

## PSYCHOMETRIC PROPERTIES AND STANDARDIZATION OF THE FARSI VERSION OF THE PHYSICAL ACTIVITY SCALE FOR THE ELDERLY (PASE)

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### ABSTRACT

**Introduction:** Old age is associated with reduced physical ability. It is necessary to measure and evaluate physical activity of the older people and devise appropriate measures to improve it, which itself requires a valid and reliable tool. Therefore, this study aimed to determine the validity and reliability of the Farsi version of Physical Activity Scale for the Elderly (PASE).

**Method:** This study is a descriptive-applied research conducted on 300 older residents of Yazd, Iran. The translation process of the English version of PASE into Farsi was carried out according to the International Quality of Life Assessment (IQOLA) Project protocol. First, the face validity was assessed using the qualitative and quantitative method of the Impact Score. To assess the content validity, the content validity rate (CVR) and the content validity index (CVI) were determined. Afterwards, construct validity was examined through exploratory and confirmatory factor analysis. The reliability of the scale was examined within 2 weeks by 20 older people via calculating the Cronbach's alpha coefficient, Pearson correlation coefficient and intraclass correlation coefficient; its test-retest reliability was also determined.

**Results:** The experts approved the quality of translation as well as the qualitative and quantitative face validity of all questions except the 7th one. Also, CVR and CVI scores of all questions, except for the 7th one, were higher than 0.6 and 0.79, respectively. With regard to construct validity assessment by exploratory and confirmatory factor analysis, three factors were accepted in terms of fitness. In terms of reliability, a Cronbach's alpha of 0.94, an intraclass correlation coefficient of 0.99 and a test-retest correlation coefficient of 0.94 were calculated.

**Conclusion:** The process of translating and finding equivalents for PASE tool had a desirable quality. The Farsi version was approved in terms of face, content and construct validity. Cronbach's alpha and intraclass correlation coefficient confirmed its reliability. Therefore, the Farsi version of this scale can be used to measure physical activity of the older people in order to assess the impact of therapeutic interventions.

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### Introduction

Ageing is one of the most important anthropological phenomena of the century [1]. Life expectancy of the older people is rising around the world. It is estimated that by 2020, the number of people over 60 will be higher than the number of children under 5 [2]. In Iran, increase in the population of the elderly will be significant from 2041 onward so that the population of people over 60 will reach 8.5 million [2,1]

Ageing is accompanied by a reduction in physical abilities [3]. The rate of motor disability in Iranian elderly is significant [4]. Today, the issue of improving older people's health and their physical activity in the older ages is a public health problem and a serious issue [5]. On the other hand, the factors affecting longevity, quality of life, life expectancy, life satisfaction, the feeling of being good, lifestyle, and regular physical activity are known today [6,7]. Also, regular physical activity in the old age can prevent osteoporosis and its consequences such as femoral and pelvic bone fractures, obesity, depression and colon

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cancer and, in general, the biological changes associated with ageing [8]. Having an active life makes the older people healthy and independent [9,10]. Regular physical activity, such as walking, reduces dependence on other family members and caregivers, accelerates socialization and, overall, improves mental health [11,12], while immobility is one of the top 10 causes of death in the world [13]. An inactive life is among the main causes of chronic diseases such as cardiovascular disease, type II diabetes, etc. [14].

Evaluation and then proper planning to promote the physical activity of the elderly are necessary, steps which require a proper tool for measuring physical activity in the population, as perhaps one of the factors that has led organizations, specialists and researchers to be less willing to assess the level of physical activity in the elderly is lack of the tools necessary to assess the level of physical activity and lack of familiarity with the effective factors in this area. Hence, if appropriate tools are not available, one of the most important issues in studying the functional consequences at different individual and social levels is development of appropriate scales for evaluation. If these scales are available globally, the appropriate scale will be chosen among the existing tools. The purpose of this selection is to provide tools that meet the clinical and research needs at a desirable level. Meanwhile, issues such as focusing the tool on target communities, how the tool is used, the psychometric properties of the tool, tool subscales, etc. are considered. One of the tools for measuring the level of physical activity in the elderly, which is currently used globally, is Physical Activity Scale for the Elderly (PASE). PASE was first designed in 1993 by Washburn et al. Its reliability and validity was measured in a sample of older people (56 males, 134 females) with an average age of  $66.5 \pm 5.3$  years. The results indicated that PASE can be considered as an appropriate tool for measuring physical activity of the elderly. PASE scale consists of eleven multiple-choice questions for assessing physical activity in the last week (including recreation, home and work activities), and a variety of leisure activities of the older people, home and outdoor responsibilities, and light, moderate, and extreme exercise. It calculates the final score by weighting each activity [15]. Based on the above, the study was conducted to determine the validity and reliability of the Farsi version of PASE.

#### **Method:**

This study is a descriptive applied research which tests psychometric properties; in some sources, it is called methodological study. The sampling in this study was both purposive and random. In the first step related to the translation of the questionnaire, 2 experts in English, 2 in ageing and 2 in physical activity were selected through purposive sampling. Purposive sampling was also used in the second and third steps related to the determination of face and content validity as well as the selection of experts in the field of ageing (10 people) and the selection of older people (10 people). In the third stage related to determining the construct validity, samples were selected randomly from nursing homes and urban parks in Yazd province. The required sample in factor analysis studies has been proposed to be from 10 to 15 subjects for each questionnaire item. The sample for this research is estimated to be  $(22 \times 13 = 286 \approx 300)$ . The inclusion criteria were being over 65 years, having relative health and willingness to cooperate. The exclusion criteria were amputation in the upper and lower limbs, Parkinson's disease, evident cognitive impairment, history of cardiovascular disease, stroke, and mental disability.

In order to prepare the Farsi version of PASE, after getting permission of the scale developers, the translation process started following the International Quality of Life Assessment (IQOLA) Project protocol. To determine qualitative face validity, the opinions of a 6-person specialist panel including 2 nursing experts, 2 sports experts and 2 ageing experts, were considered. The level of difficulty, the degree of disproportion, the ambiguity of the expressions, or deficiency in the meanings of words were checked. Quantitative face validity was examined by answering the questions based on a 5-point Likert scale: I totally agree (score 5), I agree (score 4), I don't know (score 3), I disagree (score 2), and I totally disagree (score 1). The questionnaire was distributed among 10 older people and the impact score was calculated for each question.

In the qualitative study of content validity, five experts were asked to study the tool carefully and provide written corrective comments on qualitative content validity, grammar, the use of proper words, the importance of questions, the placement of questions, and the time to complete the questionnaire. Content validity ratio (CVR) and content validity index (CVI) were used for quantitative evaluation of content validity. To determine CVR, 10 experts were asked to check every item based on a 3-point scale including the options "it is necessary", "it is useful but not necessary", and "it is not necessary". Based on Lawshe (1975) table, items with a CVR of equal to or higher than 0.6 were selected. Following Waltz and Bausell (1983), CVI was calculated by aggregating positive points for each item earning the score "relevant but needs revision" and "fully relevant" divided by the total number of specialists; a result of 0.8 and higher was accepted.

Construct validity is the accuracy of a scale in measuring a feature. Correlation, group difference, logical analysis and factor analysis methods were used to determine the construct validity. Exploratory factor analysis in the form of principal component analysis (PCA) was used to investigate the factor structure of the scale. Given the closeness of theoretical basis of factors, varimax rotation was used. Before performing the factor analysis, sampling sufficiency was checked through KMO with a value of greater than 0.6. The significance of the information in the correlation matrix was determined with the Bartlett's sphericity test. Then, factor analysis through principal component method as well as varimax rotation was conducted. The two major indicators of special value and variance ratio explained by each factor were considered to determine the saturation of the scale by main factors. Greater than one special value method and the scree curve were used to extract the number of factors. The minimum factor load of 0.6 was considered to keep each phrase in the extracted factors and to avoid secondary loads.

In the confirmatory factor analysis of the scale, the probabilistic models were first determined according to the theoretical basis of the questionnaire as well as the results obtained from the exploratory factor analysis. Then, the models were compared with each other according to the obtained dispersion indices including the ratio of chi square to its degrees of freedom, goodness of fit index (GFI), adjusted goodness of fit index (AGFI), root mean square residual (RMR), and root mean square error of approximation (RMSEA).

In order to assess the reliability of the scale, the internal consistency of the questionnaire was determined through Cronbach's alpha coefficient and Pearson correlation coefficient. The scores of 20 subjects were recalculated in a two-week interval with intraclass correlation coefficient in the test-retest method.

The statistical methods used in this study include descriptive and inferential statistics performed using EXCEL and SPSS 22. To observe ethical considerations, the moral code IRSSU.REC.1395.154 was approved for this study by Shahid Sadoughi

University of Medical Sciences in Yazd. Also, in all steps, written consent was received from the participants including faculty members and the older people.

**Results**

Based on the results, 63.3% of participants were male, 75% were married, and 53.7% were illiterate. Other characteristics are reported in Table 1.

**Table 1.** Frequency distribution of demographic characteristics of participants

Demographic characteristics		Number	Percent
Sex	Female	98	32.7
	Male	202	63.3
Marital status	Single	75	25
	Married	225	75
Education	Illiterate	161	53.7
	Elementary	72	24
	Secondary school education and higher	67	22.3
Type of living	Living with others	257	58.7
	Living alone	43	14.3
Place of living	Real estate	283	94.3
	Nursing home	17	5.7
Job	Full-time	9	3
	Part-time	87	29
	Unemployed	204	68

At the beginning of the study, the questionnaire was translated in a standard manner in several stages. After verifying the accuracy of the translation, the qualitative face validity of the Farsi version of PASE was confirmed by experts' judgment. Then, quantitative face validity was confirmed through the impact score of each question answered by the older people. The questions with impact score of equal to or greater than 1.5 were included in the questionnaire and question No. 7 was excluded based on the results (Table 2).

**Table 2.** CVR, CVI and Impact score,

Question	Impact Score	CVR score	CVI score	
Recreational activities		0.8	0.86	
1. Over the past 7 days, how often did you participate in sitting activities such as reading, watching TV, or doing handcrafts?	3.96			
(b) On average, how many hours did you engage in these sitting activities?	4.05	1	0.93	
2. Over the past 7 days, how often did you take a walk outside your home or yard for any reason? For example, for fun or exercise, walking to work, etc.	4.7	1	0.86	
(a) On average, how many hours per day did you spend walking?	4.6	1	0.86	
(b) How much distance did you cover over the past 7 days? (1.5 km or 1500 m)	2.87	0.6	0.8	
3. How many floors did you climb over the past 7 days? (each floor = 10 steps)	4.6	0.6	0.86	
4. Over the past 7 days, how often did you engage in moderate sport and recreational activities such as walking, mild running, light swimming or other similar activities?	3.28	1	1	
(b) On average, how many hours a day did you engage in these moderate sport or recreational activities?	3.36	0.8	0.8	
5. Over the past 7 days, how often did you engage in moderate sport and recreational activities such as ping pong, dancing, recreational volleyball or other similar activities?	3.69	0.6	1	
(b) On average, how many hours a day did you engage in these moderate sport or recreational activities?	2.59	0.6	0.83	
6. Over the past 7 days, how often did you engage in strenuous sport and recreational activities such as jogging, swimming, cycling, singles tennis, aerobic exercise, skiing, mountaineering or other similar activities?	2.1	0.6	0.86	
(b) On average, how many hours a day did you engage in these strenuous sport or recreational activities?	1.98	0.8	0.46	

7. Over the past 7 days, how often did you do any exercises specifically to increase muscle strength and endurance, such as lifting weights or pushups, etc.?	0.84	0.8	0.86	
(b) On average, how many hours a day did you engage in these strenuous sport activities?	1.4	0.8	0.8	
Household activity 8. During the past 7 days, have you done any light housework, such as dusting or washing dishes?	4.8	0.6	1	
9. During the past 7 days, have you done any heavy housework or chores, such as vacuuming, scrubbing floors or washing windows?	3.96	0.6	0.8	
10. During the past 7 days, did you engage in any of the following activities? a. Home repairs like painting, wallpapering, electrical work, etc.	2.8	0.8	0.86	
b. Lawn work or yard care including leaf removal, car repair, shopping, etc.	4.7	0.8	0.8	
c. Outdoor gardening	2.22	0.8	0.93	
d. Caring for another person, such as children, dependent spouse, or another adult	5	0.8	0.8	
Work-related activity: 11. During the past 7 days, did you work for pay or as a volunteer?	2.87		0.8	
a. How many hours per week did you work for pay and or as a volunteer?	3.28		0.8	
b. Which of the following categories best describes the amount of physical activity required on your job and or volunteer work? 1. Mainly sitting with some slight arm movement (Examples: office worker, watchmaker, seated assembly line worker, bus driver, etc.) 2. Sitting or standing with some walking (Examples: cashier, general office worker, light tool and machinery worker) 3. Walking with some handling of materials generally weighing less than 25 kg (Examples: mailman, waiter/waitress, construction worker, heavy tool and machinery worker) 4. Walking and heavy manual work often requiring handling of materials weighting over 25 kg (Examples: lumberjack, stone mason, farm or general laborer)	3.36		0.86	

Qualitative content validity of the Farsi version of PASE was confirmed by applying experts' opinions as follows: "Other similar activities" was changed to "similar other activities", "voluntary" was changed to "charity", "how many hours per week did you work for pay and or as a volunteer?" was changed to "last week, did you work for charity or for pay?" Content validity ratio (CVR) and content validity index (CVI) were used for quantitative evaluation of content validity. Based on Lawshe (1975) table, items with a CVR of equal to or higher than 0.62 were acceptable. In this way, all questions except the 7th one, which was not approved in the last stage, gained an acceptable score and were thus confirmed. Quantitative content validity was confirmed based on Waltz and Bausell's CVI with score 0.79 and higher as the acceptable base. Therefore, with the exception of the 7<sup>th</sup> question, the rest of the questions have acceptable validity (Table 2). The 7<sup>th</sup> question was completely removed from the scale because it did not have both content and face validity.

Construct validity was determined through correlation, group difference, logical analysis and factor analysis methods. Exploratory factor analysis in the form of principal component analysis (PCA) was used for construct validity. Given the closeness of theoretical basis of factors, varimax rotation was used. KMO test for sampling adequacy and Bartlett test were used for factor analysis. The KMO value is equal to 0.739. Also, the value of Bartlett's sphericity test is 1037.96 which is significant with a high certainty. Therefore, based on both tests, it can be concluded that performing factor analysis on the basis of the correlation matrix would result in a non-unitary matrix (Table 3). Then factor analysis was performed by principal component method with varimax rotation. The eigenvalues greater than 1 and the scree curve were used to extract the number of factors. The variance ratio explained by each factor was considered. The minimum factor load was considered 0.6 to keep each expression in the extracted factors and to avoid secondary loads (Table 3). Factor analysis led to the extraction of six factors. After varimax rotation, the first factor had a special value of 4.892, the second factor had a special value of 2.791, third factor 2.344, fourth factor 1.484, fifth factor 1.304 and the sixth factor 1.249. Therefore, 10 questions of the PASE tool

with 6 subgroup factors and eigenvalues more than 1 were determined. These 6 factors together explained 66.92% of the total variance of the scale which is significant.

**Table 3.** KMO and Bartlett’s sphericity tests in the whole sample

KMO test (sampling adequacy scale)		0.739
Bartlett’s sphericity test	X <sup>2</sup>	1037.9
	Degree of freedom	210
	Significance level	0.0001

**Table 4.**

Factor structure	
The first factor	q5a, q5b, q6, q6b have the highest factor load for the first factor
The second factor	q2, q2a, q2b, q4, q3, q4b have the highest factor load for the second factor
The third factor	q9a, q9b, q9c, q9d, q10 have the highest factor load for the third factor
The fourth factor	q1, q1b have the highest factor load for the fourth factor
The fifth factor	q7, q8 have the highest factor load for the fifth factor
The sixth factor	q10a, q10b have the highest factor load for the sixth factor

In the second part, construct validity was examined by conducting a confirmatory factor analysis. In this analysis, probabilistic models were first determined according to the theoretical basis of the questionnaire as well as the results obtained from the exploratory factor analysis, and then the models were compared with each other with respect to the obtained dispersion indices. The values of fitness indices of the scale show that except for the normed fit index (NFI), the other indices are acceptable. This indicates that the model of measurement is fit (Table 5).

**Table 5.** Fitness indices for the primary PASE model

Index grouping	Index name	Abbreviation	Primary model	Acceptable fit
Absolute fit indices	Level covered by chi-square	X	137.01	Greater than 5%
	Degree of freedom	Df	59	-
	Significance level	P	0	>0.05
	Goodness of fit index	GFI	0.937	GFI>0.90
	Adjusted goodness of fit index	AGFI	0.902	AGFI>0.90
Comparative fit indices	Non-normed fit index	NNFI		NNFI>0.90
	Normed fit index	NFI	0.86	NFI>0.90
	Comparative fit index	CFI	0.917	CFI>0.90
	Incremental fit index	IFI	0.919	IFI>0.90
Parsimonious fit index	Parsimonious normed fit index	PNFI	0.655	Greater than 50%
	Root mean square error of approximation	RMSEA	0.066	RMSEA<10%
	Normed chi square	CMIN/df	2.322	A value between 1 and 3
	Root mean square residual	RMR	0.08	<0.05

The Cronbach’s alpha and intraclass correlation coefficient (ICC) values were used for estimating the internal consistency of the scale. The Cronbach’s alpha was 0.86 for the recreational domain, 0.97 for the home domain, 0.99 for the occupational domain, and 0.94 for the whole scale. ICC value was obtained with a confidence interval of 0.95 for recreational domain, 0.89 for home domain and 0.97 for occupational domain, which were all statistically significant. Also, in the test-retest, the correlation coefficient was 0.94.

**Discussion**

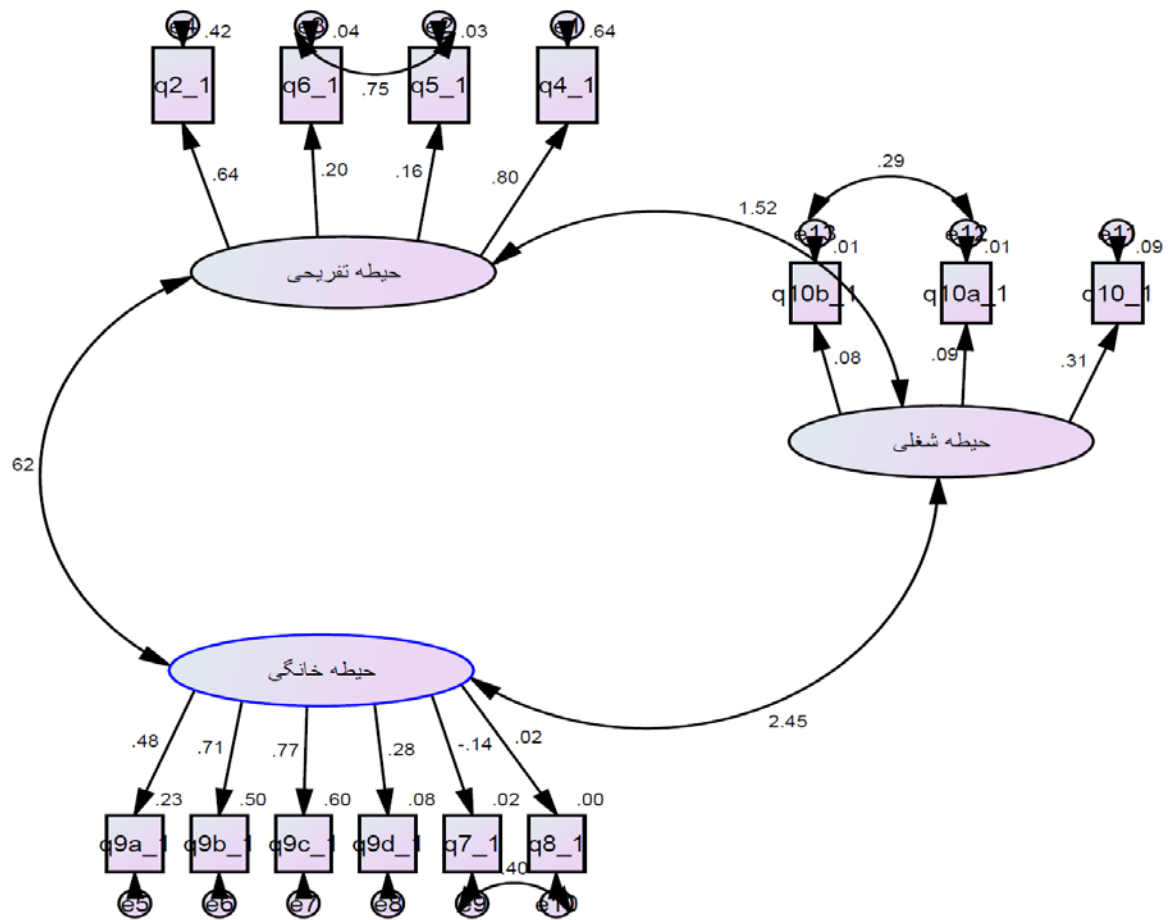
The purpose of this study was to assess the validity and reliability of the Farsi version of PASE. This questionnaire is valid in English and has been studied in many countries. The Chinese, Turkish, Japanese, etc. versions have also been adopted [16-18]. The present study was conducted on 300 elderly people living in Yazd, Iran who had no cognitive and musculoskeletal problems. In general, the results showed that the translation had a desirable quality. Specialized language and ageing experts approved the quality of the translated version. In this way, the experts of this research tried to avoid non-transparent, obscure, obscene, culturally inappropriate and multiple-meaning terms in the Farsi version. No doubt that a clear text in a tool or scale will facilitate psychometric tests for the researchers. Finally, collaborator translators and other experts confirmed the quality of translation.

The psychometric properties of PASE included face, content and construct validity. In terms of qualitative face validity, the scale was approved with regard to the appearance of questions, their difficulty and ambiguity. In terms of quantitative face validity through the calculation of impact score, all the questions, except for Question 7, received an acceptable score. Qualitative content validity included the adequacy of content, grammar, the use of proper words, the importance of questions, the placement of questions and adequate time to answer the questions which were all confirmed. Quantitative content validity calculated through CVI and CVR showed that, except for the 7<sup>th</sup> question, the rest of the questions got an acceptable score and content validity was confirmed.

Based on the results of the factor analysis, three general areas of recreation, home and work were found to be consistent with the original scale. In a study by Granger et al. (2015), PASE had a relatively modest construct validity by measuring physical activity ( $\rho = 0.57$  [95 %CI = 0.46-0.66],  $p < 0.005$ ), 6-minute walk test (6MWD) ( $\rho = 0.40$  [95 %CI = 0.23-0.55],  $p < 0.005$ ), and muscle strength ( $\rho = 0.37$  [95% CI = 0.18-0.54],  $p < 0.005$ ). In general, PASE is considered a valid tool for self-reporting physical activity in patients with lung cancer [19]. However, in the study of the validity and reliability of PASE tool in patients with hip styroarthritis, Svege writes that the construct validity of PASE is weak compared to the GTIM scale. The results of the reliability of the test-test and construct validity showed that PASE did not have the ability to examine such physical activities. Svege did not recommend PASE for measuring physical activity in patients with osteoarthritis [20].

Another test feature is reliability that is related to the accuracy and consistency of the test. The reliability of the scores derived from a test is always one of the most important features of the tool which allows it to be used in clinical and research environments. The results indicate an acceptable reliability in the test-retest, Cronbach's alpha and intraclass correlation coefficient. Sahaf et al. refer to Parada et al. (2001) study who examined the validity and reliability of PASE and CHAMPS tools on the American elderly population. They reported Pearson's correlation coefficient for the PASE questionnaire to be 0.68 [21]. Ismail et al. (2015) reported that the test-retest reliability was sufficient (ICC: 0.49) [22]. Svege reported an average score for test-retest reliability and an acceptable score for ICC(20). Forsen et al. (2010) conducted a systematic study on self-management tools for measuring physical activity for the elderly. Their results showed that PASE ICC = 0.76 and Pearson correlation coefficient = 0.84. However, in some studies, PASE has a reliability of ICC=0.66 [24]

In general, the results confirmed the validity and reliability of the Farsi version of PASE. Granger et al. (2015) write that PASE is a valid tool for self-reporting physical activity in patients with lung cancer [19]. Esmail et al. (2015) report that the Malaysian



version of the PASE has an acceptable level of validity and reliability; they believe that the tool can be useful for checking the level of physical activity in the elderly in Malaysia [22]. Ayvat et al. (2017) report that the Turkish version of PASE is a powerful measurement tool with high reliability and validity to be used in research and clinical environments [18]. Washburn et al. (1993) state that PASE is a simple, valid, and reliable scoring tool for physical activity in the elderly group [24]. Hagiwara et al. (2008) write that the Japanese version of PASE is a well-known reliable and valid instrument; it is a useful tool for assessing the physical activity of the Japanese elderly [25].

#### Conclusion:

PASE is a suitable tool in many languages, including English, Japanese, Chinese, and Turkish. Until now, the validity and reliability of the Farsi version of this scale had not been examined. Based on the results of this study, it is concluded that the translated tool has good performance in retest and reliability experiments. Therefore, it is recommended to measure physical activity in the elderly. Also, considering that different countries are now trying to improve the health of the elderly and pay attention to their well-being, it is necessary to consider and evaluate physical activity, especially in future interventions, as an evaluation index of required services. The application of this tool has made it possible for the measurement of physical activity in the elderly in different cities. National and international studies can be compared to make appropriate decisions to adopt more comprehensive approaches by policy makers and practitioners in the field of welfare and health of the older people. It is hoped that by conducting further research in this field, the ageing community will have enough development and well-being.

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