and divided by five. For the second dimension, self-regulation, items 3, 4, 5, 6, and 8 are added and divided by five. For the third dimension, personal barriers, items 7, 10, 11, 12, and 15 are added and divided by five. The scores obtained in these three sub-dimensions are added to obtain the total score of the CBPAQ. The Turkish validity and reliability study of the scale has been conducted [23, 24]. As the score increases, the individual's attitudes and behaviors toward physical activity increase in a positive way.

To analyze the known-group validity of the PACPS, participants were asked to fill out the IPAQ. To find out whether the PACPS has known-group validity, participants with an IPAQ level of ≥ 3000 were classified as "moderate and high activity level" and < 3000 as "low activity level". The known-group validity of the PACPS was analyzed by comparing the mean scores of these two activity-level groups [22, 25].

In our research, the questionnaire/interview form was developed for this study (Apendix 1).

Statistical analysis

SPSS 29.00 software was used for data analysis. The statistical significance level is $p = 0.05$ Descriptive data obtained from the interview form created to determine the characteristic to be measured were given as mean and standard deviation (X ± SD) for measured values and number (n) and percentage (%) for categorical values [26]. Expert opinions were sought for the content validity of the scale [27]. After the expert opinions were obtained, the scale was applied to the study group, and the data obtained were analyzed. Content validity was calculated using the Lawshe technique. Item analysis was performed to examine the contribution of the items in the scale. In the item analysis, the contribution of the items to the scale with item-total correlation coefficients and the items that reduced the scale reliability were examined. Cronbach's α and item-total correlations were used for internal consistency analysis. Cronbach's α coefficients > 0.80 were interpreted as "high", 0.60–0.79 as "moderate" and 0.40–0.59 as "low" internal consistency. Intraclass correlation coefficient (ICC) and 95% confidence intervals (CI) were used for test-retest reliability analysis. ICC values < 0.50, 0.50 to 0.75, 0.75 to 0.90, and > 0.90 were considered poor, fair, good, and excellent

reliability, respectively [28]. The Kaiser-Meyer-Olkin coefficient (> 0.60) and Bartlett Sphericity test result were used to determine whether PACPS was suitable for factor analysis [29]. Eigenvalues (> 1.0) in the scree plot were used to decide the number of factors and calculate the variance explained by the factors [29]. Pearson correlation analysis was performed to examine whether there was a significant relationship between the test-retest scores of the PACPS and the other scale/test scores used. Pearson correlation coefficients (rho) were interpreted as follows: 0.00 to 0.19 as "insignificant", 0.20 to 0.29 as "weak", 0.30 to 0.39 as "moderate", 0.40 to 0.69 as "strong", 0.70 to 1 as "very strong" correlations [26]. To find the smallest amount of change that was larger than the measurement amount, the measurement standard error (SEM) of PACPS was calculated in the SPSS program and the minimum detectable change (MDC) was calculated using the formula $MDC = 1.96 \times \sqrt{2} \times SEM$ [30].

Table 1 Physical and sociodemographic characteristics of the participants ($n = 162$)

Physical characteristics		Minimum	Maximum	Mean ± SD
Age (year)		23	60	31.71 ± 7.96
Height (cm)		150	188	166.32 ± 0.08
Weight (kg)		46	110	68.07 ± 12.61
BMI (kg/m^2)		16.96	35.56	24.56 ± 3.88
Working hours (week/day)		0	6.00	4.89 ± 0.98
Daily working hours (hours)		0	9.00	7.71 ± 1.44
Sociodemographic characteristics				**n (%)**
Sex	Female			137 (84.6)
	Male			25 (15.4)
Education level	High school			3 (1.9)
	University and above			159 (98.1)
Occupation Status	Physiotherapist			75 (46.3)
	Nurse			61 (37.7)
	Dietitian			17 (10.5)
	Physician			9 (5.5)
Marital status	Married			99 (61.1)
	Single			60 (37.0)
	Divorced			3 (1.9)
Working Status	Full time			149 (92)
	Part-time			10 (6.2)
	Not working			3 (1.8)
Income-Expense Balance	Equal			71 (43.8)
	Income > expense			63 (38.9)
	Income < expense			28 (17.3)
Resume	Hypertension			5 (3.1)
	Diabetes			7 (4.3)
	Other			3 (1.9)
	None			147 (90.7)
Physical activity	Doing it			96 (59.3)
	It doesn't			65 (40.7)
A condition that has previously caused musculoskeletal disorders	Yes			27(16.7)
	No			135 (83.3)
Diagnosed musculoskeletal disease	Yes			25 (15.4)
	No			137 (84.6)

M: Mean, SD: Standard Deviation, BMI: Body Mass Index

Note: The average of the participant's physical characteristics and the percentage and number of their sociodemographic characteristics are given

Results

The study included 162 participants aged between 23 and 60 years. The sample was mostly male in gender, physiotherapists by profession, married, university graduates, with a satisfactory income, and currently actively working in a paid job. The physical and socio-demographic characteristics of the patients are presented in (Table 1).

Internal consistency

In the factor analysis and construct validity conducted with 162 participants by the structural features of the scale, it was determined that there were overlapping items in question 7,8 in the pattern matrix table and the difference between the items was < 0.01. For this reason, seven items were first removed and analyzed again, and then 8 items were removed and analyzed again. Based on the construct validity data including the remaining 13 items, it was found that the internal consistency of the PACPS was high (Cronbach α = 0.917) and the item-total correlations ranged from 0.446 (PACPS 10) to 0.756 (PACPS 1) (Table 2). When item 10, which had the lowest item-total correlation, was deleted, the Cronbach α value did not change and the scale was not modified (Table 2).

Test-retest reliability

There was no significant difference between the test and retest mean values of the PACPS (t = -0.242, $p = 0.809$) (Table 3), and the ICC value of the overall PACPS was 0.88, indicating excellent test-retest reliability of the PACPS (Table 4).

Floor and ceiling effects

The ceiling or floor effect is generally defined as 15% (or more) of individuals in a sample reaching the best or worst score level [31]. In this study, the participants' scores ranged between 14 and 65, and there were 2 participants with a maximum score of 65. Since this rate constituted 1.23% of the total participants, no floor and ceiling effect was observed.

Factor analysis

The Kaiser-Meyer-Olkin coefficient was calculated as 0.88 and Bartlett's test of sphericity result $x^2 = 1363.311$ ($p < 0.001$), thus it was concluded that the data were suitable for factor analysis. According to the eigenvalues

Table 2 PACPS item-total correlation analyzes of all questions included in the scoring ($n = 162$)

Items	Item-total correlation (*r*)	Cronbach's a if item deleted
1- I regularly evaluate the physical activity practices of my patients/ consultants	0.756	0.908
2- I routinely question the physical activity practices of my patients/consultants.	0.751	0.908
3- I recommend my patients/consultants to be physically active.	0.653	0.911
4- I assess the sedentary living habits of my patients/ consultants (watching TV, using computers and smartphones).	0.692	0.909
5- If necessary, I advise my patients/consultants to reduce their sedentary habits (watching TV, using computers and smartphones)	0.651	0.911
6- I prepare personal programs to increase the physical activity levels of my sedentary patients/consultants.	0.693	0.909
7-I give my patients/consultants written (ready-made) materials about physical activity.	0.468	0.917
8- I allocate time for physical activity for my patients/ consultants during their routine medical check-ups/interviews.	0.730	0.908
9- I inform my patients/consultants about factors that impair body composition and adversely affect cardiovascular health.	0.709	0.909
10- I work with a professional trained in physical activity in my office.	0.446	0.919
11- I advise all adults to moderate to high-intensity physical activity.	0.627	0.912
12- I recommend my patients/clients to do 30 min of moderate activity at least 5 times a week.	0.707	0.909
13-I propose ways to reduce sedentary time, especially screen time for entertainment, for all children aged 5–17.	0.671	0.910
PACPS Total	0.882	

Note: Indicates the relationship of the scale items with the item-total correlation

Table 4 PACPS principal component analysis

Factor (Eigenvalue > 1)	Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %
1	6.820	52.465	52.465
2	1.322	10.167	62.632

Note: PACPS shows that the scale belongs to a 2-factor structure

greater than 1 in the scree plot, the Turkish version of PACPS has a two-factor structure with eigenvalues ranging between 1.32 and 6.82. This two-factor structure of PACPS explains 62.6% of the total variance (Table 5). According to the principal component analysis and pattern matrix technique, the factor loadings of the items ranged between 0.50 (PACPS 11) and 0.88 (PACPS 3) (Table 6). In the PACPS scale, items 1–5,8,9,11–13 were categorized under Factor 1 (Recommendations for Physical Activity Practices) and items 6,7,10 under Factor 2 (Physical activity education).

Table 3 Test-retest reliability of the PACPS items

Items		ICC	95% CI
PACPS 1[a]	I regularly evaluate the physical activity practices of my patients/ consultants	0.84	0.79–0.88
PACPS 2[a]	I routinely question the physical activity practices of my patients/consultants.	0.79	0.70–0.83
PACPS 3[a]	I recommend my patients/consultants to be physically active	0.77	0.83–0.92
PACPS 4[a]	I assess the sedentary living habits of my patients/ consultants (watching TV, using computers and smartphones).	0.87	0,82 – 0.90
PACPS 5[a]	If necessary, I advise my patients/ consultants to reduce their sedentary habits (watching TV, using computers and smartphones)	0.80	0.74–0.85
PACPS 6[a]	I prepare personal programs to increase the physical activity levels of my sedentary patients/consultants.	0.83	0.78–0.87
PACPS 7[a]	I give my patients/consultants written (ready-made) materials about physical activity.	0.74	0.66–0.80
PACPS 8[a]	I allocate time for physical activity for my patients/ consultants during their routine medical check-ups/interviews.	0.75	0.67–0.81
PACPS 9[a]	I inform my patients/consultants about factors that impair body composition and adversely affect cardiovascular health.	0.81	0.75–0.86
PACPS 10[a]	I work with a professional trained in physical activity in my office	0.79	0.73–0.84
PACPS 11[a]	I advise all adults to moderate to high-intensity physical activity	0.79	0.72–0.84
PACPS 12[a]	I recommend my patients/clients to do 30 min of moderate activity at least 5 times a week.	0.73	0.65–0.79
PACPS 13[a]	I propose ways to reduce sedentary time, especially screen time for entertainment, for all children aged 5–17.	0.79	0.72–0.84
PACPS Total[a]	First and Second Evaluation	0,88	0.84–0.91

a: ($n = 162$), ICC: İntra Class Correlation, CI: Confidence Interval

Note: Reliability was determined by determining the similarity in the first and second measurement of the scale items

Convergent validity

The convergent validity of the PACPS was assessed by analyzing its correlations with IPAQ test scores. The PACPS had a moderate positive correlation with the IPAQ (rho = 0.38, $p < 0.001$) (Table 3).

Concurrent validity

In the evaluation of the concurrent validity of the PACPS scores, the correlations between the total weighted score and the total scores obtained from the CBPAQ were determined by Pearson correlation coefficients. A strong pozitif correlation was found between PACPS scores and CBPAQ scores (rho = 0.41, $p < 0.001$) (Table 3).

Table 5 Factor loadings of items according to the PACPS pattern matrix technique ($n=162$)

		Component	
		Factor 1	Factor 2
PACPS 1	I regularly evaluate the physical activity practices of my patients/ consultants	**0.742**	0.178
PACPS 2	I routinely question the physical activity practices of my patients/consultants.	**0.736**	0.177
PACPS 3	I recommend my patients/consultants to be physically active	**0.879**	-0.156
PACPS 4	I assess the sedentary living habits of my patients/ consultants (watching TV, using computers and smartphones).	**0.855**	-0.121
PACPS 5	If necessary, I advise my patients/consultants to reduce their sedentary habits (watching TV, using computers and smartphones)	**0.887**	-0.223
PACPS 6	I prepare personal programs to increase the physical activity levels of my sedentary patients/consultants.	0.368	**0.572**
PACPS 7	I give my patients/consultants written (ready-made) materials about physical activity.	0.008	**0.768**
PACPS 8	I allocate time for physical activity for my patients/ consultants during their routine medical check-ups/interviews.	**0.585**	0.348
PACPS 9	I inform my patients/consultants about factors that impair body composition and adversely affect cardiovascular health.	**0.590**	0.309
PACPS 10	I work with a professional trained in physical activity in my office	-0.046	**0.825**
PACPS 11	I advise all adults to moderate to high-intensity physical activity	**0.499**	0.323
PACPS 12	I recommend my patients/clients to do 30 min of moderate activity at least 5 times a week.	**0.651**	0.211
PACPS 13	I propose ways to reduce sedentary time, especially screen time for entertainment, for all children aged 5–17.	**0.747**	-0.004

Note: It is shown which items of the scale belong to a 2-factor structure and which items fall under which factor

Known-group validity

Participants with an IPAQ score ≥ 3000 had a mean PACPS score of 46.72 ± 9.53 points and those with an IPAQ score < 3000 had a mean PACPS score of 37.20 ± 12.47 points. The significant difference between these two different activity level groups (t =-4.706, $p=0.027$) demonstrates the known group validity of the PACPS.

Furthermore, the calculated values for PACPS are SEM: 0.81 and MDC: 2.25 points.

Discussion

In our research, it was planned to develop PACPS in Turkish, conduct validity and reliability analyses and introduce it to the literature. In this study, PACPS was developed in the Turkish language and was found to have good internal consistency, test-retest reliability, and adequate construct validity. These findings indicate that PACPS is a reliable and valid measurement tool for Turkish-speaking health professionals.

Internal consistency analysis is used to determine whether the questions in the measurement tool are consistent among themselves or whether they measure the same thing according to the calculated Cronbach α coefficient. A Cronbach α coefficient above 0.8 means indicates that the questions in the scale are highly consistent among themselves [32]. In this study, PACPS Cronbach's α coefficient was found to be at a high level of 0.917. In a similar study, Asiamah et al. determined the internal consistency (Cronbach α = 0.75) at a moderate level in their study on the psychometric properties of the scale of patient perceptions of physicians' physical activity counseling [33]. Acar et al. found that internal consistency (Cronbach α = 0.95) was at a high level in their research on the validity and reliability of disability in physical activity [34]. Asiamah et al. found that internal consistency (Cronbach α = 0.75) was at a moderate level in their study on the development of the scale of physical activity counseling of nurses in primary care facilities [35]. Our research results are similar to previous studies.

Test-retest is the determination of the stability of a measurement tool by applying it to the same people, under the same conditions and at a certain time interval. In this study, the ICC value indicating the test-retest reliability of the PACPS scale was determined as 0.88. The ICC value of the items ranged between 0.73 and 0.87. Seves et al. determined an ICC value of 0.67 in their adaptation study to assess physical activity in disabled adults [36]. Acar et al. the ICC of the scale items ranged

Table 6 Mean values of the outcome measures and correlational analysis results ($n=162$)

	PACPS score		Total scores		Test-Retest	
	rho	*p*	Test scores Mean ± SD	Retest scores Mean ± SD	t	*p*
IPAQ	0.382**	< 0.001	3570.30 ± 857.52	3616.95 ± 851.71	-2.397	0.018
CBPAQ	0.408**	< 0.001	51.63 ± 8.97	52.12 ± 8.80	-2.323	0.021
PACPS			44.56 ± 10.34	44.66 ± 10.93	-0.242	0.809

IPAQ: International Physical Activity Questionnaire Short-Form, CBPAQ: Cognitive Behavioral Physical Activity Questionnaire, PACPS: Physical Activity Counseling Practices Scale, rho: Pearson correlation coefficients, t: Pair Simples Test, SD: Standard Deviation

Note: PACPS relationship with other outcome measures was determined by Pearson correlation coefficients. The averages of PACPS and other outcome measures in the first and second evaluations and the correlation between evaluations were shown with the Pair Simples Test

between 0.593 and 0.924 [34]. In this sense, it can be said that our study grouped our items more effectively as a scale tool compared to the scale development studies of Acar et al.

In this study, the eigenvalues of the PACPS were found to be between 1.32 and 6.82, and a two-factor structure was created, where items 1–5,8,9.11-13 were categorized under Factor 1 (Recommendations for physical activity practices) and items 6,7,10 under Factor 2 (Physical activity training). When similar studies were examined, Washburn et al. found that the scale developed in their research on the development of a physical activity scale for individuals with disabilities had 5 factors [37]. Asiamah et al. and Seves et al. determined that the scale they developed in their studies had a 2-factor structure [33, 36]. Our study is similar to the results of Asimah et al. and Seves et al. in terms of the number of factors. Considering that the purpose of factor analysis is to explain the variance in the data set with a small number of factors, the fact that our scale items have a 2-factor structure shows that our scale items are explained by a small number of factors [38].

The convergent validity of PACPS was assessed by correlation analysis of PACPS scores with IPAQ and the correlation coefficients showed a moderate positive relationship (rho = 0.38, $p < 0.001$). Asimah et al. found a positive correlation between patients' perceptions of Physical Activity Counseling and healthcare quality ($r = 0.41$, $p = 0.000$) and quality improvement ($r = 0.391$, $p = 0.000$). This result shows that as physicians' physical activity counseling in health services increases, both health service quality and quality improvement increase [33]. In their study, Acar et al. found a high correlation between disability in physical activity (DPA) total score and disorders ($r = 0.906$, $p = 0.001$), The lowest correlation was found between DPA total score and quality of life ($r = 0.637$, $p = 0.001$) [34]. Our results are similar to those of Asimah et al.

In the evaluation of the concurrent validity of the PACPS, a strong pozitif correlation was found between the total weighted score and the total scores obtained from the CBPAQ (rho = 0.408). When similar studies in literature were examined, Ball et al. in the evaluation of the concurrent validity of the Physical Activity "Vital Sign" Questionnaire with the Modifiable Activity Questionnaire, a strong correlation was found ($r = 0.71$, $p < 0.001$). Lee et al. found a moderate correlation between physical activity measured by the Korean version of the Global Physical Activity Questionnaire and accelerometry ($r = 0.33$, $p < 0.01$) and a weak correlation between sedentary behaviors ($r = 0.18$, $p < 0.01$) [39]. The concurrent validity of our study was found to be lower than that of Ball et al. and higher than that of Lee et al.

Known-group validity refers to the capacity of a test to discriminate between a group of individuals known to have a particular trait and a group that does not [32]. In this study, the PACPS scores of groups with different activity level groups were significantly different according to IPAQ scores. This shows that this developed scale has known-group validity.

The calculated values for PACPS developed in the Turkish language were SEM and MDC values (0.81 and 2.25 points, respectively). In similar studies on the subject, SEM and MDC values (2.01 and 5.57 points, 0.09 and 0.25 points, respectively) were determined in Asimah et al. and Acar et al. studies [33, 34].

Determination of SEM and MDC values is important for utilizing the developed scale or for assessing the significance of change in the scales as a measurement toll in versiyon studies in other languages.

Conducting this study in a single center can be considered a limitation. In addition, the number of health professionals included in the study was not equal. In addition, the health professionals included in the study were not determined according to their fields of study.

Conclusions

When the studies are examined, although scales similar to the PACPS we developed are anonymous scales, no scale measures the physical activity practices of healthcare professionals in the clinic [7, 13, 35]. With our research, an effective and highly scalable tool that can evaluate the physical activity practices of healthcare professionals in the clinic has been created at a low cost (Appendix 1). The physical counseling practices of healthcare professionals can be measured with the developed scale. PACPS is important in determining the extent to which clinicians apply counseling practices in the comprehensive and rapid treatment of patients. Being able to evaluate clinicians' physical activity practices will provide insight into how much more effort clinicians should put into promoting physical activity. It will also guide health policies that will be developed to encourage patients to engage in physical activity. It can therefore guide in determining the extent to which counseling interventions for both face-to-face and online setting are feasible.There is increasing awareness among health policy makers of the need for full participation in physical activity. Physical activity action plans must be adequately resourced, monitored and implemented worldwide to truly advance the fundamental right to full participation in physical activity. Further studies can increase the prevalence of the scale by making versions of the scale in other languages. In addition, further research can be conducted to determine the extent to which physical activity counseling is practiced in the workplaces of health professionals.

Abbreviations

PACPS	Physical Activity Counseling Practices
IPAQ	International Physical Activity Questionnaire short form
CBAPQ	Conscious Behavioral Physical Activity Questionnaire
WHO	World Health Organization
ICC	Intraclass correlation coefficient

Supplementary Information

The online version contains supplementary material available at https://doi.org/10.1186/s12875-025-02909-8.

Supplementary Material 1

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Author contributions

Musa ÇANKAYA (MÇ), Serdar ARSLAN (SA), Gökmen Yapalı (GY) MÇ contributed to the formulation of the research design, coordination, and manuscript composition. MÇ and SA participated in conceptualizing and designing the study, data collection, data analysis, and drafting the manuscript. MÇ contributed to the revision of the analytical framework and data interpretation. MÇ and GY Yang participated in data analysis and revising the manuscript. SA contributed to the study design and data collection. All authors reviewed and approved the final version of the manuscript.

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Data availability

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Declarations

Ethics approval and consent to participate

This methodological study approved from Necmettin Erbakan University Pharmaceutical and Non-Medical Device Clinical Research Ethics Committee (Decision No: 2023/497 Application ID: 14890 Date: 05.07.2023). The study was conducted in accordance with the Declaration of Helsinki. Verbal and written informed consent was obtained from the participants.

Consent for publication

Not applicable.

Competing interests

The authors declare no competing interests.

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