RESEARCH ARTICLE

Urdu translation and psychometric analysis of the physical activity scale for elderly (PASE)

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Abstract

Objective: To translate and culturally adapt the Physical Activity Scale for Elderly into Urdu, and to assess reliability and validity.

Method: The descriptive, analytical study was conducted from March 2023 to January 2024 at Riphah International University, Islamabad, Pakistan, and comprised healthy individuals of either gender aged at least 60 years who were enrolled from the Safari Hospital, Islamabad. The Physical Activity Scale for Elderly was tested for validity and reliability, while its translation and cultural adaptation were done in accordance with the Consensus-Based Standards for the Selection of Health Status Measurement Instruments guidelines. For face and content validity, Percent Agreement and Content Validity Index at scale and item levels were determined. Internal consistency and test-retest reliability was evaluated using Cronbach's alpha and Intraclass Correlation Coefficient. Pearson's correlation coefficient was used to assess concurrent validity. Data was analysed using SPSS 27.

Results: Of the 300 subjects, 163(54.3%) were males and 137(45.7%) were females. The overall mean age was 65.71±5.82 years (range: 60-80 years). Intraclass Correlation Coefficient 0.98 showed outstanding test-retest reliability. Cronbach's alpha value was 0.98 for the total, and for the items it was 0.99, 0.99 and 1. Face validity items 4, 7 and 9(a, d) were answered by 12 experts and 11(92%) of them answered in the affirmative, while items 1-3, 5-9(b, c) and 10 were answered in the affirmative by 12(100%). Content validity index at item level was >0.9, and at scale it was 0.76. Concurrent Validity, Pearson correlation coefficient values were 0.78 for Berg Balance Scale-Urdu, and 0.74 for Activities-specific Balance Confidence Scale-Urdu, showing a strong positive correlation, while there was a very strong negative correlation with Time Up and Go Test (-0.70) and Five Times Sit To Stand test (-0.71). Principal Component Analysis revealed 4 factors based on eigenvalues >1 for the Urdu version of Physical Activity Scale for Elderly, with (Kaiser–Meyer-Olkin's value 0.708. These 4 components explained 68.31% of total variance.

Conclusion: The Urdu version of the Physical Activity Scale for Elderly was found to be a valid and reliable tool for evaluating physical activity level in older Pakistani adults.

Key Words: Physical activity, Elderly, Psychometric, Pakistan, Urdu.

(JPMA 74: 920; 2025) **DOI: https://doi.org/10.47391/JPMA.20515**

Introduction

Ageing is an essential anthropological phenomena.[1] Globally, the life expectancy is increasing, adding to the number of elderly among the population. In 2019, there were around 15 million Pakistanis aged >60 years, comprising 7% of the country's total population. With 40 million people aged >60, the percentage of older adults is predicted to rise to 12% by 2050.[2]

Ageing is accompanied by a reduction in physical activity (PA) globally, and is the main factor associated with chronic diseases. Physically inactive individuals accounted for 6% of deaths globally, making it the fourth most important risk for death, according to the World Health Organisation (WHO).[3] Age-related conditions, such coronary artery disease (CAD), stroke, diabetes mellitus (DM), hypertension (HTN), obesity and decreased skeletal muscle mass, are largely brought on by physical inactivity. It has been claimed that physical inactivity is responsible for 6% of the overall coronary heart disease (CHD) burden [4] . Among the leading 10 causes of death worldwide is immobility.[5] The state of cognitive abilities[6] and degenerative diseases, like osteoarthritis (OA)[7], are additional variables that may impact an individual's degree of PA. Physical inactivity has been identified as a global concern despite the known benefits of PA.[6]

PA is defined as the "energy expenditure required for skeletal muscle to perform action of body". PA is a popular intervention to treat symptoms, and is essential for diseases prevention, boosting the level of independence and helping to improve physical functionality and standard of living.[8]

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Submission complete: 01-04-2024 **First Revision received:** 26-07-2024

Acceptance: 09-04-2025 **Last Revision received:** 08-04-2025

Questionnaires are frequently employed in epidemiological research to assess PA levels in relation to health. Questionnaires are inexpensive and simple to administer, and are not labour-intensive. If valid, they a very valuable tool for evaluating PA in the general population.[9,10] With the aim of boosting PA in the general population, researchers are highly interested in PA evaluation, agreeing that recreational activities, like light housework, leisure and sport, should be included in all tools epidemiologically assessing the elderly.[11] In 2012, a systematic examination of self-administered PA questionnaires was carried out by Williams et al.[12] Of the 104 questionnaires evaluated, 35 were meant for older adults, and 7 of them allowed computation of MET (Metabolic Equivalent) or energy expenditure, and 2 were self-reported; Physical Activity Questionnaire (PAQ) and The Physical Activity Scale for Elderly (PASE). The latter comprises only 12 items, compared[13]to PAQ's 54.[14]

The PASE was developed by the New England Research Institute (NERI) and was first used by Washburn et al. in 1993.[13] PASE is a self-administered and interpreted popular scale for measuring PA in older adults aged at least 65 years.[13]

The scale has undergone translation and validation in multiple languages with decent Cronbach's alpha (α), Intraclass Correlation Coefficient (ICC) and test-retest reliability values.

The current study was planned to translate and culturally adapt the PASE into Urdu, and to assess reliability and validity in Pakistani subjects.

Materials and Methods

The descriptive, analytical study was conducted from March 2023 to January 2024 at Riphah International University (RIU), Islamabad, Pakistan, and comprised healthy individuals of either gender aged at least 60 years who were enrolled from the Safari Hospital, Islamabad. Approval was obtained from the RIU ethics review committee. The sample was raised using non-probability convenience sampling technique, and data was collected after taking informed consent form all the subjects. Those included were individuals aged at least 60 years[15] who were able to perform activities of daily living (ADLs) independently, and could easily read the questionnaire in the Urdu language. Those with upper and lower limb amputation, illnesses that worsen over time, neurological disorders and cognitive impairment were excluded. The sample size was calculated using an online calculator.[16] For test-retest reliability, the sample size was based on ICC values, using the formula[16]:

$$n=2(1-ICC)\,(Z1-\alpha/2+Z1-\beta)2\times ICC2n=(Z1-\alpha/2+Z1-\beta)2\times ICC22(1-ICC)$$

Where n was the required sample size, ICC was set at ≥ 0.80 Z value for the desired level of significance (Z1−α/2Z1−α/2) was set at 1.96 for α 0.05, and the Z value for the desired power ($Z1-\beta$Z1−β) was set at 0.84 for 80% power.

Internal consistency was assessed with n=61, face/ content validity was done by a panel of 12 experts, while concurrent validity, factor analysis and floor/ceiling effects were processed with n-300.

The criteria outlined by the Consensus-based Standards for the selection of health Measurement Instruments (COSMIN)[17] was used along with additional translation, cultural adaption, and validity requirements of epidemiological research that have been mentioned in literature.[18]

In phase 1, the original PASE scale (English language-source [SL]) was forward-translated into Urdu language (target language [TL]) by bilingual translators. Two independent translated drafts of TL were generated. Preliminary initial translated draft of scale in Urdu (PI-TL) was generated, and a committee was formed to compare TL1 and TL2 with original PASE to resolve ambiguities. Subsequently, two separate bilingual experts, blinded to the original form, translated PI-TL into SL, which led to B-TL1 and B-TL2. Two backward translation drafts of the SL scale were also created. In the next step, an initial comparison was done between B-TL1 and B-TL2 in which sentence structure, relevance and meanings were evaluated in the light of original PASE. The multidisciplinary group, comprising researchers, multilingual translators and medical professionals, created a pre-final version (PF-TL). Until all ambiguities were resolved, every step was repeated. In the final step of phase 1, pilot testing/adaptation was done. A committee of neuromuscular physical therapists evaluated the face and content validity of PF-TL of the translated scale. Pilot testing was done on 20 elderly subjects. Each questionnaire item was reviewed one-on-one with each patient. All queries were taken into consideration. The experts assessed all the findings of the adaptation process, and approved the final version of PASE-Urdu (PASE-U).

Phase II comprised the psychometric evaluation process. For test-retest reliability, the scale was filled out twice. The duration of one week was chosen since it was enough long to avoid recall bias, and sufficiently brief to guarantee that individuals could not alter their PA level[19]. It was assessed on the basis of ICC values. The internal

consistency of a questionnaire sub-scale was measured using Cronbach's α value.

The experts assessed the face validity using a face validity form. It was evaluated using the percentage of agreement. For content validity, the experts reviewed every item on the questionnaire and rated it on a 4-point Likert scale. It was assessed using Content Validity Index (CVI)[1] which was evaluated at item (I-CVI) and scale (S-CVI) levels. For concurrent validity, the subjects were asked to respond to various tools, including the PASE-U, the Urdu version of the Activities-specific Balance Confidence (ABC-U)[20] scale, the Berg Balance Scale-Urdu (BBS-U)[21], the Time Up and Go (TUG)[22,23] test, and the Five Times Sit to Stand (5XSTS)[24] test. BBS-U has 14 questions. Its purpose is evaluating a subject's capacity to perform tasks.

The ABC-U scale predicts the risk of fall among the elderly. For TUG, participants were asked to get out of a chair, walk three meters, turn 180°, and then get back to the chair. Those taking >30 seconds were considered at the risk of falling. 5xSTS is a reliable and valid tool for assessing lower extremity functionality. Pearson co-relation coefficient was computed by comparing the outcomes of the scales that were taken simultaneously.

Principal Component Analysis (PCA) with varimax rotation was used for factor analysis. Bartlett's test of sphericity and Kaiser–Meyer-Olkin (KMO) measure of sample adequacy were applied to ascertain whether the correlations were strong enough to support a factor analysis Clusters of items were identified using eigenvalues indicating total amount of variance. A factor loading of at least 0.4 was deemed sufficient.

Floor and ceiling effect was assessed by dividing the summed score into quartiles, and reporting the percentages of highest and lowest quartiles.

Data was analysed using SPSS 27. P<0.05 was considered significant.

Results

The experts agreed that the examples provided for some of the questions were not typical practices in Pakistani society, and these were substituted with exercises that were more widely accepted in Pakistani society. In addition, several routinely performed tasks in Pakistani society were included in the questions. "Walking to the mosque" was substituted for "walking the dog" under item 2 of the leisure time activities list. In question 3, “bowling”, “golf with a cart”, “shuffleboard” and “fishing from a boat” were changed to “religious activities (prayers)”, “playing with children”, “climbing stairs (10 stairs)” and “taking care of a pet”. In item 4, “ballroom dancing”, “doubles tennis”, “ice-skating”, “hunting”, “golf without cart”, and “soft ball” were changed to “cricket”, “walking to the market to buy groceries”, “using a bicycle for riding”, “herding cattle”, “walking in the park with friends” and “climb stairs (20 stairs)”. In item 5, “swimming”, “singles tennis”, “aerobic-dance”, and “skiing” were replaced with “brisk walking or running”, “climbing mountains”, “working in the fields” and “playing soccer”. In item 6, “weights training” and “sit-ups” were added to the exercises that specifically increase muscle strength and endurance. In item 7, “ironing”, “washing clothes”, “hanging clothes” and “cooking” were included among moderate household activities. In item 8, “car-washing”, “washing walls” and “changing place of furniture” were included among household activities.For the estimation of psychometric parameters of PASE-U, 300 participants were enrolled; 163(54.3%) males and 137(45.7%) females. The overall mean age was 65.71±5.82 years (range: 60-80 years) (Table 1).

Table-1: Demographic characteristics of the subjects

Age (Years)		
Minimum	**Maximum**	**Mean ± Standard Deviation**
60	80	65.71 ± 5.82
Gender	**Frequency**	**Percentages (%)**
Male	163	54.3
Female	137	45.7
Marital status	**Frequency**	**Percentages (%)**
Unmarried	Nil	Nil
Married	300	100
Education	**Frequency**	**Percentages (%)**
Under-diploma	143	47.7
Diploma and higher	157	52.3
Living Type	**Frequency**	**Percentages (%)**
Living with family members	285	95
Living lonely	15	5
Employment Type	**Frequency**	**Percentages (%)**
Full-time	77	25.7
Part-time	13	4.3
Unemployed	210	70

For test-retest reliability, ICC value was 0.98 (p<0.0001), indicating outstanding -retest reliability. Overall value of Cronbach’s alpha for internal consistency was 0.98 and for the items related to leisure time activities, household activities and work-related activities, it was 0.99, 0.99 and 1, respectively, showing a very high level of internal consistency (Table 2).

Face validity items 4, 7 and 9(a,d) were answered by 11(92%) experts in the affirmative, while items 1-3, 5-9(b,c) and 10 were answered in the affirmative by 12(100%).

Table-2: Reliability data of the Urdu version of the Physical Activity Scale for Elderly (PASE-U).

Dimensions	Reliability	Mean/SD	(r)	ICC	Cronbach's-α (95%CI)	Cronbach's-α value-Based-on Standardized Items	Number of items tested
Leisure-time Activities	Time 1	176.85±124.2	0.97	0.98	0.99	0.99	2
	Time 2	171.96±122.02					
House-hold Activities	Time 1	144.08±44.63	0.97	0.98	0.99	0.99	2
	Time 2	116.08±42.95					
Work-related Activities	Time 1	43.96±72.31	1	1	1	1	2
	Time 2	43.96±72.31					
Total-score(Average-measure)	Time 1	330.66± 178.56	0.96	0.98	0.98	0.98	2
	Time 2	335.99± 172.92					

ICC: Intraclass correlation coefficient, α: Alpha SD: Standard deviation, CI: Confidence interval.

I-CVI was >0.9, while S-CVI/ universal agreement (UA) was 0.76 and S-CVI/ average (AVE) was 0.97. For concurrent validity, data was normally distributed and Pearson correlation coefficient (r) value for BBS-U was r=0.78, and it was r=0.74 for ABC-U, showing a strong positive correlation among PASE-U, BBS-U and ABC-U. The values for TUG and 5XSTS were r=-0.70 and r=-0.71 demonstrating a very strong negative correlation (p<0.001) (Table 3).

With respect to floor or ceiling effect, 66(22%) participants fell in the 1st quartile, wile 28(9.33%) fell in the 4th quartile, suggesting minimal ceiling effect. Most participants fall in the 2nd quartile 153(51%), showing no ceiling or floor effect.

Table-3: Validity data of the Urdu version of the Physical Activity Scale for Elderly (PASE-U).

Face validity and content validity		
Items description	**No of agreements**	**I-CVI**
Item 1	12(100%)	1
Item 2	12(100%)	1
Item 3	12(100%)	1
Item 4	11(92%)	0.92
Item 5	12(100%)	1
Item 6	12(100%)	1
Item 7	11(92%)	0.92
Item 8	12(100%)	1
Item 9a	11(92%)	0.92
Item 9b	12(100%)	1
Item 9c	12(100%)	1
Item 9d	11(100%)	0.92
Item 10	12(100%)	1
S-CVI/AVERAGE		0.97
Total Agreement		9
SCVI/UA		0.75

Concurrent validity for PASE-U, BBS-U, ABC Scale-U. TUG and 5 STS					
		BBS-U	**ABC-U**	**TUG**	**5 STS**
PASE-U	Pearson correlation	.78	.74	-.70	-.71

I-CVI: Item-Content Validity Index, S-CVI: Scale-Content Validity Index, UA: Universal agreement, BBS-U: Berg Balance Scale-Urdu, TUG: Time Up and Go test, 5STS: Five Times Sit to Stand, ABC-U: Activities-specific Balance Confidence-Urdu.

In PCA, KMO value was 0.71. Bartlett's test was significant (p<0.001), suggesting that the data had sufficient variance to allow for factor analysis. A total of 4 factors/dimensions were extracted based on eigenvalues >1. The first factor had 3.52 eigenvalues, which was distributed for 29.32% of observed variance. The second factor had 2.42 eigenvalues, which put an additional 20.17% of the variance. The third and fourth factors revealed 1.19 and 1.06 eigenvalues, respectively. The former computed 9.96% and the latter recorded 8.86% of additional variance. Altogether, >20% of the cumulative percentage of variance was appreciated and, these 4 components explained 68.31% of the total variance. All included items in the analysis had factor loadings >0.4 and extracted well. Scree plot also confirmed the 4-factor model (Figure). Based on the item loading, factor 1 represented strenuous physical activity, as it had high loadings on variables like strenuous sports, outdoor gardening, and lawn work. Factor 2 related to moderate physical activity, with high loadings on moderate sports and work. Factor 3 represented light/leisure physical activity, as it had a high loading on light sports and a

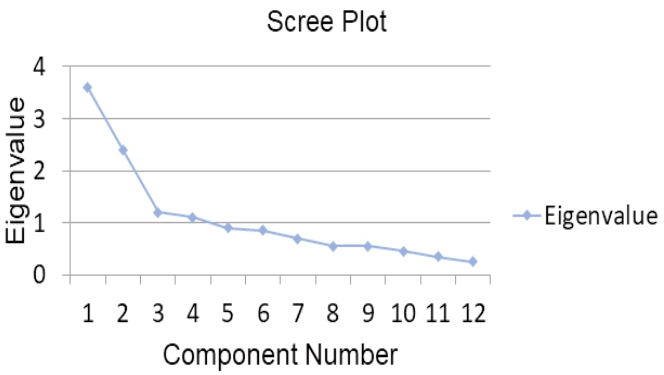

Figure: Scree plot showing components of Physical Activity Scale for Elderly (PASE).

moderate loading on light housework. Factor 4 related to household chores and caregiving, with high loadings on heavy housework, home repair, and caring for another person.

Discussion

The current study indicated that PASE-U was a valid and reliable scale for the assessment and measurement of PA among Pakistani elderly individuals. To guarantee equivalence of PASE-U to the original material, every modification corresponded to the examples that the original PASE offered.[13] Other studies have also culturally adapted the scale, which includes Arabian[19], Turkish[25], Italian[26], Dutch[27], Norwegian[7] and Polish versions.[28] Face and content validity was measured in the current study and it was reviewed by 12 experts. I-CVI of all the items was >0.9 and S-CVI/AVE was 0.97. No previous study measured the face and content validity except the Persian version[1] which reported content validity ratio (CVR) 0.6 and CVI 0.79.

PASE-U components' internal consistency was good and on par with earlier findings.[7,25,29] PASE-U components' internal consistency value of 0.98 indicated a very high internal consistency among the items.

Test-retest reliability of total PASE-U and its components showed excellent reliability and the ICC value was higher than the original PASE[13], and its Japanese[30], Chinese[6,14], Italian[26], Arabian[19] and Malay versions[31], but the current value of 0.983 was lower than the Norwegian[7], polish[28] and Turkish[25] versions.

Concurrent validity values in the current study were 0.78 for BBS-U and 0.74 for ABC-U, demonstrating a very strong positive correlation. The Italian[26], Polish[28] and Chinese[32] version also showed positive correlation. The current study demonstrated a very strong negative correlation with TUG and for 5XSTS. This association was also found in Chinese[6] and Polish versions.[28]

In the present study, distribution across quartiles appeared relatively balanced, with fewer participants clustered at either extreme end of the scale, suggesting that the variable captured what it was intended to measure and, hence, showed no floor and ceiling effect. No previous study, to our knowledge, has explored the floor and ceiling effect.

PCA in the current study showed KMO value 0.71 that was >0.5, showing that there was sufficient variance in data that could be divided using factor analysis. Bartlett's test result also showed significance, which was another reason to run the analysis. The data extracted 4 factors/dimensions based on eigenvalues >1. Only the Persian version performed Confirmatory Factor Analysis (CFA) using AMOS 20 (Analysis of Moment Structures), and the version fitted the original three-factor structure well.[1] However, the current study extracted 4 factors which differed from the original PASE due to unique cultural norms and values, socioeconomic disparities and occupational patterns having an impact on PA in the Pakistani population. As no previous study conducted PCA, the emergence of a 4-factor structure in the PASE-U, diverging from the original 3-factor model, offers a unique perspective on PA patterns within the Pakistani population. A deeper understanding of these factors may influence PA patterns in Pakistan and can result in the development of targetted interventions that address the unique needs and preferences of different population subgroups.

The current study has some limitations, including the fact that the elderly subjects had varying health conditions and living statuses that should have been taken into account. Also, leisure activities might have been impacted by the weather because the participants may not have been able to walk outside or play due to excessive hot or cold weather conditions. Furthermore, the final item on the scale only assessed whether or not a participant had worked in the preceding seven days, excluding those who had worked while seated, such as in an office setting.[26] That could have affected the scorings. Other than a subjective comparison, more exact and reliable calculation of PA, alternative objective measurements should have been taken into consideration. Also, impact of PASE with respect to age, gender, level of education and type of living were not studied.

Future research can use PASE-U to assess PA levels among older individuals in Pakistan in various contexts. It would be intriguing to investigate the patterns of PA among the elderly considering the widespread advocacy of PA, and to find how PA levels vary among different demographic and socioeconomic segments. It is recommended that PCA be carried out among other groups, and examine the relationship among demography, socioeconomic factors and health outcomes beyond the limitations of the current study.

Conclusion

PASE-Urdu was found to be a valid and reliable scale for the assessment and measurement of PA among Pakistani elderly individuals.

Disclaimer: None.

Conflict of Interest: None.

Source of Funding: None.

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AUTHOR'S CONTRIBUTION:
FUN: Concept, design, data acquisition, analysis and interpretation.
AA: Drafting, revision and final approval.
SO, ANM & MUN: Final approval and agreement to be accountable for all aspects of the work.